

## STATISTICAL ANALYSIS OF AGRICULTURAL DEVELOPMENT TRENDS IN FERGANA REGION

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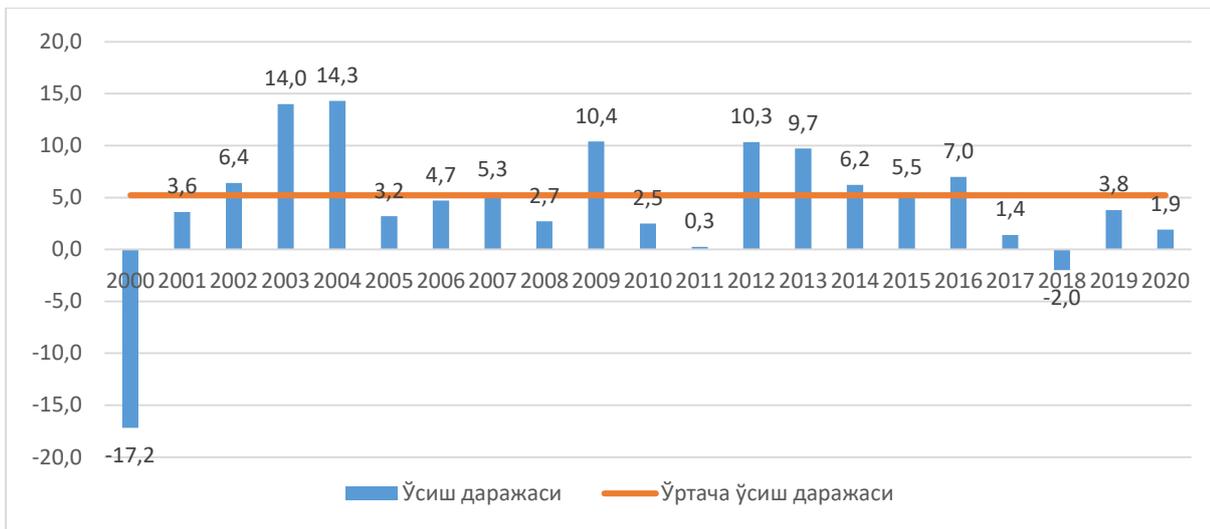
**Abstract:** Agriculture is one of the branches of strategic importance in ensuring socio-economic development of Fergana region and eliminating important economic problems. In particular, 47.7 percent of the gross regional product (GDP) created in the region, 258.9 thousand of the total of 736.5 thousand people employed in economic sectors, i.e. 35.2 percent, belong to the agricultural sector. will come . In addition, the importance of the sector in ensuring the country's food security and providing light industry with the necessary raw materials is the reason for the emergence of agriculture as one of the strategically important industries in the region.

**Key words:** statistical analysis, market, agriculture, raw materials, products

The importance of agriculture in ensuring socio-economic development and stability in the country and its regions. is causing special programs to be developed. In particular, the Decree of the President of the Republic of Uzbekistan No. PF-5853 of October 23, 2019 "On approval of the strategy for the development of agriculture of the Republic of Uzbekistan for 2020-2030" on agriculture in the country and its territories serves as an important document that serves to determine the directions of development.

The main results expected from this strategy are the expansion of areas using water-saving systems for irrigation in the regions of the republic, improvement of the mechanisms for encouraging the introduction of these systems, specialization of regions, cultivation of the same products in the same place, introduction of agro-innovation ideas, increase in productivity and product quality. it is possible to show that important issues such as creating conditions for improvement and directions for solving them have been developed.

As a result of the measures implemented to support agriculture by the state and ensure its sustainable development, the importance and role of the sector in the country and its regions is increasing. According to the data of the Fergana region, which is the object of our research, the real value of the volume of production in agriculture has been increased by 2.9 times in 2000-2020. To achieve this result, the average annual growth rate was 5.2 percent. This, in turn, ensured a 2.9-fold increase in yield from each hectare of land, which is an important production factor in the production of agricultural products. In order to see the level of stability of agricultural development in the region, we would like to refer to Figure 1 below.



**Figure 1. Dynamics of the average growth rate in agriculture in 2000-2020 compared to the previous year.**

Figure 1 shows the average growth rate of agriculture compared to the previous year, showing that there is a specific trend in the development of the sector and that this trend is caused by the factors affecting agriculture. can reach That is, it is known from our analyzes carried out in the previous paragraphs that one of the factors that affects the volume of agricultural production in the region and is important in ensuring the level of growth is the availability of water resources. Here, from the dynamics of the growth rate, it can be seen that a sharp decrease is observed during the period of water shortage, which, in turn, justifies how urgent the issue of expanding the areas using water-saving systems for irrigation in the regions of the republic is.

In the next period, we can see that the level of growth in the development of agriculture has decreased slightly, but the level of stability has increased. In order to look at this process using accurate information and statistical indicators, statistics describing the production of general agricultural, animal husbandry and farming products based on the data of 2000-2020 on the stability of the dynamics of production in agriculture and its branches We want to give an analysis of the indicators. In order to carry out this analysis, the available data have been transferred to real values, taking into account the level of inflation. The following results were obtained based on the analysis carried out using the MsExcel program (Table 1).

**Table 1.**

**Statistical analysis of the dynamics of production in agriculture and its sectors**

	<i>Agriculture</i>	<i>Animal husbandry</i>	<i>Farming</i>
<b>Sredneye</b>	1803.1	961.1	842.0
<b>Standartnaya oshibka</b>	128.7	68.6	60.1
<b>Mediana</b>	1740.0	927.5	812.5
<b>Standartnoye otkloneniye</b>	589.8	314.4	275.4
<b>Dispersiya viborki</b>	174739.8	98867.4	75872.4
<b>Ekssess</b>	-1.4	-1.4	-1.4
<b>Asimmetrichnost</b>	0.1	0.1	0.1
<b>Interval</b>	1744.7	930.0	814.7



<b>Minimum</b>	916.1	488.3	427.8
<b>Maksimum</b>	2660.8	1418.3	1242.5
<b>Summa</b>	37866.0	20184.2	17681.8
<b>Schet</b>	21.0	21.0	21.0
<b>Naibolshiy(1)</b>	2660.8	1418.3	1242.5
<b>Naimenshiy(1)</b>	916.1	488.3	427.8
<b>Uroven nadejnosti(95.0%)</b>	268.5	143.1	125.4

According to the results of the analysis, the average value of the gross agricultural products grown in Fergana region at comparable prices is 1803.1 billion soums, 53.3 percent of which are livestock products and 46.7 percent are agricultural products. We want to analyze the level of sustainability in the volume of production in agriculture, especially animal husbandry and farming, based on a number of indicators. To do this, we will analyze the results and indicators using the "Descriptive statistics" function of the MsExcel program.

Among the results obtained as a result of this analysis, the standard error indicator is also mentioned, which is determined based on the following formula.

Here: the standard error of the mean, - the mean squared deviation, - the number of observations.

The standard error of the mean represents the mean squared deviation of the distribution of sample mean values. The smaller the number, the more observations are matched to the data in the total set. From the data of Table 1, it can be seen that these indicators have a sufficiently small amount. Also, according to the law of large numbers, in order for a set to conform to the normal distribution law, its mean, mode, and median are required to have the same value, and the existence of a difference between them indicates a deviation.

If we perform a comparative analysis of the average and mediana indicators based on the data in the table, the observation of an insignificant difference in all of them shows that there is a deviation, but it is not significant. Therefore, the years selected for the analysis reflect the main set and are suitable for drawing general conclusions.

Also, the larger the standard deviation, the wider the spread of the values in the set compared to the average value, while the smaller standard deviation indicates the density of the values. According to the law of normal distribution, any unit in the set should belong to an interval that is less than 3 root mean square deviations from its mean value.

$$P(P(|\varepsilon - E\varepsilon| < 3\sigma) > \frac{8}{9}) \quad (1)$$

According to the results of the calculation based on this law, the lower limit for the total agricultural product is 33.5 billion soums, and the upper limit is 3572.8 billion soums. 17.9; It is 1904.4 billion soums. It was found that 15.6 and 1668.3 billion soums were spent on the production of agricultural products. The fact that the difference between the upper and lower limits has a large value indicates that stability is not sufficiently ensured in the period under study.

From the comparative analysis of the maximum and minimum values of the observations in the fields with the lower and upper limits of the defined interval, it is seen that both indicators are located within the given intervals. Also, the fact that the maximum and minimum values are significantly different from the lower and upper limits of the interval



serves to express the stability and obedience of these data to the laws of normal distribution. If we make a general conclusion about both cases, the large variability in this period ensured that the mean square deviation was also high, as a result, the difference between the lower and upper limits had a large value, but the variation the fact that the width is much smaller compared to it served to show stability.

Continuing the analysis, we will look at the excess coefficient, this coefficient will help to perform a comparative analysis of the spread of the numbers in the studied set with respect to the spread of the normal distribution and to draw a more complete conclusion. In other words, it is also used to assess stability and risk by answering the question of whether the set contains values that violate the current trend (outliers).

According to the results, the negative value of the excess indicator means that the spread of the normal distribution is too wide, this indicator takes values from  $-2$  to  $+\infty$  and is determined based on the following formula.

$$E_k = \frac{m_4}{\sigma_e^4} - 3 \quad (2)$$

$$m_4 = E[(x - Ex)^4] \quad (3)$$

*Here:  $E_k$  is the exponent,  $m_4$  is the set of units, and they are the sum of fourth levels of mathematical expected differences.  $\sigma_e$  – mean square deviation.*

*In our analysis, the excess coefficient was found to be  $-1.4$  for all cases. These results indicate that the analyzed indicators were stable during the obtained period.*

*At the same time, we would like to mention the coefficient of asymmetry, this quantity serves to describe the asymmetry of given random variables. This coefficient is determined as follows.*

*A symmetric distribution exists if the determined coefficient is zero. Also, the asymmetry coefficient  $A_s$  can be positive or negative. A positive value of the coefficient indicates the presence of right-sided asymmetry, and a negative value indicates the presence of left-sided asymmetry. The asymmetry coefficient of the data set used in the results of the calculation was found to be equal to  $0.1$ . the fact that this indicator is sufficiently small and close to zero confirms that the used collection units have a normal distribution.*

*According to the analysis carried out above, in the next 20 years in Fergana region, stable growth of agriculture and its branches of farming and animal husbandry was ensured.*

*However, production entities and their share are of particular importance in ensuring the development and sustainable growth of agriculture. This requires looking at the role of subjects in production and the dynamics of change. Today, farmers and farmers (personal assistants) farms and organizations performing agricultural activities appear as subjects of agricultural production. We look at the dynamics of the share of subjects in the production of total agricultural products based on the data of 2010-2020 (Fig. 2).*



**Figure 2. Distribution of agricultural products of Fergana region according to the share of the main subjects.**

From the given statistical data, it can be seen that peasant (personal assistant) farms have a high share in the production of gross agricultural products in the region, and the general trend is to increase this indicator. In the next ten years, this indicator increased from 64.9 percent to 77.8 percent, and the change was provided at the expense of a decrease in the share of farms in the production of gross agricultural products. As a result, the share of farms decreased from 33.8 percent to 20.7 percent, respectively. In turn, the share of organizations engaged in agricultural activities increased from 1.3 to 1.5 percent. As one of the important problems here, it can be pointed out that despite the fact that farms own a large amount of land, their share in production is still very low. According to the results of the research, the efficiency of land and labor use is very low in farms. In addition, the analysis of the agricultural sectors shows that the share of subjects differs significantly from each other (Table 2).

If we pay attention to the share of subjects in the production of agricultural products, the share of farms decreased from 61.7 percent to 47.0 percent in the next 10 years, as a result, the share of peasant farms increased from 37.2 percent to 51.6 percent. No significant change was observed in the organizations implementing agricultural activities. However, it is possible to consider agricultural farms as the main producer of livestock products, because agricultural farms own 94.8% of the products grown in the field, and as a result, the share of the remaining two subjects is less than 6%. It is noteworthy that the share of peasant farms remained unchanged in the next 10 years. That is, compared to 2010, it increased by 0.3 percent, and if we take the variation width to express the general fluctuation in this period, it is also 1.1 percent.

**Table 2**

**Distribution of agricultural products of Fergana region according to the share of the main subjects.<sup>1</sup>**

	Dehqonchilik			Chorvachilik		
	farms	Farmer (personal assistant) with farmri	Organizations implementing agricultural activities	farms	Farmer (personal assistant) farms	Organizations implementing agricultural activities
2010	61.7	37.2	1.1	4.0	94.5	1.5
2011	56.6	42.6	0.8	4.1	94.4	1.5
2012	58.2	40.6	1.2	4.0	94.3	1.7
2013	58.1	40.9	1.0	4.3	93.9	1.8
2014	57.2	41.7	1.1	4.2	94.1	1.7
2015	57.0	42.0	1.0	4.3	94.0	1.7
2016	53.5	45.6	0.9	4.3	94.1	1.6
2017	48.1	51.3	0.6	3.6	95.0	1.4
2018	42.4	56.6	1.0	3.4	95.1	1.5
2019	50.0	48.9	1.1	4.1	94.5	1.4
2020	47.0	51.6	1.4	3.6	94.8	1.6

The high share of farmers' farms in the production of livestock products causes difficulties such as the lack of sufficient land fund and the problem of growing fodder. As a result, the cost of production and the price of livestock products in the market are high. On the other hand, the low efficiency is preventing the increase of production volume.

In our opinion, it is necessary to pay special attention to the issues of ensuring the proportionality of the share of subjects in the production of agricultural products in the region, improving the efficiency of the use of available resources, especially land resources. Based on the conclusions obtained on the basis of our analysis, we can emphasize that increasing the efficiency of the use of land and labor force in farms is one of the opportunities that have not yet been used in the development of agriculture.

Despite their high land ownership, the low share of farms is due to their narrow specialization in crop production, i.e., farms usually specialize in cotton and grain production, with more economically efficient vegetable growing and do not engage in policing. Because the production of products in these areas requires a large amount of labor, and a large number of areas are engaged in vegetable growing and policing, which creates the problem of providing them with sufficient labor. As a result, despite having a small amount of production resources, farmers have the opportunity to produce almost 4 times more products.

According to statistics, by 2020, 82.1 percent of the total 596,200 tons of vegetables grown in the region will be owned by farmers (personal assistants), 16.0 percent will be owned by farms, and the rest will be used for agricultural activities. contributed to the increasing organizations. The same trend can be seen in the production of poly products. It

<sup>1</sup> Muallif ishlanmasi



can be observed that the current situation in fruit production has changed a little, that is, the share of farms has increased, because fruit production does not require as much labor as the production of vegetables and pulses, in addition, horticulture farms. The lower and upper amounts of the land area allocated for agriculture are not as large as in cotton and grain cultivation. In particular, it can be seen that 69% of the total fruit grown in the region was contributed by farmers, 31% by farms.

Based on the results of the analysis presented above, in the next 20 years, stability was ensured in the production of gross agriculture, farming and livestock products in the region, that is, stable growth was achieved. However, the results of the comparative analysis of the share of production entities prove that the available opportunities, in particular, the land and labor force, which are the main factors of production, are not effectively used.

**CONCLUSION.** In our opinion, expanding the specialization of farms owning a large amount of land resources, including the organization of multi-sectoral farms and the development of agricultural clusters, is one of the important and effective directions in eliminating existing problems and organizing the efficient use of resources.

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