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TRENDS IN THE DEVELOPMENT OF THE LABOR MARKET IN THE REPUBLIC OF ARMENIA

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ABSTRACT

The topic is relevant in that 2020 was a turning point for the labor market of the Republic of Armenia, given the consequences of the Covid-19 pandemic, and then the war. In this sense, it can be argued that a great crisis is expected in the labor market itself, since one of the characteristics of this market is that in its center there is a person offering his job.

The object of the study of the article is the system of regulation of employment in the labor market of the Republic of Armenia, and the goal is to develop a new regulation model based on the results of a multifaceted analysis of the labor market of the Republic of Armenia, as well as the implementation of forecasts for changes in the number of employees by institutional sectors of the economy and types of economic activity for 2023-2030. To achieve the goal, the following tasks were proposed and solved:

The dynamics of the number of employed in different sectors of the economy was analyzed: industry, energy, construction, trade and services.

A correlation model was developed, the results of the correlation analysis were evaluated and presented.

The forecasts of changes in the number of employees by institutional sectors of the economy and types of economic activity for 2023-2030 have been made.

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Introduction.

2020 was a turning point for the RA labor market, given the consequences of the Covid-19 pandemic and then also the 44-day war. In this sense, it can be argued that a major crisis is expected in the labor market itself, because one of the characteristics of this market is that at its center is the person who offers his work. Therefore, it is necessary to develop new ways of improving the regulation of the labor market, based on the comprehensive and thorough analysis of the market, which was carried out within the framework of the article.

Materials and Methods.

The basic principles of classic and modern theories of economics, works of domestic and foreign researchers, legislative and sub-legislative acts regulating the field were the theoretical and methodological basis for solving the problems presented in the research.

Below are a few:

- Legal information system of Armenia, <https://www.arlis.am/DocumentView.aspx?DocID=102510>, where the freedom of citizens in choosing a job is presented.
- RA Statistical Committee, <https://www.armstat.am/file/doc/99516743.pdf>, website presents statistical data on the RA labor market and employment.
- Central Bank of RA, <https://www.cba.am/am/SitePages/statrealsector.aspx>.
- Stepanyan "Employment as the most important factor of economic growth" European University, collection of scientific articles 9, Yerevan 2018, p. 1-18, which presents essays on the main concepts of employment.
- Eliseeva I. И. "Econometrika" M.: Prospect, 2009, st. 54-66, through which correlation analysis was carried out.
- Eliseeva I. И. "Econometrika" M. Yuright, 2014, p. 76-79, where the econometric model logarithm methods are presented.
- Kremer N. Sh., Putko B. A., "Econometrika", Uniti, Moscow, 2003, st. 170, which presents Darbin Watson's calculation criteria.
- Magnus Ya. R., Katyshev P. K. , Peresetskiy A. A. "Ekonometrika", publishing house "Delo", Moscow 2004, st. 10, with the help of which we estimated the model by the method of least squares.
- Носко В. П., "Econometrics for beginners", Institute of Economics of the Transition Period, Moscow, 2000, st. 54-62, here are calculations regarding the probabilities of the coefficients being 0.
- Greene W.H., Econometric Analysis, 5th edition, Prentice-Hall, Upper Saddle River, New Jersey, 2003, P31, with the help of which the coefficient of determination of the estimated model can be calculated.

The development and implementation of effective solutions to the presented problems require the use of economic mathematical modeling tools, optimization models and scientific research methods necessary for the application of these tools. An econometric model was also applied and then a correlation analysis was performed. an econometric model is a probabilistic-statistical model that describes the functioning mechanism of an economic or socio-economic system. Correlation is a statistical dependence between random variables, which does not have a strictly functional nature, and in which a change in one of the random variables leads to a change in the mathematical expectation of the other variable. Correlation is a statistical dependence between random variables, which does not have a strictly functional nature, and in which a change in one of the random variables leads to a change in the mathematical expectation of the other variable.

Results.

Within the framework of the article, the development of a new regulation model was carried out based on the results of a multi-faceted analysis of the RA labor market, as well as the implementation of forecasts of changes in the number of employees according to the institutional sectors of the economy and types of economic activity for 2023-2030, which will be the basis for the further development of the sector and the application of effective methods of regulation perspective.

Discussion.

Based on the theoretical approaches of the Stepanyan's article (2018) "Employment as the most important factor of economic growth", the terms observed in the research in the main 4 branches of the GDP and the economy have been completed(p.1-18) . In particular, in this research, the years 2002-2022 were considered. GDP at market prices, gross fixed assets at market prices, 2002-2021. the average annual number of people employed in agriculture, hunting and forestry, fishing, aquaculture, industry, including energy, construction and trade and other services. The selection of the specified period is due to the classification of the branches of the economy, which is similar for the years selected in the research, and according to this classification, it was possible to present the number of employees in the economy according to 4 main branches of the economy: agriculture, hunting and forestry, fishing, fish farming, industry, including energy, construction, trade and other services. Let's look at the dynamics of the number of employed people in these 4 branches of the economy.

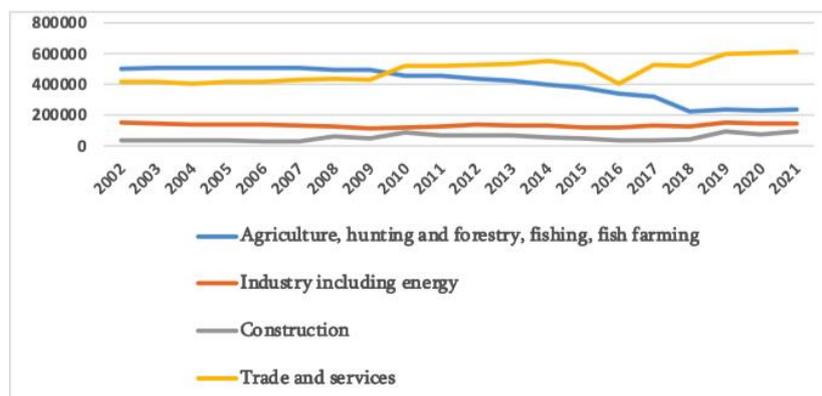


Figure 1. Dynamics of employment in agriculture, hunting and forestry, fishing, aquaculture, industry, including energy, construction, trade and services in 2002-2021.

As can be seen from the chart, the number of employees in both sectors significantly exceeds the number of employees in the other two sectors. First of all, until 2010, the number of people employed in the fields of agriculture, hunting, forestry, fishing and fish farming, which in 2009 amounted to 496,000 people, exceeding the number of people employed in the other three sectors.

Then the situation changed, as the number of people employed in that sector began to decrease. Even in this case, in the field of agriculture in 2021 the number of registered employees, which is 237,400 people, exceeds the number of people employed in industry and construction. After 2010, the number of employees in the trade services sector begins to increase sharply, surpassing the number of workers in other sectors, and in 2021. is established at the level of 610,100 people. This once again expresses the trends in the current world and the increase in the weight of the trade and service sector, which is due to the acceleration of the rate of introduction of the latest technologies. Armenia does not lag behind these processes either. In terms of the number of employees, the industry sector took the third place. The dynamics of the number of people employed in the industry, including the energy sector, was not so fluctuating: in 2021, compared to 2002, the number of people employed decreased by about 0.62%.

In 2021, the number of people employed in the construction sector was 96,000, in 2020, it increased by 27.83% compared to the previous year. 2015-2018 employment in construction was at a minimum level, but in 2019 the maximum number of the entire observed period is recorded: 96,600 people. There is a time lag in terms of GDP and gross fixed capital formation indicators. In particular, both indicators are calculated for some years in 1993. methodology, and in recent years, in 1998. methodology. Considering the fact that in 2012-2014 the data are calculated both in 1998 and 1993. methodology, we adjusted the series by the appropriate factor. Thus, to get acquainted with the dynamics of the volume of GDP and capital accumulation in 2002-2022, let's look at the following diagram. As a result, two indicators were obtained for 2002-2018. rows calculated in 1993 methodology.

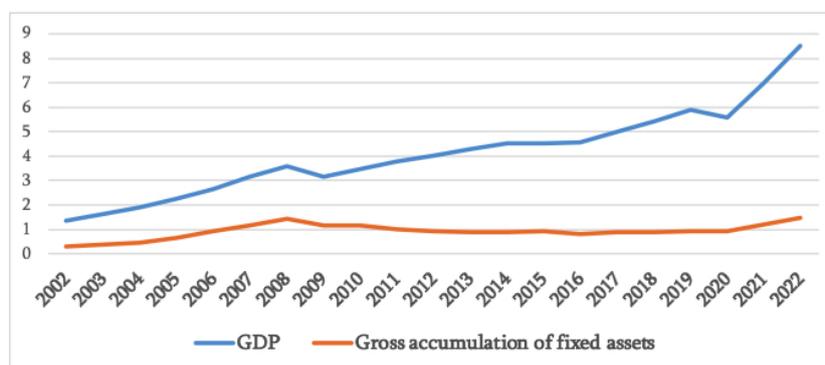


Figure 2. Dynamics of the volume of GDP and gross accumulation of fixed assets in 2002-2022.

It can be seen from the chart that the maximum level of both the gross accumulation of fixed assets and the volume of GDP was observed in 2022: 1,487,399.1 and 8,496,777.90 trillion drams, respectively. Examining the series of GDP and gross fixed capital, we notice that they have almost the same nature of fluctuation during the considered period. Both increase and decrease at the same time.

Econometric model.

Based on the theoretical approaches presented above and the statistical database, an econometric model with the well-known Cobb-Douglas specification was presented.

$$GDP_t = A * K_t^{a_1} * L_t^{aga_2} * L_t^{sa_3} * L_t^{inda_4} * L_t^{consa_5} * S_t \quad (1),$$

where:

GDP - is the gross domestic product at market prices in year t,

K_t - is the gross accumulation of fixed assets at market prices in the the year,

L_t^{ag} - is the average annual number of employees in trade and other services in year t,

L_t^S - is the average annual number of employees in trade and other services in year,

L_t^{ind} - is the average annual number of employees in the industry in year t,

L_t^{cons} is the average annual number of employees in construction in year t,

A - and a_1, \dots, a_5 - are the unknown parameters of the model,

ε_t - is the unknown parameter of the model at the t -th observation

t is the year index. Moreover: $t = 2002; 2022$.

Model customization.

According to Eliseeva I. И. "Econometrika" M. Yuright, (2014), to estimate the model (1), it is necessary to linearize it. For this purpose, the model was logarithmized and the following results were obtained (p. 76-79):

$$\ln GDP_t = \ln A + a_1 * \ln K_t + a_2 * \ln L_t^{ag} + a_3 * \ln L_t^S + a_4 * \ln L_t^{ind} + a_5 * \ln L_t^{cons} + \ln \varepsilon_t, \quad (2)$$

where:

$\ln GDP_t, \ln K_t, \ln L_t^{ag}, \ln L_t^S, \ln L_t^{ind}, \ln L_t^{cons}$ - are the corresponding variables presented above in logarithm.

(2) making the following designations in the model:

$$\ln A = a_0 \text{ и } \ln \varepsilon_t = \mu_t, \quad \ln A = a_0 \text{ и } \ln \varepsilon_t = \mu_t,$$

we will get the model with the following specification.

$$\ln GDP_t = a_0 + a_1 * \ln K_t + a_2 * \ln L_t^{ag} + a_3 * \ln L_t^S + a_4 * \ln L_t^{ind} + a_5 * \ln L_t^{cons} + \mu_t, \quad (3)$$

Correlation analysis. Then, let's perform a correlation analysis with the logarithmic variables in model (3).

Dependent Variable: LGDP_SM				
Method: Least Squares				
Sample: 2002 2022				
Included observations: 19				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LK_SM	0,24	0,0299	8,03	0,0000
LLAG_SM	0,57	0,1563	3,62	0,0031
LLS_SM	4,65	0,3545	13,12	0,0000
C	-56,4	6,2732	-8,98	0,0000
R-squared	0,99	Mean dependent var	14,99	
Adjusted R-squared	0,99	S. D. dependent var	0,41	
S.E. of regression	0,03	Akaike info criterion	-3,97	
Sum squared resid	0,01	Schwarz criterion	-3,78	
Log likelihood	37,76	Hannan-Quinn criter	-3,95	
F-statistic	985,65	Durbin-Watson stat	1,98	
Prob(F-statistic)	0,0000			

Table 1. Correlation analysis results.

Indicators	LGDP	LK	LLAG	LLCONS	LLIND	LLS
LGDP	1					
LK	0.76	1				
LLAG	-0.71	-0.19	1			
LLCONS	0.43	0.46	-0.02	1		
LLIND	-0.70	-0.71	0.39	-0.45	1	
LLS	0.70	0.42	-0.49	0.69	-0.32	1

As the correlation coefficients show, all of the independent variables, except for the logarithm of the number of workers in construction, have a strong dependence with the logarithm of GDP. However, on the other hand there are relationships between independent variables. In particular, there is a strong relationship between the number of workers in the industry and the logarithm of fixed asset accumulation, which can cause problems in the model. In addition, note that the relationship between the index of accumulation of fixed assets and GDP is stronger than the relationship between the

number of people employed in industry and the logarithm of GDP. Taking into account the results of the correlation analysis, we can present the model (3) with a new specification as follows.

$$\ln GDP_t = a_0 + a_1 * \ln K_t + a_2 * \ln L_t^{ag} + a_3 * \ln L_t^s + \mu_t, \quad (4)$$

(4) before estimating the model, note that the variables in the model have been smoothed. After these changes, the following model with smoothed series was presented for evaluation.

$$\ln GDPSA_t = a_0 + a_1 * \ln KSA_t + a_2 * \ln L_t^{agSA} + a_3 * \ln L_t^{sSA} + \mu_t, \quad (5)$$

where:

$\ln GDPSA_t, \ln KSA_t, \ln L_t^{agSA}, \ln L_t^{sSA}$ – are model variables with smoothed rows.

Model evaluation and obtained results.

Magnus Ya. R., Katyshev P. K., Peresetskiy A.A. (2004) demonstrated the model, which have been estimated by the method of least squares (p.10).

With the final specification (5), the model was estimated by the method of least squares, as a result of which the following estimated model was obtained.

$$\ln GDPSA_t = -56 + 0,24 * \ln KSA_t + 0,57 * \ln L_t^{agSA} + 4,65 * \ln L_t^{sSA}, R^2_{nlm} = 0.99, DW \sim 2, \quad (6),$$

where:

$\ln GDPSA_t$ - is the estimated value of the model's dependent variable at the t-th observation.

Within the framework of the article, forecasts of changes in the number of employees according to institutional sectors of the economy and types of economic activity for 2023-2030 were also implemented.

Table 2. Forecasts of changes in the number of employees by institutional sectors of the economy and types of economic activity in 2023-2030.

Type of activity	Year							
	2023	2024	2025	2026	2027	2028	2029	2030
1	2	3	4	5	6	7	8	9
Agriculture, hunting and forestry, fishing, fish farming	8 844	9 073	9 389	9 441	9 770	9 846	10 146	10 239
Mining and quarrying	11 719	12 091	12 535	12 945	13 358	13 771	14 183	14 595
Manufacturing	83 518	86 373	89 417	92 367	95 318	98 268	101 217	104 167
Construction	30 436	32 547	34 701	36 854	39 008	41 161	43 314	45 467
Wholesale and retail trade, repair of cars and motorcycles	133 793	141 563	149 263	156 119	161 400	173 242	179 266	183 985
Transportation and warehousing	21 967	22 309	22 591	22 927	23 261	23 548	23 864	24 180
Accommodation and public catering	36 790	35 024	38 080	37 843	43 122	41 652	47 067	45 418
Information and communication	48 565	54 469	59 824	65 390	70 957	76 525	82 094	87 664
Financial and insurance activities	21 825	21 806	21 900	21 955	22 011	22 349	22 289	22 362

Table 2. Contanuation.

1	2	3	4	5	6	7	8	9
Real estate activity	9 106	9 276	9 423	9 574	9 726	9 879	10 032	10 185
Professional, scientific and technical activity	27 286	28 583	29 809	31 048	32 291	33 536	34 781	36 027
Administrative and support activities	18 507	19 103	20 100	20 777	21 727	22 402	23 336	23 964
Public administration and defense, mandatory social security	35 847	34 168	34 908	33 038	33 719	32 024	32 617	30 928
Education	120 854	122 598	124 154	125 807	127 457	129 105	130 752	132 398
Health care and social services of the population	51 823	52 969	54 254	55 435	56 618	57 804	58 991	60 178
Culture, entertainment and leisure	18 021	17 967	18 586	18 127	17 897	19 220	18 249	18 053
Maintenance and other services	31 520	34 855	38 091	41 346	44 604	47 864	51 125	54 387
Only	710421	734773	767026	790994	822244	852194	883322	904197

Forecasts of changes in the number of employees in the main sectors of RA economic activity for the years 2023-2030 are presented.

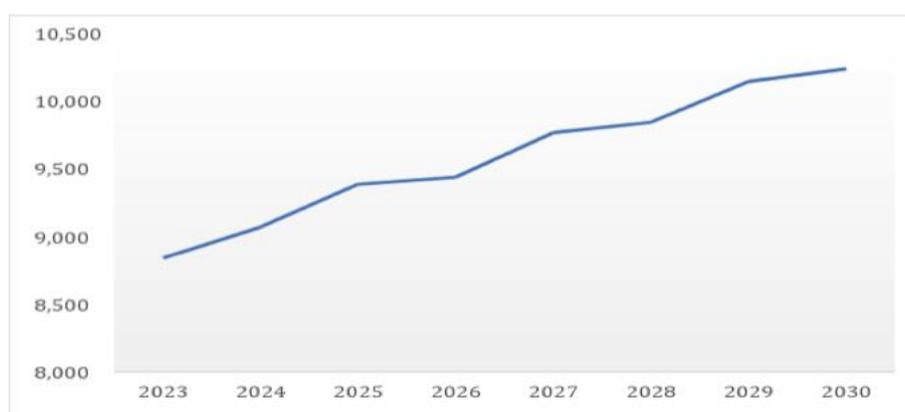


Figure 3. Agriculture, forestry economy and fishing.

As Figure 3 shows, the highest number of workers in agriculture, forestry and fishing will be registered in 2030, with 10,239 workers.

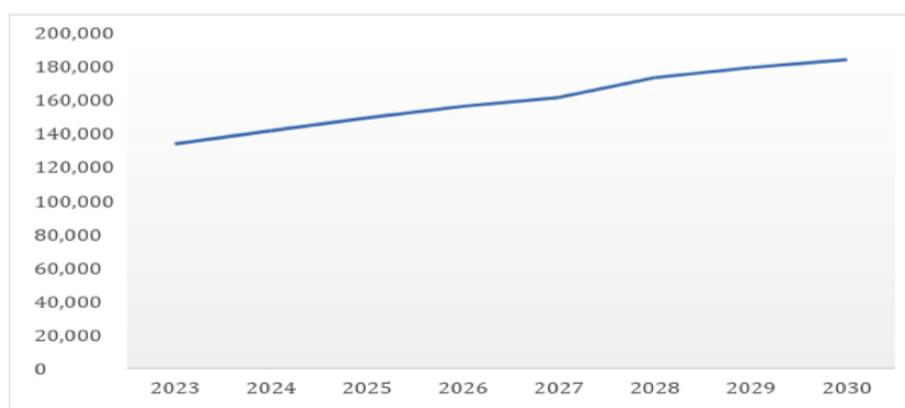


Figure 4. Wholesale and retail trade, repair of automobiles and motorcycles.

Wholesale and retail trade, automobile and motorcycle repair will also have the highest level of employment in 2030, with 183,985 workers.

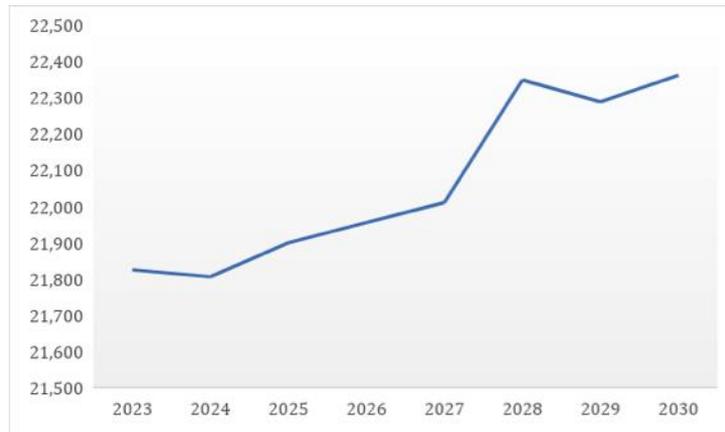


Figure 5. Financial and insurance activities.

In the field of financial and insurance activities, the highest level will be recorded in 2030 - 22,362 workers, and in 2028 - 22,349 workers.

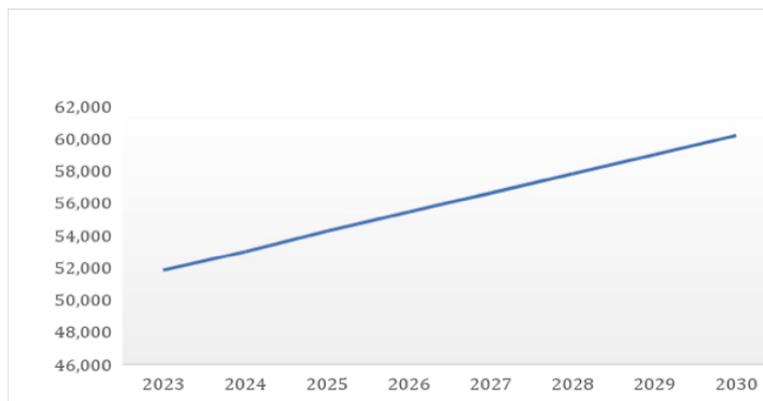


Figure 6. Health and social services of the population.

As can be seen from chart 6, the number of employees in the field of health care and social services of the population will increase year by year in 2023-2030, and in 2030, 60,178 employees will be registered.

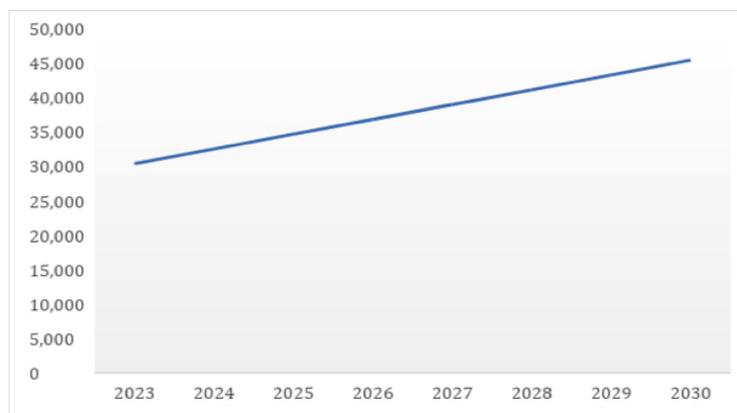


Figure 7. Construction.

The number of workers in the construction sector will increase year by year and in 2030, 45,467 workers will be registered.

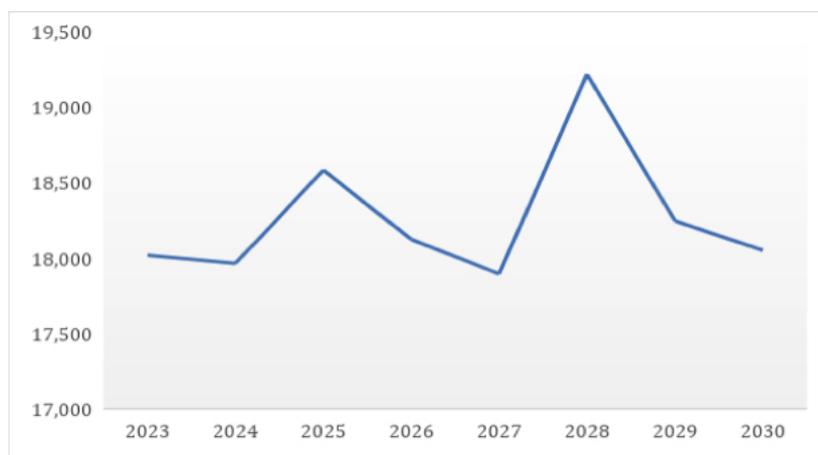


Figure 8. Culture, entertainment and leisure.

Culture, entertainment, and recreation will peak at 19,220 workers in 2028 and decline to 18,053 workers in 2030.

Conclusions.

Thus, as of 2021, the highest level of the number of employees was registered in the trade and services sector, which once again expresses the trends in the current world and the increase in the weight of the trade and services sector, which is due to the acceleration of the rate of introduction of the latest technologies. Armenia does not lag behind these processes either.

Also, as a result of the study, it became clear that the maximum level of both the gross accumulation of fixed assets and the volume of GDP was observed in 2022.

Summarizing the forecasts of changes in the number of employees, we came to the conclusion that agriculture, forestry and fishing, mining industry and open pit mining, manufacturing, construction, wholesale and retail trade, automobile and motorcycle repair, transportation and warehousing, information and communication, financial and insurance activities, real estate activities, professional, scientific and technical activities, administrative and support activities, education, health care and social service of the population, other services will register the highest level in 2030, accommodation and public catering in 2029, culture, entertainment and recreation in 2028, and public administration and defense, mandatory social security in 2023.

According to Greene W.H (2003) and Kremer N. Sh., and Putko B. A. (2003) if the corrected coefficient of determination of the model (6) estimated in the article is close to 1, the Darbin Watson criterion is close to 2 (p.31) (p.170). According to Nosko V. P (2000) The probabilities of the coefficients being zero are close to zero (p.54-62). The general pattern is also significant.

Thus, the obtained results prove that a reliable model was obtained, from which the following conclusions can be made.

1. A 1% increase in the volume of gross accumulation of fixed assets in a given year, other things being equal, can lead to a 0.2% increase in the volume of GDP in a given year.

2. A 1% increase in the number of people employed in agriculture in a given year, other things being equal, can lead to a 0.6% increase in the GDP of a given year, which indicates extensive agriculture.

A 1% increase in the number of people employed in trade and services in a given year, other things being equal, can lead to a 4.7% increase in GDP in a given year.

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