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ECONOMETRIC ANALYSIS FOR INCREASING ECONOMIC EFFICIENCY IN FRUIT PRODUCTION

Samarkand region is one of the leaders in producing and processing of fruits and berriesas Ferghana, Tashkent and Andijan regions of the Republic. 39,600 ha or 14.6% of the total area of the country's gardens falls on the region (2017). According to the official statistics of Samarkand region in 2018, land area of fruits and berries in the region is 37,204.3 ha. The areas of Bulungur (orchards - 5,249.8 ha), Jomboy (4428.7 ha), Samarkand (4007.9 ha), Urgut (2407.8 ha) and Tailak (1691.6 ha) specialize in the production of fruits and vegetables. The study shows that Nurabad (4838.6 ha), Pastdargom (3685.7 ha), Akdarya (2455.5 ha) and Ishtikhan (1361 ha) districts are good in horticulture.

The economic efficiency of horticulture is related with the yield of horticultural crops, output per unit, quality and price, the geographical location of horticulture, favorable economic and environmental conditions, as well as the area of orchards in specialized farms, specialization of production processes and industry.

Nowadays, horticulture is one of the priority sectors of the agro-industrial complex of the Samarkand region. Here, favorable climatic conditions, sufficient labor resources, as well as the experience and traditions of the local population for the production of competitive products. Many regions have unique soil and climatic conditions for industrial horticulture.

The prospective effectiveness of regional horticulture is largely determined by the development of the fruit processing industry in accordance with the requirements of a market economy.

It is requiredincreasing soil fertility, increasing orchard yields, and producing high-quality, competitive, and high-quality products for intensive development of fruit production in the country.

Therefore, the Action Strategy of the Republic of Uzbekistan says: "... reduce the area under cotton and grain crops, plant potatoes, vegetables, fodder and oilseeds in wastelands and place new intensive orchards and vineyards ..." It’s no coincidence that work was identified as important strategic objectives in the future[1].

Based on the foregoing, the development of scientific recommendations for the production of export-oriented products along with satisfying the demand of the population for food and industry for raw materials is one of the urgent tasks in our time.

The study area is fruit and vegetable farms of Samarkand region. The subject of the study is effeciently use of the methodology for modeling factors that contribute to profitability in specialized farms and production processes. The study uses methods of economic, comparative and statistical analysis, as well as econometric modeling methods.

In the condition of determining the parameters of future economic development, it is important to determine the impact of factor indicators of a particular sector on the final indicators [6].

The goal of multivariate correlation and regression analysis is to create a multivariate econometric model, determine influencing of each considered factors, as well as determining their overall dependence on the results and predict efficiency based on the developed econometric model.

This process includes following steps:

• selection of factors in multivariate regression;

• creating multidimensional regression equation;

•determining of paired correlation coefficients, elasticity coefficients and multidimensional correlation and regression coefficients;

• assessment of the statistical reliability of the constructed model;

• to make a prediction using the multivariate regression equation.

In the research, the factors that impact on profit per hectare of garden area (million UZS) such as average yield per hectare of garden (t / ha); expenses per hectare of gardens (million soums); amount of fertilizer (centner) per 1 ha of garden area; labor costs per 1 ha of sown area (man-days); agricultural land (ha) was investigated.

The general view of the econometric model of the problem under consideration is as follows:

$Y = a_0 + a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 + a_5x_5$ (1)

Where;

- Average productivity per ha, kg / ha (x_1);
- Average costs per ha, mln. UZS(x_2);
- The amount of fertilizer consumed per ha, (x_3);
- Labor cost per person per day- (x_4);
- Land area per farm, (x_5);

The total area of gardens in Akdarya district for all categories of farms in 2018 was 2145.5 hectares. 1,200 farms operate in Akdarya district in 2018. The total area of these farms is 25,550 hectares, of which 19,469 hectares, or 76.2%, are arable land. 437 farms are engaged in horticulture and 44 farms are viticulture farms in the district. The total area under horticultural farms in the district is 1820, and in viticulture farms - 155 hectares. The area of horticultural farms is 1240 hectares, vineyard area is 133 hectares [3]. 2,8 ha land area has per horticulture farm and and 0.14 hectares in viticulture farms.

The issue was resolved using the STATA software. In the process of solving this issue, 206 fruit producing farms in Akdarya district were selected.

```
regress Y X1 X2 X3 X4 X5

      Source |       SS       df       MS              Number of obs =     206
-------------+------------------------------           F(  5,   200) =   42.28
       Model |   8681.4498     5  1736.28996            Prob > F      =  0.0000
    Residual |  8213.03814   200  41.0651907            R-squared     =  05139
-------------+------------------------------           Adj R-squared =  0.5017
       Total |  16894.4879   205  82.4121363           Root MSE      =  6.4082

------------------------------------------------------------------------------
           Y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          X1 |   .0381834   .0157744     2.42   0.016     .0070779    .0692889
          X2 |   .4856971   .0386675     2.56   0.000     .4094487    .5619455
          X3 |   .7107703    .649705     1.09   0.275    -.5703805    1.991921
          X4 |   .1578157   .0591196     2.67   0.008     .0412379    .2743934
          X5 |   .7565494   .3176695     2.38   0.018     .1301382    1.382961
       _cons |  -7.308438   2.554575     2.86   0.005    -12.3458    -2.271081
------------------------------------------------------------------------------
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Figure 1. View of the problem solved in the STATA (regression) program

According to the results (fig.1), we obtain the following regression equation.

$$y = -7{,}31 + 0{,}38x_1 + 0{,}49x_2 + 0{,}71x_3 + 0{,}16x_4 + 0{,}76x_5 \ (2)$$

The multivariate correlation coefficient was R = 0.7168. This coefficient indicates that there is a strong correlation between the factors affecting the profit per ha of garden area.

The determination coefficient is R ^ 2 = 0.5139 (Figure 1). This coefficient indicates that the impact of the considered factors on the amount of profit per ha of garden area is 51.4%.

```
. correl
(obs=206)

             |        Y       X1       X2       X3       X4       X5
-------------+------------------------------------------------------
           Y |   1.0000
          X1 |   0.2454   1.0000
          X2 |   0.5958   0.1582   1.0000
          X3 |   0.0280  -0.0498  -0.0255   1.0000
          X4 |   0.2549   0.0350  -0.1603   0.0228   1.0000
          X5 |   0.2680   0.0973  -0.1379  -0.0468   0.7701   1.0000
```

Figure 2. View of correlation analysis of the problem solved in the STATA (correl) program

The correlation analysis shows that there is a strong correlation between these factors, since the value of the correlation coefficients of the pair x_4 and x_5 is greater than 0.7.

When we examined the multicollinearity of factors using the Pearson criterion, x^2_{real} =206,85, which indicates that x^2_{table} =173,79.

In the next step, the statistical significance of the parameters is evaluated to exclude the negligible factors from the econometric model and determine what is needed. We removed the x_3 factor from the model because its parameter value is less than the value of the t-static table. Therefore, the issue was resolved according to the following four factors.

- Average productivity per ha, kg / ha (x_1);
- Average costs per ha, mln. UZS(x_2);
- Labor cost per person per day- (x_4);
- Land area per farm, (x_5);

As a result of solving this issue via STATA, the model looks like this:

$$y' = -6{,}34 + 0{,}04x_1 + 0{,}49x_2 + 0{,}16x_4 + 0{,}72x_5 \ (2)$$

The following results were obtained after the calculation of elasticity coefficients:

$\Theta_1 = a_1 \cdot \frac{x_1}{y}$ =0,598, $\Theta_2 = a_2 \cdot \frac{x_2}{y}$ =0,572,

$\Theta_4 = a_4 \cdot \frac{x_4}{y}$ =0,299, $\Theta_5 = a_5 \cdot \frac{x_5}{y}$ =0,215.

Increasing 10% the value of the impact factors, the predicted value of the profit per ha was calculated.

For this, the predicted values of the factors that may exceed 10% of the average are determined, that is

$x_{пр\,1} = 1{,}1 \cdot x_1 = 1{,}1 \cdot 147{,}7 = 162{,}47$ (s/ha);

$x_{пр\,2} = 1{,}1 \cdot x_2 = 1{,}1 \cdot 10{,}93 = 12{,}02$ (mln./ UZS);

$x_{пр\,4} = 1{,}1 \cdot x_4 = 1{,}1 \cdot 16{,}99 = 18{,}69$ (person/day);

$x_{пр\,5} = 1{,}1 \cdot x_5 = 1{,}1 \cdot 2{,}75 = 3{,}03$ (ha).

From this we get the following result:

- The yield per ha is 162.47 centners;
- Expenditures per ha are 12.02 million UZS;
- The labor cost per ha is 18.69 people per day;
- Expected profit per ha of land, with average farm size of 3.03 ha

$Y = -6{,}31 + 0{,}04 \cdot 162{,}47 + 0{,}49 \cdot 12{,}02 + 0{,}16 \cdot 18{,}69 + 0{,}72 \cdot 3{,}03$ =10,839million UZS.

Taking into account the fact that the average profit per ha of 206 fruit-growing enterprises in Akdarya district is UZS $y = 9{,}27$ million, an additional 1.569 million UZS profit per ha will be achieved by increasing the above-mentioned factors by 10%.

References:

1.Decree of the President of the Republic of Uzbekistan (2017): On the Strategy for the Further Development of the Republic of Uzbekistan. 7th February, 2017. National database of legislations Republic of Uzbekistan, www.lex.uz

2. Afanasyev V.N. Statistics: additional chapters to the section "Advanced Forecasting Methodology": Textbook for graduate students. - Orenburg: OGU, 2017 .-- 112 p.

3. The official website of the Samarkand regional statistical office: URL: http://samstat.uz/en/