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FORECASTING THE PROSPECTS OF AGRICULTURAL PRODUCTION THROUGH ECONOMETRIC MODELING OF PRODUCTIVITY INDICATORS

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ANNOTATION

The article is devoted to the issues of econometric modeling of the activities of the main indicators of agricultural enterprises in the Surkhandarya region. In addition, the region has developed an indicator for forecasting the yield of wheat products for 2021.

Keywords: agriculture, econometric model, analysis, forecasting.

INTRODUCTION

Structural and structural changes in the agricultural sector in Uzbekistan in recent years have a significant impact on the development of the national economy, solving the problems of providing the population with agricultural products and strengthening social stability. The Action Strategy for the five priority areas of development of the Republic of Uzbekistan for 2017-2021 also includes "... reform and modernization of the agricultural sector, deepening structural reforms in the sector, development of diversified farms, further strengthening food security and increasing export potential." priorities have been identified [1]. Successful implementation of these tasks requires the development of econometric modeling and forecasting of agricultural production processes and trends.

Econometric methods and models are an integral part of any modern system of economic and management decision support. Today, econometric methods are used to diagnose the state of the enterprise, solve corporate finance and risk management tasks, evaluate the efficiency of investments and innovations, assets and businesses, analyze price dynamics and living standards, evaluate the parameters of economic and mathematical models of logistics.

Critical Analysis of the Literature on the Subject

A lot of research has been conducted on the development of econometric models and forecasting of agricultural production processes in the regions of the economy. These include the works of economists of our country S. Gulomov, D.S. Allamatova, B.E. Mamarahimov, foreign scientists P.P. Leshchilovsky, V.G. Gusakov, E.I. Kiveysha and others [2; 3]. In their research, these scientists have paid special attention to the issues of stimulating the agricultural sector in the regions.

However, the research of the above-named scientists has not sufficiently studied the cultivation, forecasting and study of socio-economic problems in this area at the regional level.

RESEARCH METHODOLOGY

The main purpose of the study is to develop scientific and practical proposals and recommendations to meet the demand of the population of the country with quality agricultural

products. Comparison, grouping and economic-statistical methods were widely used in the research process. As a result of the study, a forecast of wheat yield in Surkhandarya region was developed and scientific and practical proposals for further improvement of this indicator were developed. The developed scientific and practical proposals and recommendations can be used in the development of targeted state programs for the organization and improvement of food security policy in our country.

ANALYSIS AND RESULTS

Typically, econometric methods allow to answer two main questions. These are:

• What may happen in the future (forecast, forecasting the development of the economic situation);

• How a change in one quantity affects another.

The task of forecasting economic indicators is very relevant and is the basis for the development of fundamental economic decisions. Forecasting objectives can be different: crisis forecasting, demand forecasting, business efficiency forecasting, and more.

We know that the purpose of forecasting is to scientifically determine the future development of the system based on the study and analysis of the past and present state, the laws of change, to reveal the nature and content of the situation.

In the conditions of Surkhandarya region, forecasting the yield of agricultural products by econometric methods is a bit problematic. This is because the hot and arid climatic conditions of the region have a negative impact on crop formation. Therefore, in the context of Surkhandarya region, the issue of forecasting the volume of agricultural production and productivity remains more relevant.

Often, the problem of deciding which one is the most convenient function to recommend to the development trend of row dynamics on the basis of initial data becomes complicated.

As a result of our analysis, Figure 1 shows the data on wheat yield in agricultural enterprises of Surkhandarya region for 2008-2020.

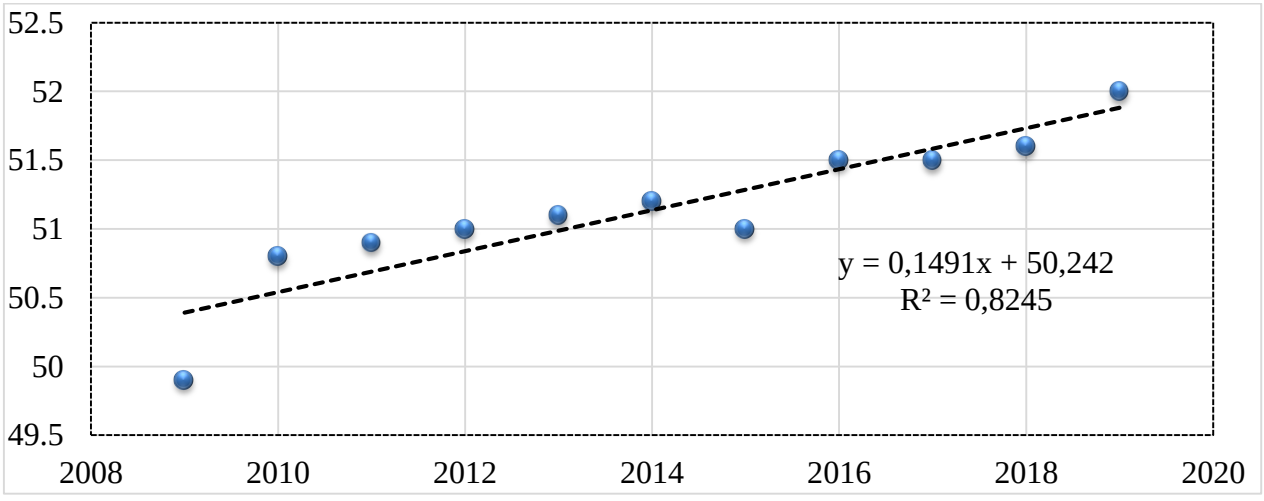

Figure 1. Dynamics of wheat yield in agricultural enterprises of Surkhandarya region

A graphical view of the dynamic efficiency series shows that from 2008 to 2020 there is an increase in wheat yield in the region as a whole, but the growth trend is observed on average. In some years, the levels change, deviating from the main trend, which depends more on the

meteorological conditions of the year. Drought in 2015 led to a 10% drop in yields this year compared to 2014 [4].

In the economic literature [5], extrapolation of a series of dynamics is carried out in various ways, for example, by analytical formulas.

By extrapolating at the level t = 12 on the basis of the model equation $\hat{y} = y = 0{,}1491\ t + 50{,}242$ calculated in Figure 1, we can determine the expected yield of wheat in 2020 in agricultural enterprises of Surkhandarya region.

$$\hat{y}_t = 0{,}1491 * 12 + 50{,}242 = 52{,}03 \text{ s.} \quad (1)$$

In practice, the result of extrapolating the estimated events is usually obtained by intermediate estimates rather than by points.

We use the following formula to determine the interval limits of the forecast:

$$\hat{y}_t = + t\alpha S\,\hat{y}_t; \text{ and } \hat{y}_t = - t\alpha S\,\hat{y}_t; \quad (2)$$

where: tα - is the confidence coefficient for the student's distribution;

$S\,\hat{y}_t = \sqrt{\Sigma (y_i - \hat{y}_t)^2 / (n-m)}$ - is the residual standard deviation from the defined trend for degrees of freedom (n-m);

n - is the number of series levels of dynamics;

m - is the number of corresponding trend parameters of the model.

Possible limits of the predicted event range:

$$\hat{y}_t - t\alpha S\,\hat{y}_t \le y_{prognosis} \le \hat{y}_t + t\alpha S\,\hat{y}_t \quad (3)$$

Using the above, we calculate the projected confidence intervals for wheat yield in agricultural enterprises of Surkhandarya region for 2021. In our analysis, we can see that the extrapolation of time dynamics for wheat yield in agricultural enterprises of Surkhandarya region is n = 12, m = 2 and the number of degrees of freedom is 10 (Table 1).

Table 1 Extrapolation of time dynamics for wheat yield in agricultural enterprises of Surkhandarya region

Years, Collected	№ year,	Yield	Square deviation	Ability to work	Striped productivity	Deviation from reality	Turning square
	t	y	t^2	yt	y = 0,1491 t + 50,242	$(y_i - \hat{y}_t)$	$(y_i - \hat{y}_t)^2$
2010	1	49,9	1	49,9	50,391	-0,491	0,241
2011	2	50,8	4	101,6	50,540	0,260	0,067
2012	3	50,9	9	152,7	50,689	0,211	0,044
2013	4	51	16	204,0	50,838	0,162	0,026
2014	5	51,1	25	255,5	50,988	0,113	0,013
2015	6	51,2	36	307,2	51,137	0,063	0,004
2016	7	51	49	357,0	51,286	-0,286	0,082
2017	8	51,5	64	412,0	51,435	0,065	0,004
2018	9	51,5	81	463,5	51,584	-0,084	0,007
2019	10	51,6	100	516,0	51,733	-0,133	0,018
2020	11	52	121	572,0	51,882	0,118	0,014
∑	66	562,5	506	3391,4		-0,003	0,520
2021					52,03		
2021	Forecast interval limit		$51{,}39 \le y_{prognosis} \le 52{,}66$				

According to the student table, the value of the confidence coefficient is 0.95 with a confidence interval of 2.201 [6]. This shows the importance of all coefficients.

Using the above, we determine the coefficient of increase (decrease) of the probability limits of the forecast.

$$\sum (y_i - \hat{y}_t)^2 = 0{,}52 \quad (5)$$

$$S\,\hat{y}_t = \sqrt{0{,}52 / 10} = +\,-\,0{,}288;$$

In Figure 1, we find the probability limits of the forecast using the value of the indicator determined by the trent equation. We determine them by the following formula:

$$52{,}03 - 2{,}2010 * 0{,}288 \le y_{\text{prognosis}} \le 52{,}03 + 2{,}2010 * 0{,}288$$

$$51{,}39 \le y_{\text{prognosis}} \le 52{,}66 \quad (5)$$

The results of our analysis show that with a probability of 0.95, in 2021 the yield of wheat in agricultural enterprises of Surkhandarya region may be less than 51.39 quintals and not more than 52.66 quintals.

CONCLUSIONS AND SUGGESTIONS

Economic methods are now one of the tools for solving problems of analysis and forecasting of economic systems. A well-constructed econometric model allows predicting and monitoring the economic situation based on a reliable analysis of existing economic data, as well as developing future development options.

Based on the above data, we can conclude that the cultivation of wheat in Surkhandarya region provides a scientific justification of the level of use of mineral fertilizers and various additives, the restoration of productive capacity of agricultural lands to further increase productivity.

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