

ASSESSMENT OF AGRICULTURAL DEVELOPMENT IN KHOREZM REGION

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Abstract

In this paper conducted econometric analysis to estimate role of agriculture sector in socio-economic development of Khorezm region. Used coefficient of elasticity for assessing role of agriculture sector to GRP, real income and employment. Based on the results, developed scientific-practical proposals and recommendations to increase role of agriculture sector on employment and real income.

Keywords: gross regional product, real income, employment, value added, agriculture, modelling, coefficient of elasticity.

Annotatsiya

Ushbu maqolada Xorazm viloyatini ijtimoiy-iqtisodiy rivojlantirishda qishloq xo‘jaligi tarmog‘ining o‘rni va rolini baholash maqsadida ekonometrik tahlil qilindi. Egiluvchanlik koeffitsienti qishloq xo‘jaligining YaHM, real daromad va bandlikdagi rolini baholash uchun ishlatilgan. Natijalar asosida aholi bandligi va real daromadlarini ta‘minlashda agrar tarmoqning rolini oshirishga qaratilgan ilmiy-amaliy taklif va tavsiyalar ishlab chiqildi.

Kalit so‘zlar: yalpi hududiy mahsulot, real daromad, bandlik, qo‘shilgan qiymat, qishloq xo‘jaligi, modellashtirish, elastiklik koeffitsienti.

Аннотация

В данной работе проведен эконометрический анализ для оценки роли аграрного сектора в социально-экономическом развитии Хорезмской области. Использован коэффициент эластичности для оценки роли аграрного сектора в ВРП, реальных доходах и занятости. По результатам разработаны научно-практические предложения и рекомендации по повышению роли аграрного сектора в обеспечении занятости и реальных доходов населения.

Ключевые слова: валовой региональный продукт, реальный доход, занятость, добавленная стоимость, сельское хозяйство, моделирование, коэффициент эластичности.

INTRODUCTION

Agriculture sector plays a key role in the socio-economic development of a country. It has already made a significant influence on the economic success of advanced countries and its role in economic development of less developed countries is of vital importance. In other words, where per capita income is low, is being laid on agriculture and other primary industries [2]. Form the views of economic theory it can be noted that development of the sectors is all mutually related, therefore optimal share of the sectors should be provided to achieve sustainable development. So, it can be concluded that industrial and agricultural developments are not alternatives but are complementary and are mutually supporting concerning both inputs and outputs [2].

For this reason, special attention is being paid to the development and intensification of agriculture the sector in Uzbekistan and its regional units. In the thirtieth goal of development strategy of new Uzbekistan for 2022-2026 set the task of increasing the income of peasant farmers and farmers by at least 2 times and bringing the annual growth of agriculture to at least 5 percent through the intensive development of agriculture on a scientific basis [1].

Agriculture is an important sector for the economy of Khorezm region, which is the object of the research and is of particular importance in the formation of socio-economic indicators. In particular, 46.0 percent of the gross value added in the region corresponds to the share of agriculture. Population of the region is 1924.2 thousand people where 1288.1 thousand are rural residents, in other words, 66.9 percent live in rural areas. Also, the role of agriculture in the formation of employment and income of the population remains significant. In particular, the fact that 67.3 percent of the gross agricultural product is accounted for by peasant farms indicates that the level of informal employment in the sector is also high.

LITERATURE REVIEW

There are numerous researchers, who have been conducted a research on estimating and evaluating role of agriculture on several indicators and processes of the economy. For instance, the role of Agriculture in economic development [3], economic sustainability [4], relationships of per capita GDP, agriculture and manufacturing sectors [5]. As well as substantiated the role of agriculture in employment and increasing income of the population [6]. For estimation of role of agricultural econometric tools should be applied, therefore the econometrics of agricultural Supply [7], econometric tools in agriculture [8], econometric methods for solving problems of analysis and forecasting dynamics of yield of agricultural crops [9] have been looked through.

METHODOLOGY

In this paper used secondary time-series data that collected by Khorezm region department of statistics. As well as used correlation-regression methods to develop econometric models and assess impact of agriculture on socio-economic development in Khorezm region. All data have been converted to constant prices, taking 2010 as the base year. Gretl software was used to perform econometric analyses.

ANALYSIS AND RESULTS

Taking into account the abovementioned results, we will look through the impact of agriculture on the gross regional product (GDP), which is considered an important socio-economic factor, based on quantitative methods. In order to assess the role of agriculture in ensuring socio-economic development, the effect of the value added by sectors on the gross added value is looked through. Data for the years 2010-2022 were used for this analysis, and all expressed in constant prices, taking 2010 as a base year. Based on the results of the correlation analysis, the following model is developed.

$$GRP = 3,72 * VADAGR^{0,42} * VADIND^{0,12} * VADCON^{0,06} * VADSER^{0,38}$$

Here: GRP - is the real value of gross regional product in 2010 prices, billion sum; VADAGR - the real value of gross added value in agriculture in 2010 prices, billion, sum; VADIND - the real value of the gross added value in the industry in 2010 prices, billion. sum; VADCON – the real value of gross added value in construction in 2010 prices, billion. sum; VADSER - the real value of the gross added value in the provision of services in 2010 prices, billion. sum.

Several criteria have been cited to justify the adequacy of the developed model and determined coefficients, and it can be observed that all of them are at the level of the established norms (Table 1).

Table 1

The results of assessment of the effect of the added value of the sectors of the economy on the volume of gross regional product

Model 1: OLS, using observations 2010-2022 (T = 13)

Dependent variable: l_GRP

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	1.31386	0.141209	9.304	<0.0001	***
l_VADAGR	0.422551	0.0192486	21.95	<0.0001	***
l_VADIND	0.118659	0.0115571	10.27	<0.0001	***
l_VADCON	0.0645785	0.00991721	6.512	0.0002	***
l_VADSER	0.379609	0.0360667	10.53	<0.0001	***
Mean dependent var	8.371029		S.D. dependent var	0.232838	
Sum squared resid	0.000041		S.E. of regression	0.002256	
R-squared	0.999937		Adjusted R-squared	0.999906	
F(4, 8)	31961.89		P-value(F)	7.66e-17	
Log-likelihood	63.93532		Akaike criterion	-117.8706	
Schwarz criterion	-115.0459		Hannan-Quinn	-118.4513	
Rho	0.124076		Durbin-Watson	1.393561	

Based on the results of developed model, we try to draw conclusions on the impact of the gross added value of sectors on the gross regional product. A percent increase in gross value added in agriculture provides a 0,42 percent increase in gross regional product and it is observed as a sector that has the highest impact. Where the coefficient of elasticity of gross added value in industry, construction and services is 0,12, 0,06 and 0,38 percent respectively. Overall, a percent increase in gross value added across sectors would increase GRP by 0.98 percent, and thus 0.42 units would be contributed by agriculture.

In 2022, the real value of agricultural products created in Khorezm region at constant prices was 3134.6 billion sums, while the gross added value in agriculture was 2163.8 billion sums. Gross added value created by each sector has a contribution on development of the gross agricultural product, therefore, the impact of the added value in the sectors on the volume of gross agricultural products was looked through. When the multifactor model was used, it was observed that the coefficients representing the

influence of the factors had the opposite sign. Therefore, simple regression analysis conducted for estimation of the impact (Table 2).

Table 2

Results of assessment of the impact of the gross added value in the sectors of the economy on the volume of agricultural products

№	Model	t-statistics	R ²	Coefficient of elasticity
1	$\ln(\text{AGRP})=0,53+0,98* \ln(\text{VADAGR})$	$b_0=6,22$ $b_1=84,35$	0,99	0,98
2	$\ln(\text{AGRP})=5,58+0,38* \ln(\text{VADIND})$	$b_0=27,96$ $b_1=11,45$	0,92	0,38
3	$\ln(\text{AGRP})=5,90+0,34* \ln(\text{VADCON})$	$b_0=33,96$ $b_1=11,28$	0,92	0,34
4	$\ln(\text{AGRP})=2,37+0,74* \ln(\text{VADSER})$	$b_0=6,10$ $b_1=14,12$	0,95	0,74
5	$\ln(\text{AGRP})=4,77+0,54* \ln(\text{VADTRFOOD})$	$b_0=20,91$ $b_1=13,51$	0,94	0,54
6	$\ln(\text{AGRP})=4,89+0,52* \ln(\text{VADTRSTOR})$	$b_0=23,79$ $b_1=14,43$	0,95	0,52

Here: AGRP - the real value of agricultural products in 2010 prices, billion sum; VADTRFOOD - the real value of trade, accommodation and food services in 2010 prices, billion sum; VADTRSTOR - the real value of transportation and storage, information and communication services in 2010 prices, billion sum.

In order to justify the adequacy of the developed models, attention was paid to two main criteria. Including Student's criterion and coefficient of determination. While the Student's criterion serves to justify the adequacy of the determined coefficient, the coefficient of determination shows what percentage of the changes in the dependent factor the independent factor provides. According to the results of the mentioned criteria, all the coefficients are adequate, and the influence level of the factors is high.

Based on the results of the analysis, we will look at the impact of the gross added value added in the sectors on the volume of agricultural production. According to the determined elasticity coefficient, a percent increase in the gross added value in agriculture ensures an increase in the volume of agricultural output by 0,98 percent. The coefficients of elasticity for gross value added in industry, construction and service sectors were found to be 0,38, 0,34 and 0,74, respectively. As can be seen from the results the highest impact corresponds to agriculture and the service sector.

For this reason, the effect of the real value of gross added value on the agricultural product by the types of services directly related to agriculture was considered separately. That is, a percent increase in the added value of trade, accommodation and food services increases agricultural output by 0,54 percent. On the other hand, the coefficient of elasticity representing the impact of gross added value on transportation and storage, information and communication services is 0.52. This means that for the development of agriculture, it is necessary to ensure the proportional development of sectors of the economy. If we take into account the important role of agriculture in the formation of important socio-economic indicators, it justifies the need

to quantitatively assess its impact on the real income of the population and the level of employment (Table 3).

Table 3

The results of the assessment of the impact of agricultural products and added value in the sector on the real income and employment of the population

№	Model	t-statistics	R ²	Coefficient of elasticity
1	$\ln(\text{REALINCPC}) = -5,94 + 1,90 * \ln(\text{VADAGR})$	$b_0 = -5,35$ $b_1 = 12,75$	0,94	1,90
2	$\ln(\text{REALINCPC}) = -6,89 + 1,92 * \ln(\text{AGRP})$	$b_0 = -5,35$ $b_1 = 11,74$	0,93	1,92
3	$\ln(\text{EM}) = 3,64 + 0,39 * \ln(\text{VADAGR})$	$b_0 = 19,80$ $b_1 = 15,72$	0,96	0,39
4	$\ln(\text{EM}) = 3,44 + 0,39 * \ln(\text{AGRP})$	$b_0 = 19,28$ $b_1 = 17,28$	0,97	0,39

Here: *REALINCPC* - real total income per capita in thousand sum; *EM* - the number of employed thousand person.

According to the results of the regression analysis, the production of agricultural products is important in ensuring the employment of the population, and a percent increase in the volume of cultivated products ensures an increase in the level of employment by 1,92 percent. If we perform the same analysis on gross added value in agriculture, the elasticity coefficient will be 1,90. It can be seen that the development of agriculture in the region, that is, the production of agricultural products with high added value in the sector, is one of the perspective ways to ensure the employment of the population.

The increase in the income of the population is naturally carried out by ensuring its employment. We will pay attention to the results of the assessment of the impact of agriculture on population employment. It was determined that the coefficient of elasticity of the number of employees in the region with respect to the production of agricultural products and the gross added value in agriculture is equal to 0.39.

As a result of our research, it was found that there are two major branches of agriculture, which are important in the development of agriculture sector and their development mutually related. That is, the correlation coefficient between livestock and agricultural products was found to be 0,82, which is high enough. In addition, if the population engages in crop producing to earn more income, where the main purpose of engaging in livestock is the formation of savings.

In addition, a person or representative of peasant farm, that is engaged in livestock, regardless of how they use the livestock products they produce, are included in the category of employed population and are determined to have the right to pension in accordance with the Law of the Republic of Uzbekistan "On State Pension Provision of Citizens".

However, taking into account that the development of both sectors is related to each other and their development is only possible when their mutual ratio is at an

optimal level, the impact of both sectors on ensuring the real per capita income and employment of the population was considered separately (Table 4).

All the coefficients those are determined according to the results of the performed regression analysis are adequate according to Student's criterion. Also, the coefficients of determination show that the influence of crop production on real total income per capita and number of employed is somewhat low. Based on the table, we present the lower and upper limits of Durbin-Watson statistics ($dL=1.01$, $dU=1.34$). Comparing with the data in the table, it was found that there is an autocorrelation problem in the models developed for the purpose of assessing the impact of crop production. As a result, it was not possible to assess the impact of crop production on real total income per capita and number of employed.

Table 4

The results of the assessment of the impact of crop and livestock production on the real income and employment of the population

№	Model	t-statistics	R ²	DW	Coefficient of elasticity
1	$\ln(\text{REALINCPC}) = -5,53 + 1,92 * \ln(\text{CROPP})$	$b_0 = -2,06$ $b_1 = 5,12$	0,70	0,80	1,92
2	$\ln(\text{REALINCPC}) = -3,57 + 1,64 * \ln(\text{LIVESTOCKP})$	$b_0 = -5,80$ $b_1 = 19,15$	0,97	1,19	1,64
3	$\ln(\text{EM}) = 3,57 + 0,41 * \ln(\text{CROPP})$	$b_0 = 9,05$ $b_1 = 7,47$	0,85	1,00	0,41
4	$\ln(\text{EM}) = 4,23 + 0,32 * \ln(\text{LIVESTOCKP})$	$b_0 = 19,25$ $b_1 = 10,49$	0,92	1,31	0,32

Here: *CROPP* - real volume of crop production in billion soums; *LIVESTOCKP* - real volume of livestock production in billion soums.

The developed models for assessing the impact of livestock are adequate by all criteria, but the Durbin-Watson statistic is in zone of indecision. That is, it is not possible to make a decision on the presence or absence of autocorrelation in this interval. Considering the positive results of other criteria, we found it appropriate to present the conclusions drawn using the results of this model.

According to the results of the research, a one percent increase in the volume of livestock products in the region ensures an increase in real total income per capita by 1,64 percent, and number of employed by 0,32 percent. That is, the development of livestock in the region serves to increase employment and well-being of the population. On the other hand, the development of livestock is directly related to crop production. It is clear from results that it will be necessary to develop livestock in the region and ensure the development of crop production in appropriate proportion to livestock production.

CONCLUSION AND RECOMMENDATION

The high impact of the agriculture sector on the income of the population, but low relative to the provision of employment, indicates the high level of informal employment in agriculture. Also, the high share of peasant farms serves to justify the

abovementioned conclusions. Because most of the peasant farms have organized their activities without establishing a legal entity and employment at such farms officially not recorded. Based on the above, it can be noted that expanding the activities of peasant farms, helping them to form a legal entity, considering the issue of land allocation, serves to increase the role of the sector in ensuring social and economic development.

Moreover, models representing effect of crop production on real total income per capita by 1,64 percent, and number of employed is not adequate, where increase in the volume of livestock products in the region ensures an increase in real total income per capita by 1,64 percent, and number of employed by 0,32 percent. Therefore, development of livestock in the region is the on of the perspective way to increase per capita real income and employment.

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