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Examining economic growth from the agricultural sector perspective in Azerbaijan

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Abstract

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The importance of the agricultural sector, which plays an important role in the development of countries and societies, is gradually increasing with the effect of the globalizing economic system, increasing competitive environments and rapidly changing market conditions. Azerbaijan has a special importance in terms of plant, animal, and aquatic products due to its geopolitical position, the Caspian memory it has, the rivers it has and its ecological diversity. In this study, general information about the agricultural sector is given, and the effects of the agricultural sector on economic development are emphasized. In addition, the relationship between employment rates in the agricultural sector and economic growth has been examined. According to the results obtained, there is a significant relationship between the agricultural sector workers and economic growth in this country.

Keywords: agricultural sector; employment in agriculture; economic growth; least squares method; Azerbaijan

Introduction

The agricultural sector is a sector that produces various nutrients, diversifies the nutrients by processing these substances, meets the needs of individuals for these substances, and therefore has a significant impact on the health and development of societies. Nutrition is an indispensable element for human beings to survive. Community health and socio-economic development are possible with adequate and balanced nutrition. For individuals to have adequate and balanced nutrition, they must first find the amount and type of nutrients they want, and then have an income to buy these substances.

The agricultural sector has undertaken very important tasks in the economic and social development of countries until today, and it is expected that it will continue to undertake these tasks in the future. Agriculture is an indispensable sector all over the world due to the survival of the country's population, its contribution to national income and employment, providing raw materials and capital to other sectors, its direct and indirect impact on exports, and its contribution to biological diversity and ecological balance. For this reason, the agricultural sector, with its economic, social, and environmental dimensions, is closely related to all segments of the society.

In the literature, economic growth has been analyzed empirically and qualitatively in different sectors. Agriculture (Birthal et al., 2011; Raihan & Tuspekova, 2022; Wang, 2022), tourism (Tiwari, 2011; Liu & Wu 2019; Huseynli, 2022a, b) and energy (Farzanegan & Markwardt, 2009;

Demiral et al., 2016; Awunyo-Vitor et al., 2018; Huseynli, 2023) can be examples.

There are several studies in the literature on the effects of the agriculture sector on either economic growth or employment. It is seen that some of them have meaningful results, but some of them have meaningless results. This situation varies depending on whether a country is developed or developing. If we give place to several studies in the literature, the study by Awokuse and Xie (2014) proved that the agricultural sector is a dynamic of economic growth. Azra and Syed Shujaat Ahmed (2012) found in their study that there is a strong relationship between the agricultural sector and economic growth. Safdar et al. (2012) concluded in their study that productivity and employment in the agricultural sector positively affect growth. Bakari & Mabrouki (2018) showed that agricultural trade has a positive correlation with GDP. However, it was concluded that there is a weak correlation between agricultural exports and GDP. According to the Gravity Model, while there is a positive relationship between agricultural exports and economic growth, it has been determined that there is no relationship between agricultural imports and growth. Bekun (2015) studies revealed that real GDP, agricultural production, and oil rents have a long-term equilibrium relationship. According to the VECM result, although agricultural productivity has a positive effect on growth, the adaptation rate of the variables to the long-term equilibrium paths is low. Poonyth et al. (2001) concluded in their study that a 1% growth in agriculture has a more than 1% effect on growth compared to other sectors.

According to the content of economic growth, the growth rate of employment can also gain direction. In determining the relationship between employment and growth, it is important whether economic growth is based on labor-intensive or capital-intensive growth. In addition, factors such as whether economic growth is directed to the domestic or foreign market, how it is realized and its speed in the sector play a decisive role. In addition, the factors that determine economic growth determine the direction and strength of the relationship between economic growth and unemployment (Kreishan, 2011; Kanca, 2012).

Literature review

Agriculture sector

Economics is a science that examines how and in which alternatives a limited number of production factors can be used to meet all the needs of the individuals that make up the society (Gürler, 2008). The branches of activity that make up the economies of the countries, on the other hand, constitute the economic sectors. The agricultural sector is one of the basic sectors that makes up the country's economy. Today, when agriculture is mentioned, the first concept that comes to mind is plant production. However, agriculture is a much broader concept. Agriculture includes animal husbandry, forestry, and aquaculture as well as plant production (Olali & Duymaz, 1987). Due to its share in national income, employment, foreign trade, agriculture-based industry, support, and consumption expenditures, it has an important place in economies because it is a sector that produces essential foodstuffs for people.

Agriculture, which is also expressed as a technique of making vegetable and animal production by rationally using production factors (labor, capital, technology, entrepreneur, etc.) depending on economic, natural, and cultural conditions, or making a profit by processing these products, is one of the various branches of activity as a sector consists. All these basic branches of activity, each of which are sub-sectors, are called the agricultural sector. Today, in addition to these 5 main activity branches that make up the agricultural sector, activities such as processing, storage, classification, packaging, and evaluation of agricultural products are also included in the agricultural sector and have an important share. These activity lines are soil and water resources, crop production, animal husbandry, forestry, and aquaculture (Zincirlioğlu, 1977).

The agricultural sector has undertaken and continues to undertake very important tasks in the economic and social development of this country since independence. Agriculture is indispensable all over the world because of its contribution to the country's population, its contribution to national income and employment, its supply of raw materials to the industrial sector, its transfer of capital to the industry, its direct and indirect contribution to exports, its contributions to biological diversity and ecological balance, and it is a strategic sector due to the safety of food production.

Regardless of the development level of the countries, the agricultural sector has an important place in the economic life of all countries. Because the supply of foodstuffs and raw materials required for human nutrition is provided by the agricultural sector and there is no substitute for this sector.

In the past, the development of the agricultural sector faced great obstacles for many years. Until the 18th century, only animal manure was used as the nutritional need of soil and plants, the soil was left fallow every year and a different plant was planted in the soil every year. Agricultural production remained limited because of both the lack of adequate animal manure and the fallowing each year. Later, with the start of turnip cultivation in the western world, especially in England, the necessity of leaving the lands fallow was eliminated and turnip had an important place in animal production as winter

food for animals. With turnip cultivation, more animals were fed, and animal production increased. Along with the increase in the number of animals, an increase in animal manure was also observed. Another important development in the agricultural sector in the world is the establishment of the quadruple rotation system developed by British farmers. Thanks to this system, by planting wheat, turnip, barley, and alfalfa in the soil successively, an increase in productivity has begun to be experienced in agriculture. Another important development in the agricultural sector is that the German chemist Justos von Liebig determined the positive effects of potassium, phosphorus, and nitrogen on the development of plants in 1840 and invented artificial fertilizer in the light of this knowledge. As a result of the increase in productivity brought by artificial fertilizers and the cultivation of soils with new methods, the market share of agricultural activities has increased, and the agricultural sector has become an economic power.

Employment

It is possible to define the concept of employment in different ways. In general terms, employment can be defined as "employment of people who have the will and will to work and provide income in the production of goods or services" (Ünlüönen et al., 2007). Employment refers to full-time permanent jobs; classified as underemployment, full employment, and overemployment. However, due to the needs arising from the relations between labor supply and demand, atypical (flexible) employment types (part-time work, temporary work, teleworking, homework, loan employment relationship, on-call work) expressing work relations other than full-time jobs are also possible job sharing, shift work, shifting work time, freelancing, and working with subcontractors) have been formed within the economic structure (Ünlüönen et al., 2007).

The term employment is used in economics in two senses, one narrowly and the other broadly. In a broad sense, employment relates to the use of all factors of production in an economy. If all the factors of production in an economy are used, that economy will reach its maximum production level, which is called "full employment national income level". Against this, if one or all the factors of production are not used, then there is "underemployment national income level". When it comes to employment in the narrow sense, only labor and its participation in production come to mind (Erdoğan, 1996). If the economy comes to equilibrium in underemployment, it means that some of the factors of production remain idle. If expressed in the narrow sense of employment, there will be varying rates of unemployment of labor at any level of employment below full employment. From this point of view, the employment level of the economy, which can be used as a basic indicator for the distinction between developed and developing economies, will reveal the fact that unemployment in developed countries is lower than in developing countries. The main purpose of developing countries is to transform their countries into an industrial society and realize their economic development. However, one of the problems encountered in this regard is that industrialization is not sufficient to solve the employment problem in developing countries due to technological development. In other words, due to the labor-saving features of technical advances, great increases in employment cannot be achieved, and accordingly, the unemployment problem cannot be solved satisfactorily.

Effects of agriculture sector on economic development

The agricultural sector often forms an integral part of economic systems. The place of the agricultural sector in the country's economy is measured by the added value that agriculture has created in the general economy. This added value, on the other hand, consists of titles such as the output resulting from agricultural activities, agricultural output, foreign trade, employment, and input to other sectors.

Developing countries are making great efforts to reach a more modern economic structure than the traditional economic structure. The way to reach this structure is usually possible with industrialization. However, there is a relationship between the industrialization process of the countries, their economic development aspirations, and the traditional economic structure. In other words, there is a close relationship and interaction between the agricultural sector and the industrial sector in the economic development process. For this reason, developed countries, which had economies based on agriculture in the past, first focused on the agricultural sector and ensured the development of the agricultural sector, and then accelerated industrialization with the accumulation of resources obtained from this sector. Countries such as France, England, Russia, and Japan provided the financing of their industrialization largely with the resources obtained from the agricultural sector (Tuna, 1993).

In terms of the agricultural sector, the product can be expressed as the total monetary amount of the physical value of the products produced because of agricultural activities (Ege, 2011). The rate of development of agricultural GDP in developing countries cannot be as high as the rate of development of GDP in other sectors. The reason for this is that the income growth rate in the agricultural sector, where traditional production techniques are used, is slower than in other sectors (Tuna, 1993).

Another positive effect of the agricultural sector on the economic development of countries is the foreign exchange

inflow through foreign trade. Through the agricultural sector, foreign exchange inflows to countries are provided in three ways. The first of these; Ensuring foreign exchange inflow by exporting the agricultural products produced by the countries, secondly, ensuring that the foreign currency that is possible to go out of the country is ensured by import substitution because of agricultural production, and thirdly, as a result of the development of agriculture-based industrialization, foreign exchange inflow is provided by exporting consumer goods as well as raw materials (Deran, 2005).

When we look at the effects of the agricultural sector on economic development through foreign trade, another indicator that needs to be emphasized is the share of foreign exchange revenues obtained from the export of agricultural products in the financing of the import of investment goods and intermediate inputs (Şahin, 2000).

The agricultural sector is in close interaction with nature, capital, labour, and entrepreneur, which are expressed as production factors. In a traditional agricultural sector, land and labor are expressed as primary inputs. The share of these inputs in production is higher than the share of capital goods, which is a factor of production. Compared to other sectors, the agricultural sector is a sector where labor-intensive production techniques are applied. However, today, along with economic and technological developments, a change is seen in agricultural structures. The share of land and labor in production is decreasing relatively, while the share of capital is gradually increasing. As the economy develops, the integration of agriculture with the economy increases, so agriculture offers more products to the market and buys more inputs from other sectors.

The capital contribution of the agricultural sector to economic development is expressed as the use of some of the income from the agricultural sector in new investments. It is very important for the economic development of the countries that the incomes obtained because of agricultural activities are re-invested and the workforce living in rural areas is employed through agricultural activities.

Agriculture is an indispensable and strategic sector for industrialized countries because of the safety of food production and the supply of raw materials to the industrial sector. Therefore, the agricultural sector plays an important role in the development of agriculture-based industries. While the agricultural sector provides raw materials to agriculture-based industries, it also contributes to the economy by creating demand for goods and services produced in other sectors. With the growth to be experienced in the agricultural sector, the buying and selling relations between the sectors will increase and as a result, the agricultural sector will integrate with the economy and help the development of the industry and other sectors. Therefore, the agricultural sector interacts with many sectors. This degree of interaction between the sectors increases and diversifies in parallel with the developments in the sectors (Kiral & Akder, 2000).

Research Methodology

Purpose and data set

In this study, an estimation model was created with the "Least Squares Method Analysis" in time series analysis for agricultural employment rates and economic growth data, with imported machinery for use in the agricultural sector. In the analysis, 25 years of analysis data were examined by years. The dataset used in the analysis was obtained from the World Bank database.

Analysis method

As is known, panel data is a combination of cross section and time series data. It is known that panel data analysis offers some advantages in controlling heterogeneity related to countries (Yamak et al., 2016; Baltagi, 2008). These advantages are listed as follows:

- The analysis in question allows the control and measurement of this difference within the model, based on the difference specific to the cross-sectional units (for example, different tendencies and behaviors of the countries).
- It provides less linear relationship between the variables, more degrees of freedom and efficiency in the analysis, and allows to investigate the dynamics of change.
- Panel data can consider the possible effects of varying effects across the cross-section on the dependent variable.
- It is suitable for empirical studies with more complex behavioral models (Tari & Ozden, 2010). Different data sets can be used while conducting economic research. Each dataset can only be used for models suitable for their structure. There are three types of datasets. These are cross section data, time series and panel data.

Today, panel data analysis method is used in many studies. Panel data can be defined as a data set with time series belonging to more than one slice or as a cross-sectional data with a time dimension. If the panel data sets contain time series of equal length for each section, such panel data is called balanced panel data, and if it contains time series of different lengths, it is called unbalanced panel data (Equation 1).

$$Yit = \alpha + X_1 it\, \beta_1 it + X_2 it\, \beta_2 it + \cdots \ldots + X_k it\, \beta_k it + uit \qquad (1)$$

$i = 1, \ldots, N;\ t = 1, \ldots, T$

Here *i* is the cross section and *t* is the time. Since *Y* variable takes different values in each time period of each section, it is expressed with two sub-indexes, *i* and *t*.

The least squares method is a standard regression method used to write down the mathematical relationship between two dependently varying physical quantities as an equation that is as realistic as possible. In other words, this method serves to find a function curve that will pass "as close as possible" to the measured data points. The least squares method is the optimal method for regression. One of the most common methods used for the estimation of β_0 and β_1 parameters today is the LCC method. Least Squares Method. The data collected by any application in various areas of real life are examined by bringing them into tabular form and a function that models the collected data is tried to be found. Often it is not possible to find a function that fits this data table exactly. The function that best fits the data table is tried to be determined. The process of finding the function that best fits a data table is called regression analysis. The least squares method is among the most important tools used in determining the relationships between various variables in various branches of science such as medicine, finance, engineering, agriculture, biology and sociology.

Results and Discussion

The model established for the analysis results of the study is included in the Equation 2 below. After the model was created, assumption tests were made for analysis.

$$LGDP = \beta_0 + \beta_1\ employment\ in\ agriculture + \\ + \beta_2\ LAgricultural\ raw\ materials\ imports + \mu \quad (2)$$

In the study, assumption tests necessary for the application of least squares analysis were performed. First, the *LR* test was applied to measure whether the model had any effect. According to the results obtained, it was decided that the least squares method was suitable for analysis, since there was no effect between the data. The White test was applied to measure the variance problem between the data. Variance Inflation Factor (VIF) is a set of statistical methods that measure the severity of multicollinearity in regression analysis and are used to estimate the relationships between a dependent variable and one or more independent variables. According to the VIF results, there is no multicollinearity problem between the data. The Wooldridge test also shows that there is no deviation. Resistive regression analysis was performed for the analysis according to the possible deviation in the White test. The results regarding the assumptions are given in Table 1.

Table 1. Test results for necessary assumptions

Likelihood Ratio (LR) Test Results		
Test Names	LR Statistics	Probability Value
Unit and Time Impact	0.00	1.0000
Unit Impact	4.2e-14	1.0000
Time Effect	1.7e-13	1.0000
White Test Results		
Test Statistic	Probability Value	
6.440762	0.2657	
Wooldridge's Test Results		
Test Statistic	Probability Value	
22.075	0.0178	
VIF Criteria Results		
Variable	VIF	1/VIF
Agricultural raw materials imports	1.00	0.999251
Employment in agriculture	1.00	0.999251
Mean VIF	1.00	

The data on the final results on which the resistant regression analysis was applied are given in Table 2. As it can be understood from the analysis result, the model shows significance in general terms. A high R^2 value also indicates the significance of the model. When we examine the variables in the analysis result one by one, there is a strong relationship between the employment rates in the agricultural sector and economic growth. Namely, a 1% increase in the number of shiki employed in the agricultural sector has an explanatory power of approximately 19% on economic growth. The effect of the equipment imported for the agricultural sector on the economic growth gave insignificant results.

Regardless of the level of development of the countries, the agricultural sector has an important place in the economic life of all countries. Because most of the foodstuffs required for people to survive and the raw materials they use are sup-

Table 2. Least Squares Estimation test result

R^2	Number of Observations	Prob prob>		
0.7592	75	0.0000		
GDP	Coefficient Values	Robust Standard Errors	T statistics	P > |t|
Agricultural raw materials imports	.0392251	.1246617	0.31	0.756
Employment in agriculture	.1890012	.0150555	12.55	0.000
Fixed Coefficient	17.59603	.5377549	32.72	0.000

plied by the agricultural sector and there is no substitute for this sector. In the economic development process, there is a close relationship and interaction between the agricultural sector and the industrial sector. For this reason, developed countries, which had economies based on agriculture in the past, first focused on the agricultural sector and ensured the development of the agricultural sector, and then accelerated industrialization with the accumulation of resources obtained from this sector.

Since the agricultural sector is a sector that is more indispensable and of strategic importance compared to other sectors, it is seen that the interest of large-scale even multinational enterprises in the agricultural sector or its sub-sectors has increased. Agricultural activities should be carried out by large-scale and specialized agricultural enterprises using modern agricultural methods. In the constantly changing and developing market conditions, the managers of both large-scale and medium-sized agricultural enterprises must act more professionally and planned in the face of the events while the business activities are carried out. It is possible for business managers to be in a certain plan or to act consciously and make rational decisions in the face of developing events, with the presence of correct and real information. For these reasons, accounting information system in agricultural enterprises, as in all enterprises, has a special place and importance in terms of the future of the enterprise. It is very difficult to reach real and precise accounting information about agricultural products obtained because of production processes in all enterprises engaged in agricultural activities. Because in the agricultural production process; production of many agricultural products together, failure to determine the share of the relevant period from the expenditures made for agricultural production, personal use of agricultural products produced with agricultural tools, machinery, vehicles, use of agricultural assets as raw materials in the production of other agricultural products. As a result of reasons such as not taking into account their own labor by working in activities and paying wages for agricultural products, it becomes difficult to determine agricultural production costs and therefore profit or loss.

Conclusion

In this study, the importance of the agricultural sector for Azerbaijan was emphasized. In this framework, imported tools and employment rates in the agricultural sector were considered as independent variables. As a result of the study in which the least squares method was applied, it was concluded that imported agricultural equipment for Azerbaijan did not have any effect on economic growth. Another dependent variable, a significant relationship between agricultural sector employment rates and economic growth. According to the results obtained, a 1% increase in the employment rate of the agricultural sector has the power to affect economic growth by 18%.

References

Awokuse, T. O. & Xie, R. (2015). Does agriculture really matter for economic growth in developing countries? *Canadian Journal of Agricultural Economics/Revue Canadienne d'agroeconomie*, *63*(1), 77-99.

Awunyo-Vitor, D., Samanhyia, S. & Addo Bonney, E. (2018), Do oil prices influence economic growth in Ghana? An empirical analysis. *Cogent Economics and Finance, 6*(1), 1-14.

Azra, D. K., & Syed Shujaat Ahmed, E. A. (2012). Agriculture and economic growth: Empirical evidence from Pakistan. *Proceedings of the 2nd International Multidisciplinary Conference towards Better Pakistan*, 1-6, 2012, Pakistan.

Bakari, S. & Mabrouki, M. (2018). The impact of agricultural trade on economic growth in North Africa: Econometric analysis by Static Gravity Model. *Munich Personal RePEc Archive,* 1-14. https://mpra.ub.uni-muenchen.de/85116/

Baltagi, B. H. (2008). Forecasting with panel data. *Journal of Forecasting*, *27*(2), 153-173.

Bekun, F. V. (2015). The contribution of agricultural sector on the economic growth of Nigeria. *Master's Thesis.* Eastern Mediterranean University.

Birthal, P. S., Singh, H. & Kumar, S. (2011). Agriculture, economic growth and regional disparities in India. *Journal of International Development*, *23*(1), 119-131.

Demiral, M., Harun, B. & Emrah, A. (2016). Oil Revenues and Economic Growth: A Panel Data Analysis on Selected OilRich Developing Countries. *Sosyoekonomi, 24*(27), 85-102. (Tr).

Deran, A. (2005). Calculation and applications of costs in orchards within the framework of accounting theory. *Unpublished Doctoral Dissertation*. Gazi University. Ankara, Türkiye. (Tr).

Ege, H. (2011). The place and importance of the agricultural sector in the economy. *Institute of Agricultural Economics and Policy Development TEPGE Vision*, *7*, 1303-8346 (Tr).

Erdogan, H. (1996). International tourism with its economic, social, cultural and environmental aspects. Bursa: Uludag University Publications (Tr).

Farzanegan, M. R. & Markwardt, G. (2009). The effects of oil price shocks on the Iranian economy. *Energy Economics, 31*(1), 134-151.

Gürler, A. Z. (2008). Agricultural Economics. Ankara: Nobel Publishing and Distribution (Tr).

Huseynli, B. (2022a). The contribution of the number of tourists to the economic growth of Egypt: An econometric analysis. *African Journal of Hospitality, Tourism and Leisure, 11*(4), 1350-1361.

Huseynli, B. (2022b). A research on econometric analysis of tourism sector, economic growth and unemployment indicators in Turkey. *Journal of Environmental Management & Tourism*, *13*(6), 1629-1636.

Huseynli, B. (2023). Renewable solar energy resources potential and strategy in Azerbaijan. *International Journal of Energy Economics and Policy*, *13*(1), 31-38.

Kanca, O. C. (2012). An empirical analysis of causality between unemployment and economic growth in Türkiye. *Çukurova University Social Sciences Institute Journal*, *21*(2), 1-18 (Tr).

Kiral, T. & Akder, H. (2000). Agricultural sector with macro-economic indicators. In *5th Turkish Agricultural Engineering Technical Congress, 2*, 1-19 (Tr).

Kreishan, F. M. (2011). Economic growth and unemployment: An empirical analysis. *Journal of Social Sciences*, *7*(2), 228-231.

Liu, A. & Wu, D. C. (2019). Tourism productivity and economic growth. *Annals of Tourism Research*, *76*, 253-265.

Olali, H. & Duymaz, İ. (1987). The Place of Agriculture in the Turkish Economy and Its Contribution to Economic Development. Izmir Commodity Exchange (Tr).

Ozden, E. & Tari, I. (2010). Shell side CFD analysis of a small shell-and-tube heat exchanger. *Energy Conversion and Management*, *51*(5), 1004-1014.

Poonyth, D., Hassan, R., Kirsten, J. F. & Calcaterra, M. (2001). Is agricultural sector growth a precondition for economic growth? The case of South Africa. *Agrekon.*, *40*(2), 269-279.

Raihan, A. & Tuspekova, A. (2022). Dynamic impacts of economic growth, renewable energy use, urbanization, industrialization, tourism, agriculture, and forests on carbon emissions in Turkey. *Carbon Research*, *1*(1), 20, 1-14.

Safdar, H., Maqsood, S. & Ullah, S. (2012). Impact of agriculture volatility on economic growth: a case study of Pakistan. *The Lahore Journal of Economics*, *1*(2), 25-34.

Şahin, H. (2000). Turkish Economy: Historical Development and Current Situation. (6th Ed.). Bursa: Ezgi Publishing (Tr).

Tiwari, A. (2011). Tourism, exports and FDI as a means of growth: Evidence from four Asian Countries. *Romanian Economic Journal*, *14*(40), 131-151.

Tuna, Y. (1993). Economic Consequences of Productivity Increase in Agriculture: An Assessment of Türkiye. Ankara: National Productivity Center (Tr).

Ünlüönen, K., **Tayfun, A. & Kili**çlar, A. (2007). Tourism Economy. Ankara: Nobel Publishing Distribution (Tr).

Wang, H. (2022). Role of environmental degradation and energy use for agricultural economic growth: Sustainable implications based on ARDL estimation. *Environmental Technology & Innovation*, *25*, 102028.

Yamak, N., Gürel, F. & Koçak, S. (2016). Socio-economic and demographic determinants of theft crime: panel data analysis. *TISK Academy, 11*(21), 56-69 (Tr).

Zincirlioğlu, Ö. (1977). *Feasibility in Agricultural Investment Projects.* Ankara, Şark Press (Tr).

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