

**REPUBLIC OF AZERBAIJAN**

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**ABSTRACT**

of the dissertation for the degree of Doctor of Philosophy

**ECONOMIC PROSPECTS FOR THE DEVELOPMENT OF  
THE GOLD MINING INDUSTRY IN THE REGIONS OF  
AZERBAIJAN**

Speciality: 5312.01 – sectoral economy

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## GENERAL CHARACTERISTICS OF WORK

### **Relevance and degree of scientific elaboration of the topic.**

Development of the gold mining industry in Azerbaijan contributes to the emergence of one of the most strategically important sectors of the republic's economy. Today, when Azerbaijan faces the goal of modernizing and diversifying the national economy through prevailing development of the non-oil sector, the revival of the gold mining industry entails the need for its development in market conditions. In addition to providing the country's industry with gold, creating a gold reserve and ennobling the commodity structure of exports, the national gold mining industry obviously performs a very important function of improving the socio-economic situation in the regions where gold is mined, and contributes to balanced socio-economic development of the country and its regions.

Gold plays a huge role in ensuring economic and defense security, which Azerbaijan is in dire need of today. All products of such strategic industries as defense, space, engineering, shipbuilding are traditional consumers of gold, which requires the intensification of the work of gold mining. Gold mining also creates demand for the products of dozens of related industries, including mechanical engineering. In this regard, the importance of its own mineral resource base of gold in ensuring the balanced development of economic sectors is exceptionally growing.

Effect of the implementation of the measures provided for in the "Strategic Roadmap for the Development of Heavy Industry and Mechanical Engineering" can ensure real GDP growth by 1.56 billion manat, while an increase in GDP by 1 billion manat is planned to be achieved through the development of the mining industry and metallurgical complex. In particular, gold for Azerbaijan is a priority and highly liquid type of strategic minerals along with fuel and energy raw materials and some other important minerals. The economic and socio-political role of gold for Azerbaijan is confirmed by the attention paid to this industry by President of Azerbaijan Ilham Aliyev, who created AzerGold CJSC

in February 2015. It is from this period that the industry's "second wind" opens.

As is well known, the richest minerals, including gold, in Azerbaijan were under the occupation of Armenian terrorists for almost 30 years. So, in these territories there are 155 deposits of various types of minerals, including 5 documented gold deposits. A detailed analysis of the predatory exploitation of gold deposits by Armenian entrepreneurs on the territory of Azerbaijan, considered in paragraph 2.2. of this dissertation, is valuable material for the Azerbaijani side to prove the plundering of minerals on previously seized lands. Thus, the victorious return by Azerbaijan of its Karabakh, and with it the rich gold deposits, opens a "new" page in the gold mining industry of Azerbaijan.

Gold is a testament to the economic power of the state, traditionally serving as a currency metal and the state's reserve fund. Most of the gold is stored in the form of a gold reserve, which ensures stability of the money supply, and is also used for mutual settlements with foreign countries and payment of government debts. The need for gold, as a means of payment and a commodity, is constantly increasing in modern conditions, and growing consumption of gold against the background of a decreasing supply forms a trend of continuous outstripping global demand for gold and the dynamics of growth in world prices for this precious metal. Consequently, the gold mining industry of Azerbaijan, as a young branch of the economy, has a promising future. And the study of individual problems in this industry is of particular importance for the republic.

Degree of scientific elaboration of the problem. Issues of rational development of deposits of gold and other mineral resources have always been the subject of research of foreign and domestic scientists. Geologists of different generations were engaged in gold deposits in Azerbaijan, including the Lesser Caucasus. The first works in this direction on the material composition of ores were carried out by G.Efendiyev, M.A.Kashkay (1960), T.G.Tvalchrelidze (1963, 1965), R.N.Abdullayev (1971) and others.

Certain problems of industry were considered in the works of Azerbaijani economists such as A.A.Nadirov, A.H.Nuriyev, T.T.Huseynov, A.A.Aliyev, F.A.Farajov, R.P.Sultanova, G.Z.Yuzbashiyeva. However, without belittling the importance and dignity of the works of the above scientists, this problem was not the object of a special study.

It should be noted that the development of the gold mining industry is still poorly reflected in the economic literature of Azerbaijan. The theoretical and methodological base is not developed deeply enough, there is no purposeful and systematic approach in the scientifically based recommendations, which hinders the development of the gold mining industry in practice. All this requires a deeper analysis of the problem and an integrated approach to its solution in modern conditions.

**Purpose and tasks of the research.** The purpose of the dissertation is to develop scientifically based recommendations for determining the prospects for the development of the gold mining industry of the Republic of Azerbaijan, taking into account the stability of the country's economy as a whole and separately its gold-bearing regions.

To achieve this goal, the dissertation was solved the following tasks:

1. To reveal the importance of the mineral resource base of gold in the modern economy of the republic;
2. To study foreign experience of gold mining and the work of enterprises in this industry;
3. To give a description of the main deposits and objects of the gold mining industry of the republic;
4. To reveal the objective prerequisites for the revival of the gold mining industry in Azerbaijan;
5. To analyze the state of the gold mining industry in the republic in the context of the geopolitical problems of the region;
6. To evaluate the production and economic activity of gold mining enterprises in Azerbaijan;

7. To show government support for the regulation of efficient gold mining and the functioning of gold mining enterprises in the republic;

8. To determine the ways of development of the gold mining industry in Azerbaijan:

9. To develop a methodological approach to modeling the economic assessment of the impact of gold production on the macroeconomic indicators of the Republic of Azerbaijan, and in particular the Ganja-Kazakh economic region;

10. To substantiate the prospects for the development of the gold market and Azerbaijan's place in the world gold export.

**Research object.** The object of research is the gold mining industry of the Republic of Azerbaijan. **Research subject.** The subject of the research is a comprehensive review of the current state of the country's gold mining industry with the subsequent formation of the prospects for its development in the regions of the country in the near future.

**Research methods.** Research was based on the principles of an integrated approach, using methods - abstract-logical, analytical-predictive, economic-statistical, comparative and correlation-regression analysis, SWOT-analysis method, expert assessments, graphical, economic and mathematical, etc.

**Main provisions of the research submitted for defense:**

- substantiation of the current state of the mineral resource base of gold, including its essence, significance and functions, determination of the role of gold mining in the strategic plan of increasing the competitiveness and innovative development of the economy of the Republic of Azerbaijan;

- comprehensive assessment of the development of the domestic gold-mining industry in the period of independence with the identification of conditions and prerequisites for the emergence of gold mining in the country, taking into account promising gold deposits;

model of economic assessment of the impact of gold production on the macroeconomic indicators of the Republic of Azerbaijan and in particular the Ganja-Kazakh economic region;

- recommendations for the transition to innovative methods of development in the production, consumption and sale of gold with the introduction of a more effective policy of regulation of the industry by the state.

- proposals on the feasibility of building a refinery in the country for the production of ingots in order to further develop the gold market in Azerbaijan and practical recommendations to determine the prospects for gold exports in Azerbaijan.

**Scientific novelty** of the research is as follows:

- Importance of the mineral resource base of gold in the modern economy of the republic is determined;

- Possibilities of adaptation of foreign (Australian) experience of innovative development of the gold mining industry to domestic conditions have been identified;

- Description of the main gold deposits in the regions, including in the liberated territories of the country, is given, indicating the dividends that Azerbaijan will receive from the development of rich gold deposits that were previously illegally exploited by Armenian companies;

- The conditions for the development and the degree of revival of the gold mining industry in Azerbaijan have been investigated;

- On the basis of a comprehensive analysis of the gold mining industry in the regions of the country through the use of SWOT analysis, its strengths and weaknesses have been identified;

- Shows the main directions of state regulation of gold mining and production at gold mining enterprises of the republic;

- High correlation between gold production and GDP in the Republic of Azerbaijan has been proved, in particular, an econometric assessment of the impact of gold production on gross production in the Ganja-Kazakh economic region has been given;

- By applying a mathematical model, it was established that the level of profitability of gold production in the mining industry is higher than in other production areas of the manufacturing industry;

- Investigated new phenomena regarding the growth of income from the extraction and export of gold from the increase in investment in the main production in the mining industry;

- Based on the statistics of GDP and the total volume of gold production in the Republic of Azerbaijan for 10 years, the forecasted value of GDP until 2025 and the forecasted volumes of gold production in the country are presented;

- Substantiated the feasibility of building a gold refinery in the country for the production of gold bars in order to further develop the gold market in Azerbaijan;

- Priorities of modernization of the gold mining industry were proposed within the framework of strategies for industrial and innovative development and increasing competitiveness;

- Practical recommendations have been developed to determine the prospects for Azerbaijan's gold exports.

**Theoretical and practical significance of the research.** The practical and theoretical significance of the dissertation lies in the fact that the main provisions and conclusions obtained during the study, recommendations for increasing the competitiveness of the country's gold mining industry, proposals for increasing the role of the industry in the sustainable development of the economy of the country's regions can become fundamental in developing a concept for the strategic development of this industry. The research carried out in this dissertation on the need to revive gold mining, emphasizing its importance, made it possible to formulate the prospects for the development of the gold mining industry in the Republic of Azerbaijan.

**Approbation and application of research results.** Concrete results and proposals for the dissertation have been submitted to AzerGold CJSC of the Republic of Azerbaijan and are expected to be positively evaluated and accepted for practical use.

Main results and provisions of the dissertation were also reflected in articles published in the republic and abroad, in speeches at scientific and theoretical seminars in universities and at republican and international conferences.



On the topic of the dissertation, the applicant published 15 printed works in republican and international publications.

**Name of the organization** where the dissertation is performed. The dissertation was carried out at the Institute of Economics of ANAS.

**Scope and overall structure of the dissertation.** The dissertation consists of an introduction, three chapters, ten paragraphs, conclusion, list of used literature and list of abbreviations, is overall 285,240 characters, 14 graphics, 24 tables, 3 diagrams, 5 figures, 5 formulas are given in the dissertation. Bibliography contains 105 titles.

## **STRUCTURE OF DISSERTATION**

### **Introduction**

#### **Chapter I. Theoretical and methodological foundations of the development of the gold mining industry**

1.1. The role and importance of the mineral resource base of gold in the modern economy

1.2. Geological studies of gold-bearing areas in Azerbaijan

1.3. Study of foreign experience in gold mining and the work of gold mining enterprises

#### **Chapter II. Analysis of the state and economic assessment of the development of the gold mining industry in the regions of Azerbaijan**

2.1. Prerequisites for the origin and conditions for the development of the gold mining industry in Azerbaijan

2.2. Gold mining in the context of the geopolitical problems of the region

2.3. Specificity of production and economic activities of gold mining enterprises and problems of their development in the regions of Azerbaijan

2.4. Economic assessment of the impact of gold production on the macroeconomic indicators of the Republic of Azerbaijan

2.4.1. Econometric assessment of the impact of gold production on gross output in the Ganja-Kazakh economic region

### **Chapter III. Prospective directions for the development of the gold mining industry in the Republic of Azerbaijan**

3.1. State regulation of gold production at industrial enterprises of the country

3.2. Ways and methods of development of the gold mining industry in the regions of Azerbaijan

3.3. Prospects for the development of the gold market in the Republic of Azerbaijan

#### **Conclusion**

#### **List of used literature**

#### **List of abbreviations**

## **KEY PROVISIONS OF THE DISSERTATION**

**1. Importance of the mineral resource base of gold in the modern economy of the republic has been determined. In particular, it is indicated that for Azerbaijan, the presence of its own mineral resource base of gold is extremely important in strengthening economic and defense security, as well as ensuring the balanced development of economic sectors.**

Azerbaijan is one of the few countries in the world with sufficient reserves of gold, therefore, the efficient exploitation of its deposits and the rational use of the mined metal determine the functioning and development of the republic's economy<sup>1</sup>. According to the indicators of the Ministry of Ecology and Natural Resources of Azerbaijan, gold reserves in the country, taking into account all discovered deposits, amount to 1,500-2,000 tons.

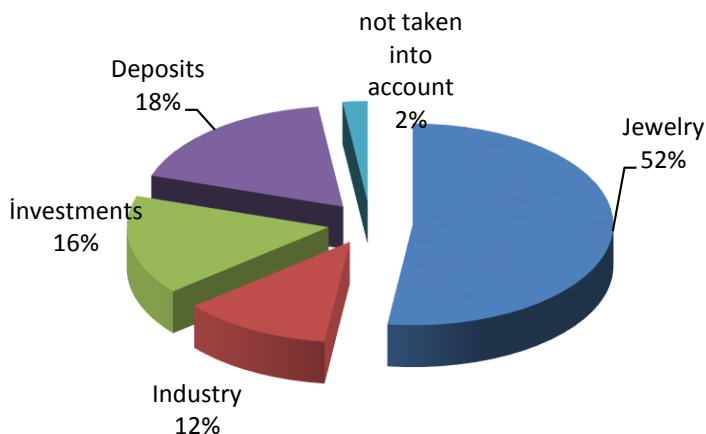
The defense and space industry, industrial and civil construction, mechanical engineering and shipbuilding traditionally

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<sup>1</sup> Khankishieva, E.M. Gold mining industry as a young sector of the Azerbaijani economy// - Bakı: Azərbaycan Milli Elmlər Akademiyasının Xəbərləri/İqtisadiyyat seriyası, -2013. №1, c. 159-163

consume gold for the production of products of extremely high reliability<sup>2</sup>. Creation of the production of aviation and space technology in Azerbaijan in the future requires uninterrupted supply of gold. In this regard, the role of its own mineral resource base of gold is extremely important in ensuring the balanced development of economic sectors.

Its role is also exceptional in the jewelry business. Thus, a significant amount of gold is used to make dentures, coins and medals, jewelry, gilding, and more<sup>3</sup>. The share structure of gold consumption can be clearly seen in Graph 1.



**Graph 1. Structure of world gold consumption in 2019**

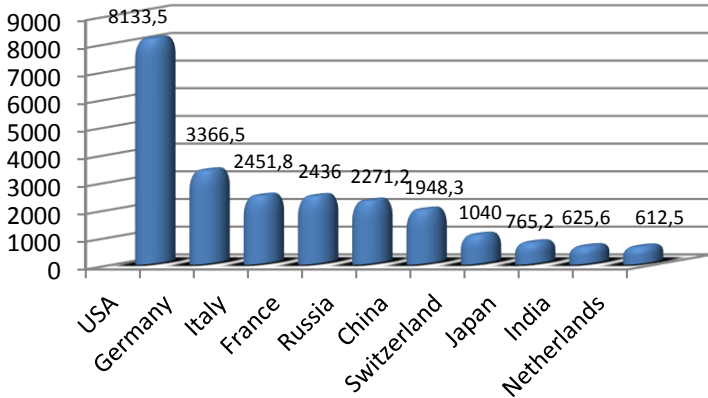
*Note: Compiled by the author based on data from the World Gold Council (<https://www.gold.org/Metals Focus>, World Gold Council; Disclaimer)*

Having a sufficient mineral resource base of gold means being the owner of gold reserves, which are on the balance of the central bank or finance ministry and serve to stabilize the money

<sup>2</sup> Busev, A.I. Analytical chemistry of gold / A.I. Busev, V.M. Ivanov – Moscow: Nauka– 1973. – 267 c.

<sup>3</sup> Guseynov, G.S. Gold content of pyrite deposits of the Lok-Agdam metallogenic zone of the Lesser Caucasus/ G.S.Guseynov, R.B. Mobiy – Баку: Азернешр – 2010. –287 c.

supply, settlements with foreign countries and payments of public debt. As part of the country's gold and foreign exchange reserve, gold is a testament to the economic power of the state<sup>4</sup>.(Graph 2)



**Graph 2. Ten countries with the largest gold reserves in 2020, tons**

*Note: Compiled by the author based on data from the World Gold Council (<https://www.gold.org/Metals Focus>, World Gold Council; Disclaimer)*

Azerbaijan is also no exception, in 2019 share of pure gold in Azerbaijan's strategic international reserves amounted to more than 10%.

Development and extraction of gold, along with oil and gas, form the state budget, affect the well-being of the population and the competitiveness of the national economy, and provide the necessary conditions for sustainable socio-economic growth of the country and its regions. The economic and socio-political role of gold for

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<sup>4</sup> Khankishiyeva, E.M. The role of national leader Heydar Aliyev in the restoration of the gold mining industry in Azerbaijan// “Beynəlxalq münasibətlərin aktual problemləri” adlı Respublika elmi konfransı 25 oktyabr 2019-cu il, - Bakı: Elm və təhsil, - 2019, - 580 səh

Azerbaijan is confirmed by the attention paid to this industry by President of Azerbaijan Ilham Aliyev, who created AzerGold CJSC in February 2015<sup>5</sup>.

Development of the mineral resource base should go on continuously and even at a faster pace, be updated with competitive objects of rich ores, and newly discovered reserves should compensate for the extracted volumes. Only in this case will the sustainable operation of the extractive industries in the long term be possible<sup>6</sup>. Consequently, for Azerbaijan, it remains relevant to clarify the national security strategy and create a comprehensive program for the development of the country's productive forces for the long term, and the mineral resource policy should be the main component of the general program of economic development of our state.

**2. New geopolitical reality, global plans for the restoration and reconstruction of the liberated territories of Azerbaijan and their transformation into a prosperous region with a stable economy are inextricably linked to the integration of rich natural resources, including gold, in these areas in the country's economic system.**

The richest minerals in Azerbaijan remained under the occupation of Armenian terrorists for a long time. On the Azerbaijani territories liberated have 3 gold deposits with documented approved commercial reserves. These are the “Soyudlu” and “Gyzybulag” fields in Kelbajar region and “Vejneli” field in Zangilan region<sup>7</sup>.

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<sup>5</sup> Khankishiyeva, E.M. The role of national leader Heydar Aliyev in the restoration of the gold mining industry in Azerbaijan // “Beynəlxalq münasibətlərin aktual problemləri” adlı Respublika elmi konfransı 25 oktyabr 2019-cu il, - Bakı: Elm və təhsil, - 2019, - 580 s.

<sup>6</sup>Baba-zade, V.M. Gold-bearing placers of Azerbaijan/V.M.Baba-zade, Y.D.Zamanov, T.N.Nasibov, Sh.D.Musaev, V.G.Ramazanov. - Bakı: “Nafta-Press” – 2001. 56 c.

<sup>7</sup> Khankishiyeva, E.M. Azerbaijan's gold mining industry in the context of geopolitical problems// – Bakı: Azərbaycan Milli Elmlər Akademiyası İqtisadiyyat İnstitutunun Elmi Əsərlər - 2014. №4, s.341-345

For exactly 30 years these workshops and deposits were freely used by the Armenians as a source of profit. According to the Ministry of Ecology and Natural Resources of Azerbaijan, over 30 Armenian companies were established in Nagorno-Karabakh to plunder natural resources in the occupied territories<sup>8</sup>. The volume of capital investments in the mining industry in the previously occupied Azerbaijani territories was the most significant and grew mainly due to foreign investors<sup>9</sup>.

“Base Metals” was founded in August 2002 by the Armenian company “Vallex Group” in order to study and operate “Gyzylbulag” (Drmbon) copper gold mine in Kelbajar region. During 13 months it has been built and is involved Drmbon mining and processing plant for the extraction and processing of gold and copper, which all these years has been the most successful enterprise in the occupied territory, and “Base Metals” company - the largest producer and the taxpayer<sup>10</sup>. According to Azerbaijani economists, from 2009 to 2017, “Vallex” and “Base Metals” companies received about 302 million manats of "illegal profit" from “Gyzylbulag”. At present, development of these fields and activities of “Base Metals” company on the territory of Karabakh is suspended.

Turnover mine "Soyudlu" in Kelbajar region in 2019 amounted to 126 million dollars, making it the largest asset of the armenian company “GeoProMining”. According to the company, in 2018, the mine produced 130,000 ounces of gold, and the company paid Armenia about \$60 million in revenues. “Soyudlu” deposit is located on the Armenian-Azerbaijani border on the territory of Kelbajar region, and more than 112 tons of gold are located on its

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<sup>8</sup> Data of the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan, official website [eco.gov.az](http://eco.gov.az)

<sup>9</sup> Russian news site "Regnum" [Electronic resource]. URL: <https://regnum.ru/news/2262376.html>

<sup>10</sup> Khankishiyeva, E.M. Azerbaijan's gold mining industry in the context of geopolitical problems// – Bakı: Azərbaycan Milli Elmlər Akademiyası İqtisadiyyat İnstitutun Elmi Əsərlər - 2014. №4, s.341-345

Azerbaijani part. On September 27, 2020, with the start of a new war in Karabakh, “GeoProMining” suspended the operation of the field in Azerbaijani side.

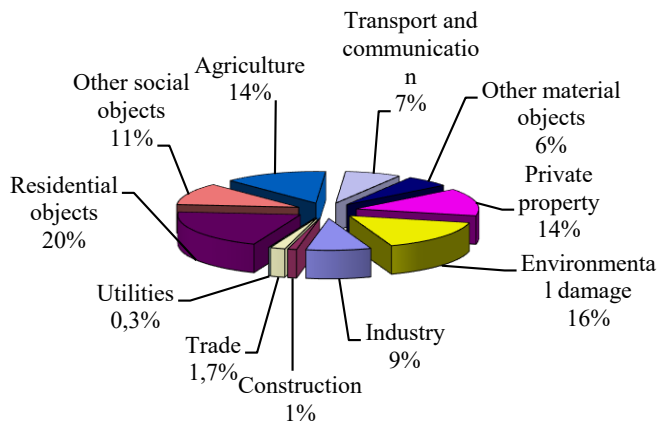
The proven reserves of “Vejneli” deposit of Zangilan region, discovered in late 1950s, amount to 6.5 tons of gold<sup>11</sup>. In recent years, it was developed by Armenian company “Gold Star”, which was fourth largest taxpayer in Nagorno-Karabakh in 2019. After the liberation of the Zangilan region, “Vejneli” field was explored. It was confirmed that for a long time the Armenian occupants were carrying out illegal gold mining there.

At present, Azerbaijan has already applied to Interpol with a request to arrest persons involved in illegal economic activity in the previously occupied territories of Azerbaijan. And President of Azerbaijan Ilham Aliyev issued a final warning to these companies: if they do not pay compensation, the issue will be referred to an international court.

The working group specializing in the situation in conflict countries has estimated the damage from the occupation of 20% of Azerbaijan’s territories by Armenia at \$818.88 billion, and these are not final figures. The appraisal took into account the value of lost property and lost profits during the occupation period. And of course, this amount includes the lost revenues that Azerbaijan could get from the exploitation of gold deposits that were in the occupied territory, which, according to geologists, have the richest deposits of gold and silver.(Graph3)

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<sup>11</sup>Khankishiyeva, E.M. Azerbaijan's gold mining industry in the context of geopolitical problems// – Bakı: Azərbaycan Milli Elmlər Akademiyası İqtisadiyyat İnstitutun Elmi Əsərlər - 2014. №4, s.341-345



**Graph 3. Structure of economic damage caused to Azerbaijan as a result of the Karabakh war**

*Note: The graph was built by the author based on data from the Ministry of Economic Development of the Republic of Azerbaijan*

From now on, a new geopolitical reality, global plans to restore and reconstruct the liberated territories of Azerbaijan and turn them into a prosperous region with a stable economy are inextricably linked with the integration of rich natural resources in these territories into the country's economic system.

- Involvement in the use of gold deposits in the returned territories will play an important role in the economic development of Azerbaijan. This means that with the exploitation of gold deposits in these territories, Azerbaijan will acquire potential economic resources. All deposits promise great prospects for the development of the mining industry due to the presence of rich gold reserves.

-The extraction of metals, especially precious metals, plays an important role in the mining sector of the industrial sector of the non-oil sector of the country's economy. The commissioning of new deposits of gold and other non-ferrous metals will contribute to new rates of development of the mining sector and will further increase its contribution to the economic growth of the country.



-According to Center for Analysis of Economic Reforms and Communications, the gold reserves in these areas is estimated at \$8 billion. It is estimated that through the use of gold and other resources of the liberated territories for the good of the country, the added value to the economy of Azerbaijan will amount to \$2 billion.

-Reconstruction work in the liberated regions of Azerbaijan may significantly increase the export potential of mineral resources and gold. Thus, the export of gold, which is considered one of the three leading products in the non-oil sector will be increased after the effective use of the potential of Zangilan, Kalbajar and Terter regions.

-Along with the production of gold in the liberated territories, Azerbaijan in the future may begin to create complexes in the country that will process it. The presence processing complex in our country can help to turn Azerbaijan into a regional industrial center, to promote economic integration and expansion of markets.

-Investments, to be invested in the development of gold deposits, will give an immediate effect, as after the restoration of the mining sector to build a chain of new industries - metallurgy, electric power, engineering, after which Azerbaijan will no longer be a country with surplus labor force, and most of its citizens can find work at home, not abroad.

-Establishing a direct connection between Kelbajar and Dashkesan- the center of mining in our country, in connection with the development of gold at "Soyudlu" deposit and other minerals, and the construction of a railway in this direction in the future will also increase the overall economic potential of Kelbajar.

**3. Econometric assessment of the gold mining industry of the republic showed that there is a high correlation between gold production and GDP in Republic of Azerbaijan. As a result of the research, it was found that an increase in gold production in the mining industry of Azerbaijan by 1% increases the total volume of production in the Ganja-Kazakh economic region by 0.34%.**

Since gold production in the mining industry as an economic activity affects GDP growth, it is especially important to assess the relationship between these indicators and determine the development prospects. Here the model of correlation-regression to assess the relationship between GDP, which is a key indicator of economic well-being of society, and income from gold production<sup>12</sup>.(Table1)

**Table 1**

**Main indicators of the mining industry in Azerbaijan in 2009-2019 and GDP, in mln AZN**

Years	Investment in fixed assets in the mining industry	Volume of gold production	GDP
2009	2088	8,82	35601,5
2010	2952	65,89	42465
2011	3244	70,85	52082
2012	3857	66,22	54743,7
2013	5095,2	57,3	58182
2014	5947,9	59,48	59014,1
2015	7145,1	85,63	54380
2016	8576,7	121,94	60425,2
2017	8428,9	254,92	70135,1
2018	5702,3	240,98	79797,3
2019	5288,2	282,51	81681,0

*Source: Prepared by the author based on the materials of the State Statistics Committee of the Republic of Azerbaijan*

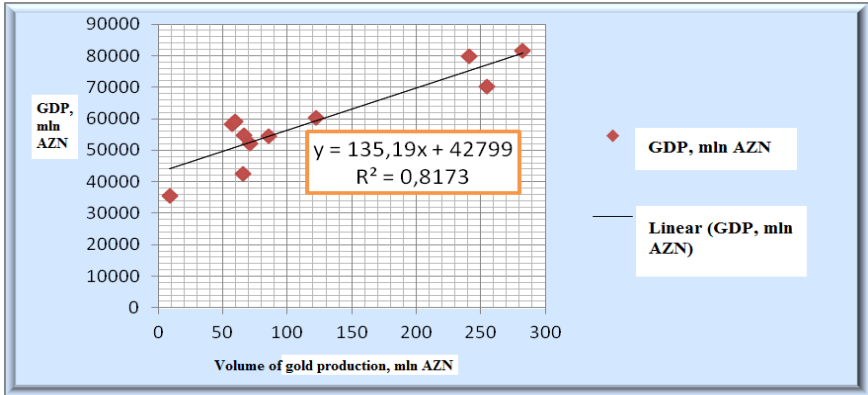
To conduct a regression analysis of the relationship between the impact of total gold production on GDP in the Republic of Azerbaijan in 2009-2019, according to Table 1, a ready-made

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<sup>12</sup> Yadigarov, T.A. Operations research and solution of econometric problems in MS Excel and EViews application software packages: theory and practice/ T.A.Yadigarov –Bakı: Avropa – 2019. -352 s.

mathematical software package EViews was used. To this end, the production of gold in the mining industry as a causal factor is denoted as X, and GDP as an effective factor is denoted as Y. As a result, the following regression equation was obtained:

$$Y = 135.19 * X + 42799.11 \quad (1)$$



**Graph 4. Relationship between GDP and total gold production in the mining industry in Azerbaijan**

*Source: Prepared by the author based on the materials of the State Statistics Committee of the Republic of Azerbaijan.*

As can be seen from the Graph 4, there is a high direct correlation ( $R_{yx} = 0,82$ ) between the Y and X variables on the Chadok scale (0.7-0.9)<sup>13</sup>. Also, using the F-Fisher and Durbin-Watson (DW) tests, it was proved that the regression equation as a whole is statistically significant and the constructed model (1) is adequate.

<sup>13</sup> Musayev, A.F. Mathematical modeling and programming in economics / A.F. Musayev, A.T. Gahramanov - Baki: Sabah, - 1999. - 452 s.

Calculating the elasticity coefficient in accordance with the coefficient of free variables and the average value of the volume of GDP, the following result was obtained:

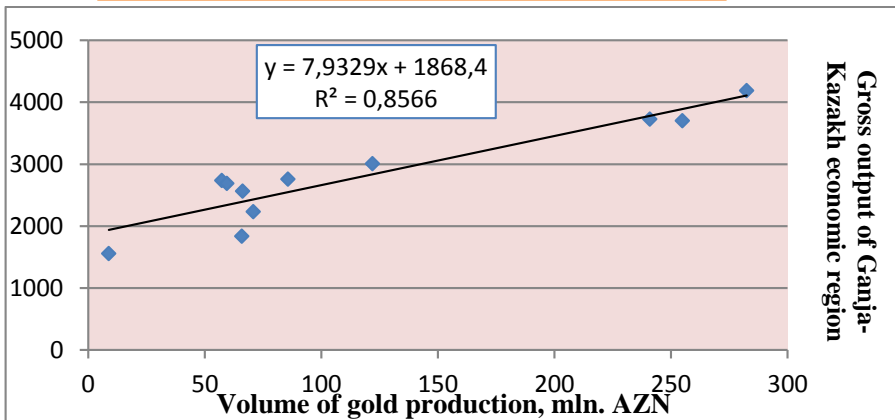
$$E_{BBII} = \frac{\alpha \times \bar{x}}{\bar{y}} = \frac{135,193 \times 74,37}{58955,17} = 0,170541 \quad (1), \text{ where}$$

$\alpha$  – coefficient of the dependent variable in the regression equation,  $\bar{x}$  – average free variable value,  $\bar{y}$  – average value of the dependent variable

According to the calculation, an increase in total gold production by 1% in the mining industry of Azerbaijan leads to an increase in GDP by 0.171%.

The regression equation expressing the relationship between gross output and gold production in the Ganja-Kazakh economic region of the Republic of Azerbaijan for 2009-2019, calculated in a similar way, is as follows.

$$Y = 7,9329 * X + 1868,4 \quad (2)$$



**Graph 5. Ratio between gross output and gold production in the Ganja-Kazakh economic region**

*Note: Developed by the author in MS Excel– 2001. - 320 c.*

As can be seen from the Graph 5, determination coefficient  $R^2 = 0.857$  or 85.7%. The higher the coefficient of determination, the better the model<sup>14</sup>. Consequently, in our case, the model is very high-quality.

Calculation showed that the volume of gold production in the mining industry increases the volume of gross production in the Ganja-Kazakh economic region. This can be determined from the value of the coefficient of elasticity calculated below.

$$E = \frac{\alpha \times \bar{x}}{\bar{Y}} = \frac{7,9329 \times 119,503}{2816,44} = 0,337 \text{ (2)}$$

Elasticity coefficient equal to 0.337 means that an increase in gold production in the mining industry in Azerbaijan by 1% leads to an increase in the total production in the Ganja-Kazakh economic region by 0.337%.

#### **4. SWOT analysis characterizing the strengths and weaknesses of the gold mining company Anglo Asian Mining (AAM) made it possible to formulate proposals for overcoming threats and using the opportunities of the environment and the transition to innovative technological development, expanding its own raw material base, increasing investment attractiveness.**

Acting in Azerbaijan British gold mining company AAM illustrative example of a company with quality assets and low costs. AAM successfully benefits from a production sharing agreement (PSA), the company has no restrictions on foreign exchange transactions, and is also exempt from taxes related to the import and export of its products. The company pays a profit tax of 32 per cent and is not burdened by double taxation.

AAM has managed to create a good and sustainable business in the field of mining, processing, production of precious metals and their sale, and during their activity in Azerbaijan have made

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<sup>14</sup> Samarsky, A.A. Mathematical modeling. Ideas. Methods. Examples. 2nd ed. / A.A. Samarsky, A.P. Mikhailov. - Moscow: Fizmatlit - 2001. -- 320 p.

significant progress in operational efficiency, having managed to significantly improve financial performance. In 2018, the company's revenues grew by 18.6 million and reached \$90.4 million. This improvement was driven by both increased gold production and higher gold prices.

It has accelerated the ability to - deposit "Ugur" started to produce, within one year from the date of opening. The exploration potential is extensive, geological exploration is underway.(Table2)

Until 2016, AAM had no competitors in its activities in the republic (apart from the passive activities of the second consortium). The established positive image of the organization attracted new buyers to it, which enabled the company to choose reliable partners.

**Table 2**

**Gold production of Anglo Asian Mining Company**

Years	Production volume (ounces)	Sold (ounces)	Average price (USD)	Cost price (dollars)
2010	67267	57398	1241	358
2011	57068	49304	1573	448
2012	50215	42743	1666	668
2013	52 068	46076	1387	626
2014	60285	50615	1267	971
2015	72 032	63924	1161	858
2016	65 394	53 281	1 253	616
2017	59617	43496	1265	604
2018	72798	59481	1265	541
2019	70098	53992	1410	591

*Source: Official site of the company Anglo Asian Mining PLC, Reports and account. [Electronic resource]. URL: <http://www.angloasianmining.com>*

In 2018, AAM board of directors adopted the quoted principles of the Governance Code, which allows the company to apply various methods of foreign management in our country. For example, employees of this company have the opportunity to receive training and wages higher than the average monthly level in the

republic. Note that AAM has a highly qualified team of employees with decades of experience in the gold mining industry. AAM purchases machinery and equipment for mining operations from foreign specialized companies, which indicates that the company has a high-quality characteristic of fixed assets. All of the above defines the main strengths and capabilities of the company.

Now, in order to obtain a more complete and objective analysis of the company's activities, we will consider its weaknesses and possible threats. Changes in world prices in the precious metals market, fluctuations in the official exchange rate of the manat against US dollar, as well as a relatively high level of inflation in the country negatively affect the functioning of the company.

An analysis of the financial indicators of AAM showed that the company until 2018 had an insufficiently stable financial condition and high credit debt. This was due to the expansion of the company's activities, the construction of factories, the acquisition of the necessary equipment and the conduct of geological developments, as well as the relative drop in world prices for gold. A key milestone for AAM was the payment of the first dividend of 3 cents per share in November 2018. In accordance with the company's development goal, approximately 25% of free cash should be transferred to shareholders every year. And the company's total dividend for 2018 was 7 cents per share<sup>15</sup>.

Thus, we highlight the main strengths and weaknesses of AAM company. Strengths (S) are: 1) foreign management; 2) regular customers; 3) a small circle of competitors; 4) the use of various methods of mining; 5) training of personnel at the expense of the company; 6) the use of foreign machinery and equipment; 7) support of the industry by the state; 8) constant monitoring of environmental safety. Weaknesses (W) are: 1) volatility of world prices for precious metals; 2) a high percentage of equipment wear; 3) a narrow circle of buyers; 4) the presence of credit debt; 5) insufficiently stable financial position; 6) a small number of highly qualified personnel.

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<sup>15</sup> Official site of the company Anglo Asian Mining PLC, Reports and account. [Electronic resource]. URL: <http://www.angloasianmining.com>

With regard to such categories of SWOT analysis as opportunities and threats to the company, in the case of AAM, the following was revealed. Opportunities (O): 1) quality asset management; 2) involvement in the use of new deposits; 3) an increase in the volume of production and, consequently, the export of gold; 4) reducing the cost of production; 5) expanding the circle of buyers; 6) advanced training of employees; 7) updating and repairing the equipment used. Threats (T): 1) decline in world gold prices; 2) an increase in the number of competitors; 3) loss of market share; 4) an increase in the cost of purchasing and repairing equipment; 5) the outflow of specialists from the region; 6) environmental collapses.

Thus, a study of AAM's activities using SWOT analysis showed that the company has quite enough strengths capable of eliminating existing and possible threats from the external and internal environment, as well as quite a lot of opportunities to eliminate weaknesses. Consequently, AAM does not have such activities that it could reduce or even leave the market to eliminate threats, but on the contrary has every chance to gain a foothold as a leading producer of precious metals and copper in the Caucasus.

**5. Taking into account the strategic importance of the replenishment of the gold reserve of the country, economic security and development of the jewelry industry in the country is advisable to establish a full cycle of the gold industry, including the construction of its own gold refinery.**

Construction of its own gold refinery in Azerbaijan will ensure the processing of its own raw materials, the creation of competitive products with added value within the country and will reduce the import of precious metals and stones.

A modern plant built according to "green" technologies, with a closed production cycle and modern treatment facilities in Azerbaijan will undoubtedly become one of the world's best producers of precious metals, and the recognition of its products on the international precious metals market will be the key to the



successful operation of the refinery<sup>16</sup>.

Obtain a certificate of the London Metal Exchange Good Delivery - a very complicated procedure, high technological requirements. So, for three years before applying for a Good Delivery company must annually produce at least 10 tons of high-quality gold. The plant must keep strict production parameters, and must be a sufficient amount of the share capital. But in the end the official confirmation of the accreditation of the London Stock Exchange will allow the refinery to trade on their own jewelry alloys that will push both the development of the internal market of gold, and a lot of support to Azerbaijani jewelers. Not every jeweler, not every small or medium-sized business can afford to buy a 12-13-kilogram gold bar or a 32-kilogram silver bar. It will be possible to produce investment bars in sizes of 100, 250, 500 and 1,000 grams and flexibly adapt to market demands. And the production and sale of gold in small ingots weighing 1-10 grams will help meet the population's demand for high-quality domestic gold.

Next stage in the development of the plant can be the addition of technological equipment for the production of wire or foil, semi-finished products for the space industry, medicine, and even its own jewelry production. In short, to establish the processing of precious metals within the country, to create export-oriented and competitive products with high added value. There are countries that do not produce gold, but process it. Azerbaijan has all the necessary conditions for this.

It is known that the cost of refining gold is from 0.6 to 1.1% of the cost of a precious metal, depending on the alloy in which it is located. However, some refineries set a fixed price for refining (\$5-7 per ounce, in Switzerland it is 2 times lower), or, more rarely, take a certain percentage of gold for themselves as payment for the work. So, if we take the average cost of processing gold \$3 per ounce, and

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<sup>16</sup> Belyaev, V.K. Operational (production) management / V.K.Belyaev. - Tutorial. - Irkutsk: BSU Publishing House, 2017. – 320 c.

transportation costs to the refinery plant nearly \$ 1 per ounce, the cost of production volume of gold to 60,000 ounces (2017 AAM company produced 59,617 ounces of gold) make \$240,000 and it's even gentle scenario, not taking into account the costs of loading and unloading operations, the costs of security and other expenses directly related to the costs of delivery of metal from the metal registration place before refining.

Consequently, the presence of their own enterprise for the refining of precious metals will enable domestic enterprises not to send concentrates abroad, but to sell them to the plant on the spot, receiving both money and, if desired, bank gold. As is known, the central bank has the priority right for the purchase of refined gold produced from domestic raw materials, not only in the country but also abroad to replenish the country's gold reserves. And the State Oil Fund in 2019 purchased 1.77 tons of gold produced by AzerGold CJSC in order to replenish the country's fund with non-ferrous metals<sup>17</sup>.

On the other hand, Azerbaijan will supply finished products of high quality gold mining industry to world markets. Presence in the country's own gold refinery will boost domestic national gold market, the main participants of which will be local investors and hoarders. The strategic importance of the precious metals market for Azerbaijan lies in the accelerated replenishment of gold and foreign exchange reserves and the stable receipt of taxes from this sector of the economy to the state budget.

**The most important results of the research were determined by the following image:**

- Gold, outfit with oil, copper, silver and iron ore is one of the main natural resources of Azerbaijan. For Azerbaijan, the availability of its own mineral and gold bases is exceptionally important in

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<sup>17</sup> Data of the State Oil Fund of the Republic of Azerbaijan / Access mode: [www.oilfund.az](http://www.oilfund.az)

strengthening economic and defense security, as well as ensuring a balanced development of the economy.

- Availability of mineral resources, and especially gold, in its proper operation, always have a positive impact on the development of the regional economy.

- As the analysis showed, the development of gold mines is a complex, labor-intensive and expensive business. Now it becomes clear, why gold - it is one of the most expensive goods in the world.

- As a result of the research, it was found that the level of profitability of gold production in the mining industry over the past 10 years fluctuated between 30.5% and 251.1%, which is higher than in other production areas of the manufacturing industry.

- Based on the statistics of GDP and the total volume of gold production in the Republic of Azerbaijan for 2009-2019, forecast indicators were calculated until 2025 and it was determined that the forecast value of GDP in the country in 2025 compared to 2019 will increase by 1.3 times and will reach 103.5 billion manat, and the total volume of gold production will be 400.12 million manat.

- With a view to the socio-economic development of the country in the gold mining industry of Azerbaijan, which is a strategic sector of the economy, a balanced state policy is being implemented.

- Develop scientific and technical potential, gold mining companies should closely cooperate with the National Academy of Sciences of Azerbaijan, and on the basis of the memorandum, it is advisable to create a Center for Geological Research of Azerbaijan.

- Increase in demand for gold from the domestic jewelry industry is a significant stimulus for the growth of gold production in Azerbaijan.

- Establishment, under the supervision of the central governing body of the gold mining industry, a gold mining bank to promote and finance the industry and allow free access of foreign capital to joint-stock companies and industrial enterprises engaged in gold mining are proposed as an incentive for the further development of the gold mining industry in Azerbaijan.

- Results of the research revealed the important role that the

domestic gold mining industry plays in the socio-economic development of the country.

**The main provisions of the dissertation, obtained results and recommendations are reflected in the following published articles and theses of the author:**

1. Khankishieva, E.M. Gold mining industry as a young sector of the Azerbaijani economy// - Bakı: Azərbaycan Milli Elmlər Akademiyasının Xəbərləri/İqtisadiyyat seriyası, -2013. №1, c. 159-163
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perspektivlər” Beynəlxalq Konfrans, Naxçıvan Dövlət Universiteti

15. Rena Polad Sultanova, Ellada Khankishiyeva. Innovation as a necessary factor in the development of the gold mining industry in Azerbaijan// International Scientific Journals of Scientific Technical Union of Mechanical Engineering "Industry 4.0" Vol. 9 (2021), Issue 3, pg(s) 93-95

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