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MACROECONOMIC PROBLEMS OF ENSURING SUSTAINABLE DEVELOPMENT OF PRODUCTION (ON THE BASIS OF MATERIALS OF AGRARIAN SECTOR)

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ABSTRACT

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INTRODUCTION

The relevance of the study and literature review. The global GDP increased by more than 20 times at current prices, and by more than 4 times in real prices in 2018 in comparison with 1970. One of the main reasons for such a rapid increase in the production of goods and services is the speedy development of science and technology. Formation of the world economic system, expansion of inter-country relations and population growth also contributed to the increase in production. The transfer of technological innovations from developed countries to developing countries has facilitated the expansion of production in these countries.

Economic growth in countries' economic policies should be the primary goal of making greater use of natural resources and maximum use of the labor force. As a result, natural resources are used widely in developing countries. In addition, maximum use of workforce also brings about the deterioration of their socio-economic status. Thus, the main goal of economic growth poses a threat of environmental and socio-economic imbalances.

This danger exists in the agricultural sector. Although various measures such as the use of large areas for livestock, forestry preparation for agriculture, the use of chemical fertilizers and pest control, are important for increasing productivity, sometimes it leads ecological, social-economic problems.

The need for maintaining a balance between economic development and environmental and socioeconomic situation has been in the focus of the world lately. In 1987, the UN General Assembly emphasized the importance of balanced economic, social and environmental development. The same year, the World Commission on Environment and Development introduced the concept of "sustainable development". "Sustainable development" is development that meets the needs of present generations without compromising the ability of future generations to meet their own needs. The concept of "sustainable development" as a model of future civilization, was adopted in 1992 at the United Nations Conference on

Environment and Development (UNCED) in Rio de Janeiro. Taking into account the importance of ensuring sustainable development of the country's economy, the National Coordination Council for Sustainable Development has been established by the Decree of the President of the Republic of Azerbaijan.

Ensuring sustainable development in the agricultural sector, as in other areas of economic activity, is one of the main challenges of the modern era. The concept of sustainable development requires that the use of land and water, fauna and flora should be in such a level and way that it will be useful for future generations along with the needs of modern generations.

The problem of maintaining a balance between economic development and the environmental and socioeconomic situation is also present in agriculture in Azerbaijan. It is necessary to take into account that planned economy model is not available in agriculture any more. Land plots were distributed to individual entrepreneurs for use. The decision of "what" and "how much" to be planted on their land is made by individual entrepreneurs. There are also widespread cases of rent of land plots for use. In this case, the maximum use of the land is preferred.

Thus, there is a need to study macroeconomic problems to ensure sustainable agriculture development in Azerbaijan. Ensuring sustainable development of production creates condition for comprehensive, strong development and healthy future, by solving effectively the formation of new economic relations and macroeconomic balance in the country. From this point of view, the Azerbaijani economy has suffered serious shocks in the last decade of the twentieth century but has entered the 21st century as an independent country with a steady growth in market relations.

Theoretical-methodological study of the regularities, features and problems of the formation of a healthy and sustainable national economy in Azerbaijan, requires a logical, consistent and historical approach to economic processes. It is also necessary to use creatively the results of a particular economic science in the course of research, and analyze systematically economic, political, and social aspects of

the studied processes by evaluating them simultaneously and in isolation at the micro, macro and mega economies.

Production process in the agrarian sector is one of the areas where the economy has historically been poorly adapted to market conditions and has poor resistance to crises. The agrarian sector as a whole is the most important and leading segment of the national economy. Agriculture plays an important role in meeting the needs of the population in food products and industry. Agricultural production and the agrarian sector as a whole play a key role in the implementation of strategic economic interests of the country, in achieving sustainable development of the countryside, as well as in ensuring the state's food security.

The problem of sustainability of socioeconomic systems has been studied by various scientists long before the concept of "sustainable development" was adopted. For example, J.Keynes, J. Şumpeter, B. Becker, S.David and others investigated these problems. Even the concept of "sustainability" has been expressed by F.Engels. However, the problems of Sustainable Development, as an economic category, became a subject of serious scientific research immediately after the concept was adopted. Such studies can be divided into two groups: The first group of studies focused on the sustainable development of the economy as a whole. The second group of studies covered any area of economic activity.

Problems of sustainable development of agriculture have been studied by B.M.Beus, R. Senanayake, M. Altieri, V.A. Klyukaç, J. İkerd, L. Zhen, J.K. Routray and others.

Economists of the Republic of Azerbaijan, R.A. Mehdiyev,Sh. M. Muradov, Z.A.Samedzade, F.F. Mustafayev, A.K.Nuriyev, A.F. Musayev, I.H.Aliyev, M.C. Atakishiyev, S.V.Salahov, A.A. Nadırov,

N. Muzaffarli, D.A. Valiyev, F.A. Ganbarov, A.F. bbasov, I.A, Kerimli, A.S.Shakaraliyev, T.N. Aliyev, R.P.Sultanova, G.Z.Yuzbaşıyeva, M.A.Ahmedov, M.G. Gulalıyev, S.M.Mikayılova, H.A. Xalilov, T.N. Huseynov and others conducted numerous researches, prepared and published articles and monographs on measures for the development of the agrarian sector, including the

establishment of new economic mechanisms, economic efficiency and ways of its development.

However, it should be noted that researches devoted to 1) sustainable development of the agrarian sector; 2) increase in value added in this area; 2) minimizing environmental impacts in agricultural production and 3) improving the socioeconomic status of the rural population are not sufficient.

The aim and objectives of the study. It is assessment of dependence of agricultural production, socio-economic development and environmental balance in the regions, as a united system, on macroeconomic indicators.

In accordance with the objectives of the study, the following tasks have been identified and solved:

- classification of different approaches to the economic essence of "sustainable development";
- comparative analysis of assessment methodologies for sustainable economic development;
- classification of characteristics of sustainable development in the agrarian sector;
- comparative analysis of methodologies for assessing sustainable development in the agricultural sector;
- assessment of agricultural production development in Azerbaijan;
- assessment of socio-economic situation in the agrarian regions of Azerbaijan;
- classification and assessment of certain environmental impacts of agricultural production in Azerbaijan;
- directions of state regulation for sustainable development of agricultural production;
- directions of state regulation to improve socio-economic situation in the regions;
- directions of state regulation to reduce possible environmental impacts on agricultural production.

Research methodology. The linear regression analysis method has been widely used as a method for assessing the relationship between indicators in the research process. In order to determine the level of

economic, social and environmental sustainability, the current situation was assessed on the basis of "threshold prices" for the relevant aspects in the country. The classification of approaches to different aspects of the problem has also been selected as a method for comparative analysis.

Main theses for defence. Sustainable development of crop production in Azerbaijan depends on more than three indicators - the size of the sown area, the volume of capital investments and the volume of fixed assets in agriculture. The dependence on other indicators, including the number of employed population in agriculture, the number of private enterprises and business entities in agriculture, the number of state-owned enterprises in agriculture and the size of irrigated land are not significant;

1. The sustainable growth of crop production in Azerbaijan can be confirmed. However, crop production does not depend on the factors affecting the volume of production, including total sown area, agrarian population, volume of capital investments, number of private enterprises and individual entrepreneurs in agriculture, number of state-owned agricultural enterprises, and area of irrigated arable land and the volume of fixed assets in the agrarian sector. Crop productivity depends mostly on the quality of labor;
2. The sustainable development of agriculture in Azerbaijan depends on two factors: the volume of capital investments in agriculture and the state support for agriculture. Other factors related to the agrarian sector, including the agricultural population and the amount of fixed assets in agriculture, do not have a significant impact on output;
3. Increase in the share of agricultural production in GDP in Azerbaijan brings about a decrease in imports and an increase in foreign trade balance;
4. Sustainability of agrarian sector in terms of economic and environmental aspects in Azerbaijan is weak.
5. Sustainability in rural areas in Azerbaijan can only be considered moderate in terms of social aspects.
6. Sustainability of the agrarian sector as a whole is also below average. Increasing the sustainability of the economic aspect may have

some effect on the weakening of the environmental aspect in the future.

7. However, weak sustainability of the overall agrarian sector rises certain inequalities between rural and urban areas, especially in Baku.

8. For all three aspects of the agrarian sector in Azerbaijan and for the sustainability of overall agrarian sector, the result of AS = 0.48665 shows that the level of sustainability in the development of the agricultural sector in Azerbaijan is lower than the required level, AS = 0.5.

The scientific novelty of the research is as follows:

1. It has been classified as a measurable indicator for sustainable development in the agrarian sector;
2. Methodology is identified for assessing sustainable economic development;
3. Assessment of agricultural production in Azerbaijan and its dependence on other indicators;
4. Assessment of socio-economic situation in the agrarian regions of Azerbaijan and its dependence on other indicators;
5. Classification of potential environmental impacts on agricultural production in Azerbaijan;

The object of study is agrarian sector and various economic entities with organizational and legal form, which play an important role in the sustainable development of the sector.

The subject of the study is studying of three systems - agricultural production, socio-economic situation in the regions and the interaction of the environment with macroeconomic indicators in a united system.

Data sources of study. In the research work, statistical and reporting documents of the Ministry of Agriculture of the Republic of Azerbaijan, State Statistical Committee of the Republic of Azerbaijan, as well as statistical reports of Ministry of Finance, Central Bank of the Republic of Azerbaijan, various credit institutions, enterprises and organizations rendering different services to business entities in the agricultural sector are also used.

Theoretical and practical excellence of study. The research is of two significance: 1) the methodology used in sustainable development research can be used for evaluation in other areas of economic activity;

2) the results and suggestions obtained from the research can be used in the process of state regulation to ensure sustainable development in the agricultural sector of the country.

Approbation and utilization of research outcomes. The main provisions of the dissertation and specific proposals in the study have been published in various scientific journals, including the SCOPUS Q3 journal. Some provisions of the dissertation were reported at scientific and practical conferences held in the country and were discussed at meetings held in relevant economic institutions.

12 articles were published on dissertation topics. Two of them have been published in foreign journals, including the *Bulgarian Journal of Agricultural Science*, which is included in the RSCI database in Russia and the other in the SCOPUS and Clarivate database in Bulgaria. 5 abstract on dissertation topics were published as conference proceedings in the country.

Name of the organization where the thesis submitted to. Institute of Economics of the Azerbaijan National Academy of Sciences.

The scope and structure of the study. The thesis consists of three chapters and nine paragraphs, introduction, conclusion and suggestions. The first chapter is 48 pages, the second chapter is 33 pages and the third chapter is 42 pages. The total volume of the dissertation is 155 pages and consists of 272,000 characters. The volume of the work is 239,000 characters, excluding pictures, tables, graphs, and bibliography. 14 tables, 11 graphs, 5 figures, as well as 214 sources were used in the dissertation.

MAIN SCIENTIFIC STATEMENTS PRESENTED FOR DEFENCE

Statement 1: ***Sustainable development of crop production in Azerbaijan depends mostly on three indicators — the total area of the sown area, the amount of capital investments, and the amount of fixed assets in agriculture. The dependence on other indicators, including the number of employed population in agriculture, the number of private 0enterprises and business entities in agriculture, the number of state-owned enterprises in agriculture, and the area of the irrigated arable land is weak.***

The sustainability of production in the agrarian sector has two economic objectives: (1) increasing agricultural productivity and (2) strengthening the export potential of agrarian products. Factors affecting the sustainable development of agricultural production can be divided into two groups. The first group factors do not depend on the efforts of farmers or households and the organization of agricultural production. Such factors can increase or decrease productivity. Such factors can be considered as "objective" factors.

Assessment of the "subjective" factors that are important for sustainable development in the agricultural sector is of great importance in terms of its organization and forecasting of production in the future.

The volume and productivity of agriculture in the field of crop production is dependent on several factors, including: 1) total crop area (X1); 2) the number of employed population in agrarian sector (X2); 3) the amount of capital investments (X3); 4) the number of private enterprises and individual entrepreneurs in agriculture (X4); 5) the number of state-owned enterprises operating in the agricultural sector (X5); 6) the area of irrigated arable land (X6); 7) the amount of fixed assets in the agrarian sector (X7) and so on. The importance of these factors will be determined by the regression equation we will construct.

The regression relationship of the dependence of volume of crop production on the aforementioned factors indicates that the volume of crop production is dependent mostly three indicators: 1) the total sown

area (X1); 2) the volume of capital investments in fixed assets (X3); 3) the volume of fixed assets in agriculture. There is weak dependence on other indicators.

Table 1

Dependence of crop production on some production factors in Azerbaijan

	Total crop production (million manat)	Total sown area (1000 ha)	Employed population in agriculture (thousand people)	Capital investments in fixed assets (million AZN)	Private enterprises and entrepreneurs in agriculture	Government agencies in agriculture	The sown area	Fixed assets in agriculture (million manat)
	Y	X1	X2	X3	X4	X5	X6	X7
2000	617,7	1041,5	1509,4	6,5	5750	408	1423,0	2634,4
2001	718,6	1162,3	1521,7	8,3	4777	247	1418,1	2694,3
2002	774,1	1222,9	1530,4	18,5	4254	319	1422,9	2727,1
2003	807,0	1219,5	1546,1	37,4	4448	302	1422,9	2764,7
2004	874,8	1293,8	1551,6	35,0	4600	302	1428,1	2821,5
2005	988,2	1327,9	1573,6	40,7	4884	303	1429,7	3004,6
2006	1124,4	1326,3	1583,2	58,3	4700	274	1429,1	3467,3
2007	1726,4	1323,9	1597,6	243,3	4506	264	1429,6	4150,2
2008	2084,9	1499,9	1611,3	336,5	4664	257	1429,5	4521,9
2009	2106,0	1705,4	1628,6	266,6	4731	249	1420,7	4868,1
2010	1999,2	1583,9	1655,0	431,0	4737	217	1421,4	5099,8
2011	2339,8	1608,2	1657,4	437,3	4682	254	1421,0	5271,4
2012	2458,2	1647,1	1673,8	648,8	4074	241	1424,3	5611,9
2013	2629,6	1684,2	1677,4	574,3	3956	238	1431,8	5852,3
2014	2449,4	1613,8	1691,7	363,9	3253	240	1435,3	6106,4
2015	2761,1	1585,4	1698,4	355,4	3136	235	1431,0	6903,6
2016	2431,4	1628,3	1729,6	325,1	3125	231	1438,8	7148,1
2017	2381.5	1640.5	1703.6	322.5	955	189	1445.8	6408.8
2018	2623.1	1632.2	1807.2	320.5	907	168	1449.4	7059.2

Note: The table is compiled based on the data of the State Statistics Committee of the Republic of Azerbaijan

Thus, by determining the significance of these factors affecting the crop production volume, we can propose a model for the production volume of the crop sector in Azerbaijan:

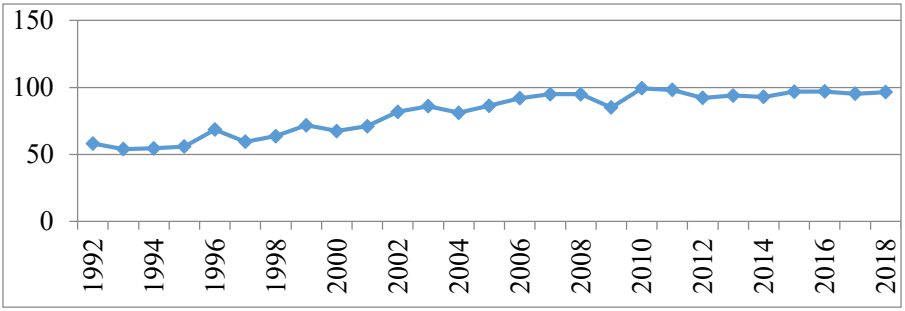
$$Y=-17033,9+1,105349\times X1+0,832367\times X3+0,528424\times X7 \quad (1)$$

Statement 2: ***The sustainable growth of crop production in Azerbaijan can be confirmed. However, crop production is influenced by factors affecting production, including total sown area, employed population in agrarian sector, volume of capital investment in fixed assets, number of private enterprises and individual entrepreneurs in agriculture, number of state-owned agricultural enterprises, and area of irrigated arable land and does not depend on the volume of fixed assets in the agrarian sector. Crop productivity depends on the quality of labor.***

It is important to assess the dependence of productivity on both the all products and crop products as a whole. Crop productivity in general:

$$\frac{\sum_1^8 P_i * V_i}{\sum_1^8 V_i} \qquad (2)$$

Here P_i-the productivity of any of crop species taken separately V_i-is the volume of production of that product. We can calculate the average crop yield with the formula (2).



Note: The table is compiled based on the data of the State Statistics Committee of the Republic of Azerbaijan

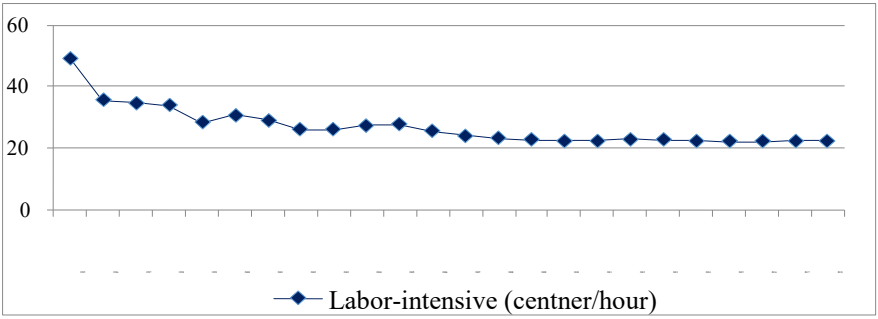
Graph 1. Dynamics of average crop production

According to the results of regression statistics, crop productivity are not significantly dependent on any of these factors.

The main goal of sustainability of production is its dependence on the above factors, which can be attributed to other factors, such as increased skills and abilities of the employed population, the use of techniques, the use of mineral fertilizers and labor costs. We can calculate the average labor cost of plant products on the labor cost for some products with this formula

$$\frac{\sum_1^8 L_i * V_i}{\sum_1^8 V_i} \quad \textbf{(3)}$$

Here $\boldsymbol{L_i}$ - is the labor cost of any of the 8 crop products involved in the study, $\boldsymbol{V_i}$ - is the volume of production of this product. Comparative analysis shows that tobacco products are more labor intensive compared to other types of products. Among these products are melon and sugar beet products with less labor-intensive.



Note: The table is compiled based on the data of the State Statistics Committee of the Republic of Azerbaijan

Graph 2. Average labor-intensive for some crop products

Achieving greater productivity with less labor may be possible with the quality of labor and compliance with agro-technical requirements, as well as with the use of mineral fertilizers.

Statement 3*: The sustainable development of agriculture in Azerbaijan depends on two factors: the volume of capital investments in the fixed assets in agriculture and the state support for agriculture. Other factors related to the agrarian sector, including the employed*

population in agriculture and the amount of fixed assets in agriculture, do not have a significant impact on output.

Some indicators of agricultural production in Azerbaijan and some of its possible dependence on the dynamics of development over the past 15 years have shown that four indicators (Y, X2, X3, and X4) have been sustaining growth rates over the years. Decrease and increase are observed in the volume of capital investments in fixed assets (X1) in agriculture.

Table 2

Dynamics of development of production volume and some macroeconomic factors in agriculture

	Production volume in agriculture (million manat)	*Capital investments in fixed assets in agriculture (million manat)*	*Employed population in agriculture (thousand people)*	*Volume of state support for agriculture (million manat)*	*Fixed assets in agriculture (million manat)*
	Y	X1	X2	X3	X4
2000	1112,4	6,5	1509,4	34,0	2634,4
2001	1242,2	8,3	1521,7	34,2	2694,3
2002	1342,9	18,5	1530,4	45,3	2727,1
2003	1450,5	37,4	1546,1	53,6	2764,7
2004	1572,7	35,0	1551,6	61,1	2821,5
2005	1844,8	40,7	1573,6	96,4	3004,6
2006	2115,5	58,3	1583,2	132,4	3467,3
2007	2918,6	243,3	1597,6	247,5	4150,2
2008	3505,9	336,5	1611,3	281,9	4521,9
2009	3805,5	266,6	1628,6	390,5	4868,1
2010	3877,7	431,0	1655,0	372,1	5099,8
2011	4525,2	437,3	1657,4	444,7	5271,4
2012	4844,6	648,8	1673,8	468,2	5611,9
2013	5244,6	574,3	1677,4	487,9	5852,3
2014	5225,8	363,9	1691,7	562,9	6106,4
2015	5635,3	355,4	1698,4	596,2	6903,6
2016	5748,2	325,1	1729,6	601,3	7148,1
2017	6580.0	322.5	1703.6	605.7	6408.8
2018	7010.0	320.5	1807.2	604.5	7059.2

Note: The table is compiled based on the data of the State Statistics Committee of the Republic of Azerbaijan

The linear dependence between these indicators can be expressed as

$$\boldsymbol{Y_i = a_{0i} + a1_i * X1_i + a2_i * X2_i + a3_i * X3_i + a4_i * X4_i + \varepsilon_i} \quad (4)$$

Here Y_i, $X1_i$, $X2_i$, $X3_i$, $X4_i$ consistently, volume of production in agriculture, capital investments in fixed assets in agriculture, the number of employed population in agriculture, the amount of state support for agriculture and the amount of fixed assets in agriculture. a_{0i}, $a1_i$, $a2_i$, $a3_i$, $a4_i$ are ratios (and parameters) , ε_i is residue.

$$Y = -5332.983 + 0.951598 * X1 + 3.387216 * X3 \quad (5)$$

Thus, we can confirm that volume of capital investments in fixed assets in agriculture and the state support for agriculture has a significant impact on agricultural production.

Statement 4: ***Increase in the share of the volume of agricultural production in GDP in Azerbaijan will result in a decrease of imports and an increase of the foreign trade balance.***

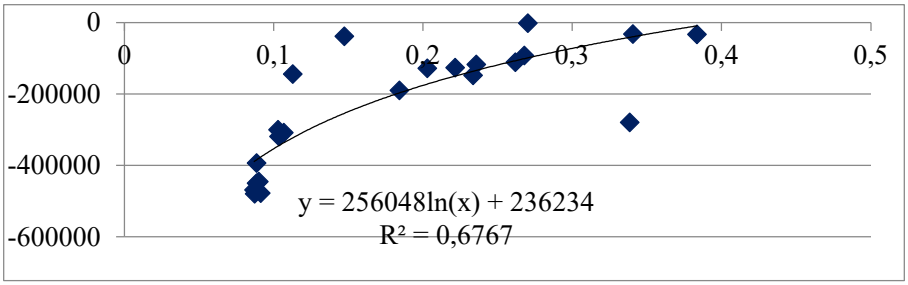
There is a strong need to strengthen its export potential for sustainable agricultural development. Over the past 20 years, the trade balance of agricultural products in Azerbaijan has remained largely negative. Unfortunately, the absolute price of the negative trade balance continues to increase. This means an increase in foreign currency on food products.

We can include among the factors affecting the trade balance of agricultural products are: 1) GDP or the share of agricultural production in GDP; 2) volume of agricultural products; 3) volume of consumption of food products; 4) actual latest consumption expenditures of households.

To determine general regression equation for the dependence of foreign trade balance (Y) on agricultural products by various factors, first of all, consider the dependence of this indicator separately on each factor. First, let's look at the dependence of Y on agricultural production (X1). It is notable that there is no linear dependence between these two indicators and is more logarithmic and it can be expressed as

$$\hat{Y} = a_0 + a_1 * LnX1$$

In this dependence, the correlation coefficient is R=0.8226. Graphically this is as follows (Graph 2.10). This dependence proves that it is necessary to increase the volume of production in order to reduce the negative trade balance of agricultural products and to turn it into a positive balance in the future.



Note: The table is compiled based on the data of the State Statistics Committee of the Republic of Azerbaijan.

Graph 3. Dependence of foreign trade balance on agricultural products (Y) on the share of agricultural production in GDP (X)

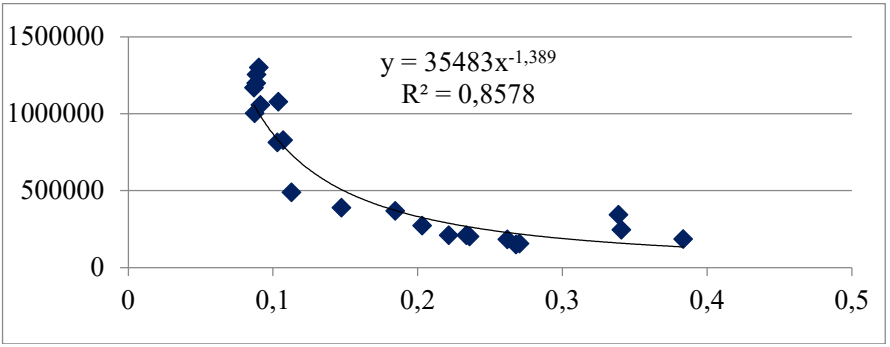
The dependence of the volume of imports of agricultural products on the share of agricultural production in GDP is also non-linear and a predominant function. This function can be expressed as

$$\hat{Y} = a_0 * X^{\alpha}$$

This dependence can produce such a conclusion that in order to reduce imports it is necessary to increase the share of agriculture in GDP. As can be seen from graph 4, the correlation coefficient between these two indicators is sufficiently strong: R = 0.9262.

The dependence of agricultural exports on the share of agricultural production in GDP differs sharply from many countries in the world. Thus, in the countries that consider agriculture as its strategic priority, in other words, in the countries where the share of agricultural production exceeds 25% of GDP, export revenues tend to increase

with that share, as agricultural products make up the main part of export products. As the share of agricultural production in GDP declines, the volume of exported agricultural products also declines. In Azerbaijan, however, there is a very different view. Thus, as the share of agricultural production in GDP declines in Azerbaijan, exports increase. Although this dependence is not linear, the tendency of inversely proportional relationship has been maintained for the last 20 years.



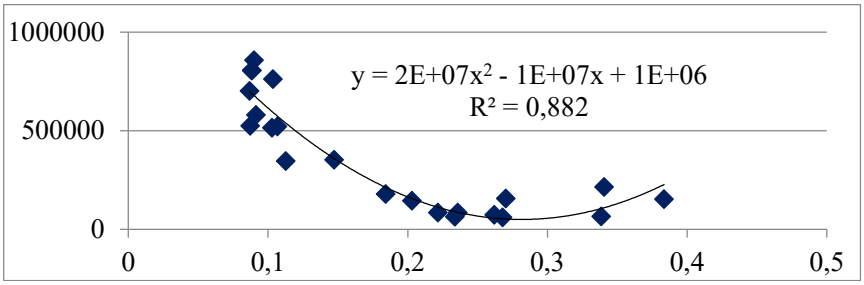
Note: The table is compiled based on the data of the State Statistics Committee of the Republic of Azerbaijan.

Graph 4. Dependence of the import of agricultural products (Y) of the share of agricultural production in GDP (X)

Note that dependence of agricultural production on the share of GDP and export volume is closer to the polynomial dependence and it can be expressed as,

$$\hat{Y} = a_0 + a_1 * X + a_2 * X^2$$

According to Graph 5, here -$a_0 = 10^6$, $a_1 = 10^7$, a_2 =2*10^7. In this case, the correlation coefficient - R=0,9391. This suggests that there is a sufficiently strong dependence.



Note: The table is compiled based on the data of the State Statistics Committee of the Republic of Azerbaijan.

Graph 5. Dependence of agricultural exports on the share of agricultural production in GDP

Thus, we can state that, given the economic characteristics of Azerbaijan, it is necessary to have a certain amount of 1) the share of agricultural production in GDP, and 2) the volume of agricultural production a positive balance of foreign trade in agricultural products.

Statement 5 - ***Increasing the sustainability of the economic aspect can have a definite impact on the weakening of the environmental aspect in the future.***

To determine the "threshold prices" for the economic aspect of sustainable agriculture, we will use the results of the combined activities of all economic subjects, including farms, households, and collective farms. This includes the financial resources of farms, including value added in the agrarian sector, labor productivity in crop and livestock, gross product in various areas, and so on. We will use only 12 of these indicators.

Thus, a comparison of the actual and "threshold prices" of the 12 economic indicators for the sustainability of the agrarian sector in Azerbaijan in 2017 suggests that the actual results on these indicators are much lower than the "threshold prices". Even the actual index of potato productivity is 30% lower than the world average. The production of tea leaves is 2.5 times lower than the actual figures in Turkey. In terms of milk production per cow and buffalo, Azerbaijan lags behind the world average. Strategic Roadmap aims to accelerate production of meat, milk, cotton, and cocoon for the near future. At

present, the volume of production in the country is far behind these risks.

Table 3

Actual (2018) and target indicators for the economic aspect of sustainability in the agrarian sector

	Economic indicators	f_{1i}	t_{1i}	Source of target prices
1	GDP Volume in agrarian sector (million AZN)	3949.3	5184.3	Strategic Roadmap
2	Grain productivity (ton / ha)	2.98	10	New Zealand
3	Cotton productivity (ton / ha)	1.53	1.887	Australia
4	Tobacco productivity (ton / ha)	1.66	1.922	Argentina
5	Potato productivity (ton / ha)	15	20	World average
6	Tea Leaf Productivity (ton / ha)	1.11	2.987	Turkey
7	Milk production per cow and buffalo (kg/year)	1528	2200	World average
8	Meat production (1000 t.)	316.8	380.16 (+20%)	Strategic Roadmap
9	Milk production (1000 t.)	2024.1	2631.33 (+30%)	Strategic Roadmap
10	Cotton production (1000 t.)	207.5	830 (x 4)	Strategic Roadmap
11	Cocoon production (ton)	245.2	245200 (x1000)	Strategic Roadmap
12	Area sown (thousand ha)	1665.71	1749 (+5%)	Strategic Roadmap
				0,00154

Statement 6 - Only the sustainability on social aspect can be considered as moderate.

Different indicators can also be used for the social aspect of sustainability. We will use fifteen indicators that are more specific to the social status of the population.

We will take the targets for the nearest future as the basis in Strategic Roadmap for determining “threshold prices” of sustainable agricultural sector on ***social aspect*** in Azerbaijan. “Threshold price” for an indicator – “total fertility rates in rural areas” is taken as the

fertility rate in urban areas (Table 2.2). According to this indicator, rural regions' indicator exceeds "threshold prices".

Table 4

Actual (2018) and target indicators for the social aspect of sustainability in the agrarian sector

	Social indicators	f_{2i}	t_{2i}
1	Total fertility rate in rural areas	2	1.7
2	Share of the men with higher education in rural areas in the total number of the male population of the country	6.2	12.3
3	Share of the men with secondary, college and secondary general education in rural areas in the total number of male population of the country	42.4	34.8
4	Share of the women with higher education in rural areas in the total number of the female population of the country	3.9	10.6
5	Share of the women with secondary, college and secondary general education in rural areas in the total number of female population of the country	45.9	41.3
6	Average per capita income in rural areas (manat)	256.75	278.65
7	Central heating system (%)	6.8	34.4
8	Connecting to the phone (%)	60.9	91.1
9	Availability of a sewage system (%)	96.2	99.9
10	Availability of bathroom, shower, bath (%)	81.5	96.0
11	Network gas connection (%)	84.0	97.4
12	Availability of water heating supply (%)	47.0	80.6
13	Connecting to a water pipe (%)	75.8	98.9
14	Number of employers in the agricultural sector (%)	1752.9	1772.9
15	Number of people with all agricultural specialties (person) in the higher education institutions	2884	3460.8 (+20%)
			0.86568

Statement 7 - *The agricultural sector's sustainability on environmental aspect is weak in Azerbaijan.*

We will use four indicators to assess the environmental aspect of agrarian sector sustainability. Taking into consideration on the estimates Based on actual and "threshold prices" for the four indicators for 2017, it can be shown that sustainability on the environmental

aspect in Azerbaijan can be considered as average for of agrarian sector. ($\sigma_3 = 0.59272$).

Table 5

Actual and target indicators for the environmental aspect of sustainability in the agrarian sector

	Environmental aspects	f_{3i} (2017)	t_{3i}
1	Specific weight of the fertilized area in the total planting area, %	72	100
2	Use of mineral fertilizers (1000 tons)	118.7	148.375(+25%)
3	Volume of use of plant protection ways of agricultural producers		+25%
4	The level of use of certified seeds, saplings by the agricultural producers		90%
5	Provision of agricultural products manufacturers with techniques, machinery and equipment, as well as small-size technique, machinery and equipment (1000 hectare sown area)	13.1	15.72 (+20%)
6	The rate of utilization and disposal of waste generated in the agricultural sector (%)	0.32	100
7	The amount of gases generating heating effect with $1 added value in the agricultural field (kg / $)	3.056	
			0.59272

Statement 8 - ***We can obtain AS = 0.48665 for all three aspects of the agrarian sector sustainability in Azerbaijan and for the overall agrarian sector sustainability.***

Table 6

The level of sustainability of the agrarian sector of Azerbaijan (2018)

	$\lvert\bar{S}_j\rvert$	$\lvert\bar{\lambda}_j\rvert$	$(\bar{S}_j, \bar{\lambda}_j)$	$\cos\varphi_j$	σ_j
economic	5000.711	245286.72	92491396.7	0.0754	0.00154
social	3390.377	3905.840	13206382	0.9973	0.86568
environmental	139.480	205.578	25050.04	0.8736	0.59272
AS (2017)					0.48665

CONCLUSION AND SUGGESTIONS

- Present land - climatic conditions, historical agricultural culture and rich experience associated with it, scientific and technical achievements, innovative trends and more - create favorable conditions for sustainable development of agricultural production.
- Liberalization in the agrarian sector will have a positive impact on the sustainable growth of agricultural production;
- Sustainable development of crop production in Azerbaijan depends on more than three indicators - the size of the sown area, the volume of capital investments and the volume of fixed assets in agriculture.
- Ensuring sustainable development in the agrarian sector depends greatly on macroeconomic regulation of the state. Improvement of these tools and their adherence to the principles and laws of sustainable development of the agrarian sector are also important from the point of view of the country's strategic interests.
- The sustainable development of crop production in Azerbaijan is less dependent on the number of employed population in agriculture, the number of private enterprises and businesses in agriculture, the number of state-owned enterprises in agriculture, and the size of irrigated land.
- It is possible to confirm the steady increase in crop production in Azerbaijan.
- Crop productivity is not dependent on factors affecting the volume of crop production, including the total sowing area, the number of agrarian population, the volume of capital investments in fixed assets, the number of private enterprises and individual entrepreneurs in agriculture, the number of state-owned agricultural enterprises, area of irrigated arable land, the volume of fixed assets in the agrarian sector.
- Crop productivity depends on the quality of labor.

- The sustainable development of agriculture in Azerbaijan depends on two factors - the volume of capital investments in fixed assets and the state support for agriculture.
- Increase in the share of agricultural production volume in GDP in Azerbaijan will result in a decrease in imports and an increase in the foreign trade balance.
- Increasing the sustainability of the economic aspect may have some effect on the weakening of the environmental aspect in the future.
- Only the sustainability on social aspect can be considered as moderate.
- The sustainability of agrarian sector in Azerbaijan is weak on environmental aspects.
- We can obtain the AS = 0.48665 result for all three aspects of the agrarian sector in Azerbaijan and for the sustainability of overall agrarian sector.

The main theme of the research is reflected in the following scientific works of the author:

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