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An Econometric Model of the Dependence of Economic Growth of Gdp on A Group of Factors

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Abstract

The purpose of the study is to summarize the theoretical results on economic growth and build a model of the relationship between economic growth of GDP and other factors.The conducted research reflects the change in various points of view of researchers explaining the relationship between economic growth and a number of groups of factors. Research theories Economic growth is a complex phenomenon and theories must take into account natural resources, political institutions, etc. through a variety of factors. The methodology of the study is based on research on economic growth, employment, credit investment, nominal incomes of the population, budgetary and internal expenses for work and research. Data collection was carried out with the help of statistical materials from EU countries and Azerbaijan. The systematic method is used to analyze materials that ensure an increase in the country's GDP, employment, income, etc. Also, the calculation of the relationship of these indicators is carried out and refers to the country's policy in the context of combating unemployment.The results reveal that 188 countries produce a small portion of global GDP. Based on the analysis of the EU countries with the highest real GDP growth rate, it was noted that the economic growth of each year does not correspond to the previous values. An econometric model of the relationship between economic growth of GDP and groups of factors selected for the study is constructed. Note that the model justifies itself in determining the dependence of GDP in any country on multinational factors. The model allows us to determine the form of impact reflecting the dependence of economic growth of GDP and groups of factors in any period.The results of the study can be applied in determining priority areas for the economy and maintaining its pace at an optimal level of the national economy.The research contributes to the development of the country's economy, thanks to the theoretical and practical results obtained. The relevance and value of the study are confirmed by the impact on the field of economics and the standard of living of the population.

Keywords: *GDP, Volume, Employment Level, Credit, Investments, Budget and Domestic Expenditures, Economic Growth.*

Introduction

The changing parameters of economic globalization, along with the transforming nature of the global economic hierarchy, leads to the fact that key players in the global economy have to reconsider not only their place and role in the changing system, but also traditional approaches to economic policy and its main instruments (Xie, 2000, p. 670).

Gross domestic product (GDP) is one of the key multipliers of macroeconomics. The term GDP refers to the market value of all goods and services produced in a country and intended for consumption by the population. GDP is also understood as the total income of citizens, enterprises and the state as a whole. If the GDP in the country is growing, then the economy is developing and therefore there are favorable opportunities for people to work, and if this process is reversed, then the opposite situation arises. Currently, there is increasing interest related to the issues of structural changes and economic growth. In our opinion, the growing interest in structural and growth theories is explained by the crisis state of the country's economy, which is caused by structural and economic growth patterns. In particular, these indicators include the low state of the technological and sectorial structure of the economy, which constrains the economic growth of the regions and the country as a whole (Pereverzev, 2016, p. 265).

In the main works of J. Keynes criticized the ideas of the classics and noted that supply in the market creates demand and government support is needed to effectively generate demand. Therefore, the solution to the

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necessary crisis situation in the field of labor must ensure full utilization of production capacities. In his work, he proposes the regulation of the economy with the fiscal sphere. He noted the necessary mechanisms for effective functioning, taking into account some factors affecting the country's economy. But issues related to technological advances, population migrations, concentrations and specializations of production processes were not considered on a global scale. The theory of employment developed in two directions: classics and monetarism, Keynesians and neo-Keynesians. At the same time, it is important to take into account the challenges of progress faced by the global world (Pustoschinskaya, 2023, p.47).

One of the main priority goals of the economic policy of the Government of the country in the long term is to achieve economic growth and maintain its pace at a stable and optimal level for the national economy (Baba, 2023, p.4). Economic growth is a quantitative and qualitative change in the results of economic production in a country, as well as the factors that caused its existence (i.e. their productivity).

According to B. B. Seligman, economic growth is an extremely complex phenomenon (Seligman, 1970). The theory of economic growth should take into account natural resources, political institutions, legislation, through a variety of factors (psychological and social). And the development of an all-encompassing theory seems to be a problematic task. Konovalov and Balashov's research notes that an increase in labor productivity is the most important factor ensuring the growth of real income. An increase in labor costs determines about 30-35% of the increase in real income and 65-70% of the increase is provided by an increase in labor productivity (Konovalov and Balashov's, 2013, p.940).

The results of E. Denison's research show that among the aggregated production factors, the most important factor for economic growth in the country belongs to the factor of productivity increase, i.e. the increase in output per unit of costs (Denison, 1985). With the increase in jobs, new entrants to the labor market are needed in line with the growth rate of the working-age population around the world. The study of the relationship between the level of employment and economic growth has remained relevant for many years, since one of the indicators of economic efficiency is ensuring an adequate standard of living for the population. According to A. Okun's law, a decrease in the GDP growth rate by 2% leads to an increase in the unemployment rate by 1% (Pissarides et al., 2018, p.306).

An important stage in the formation of an economic understanding of the principles and features of the economic development of countries and regions of the world is the analysis of various approaches to the classification of countries (Antropov, 2020, p.158). Currently, there are a large number of States, and there are different approaches to substantiating their number. Based on the functioning of the United Nations (hereinafter - the UN), which was founded in 1945, we can talk about the existence of 193 full-fledged UN Member States and two observer States - the Holy See (Vatican City) and the State of Palestine, which received a permanent invitation to participate as observers in the sessions and work of the General Assembly and have a permanent observer mission at Headquarters (Non-UN member States. The official website of the United Nations).

In order to understand the economic landscapes of different countries, it is necessary to prepare for the global processes (expansions) taking place throughout society. Many development corporations are moving to the international level in order to gain access to more professionally developed, talented specialists, enter new labor markets and diversify the organization's command staff to ensure business continuity. Based on the construction of a model that determines the correlation between the growth or decrease in GDP in the country and the level of employment, the volume of loans, investments, income, budget and domestic expenditures. This is due to the fact that the dependence of the country's economic growth on the volume of GDP and its volume per person has always been an object of study and still needs to be widely studied (Jones, 2016, p.5).

Materials and Metods

The theory and methodology of the research is based on the basic research of many scientists on economic growth, employment, credit investment, nominal income of the population, budget expenditures for scientific work and internal research and development costs in the country. The following methods were

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used when writing the article. In the article, the systematic method is used to analyze statistical materials that ensure an increase in the country's GDP, employment, income, etc. Also, when clarifying the essence of the unemployment rate in different countries, we used a comparative method and the effects of these indicators on the economic development of the country. Here it is necessary to refer to the country's policy in the context of the fight against unemployment.

In determining the impact of the country's development process on the standard of living of the population, a comparative method of indicator values was used, reflecting the condition of people living in different countries of the world. A comparative analysis of the macroeconomic indicators of countries (using the example of some countries of the world) by the level of employment of the population was also carried out in order to determine the impact of these indicators on economic growth, which is directly related to the unemployment rate.

Using a systematic method, the current state of the unemployment rate in some countries of the world was analyzed. Using this method, the data on the number of unemployed in various countries and the impact of this indicator on the lives of the population are systematized. At the end of the article, based on the analysis of the above indicators, appropriate suggestions and recommendations will be given to increase employment.

Results

A System of Factors That Ensure Sustainable Economic Growth

Economic growth depends on a number of factors, which are understood as phenomena (phenomena) and processes that determine economic growth, long-term rates and scales of growth in real production, opportunities to improve the efficiency and quality of growth. Since the development of the economic system is characterized by an increase in production, it depends on the availability and level of use of factors of production in a country or region. The system of factors ensuring sustainable economic growth can be systematized in three groups.

Factors of production-indicate the resources available to any country or region to ensure its economic growth, the level of their development and development. Resource utilization factors-indicate a qualitative and quantitative correspondence between the factors of production, and may appear as subjective (quality of management, personnel training system, public policy, etc.) so are objective factors (the economic mechanism of the region, etc.) (Filimonenko, 2011, p.17).

Factors of market conditions and innovative economic growth-indicate the current state of the external macro- and microenvironment, as well as the internal environment of a country or region, determine the demand for products (the number of population and able-bodied people, the amount of products produced per person) produced within the country, lead to an expansion or reduction of production. The emergence of an innovative economy is considered an important stage in the logical development of economic systems. The main indicators determining the level of innovative development of a country or region include: -the number of employees engaged in research and development; -costs of internal research and development; -costs of technological innovation; -the number of organizations performing research and development; -the number of innovative and active organizations; -the level of innovative activity of organizations; -the volume of scientific and technical work performed at the expense of their own forces; -investments in fixed assets by type of economic activity "scientific research and development"; -the volume of advanced production technologies created; -the number of advanced production technologies used in production.

Referring to real statistical indicators, it should be noted that "economic growth" is defined as a quantitative indicator through GDP, GNP, ND, etc. Moreover, economic growth rates are calculated as a percentage of the growth rate of real GDP or GNP and are usually calculated during the corresponding year. However, depending on the nature of the study, this indicator can be calculated for a month, quarter, year, decade, that is, for any corresponding period of the year (Konovalov and Balashov's, 2013, p. 941).

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Considering the above, we have compiled a list of 15 countries with the highest GDP in 2024. The data is the World Bank's most recent Gross Domestic Product (GDP) reading. For more than two decades, International Expansion with Global PEO Services has been providing comprehensive growth solutions to public, private and non-profit organizations of all sizes.The GDP statistics of 315 countries of the world (2022-2024) were used as a basis for evaluating the effectiveness of measures topromote economic growth (table 1).

Table 1. GDP in the TOP 15 Countries of the World, Trillion $

Country	The volume of GDP		GDP growth by volume	The change in GDP in 2024 compared to 2022, %, (+), (-)	The country's share in the world's GDP in 2022, %
	2022	Forecast for 2024			
United States	25.4627	25.48	0.0173	3.9	25.32
China	17.9632	14.81	-3.1359	-17.45	17.86
Japan	4.23114	4.26	0.02896	4.8	4.21
Germany	4.07219	3.86	-0.21219	-5,2	4.05
İndia	3.38509	3.41	0.02491	0,74	3.37
United Kingdom	3.07067	2.69	-0.38067	-12.4	3.05
France	2.78291	2.68	-0.10291	-3.7	2.77
Russia	2.24042	2.24	-0.00042	-0.02	2.23
Canada	2.13984	2.16	0.01974	0.92	2.13
İtaly	2.01043	2.04	0.02957	1.47	2.00
Brazil	1.9201	1.93	0.03947	2.06	1.91
Australiya	1.67542	1.69	0.05405	3.23	1.67
South Korea	1.66525	1.67	0.0588	3.53	1.66
Mexico	1.41419	1.46	0.10461	9.89	1.41
Spain	1.39751	1.41	0.1171	8.38	1.39
World's GDP	100.562	-	-	-	-
The share of all TOP 15 countries in world GDP	-	-	-	-	75.03

Source: //globalpeoservices.com/top-15-countries-by-gdp-in-2024/

Based on the analysis of GDP in the TOP15 countries, it can be noted that among these countries, the highest percentage of growth in 2024 compared to 2022 was in Mexico (9.89%), Spain (8.39%), Japan (4.9%), the United States (3.9%) and South Korea (3.53%). The largest decrease in this indicator occurred in China (-17.45%), Great Britain (-12.4%), Germany (-5.2%), France (-3.7%) and Russia (-0.02%). Among these countries, the United States ranks first in terms of its share in the total GDP of the world in 2022 (25.32%). In general, the total GDP of the countries that we analyze is 2/3 or 75.03% of global GDP. The total volume of this indicator in these countries in 2022 amounted to 75.43106 trillion dollars. According to forecast data, in 2024 the total GDP of these countries will amount to 71.79 trillion dollars and, compared with the previous year, it is lower by more than 4.8% or 3.64106 trillion dollars. From this we can conclude that only 15 countries in the world produce almost 2/3 of the world's GDP, and the rest of 188 countries 1/3 of it. Note that 188 countries (with the exception of a few countries such as Indonesia, Saudi Arabia, the Netherlands, Turkey, etc.) produce a very small part of global GDP, and inevitably become economically dependent on these 15 countries. They can achieve economic development only after some support from these States. In our opinion, this is also one of the main important reasons, reflecting the low levels of integration between countries.

An increase or decrease in real world GDP as a percentage directly affects the unemployment rate positively and negatively, respectively. For a broader study of this level of influence, consider the annual changes in real GDP growth rates in countries around the world. The real GDP growth rates in countries are affected

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by the inflation process, expressed as a percentage. In the global world, prices for all goods, services, etc. are getting more expensive. Even, it's not a conspiracy of producers, but inflation-an increase in the overall price level. The inflation rate is measured as a percentage. For example, in Azerbaijan in 2023, inflation was 9.5%. Usually, the country's inflation rate is calculated based on the consumer basket approved by the Milli Majlis at the end of the previous year. Achieving a stable, growing competitive economy, resisting internal and external influences is noted in the main goals of the "Strategy of Socio-economic Development of the Republic of Azerbaijan for 2022-2026". To this end, the approved target indicators set a reduction in the inflation rate of 12% in 2022 from 4 to 6% by 2026 (Strategy of socio-economic development of the Republic of Azerbaijan for 2022-2026".

When calculating the inflation rate in Azerbaijan, changes in prices for food and non-food products, all types of services included in the accepted consumer basket are taken into account. However, the population consumes products and services containing this ingredient in varying amounts. People buy products every day, for example, the list of products approved by the Decree of the Cabinet of Ministers of the Republic of Azerbaijan dated June 6, 2014 (No. 182) does not mention wedding rings, mixers or footballs in demand among the population (The composition of the minimum consumer basket in the Republic of Azerbaijan). Inflation has less impact than on other types of goods and services, while prices for food and non-food products are rising from year to year. From this point of view, it can be seen that the price difference between the price tags on supermarket shelves and official data often changes.

Let's compare the growth rates of real GDP in some EU countries in 2016-2023 based on Eurostat data (Table 2).

The data show that in 2016 the highest growth rate among the EU countries was in Cyprus (6.6%), Iceland (6.3%) in the second and Kosovo (5.6%) in the third. Of the 10 countries represented, the lowest level of real GDP growth was in Albania (3.3%), Denmark (3.1%) and in Estonia (3.1%). And in 2020, Ireland took the first place in this indicator (7.2%), Turkey (1.9%) and Lithuania (0.0%) took the second place. But the last-ranked countries did not have economic GDP growth, even their reading was less than

Table 2. List Of EU Countries with the Highest Real GDP Growth Rate, %

Countries	2016	Countries	2020	Countries	2021	Countries	2022	Countries	2023
Gyprus	6.6	Ireland	7.2	Ireland	16.3	Iceland	9.0	Malta	7.5
Iceland	6.3	Turkey	1.9	Malta	13.5	Ireland	8.6	Montenegro	6.3
Kosovo	5.6	Lithuania	0.0	Montenegro	13.0	Gyprus	7.4	Turkey	5.1
Luxembourg	5.0	Luxembourg	-0.9	Croatia	12.6	Croatia	7.3	Iceland	5.0
Malta	4.1	Serbia	-1.0	Turkey	11.4	Portugal	7.0	Kosovo	4.1
Croatia	3.5	Norway	-1.3	Gyprus	11.4	Montenegro	6.4	Lithuania	3.8
Turkey	3.3	Denmark	-1.8	Kosovo	10.7	Spain	6.2	Croatia	3.3
Albania	3.3	Poland	-2.0	Italy	8.9	Greece	5.7	Spain	2.7
Denmark	3.1	Sweden	-2.0	Greece	8.7	Poland	5.3	Denmark	2.5
Estonia	3.1	Switzerland	-2.1	Slovenia	8.4	Austria	5.3	Greece	2.3

Source: //ec.europa.eu/eurostat/databrowser/view/tec00115/default/table?lang=en

zero, for example, Poland (-2.0%), Sweden (-2.0%), Switzerland (-2.1%). Also in 2021-2023. There have been changes in the list of 10 countries with occupied places every year. Including in these years, Ireland took the first place respectively-16.5% (in 2021), Iceland-9.0% (in 2022) and Malta-7.5% (in 2023). Hence, we can conclude that despite the fact that these countries are developed, and in the economic growth of each year does not correspond to the values of the previous year (Sergeev, 2024, p.76). And so, in our opinion, even countries located in other regions are also developing economically ambiguously and the real GDP growth rate differs in percentage terms. Therefore, their occupied places change differently from year to year.

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Establishing the dependence of economic growth on a different group of factors is an important diagnostic issue that allows us to determine the type of economic growth characteristic of any country in a certain period of time. Regression models are the best tool (method) for analyzing, evaluating and forecasting economic growth, including identifying the main factors that directly affect the economic growth of the economic system.

Correlation analysis is a method of modeling and studying the properties of measured data. The initial data consists of a combination of values of the dependent variable and independent variables (explanatory variables). The model parameters are set in such a way that the model is as close to the data as possible. The qualitative criterion for approximating quantities (the objective function) usually shows the standard error. Here it is assumed that the dependent variable is the sum of the values of this model and a random variable. Regression analysis is used to predict, analyze time series, test hypotheses, and identify hidden relationships in data (Glukhov at el., 2000).

The general view of the regression model for determining the dynamics of economic growth is presented in the form:

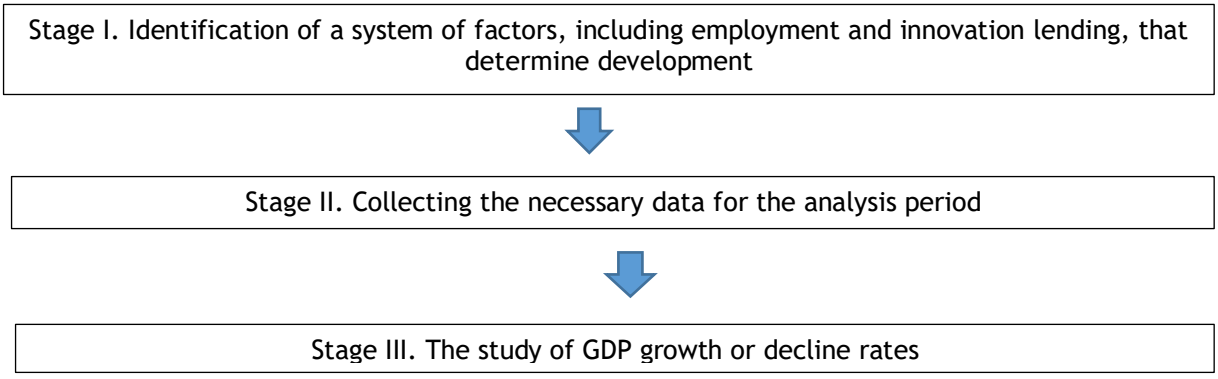
$$Y(t+1)=f\,[\,Y(t),\,X_i(t),\,e\,(t)], \qquad (1)$$

where: Y(t), the gross output of the economy (GDP) in period *t*; Xi(t)-the state of the *i*-th factor (indicators of innovative activity of economic growth, including the volume of loans, the number and income of the population, the number of able-bodied people, employment, the amount of government spending on applied research and development and internal research expenses) at the end of period *t*; e (t) is the forecast error in period *t* (Nikolayeva, 2023; National accounts of Azerbaijan, 2024].

The dependence of the country's GDP growth on a system of independent factors is determined by the passage of the following stages (Figure 1).

Certain systems of factors should influence the value of GDP and be directly related to the degree of innovation activity, so their dynamics will reliably reflect the overall change in innovation in the economy. When collecting materials, statistical data is the only source of information. In our opinion, calculating the average rate for the period under study, determining the minimum and maximum rates of change will allow us to determine the rate of increase in innovative components, economic growth and further determine the most likely development scenarios. The following indicators of innovation activity in the country are taken as independent variables, including the volume of loans, income of the population, employment, the amount of government spending on applied research and development and domestic spending on scientific research, GDP as a dependent variable. The next stage checks the realism of the model by comparing statistical data and calculated GDP values. And in the last stage, a regressive model of

Figure 1. Stages of Building a Regression Model



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Stage IV. Construction and verification of a regression model. Building a multivariate regression model, determining the reality of the model based on comparing the results obtained with real data

Stage V. Building the dynamics of GDP growth until 2024, depending on the above-mentioned system of factors

Source: (Filimenko, 2011, p.16-25; Katarzyna, 2015, p.64)

economic growth and the systems of factors influencing it will be built.

In our opinion, the above approach will allow us to determine the equation of the relationship between GDP and groups of determining factors, assess the degree of influence of individual factors on the value of GDP and determine the type of economic growth of the state. Also, as a result of the construction of the projected GDP volume, it will be possible to establish alternative options for Azerbaijan's economic growth due to the varying degree of influence of key factors.

Development of Hypotheses for Modeling Key Relationships in the Economy of Azerbaijan

The period of analysis, the selection of initial data. To develop an econometric model that ensures economic growth in Azerbaijan, a period covering 2014-2023 was taken. The initial data were used from the statistical collection of the System of National Accounts of the State Statistical Committee of Azerbaijan (Baku, 2024) (Table 3). To present the results of the analysis in a comparative form for 2014, all cost indicators fully cover subsequent years.

Independent variable factors. The following factors are considered as a possible set of factors affecting the value of GDP: 1. Investment factors of reproduction and renewal of fixed assets: X1 is the volume of capital investments, million dollars. X2-investments aimed at the economy, one million dollars.

Labor resources: X3-nominal income remaining at the disposal of the population, one million dollars. X4-is the number of employed people per able-bodied population, one million people.

Innovative factors of economic growth: X5-R&D expenditures from the state budget, million dollars. X6-internal research and development expenses, million dollars.

Each of the above factors has been tested for the possibility of using the regression model as an independent variable. The closeness of the relationship between the selected factors and GDP was established by the special program "Vizual Studio Code" developed by us using the pair correlation coefficient. The following rule was used: • if the correlation coefficient for two quantities (GDP and each factor affecting it) has a value close to ±1, then the relationship between them is considered strong and the factor

Table 3. Initial Data for Building the Model

	GDP, (Y) – million $	The volume of loan investments, (X1) - million $	Investments in the economy, (X2) – million $	Nominal incomes remaining at the disposal of the population	The number of employees in the working-age population	R&D expenditures from the state budget, (X5) - million $	Internal research and development expenses, (X6)- million $

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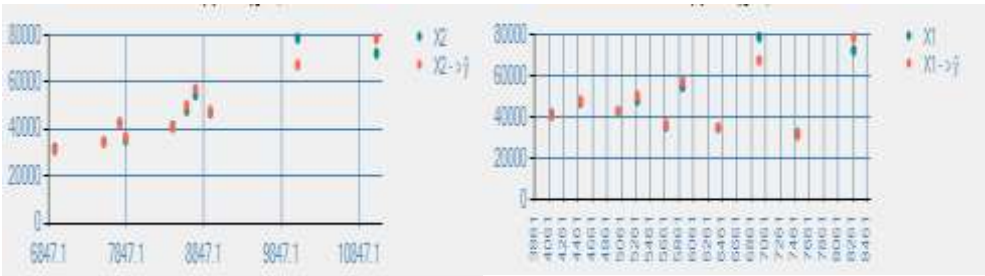
				, (X3) – million $	, (X4) - thousand people.		
2014	34673.3	6401.0	7556.8	19956.2	4602.9	72.97	72.74
2015	31950.6	7501.5	6923.9	22444.2	4671.6	66.51	71.04
2016	35502.5	5676.8	7838.4	24768.1	4759.9	64.75	73.27
2017	41326.6	4094.1	8444.7	26638.9	4822.1	64.51	76.32
2018	47057.6	4494.7	8932.9	28801.2	4879.3	69.21	86.66
2019	48117.6	5281.1	8625.6	30662.9	4785.6	71.86	96.30
2020	42642.8	5016.0	7761.6	29685.9	4721.2	84.37	95.48
2021	54760.9	5909.9	8738.5	30095.1	4831.1	89.19	114.10
2022	78714.9	6967.6	10057.7	36106.8	4901.1	98.59	119.10
2023	72271.2	8277.8	11074.6	40741.0	4963.3	113.75	131.37

Source: National accounts of Azerbaijan, 2024

used in the model; • if the correlation coefficient has a value close to 0 (corr . 0.3), then the relationship between the values used is considered weak and the factor is not taken for use in the model.

The GDP scattering diagrams from each considered factor of the model and the values of the pair correlation coefficients are shown in Fig. 2.1-2.6.

Figure 2.1-2.6



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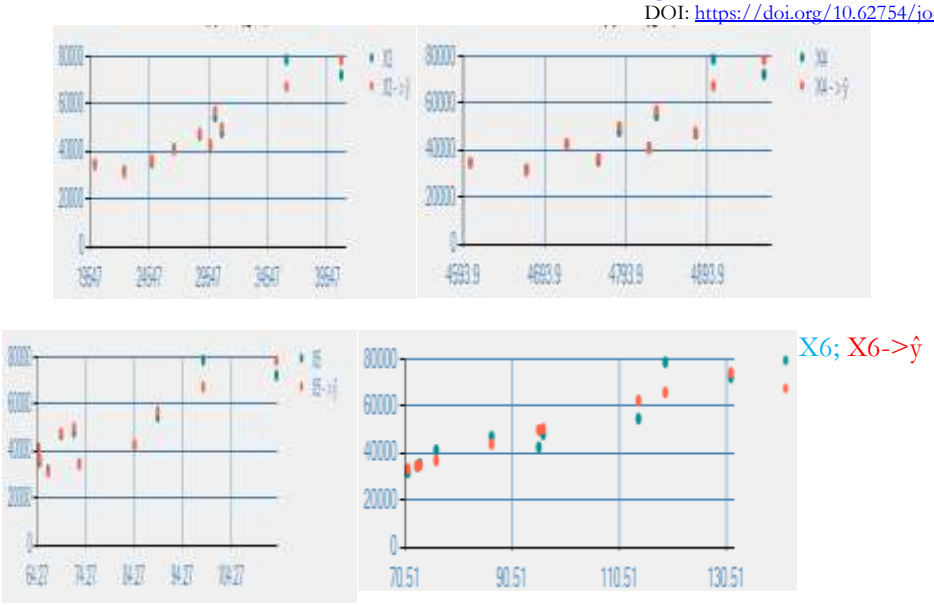

As can be seen from the presented diagrams, all the correlation coefficients between GDP and the independent factors selected for analysis were significant, i.e. capable of having a noticeable effect on the value of GDP. It should be noted that a small number of observations (n = 10) does not allow us to obtain a high quality model. In addition, the quality of the model depends on the degree of mutual influence of independent factors: ideally, there should be no mutual influence. In the real economy, it is extremely difficult to find alternative growth factors due to their complex indirect and sometimes direct effects on each other.

In order to circumvent these problems, estimate the value of GDP separately, and subsequently generalize the influence of all groups of factors based on the geometric mean. To do this, you need to

perform the following modeling steps:

to build three regression models, each of which establishes the relationship between GDP and the corresponding groups of factors; 2) to estimate the sensitivity coefficients of GDP growth rates from the rate of change of factors in each group presented above; 3) to estimate the generalized GDP growth rates from the combined influence of all groups of factors.

Description of the Regression Results

A linear regression model was chosen as an econometric model to study the influence of the selected growth factors on the value of GDP, which in general looks like this:

$$Y=a.X+b, \qquad (2)$$

where: Y is the number of dependent GDP observations (number of observations n=10) from independent factors (k=6); a is regression coefficients, a=1,2, ... ,6. To determine the relationships between GDP and each group of key factors, the capabilities of the "Vizual Studio Code" program were used and the results are presented in Table 4.

Table 4. Matrix of Regression Model Coefficients

A group of independent variables	Leveling up	R^2	The coefficients of the model					
			a_1	a_2	a_3	a_4	a_5	a_6

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Investment factors of reproduction and renewal of fixed assets	$GDP^1= a_1^1$ x $X_1+a_2^1 x\ X_2 +$ b^1	0.8683	1.3953	11.3696	-	-	-	-
Human resources	$GDP^2= a_3^2$ x $X_3+a_4^2 x\ X_4 +$ b^2	0.8427	-	-	2.2187	8.4714	-	-
Innovative factors of economic growth	$GDP^3= a_5^3$ x $X_5+a_6^3 x\ X_6 +$ b^3	0.8581	-	-	-	-	3.0665	673.1284

The coefficients of determination R^2- (respectively: 0.8683; 0.8427; 0.8581) are sufficient to confirm the high reliability of the results obtained. This shows that all the factors used that affect the value of GDP are taken into account in the models.

Also, in the study, based on the selected data, a correlation model of economic growth In (Y) was built depending on many factors (1,2, ... ,6 factor) and this formula is expressed in this form:

$$Y=a_0x_{0+}\ a_1x_{1+}\ a_2x_{2+}\ a_3x_{3+}\ a_4x_{4+}\ a_5x_{5+}\ a_6x_{6+}u, \quad (3)$$

where: x0=1; u is the deviation from the regression function (i.e. dissatisfaction).

Based on the calculation using the "Vizual Studio Code" program, the following formulas were obtained:

$$GDP=-38121.25+0.7712\ V_i+6.6459\ I_e-0.0562N_{ir}\ -0.9264N_{qp}-99.3303E_{sb}+417.2524\ I_{rde}.$$

$$R_m=0.9592;\ R^2=0.9201;\ S_e=4729.7848;\ DW=1,97.$$

The Darbin-Watson criterion (DW), which is an indicator of the adequacy of the model obtained from the calculation, is determined at the level of significance of the statistical values dL=0.23 and du=2.193 in the case of α=0.01 (1%). Also, it is determined at the level of significance of the statistical values dL =0.56 and du=2.21 in the case of α=0.05 (5%) (Kremer, 2001, p.447). At the same time, three hypotheses of the autocorrelation residue in the model were tested:

When DW > dL, the hypothesis is rejected in the absence of a true autocorrelation residue.

In the case of dL ≤ DW≤ du, the hypothesis remains open.

When DW > du, u is taken as a hypothesis. If we look at the hypothesis, DW >du, or 2.2193>1.97, the absence of an autocorrelation balance in the real price is assumed at the level α=0.001 (1%) of the Darbin-Watson criterion.

Thus, the economic growth of GDP in Azerbaijan and its projected value can be solved on the basis of long-term data of the factors selected for the case under consideration. Note that the model justifies itself in determining the dependence of GDP in any country on multinational factors. The model allows us to determine the form of impact reflecting the dependence of economic growth of GDP in any period on the influence of various factors.

Discussion

In the study, V. I.Ismayılov concludes that the mission of the digital economy in the economic development of Azerbaijan is to improve the quality of life of the population, ensure competitiveness and national

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security of the country, and the goal for the future within 15-20 years is to join the group of leading economies of the world through the development of the digital economy in this industry and catch up with the average standard of living of the population in the world (Ismayılov, 2024, 8).

Economic growth is closely linked to an increase in the standard and quality of life of the population: -an increase in life expectancy; -quality of medical care; - quality education and accessibility; -reduction of working hours; - safety of citizens, etc. There are two types of economic growth: extensive and intensive. Extensive economic growth is achieved with a quantitative increase in the factors of production while maintaining the same technical basis. Intensive economic growth is achieved through the use of more progressive means and economical items of labor, improving the skills of the workforce and using production potential, raw materials and supplies. Research on long-term economic development is mainly conducted on the basis of a database compiled by Angus Maddison. It is based on historical growth data, introducing a new version of the Maddison Project database, but also includes a comparison of countries' incomes by year. These mentioned changes open up new opportunities for long-term development models and income convergence in different countries (Bolt at el., 2018). R.J. Barro notes in the study that the modern database of the Maddison project provides us with a more systematic approach to analyzing other issues that require long-term data on GDP per capita. He argued that long-term data series are needed to reliably estimate the rate of convergence. Existing data indicate that the convergence rate is 2% and its new "convergence by country" indicator confirms this figure, but is estimated much more reliably. This explains that the error in measuring income convergence was less than that of the 'growth' indicator (Barro, 2015, p.911).

Ch. A.Ibrahimli notes in his research that progressive changes due to the influence of e-business on economic growth can create conditions for a qualitative economic recovery to a new level. The need for new directions in studying the impact of e-business on economic growth is justified by the systematic measures taken by individual countries against the spread of infectious diseases in early 2020. And puts forward a position according to which appropriate concepts should be developed, taking into account the impossibility of using physical resources necessary for the functioning of traditional and electronic business in the economy (İbrahimli, 2020, p.21).

The Italian theologian and economist F. Aquinas, in his treatise Summa Theologica, considered the concept of a fair price, which he considers necessary for the reproduction of public order. In many ways, the concept presented is similar to the modern concept of long-term equilibrium, which indicates that a fair price is sufficient to cover production costs. He argued that it was immoral for sellers to raise prices just because buyers had an urgent need for a product.

Some studies have noted that low unemployment (with high demand for labor resources and an unfavorable demographic situation, increasing migration outflow), as well as its high level (with low demand for labor resources and a favorable demographic situation, positive migration inflow), have a destructive effect on the dynamics of economic growth (Slepneva, 2024, p. 913). But, in our opinion, regions characterized by low per capita GRP with low and average employment, high unemployment is an indicator of "labor surplus" and this contributes to economic growth. And for regions with a high per capita GRP with a high and average level of employment, low unemployment is an indicator of "labor shortage" and "slows down" economic growth. It should be noted that both the low unemployment rate and its high level can have a destructive effect on the dynamics of the country's economic growth.

Some scientists point out that investments in technology play an important role in economic development. Technological progress makes it possible to automate production and increase its efficiency, reduce production costs and improve product quality. Investments in research and development of new technologies promote innovation, which allows companies to create new goods and services, increasing their competitiveness and, ultimately, stimulating economic growth (Litvinyuk, 2023, p.70). Investment in human capital is a determining factor of economic growth. Since the development of education, professional training and professional development of human resources can increase their productivity and improve their competitiveness in the labor market. This process also contributes to the development of innovation and technological progress in the country. For example, subsidies provided by the state to

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support employment create a multiplier effect for the national system of the country. At the same time, an increase in the number of employed people affects the volume of demand, which means that a large volume of supply is required. As a result, the economic activity of all economic entities of the country is stimulated.

We must also not forget that investments are a source of financing for entrepreneurship. Small and medium-sized enterprises play an important role in creating new jobs and stimulating economic growth. Thanks to investments aimed at developing the economy, small and medium-sized enterprises can also gain access to credit resources and organizational support, allowing them to develop. In turn, an increase in the number of efficient small and medium-sized enterprises leads to active economic growth and the creation of new jobs. And this allows for an increase in the level of employment, which is one of the main indicators of economic growth in the country. Investments play an important role in stimulating production, promoting the use of advanced technologies, improving infrastructure and developing human capital. Thus, targeted investments help to create a favorable environment for economic development, which directly affects the improvement of the quality of life of the population.

Identifying problems in the field of wage regulation (Kostyakova, 2018, p.791] notes that this indicator has a negative impact on the development of the economy. Among these problems are low wages, GDP, high income differentiation, a low proportion of the middle class, and a high number of “working poor". The characteristic of the population as a producer of material goods is the labor potential. The labor potential includes a set of various qualities that determine the working capacity of the population. Thus, summarizing our research, we can note the following-investments aimed at developing the economy, helps to gain access to loans, and allows small and medium-sized enterprises to develop; - that low and high unemployment have a destructive effect on the dynamics of economic growth; -intensive economic growth is achieved through the use of more progressive means and economical items of labor, improving the skills of the workforce and using production potential, raw materials and supplies; - economic growth is closely and directly related to the growth of the standard and quality of life of the population.

Conclusions

Gross domestic product is one of the key multipliers of macroeconomics, if GDP in a country is growing, then the economy is developing and therefore there are favorable opportunities for finding a job in the profession. The growing interest in structural and growth theories of economics is explained by the crisis state of the country, which is due to the reasons for the growth characteristics. One of the main priorities of the country's public policy in the long term is to achieve economic growth and maintain its pace at a stable and optimal level of the national economy. Factors of market conditions and innovative economic growth-indicate the current state of the external macro- and microenvironment, as well as the internal environment of a country or region, determine the demand for products (the number of population and able-bodied people, the amount of products produced per person) produced within the country, lead to an expansion or reduction of production. Countries with a low per capita GRP with low and average employment, high unemployment contributes to economic growth, and with a high value -with high and average employment, low unemployment ”slows down" economic growth.

Analyzing the data of the 10 EU countries, we came to the conclusion that despite the fact that these countries are developed, and their economic growth each year does not correspond to the values of the previous year. And so, in our opinion, even countries located in other regions are also developing economically ambiguously and the real GDP growth rate differs in percentage terms. Therefore, their occupied places change every year. An analysis of the inflation rate in Azerbaijan has shown that it has less impact than on other types of goods and services, while prices for food and non-food products are rising from year to year. From this point of view, we can say that the price difference between the price tags on supermarket shelves and official data often changes. In our opinion, the calculation of the average rate for the period 2014-2023, the determination of the minimum and maximum rates of change will allow us to establish the rate of increase in innovative components, economic growth. The indicators of innovation activity in the country are taken as independent variables, including the volume of loans, income of the population, employment, the amount of government spending on applied research and development and

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domestic spending on scientific research, and GDP as a dependent variable. The constructed correlation-regression model justifies itself in determining the dependence of GDP in any country on multinational factors. It allows us to determine the form of impact reflecting the dependence of economic growth of GDP in any period on the influence of various factors.

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