

**REPUBLIC OF AZERBAIJAN**

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**ABSTRACT**

of the dissertation for the degree of Doctor of Philosophy

**ASSESSMENT OF THE EFFICIENCY OF OIL EXTRACTION  
IN THE REPUBLIC OF AZERBAIJAN USING MODERN  
ECONOMIC METHODS**

Speciality: 5304.01 – “Types of economic activity”

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## INTRODUCTION

**Research issue rationale and development rate.** The experience of the developed countries of the world proves that only the countries that ensure the complex and balanced development of the economy and consider the solution of social problems of the population as a strategic task can be tolerant of global threats and struggles against unfair competition. As a result of this necessity, "Azerbaijan 2030: National Priorities for socio-economic development", "Strategic road map for national economic prospects of the Republic of Azerbaijan", "Great return" and a number of state programs were adopted in our country. The main goal of these program-concepts is to achieve the innovative development of the industrial sectors of the economy, including the wide application of innovation-investment projects in the energy, oil-gas and chemical complex.

It should be noted that the national economy of each country and its level of development are characterized by a number of indicators: the structure of the economy, the level of development of the industry, the variety and volume of the produced products, the level of use of the potential of natural and economic resources, etc. It is known that natural fuel-energy resources have certain limitations. It is the "limitation" of resources that brings to the fore the importance of the superior development of science-intensive fields, the development and application of high technologies. From this point of view, the creation of an efficient system of applying innovations in the development of oil and gas fields (NQY) and the implementation of the relevant innovation policy are considered as a requirement of the modern era.

The basis of the oil and gas complex is oil and gas production, oil and gas processing and petrochemical fields, whose balanced development is considered one of the important directions of the country's development strategy.

It should be noted with a sense of agreement that the formation of oil and gas production as a field, as well as the discovery and exploitation of new oil and gas fields for the future development of the field, and the formation of a scientific school that generally

serves oil and gas production, academicians of the National Academy of Sciences M.Aliyev, M.Guluzade, S.Guliyev, A.Yagubov, Sh.Mehdiyev, A.Alizade, A.Mirzajanzade, M.Abbasov, correspondent members of the National Academy of Sciences Seyidrza Mirkazim, S.Orujov, F.Salmanov, B.Babazade, S.Salayev, A.Hasanov, J.Gurbanov, Kh.Yusifzade, I.Guliyev, F.Hamidov, E.Ramazanova, G.Aliyev, F.Samadov provided exceptional services.

The role of the oil and gas complex in the country's economy, analysis of economic factors ensuring its efficiency, theoretical and methodological issues of production, organization and management Z.Samadzade, E.Hajizade, M.Atakishiyev, N.Aliyev, G.Safarov, A.Huseynov, It was investigated by S.Gasimov, G.Suleymanov, M.Mammadov and others.

While conducting research, the author consulted economist scientists and engineers specializing in issues of economics and economic efficiency of the oil and gas industry, including scientists and specialists from the CIS and foreign countries R.Gasimov, Bobrova A.V., Drozdenko Yu.A., Ibatullin R.R., Ivanov S.I., Kolokoltsev S.S., Kolomeets V.V., Dmitrievsky A.N., Komkov N.I., Krotova M.V., Perchik A.I., Salimov S.M., Dunaeva V.F. while appreciating their services, at the same time, he noted the need for research on improving the efficiency of oil and gas field exploitation in terms of innovative development, modern ICT requirements. From this point of view, it is important scientific and practical importance to study the innovative and methodological bases of the analysis of the efficiency of the development of oil production at the modern stage, to develop complex modeling methods of innovative methodological bases in the process of developing oil and gas fields, to evaluate the technical and economic efficiency of the application of innovative approaches and to develop management principles and mechanisms. is one of the issues.

In this regard, many issues have not yet been sufficiently resolved in terms of modern requirements.

Taking into account that the existing theoretical and innovative methodological foundations are not developed in terms of modern

requirements and it is important to increase the efficiency of their exploitation of oil and gas fields, the research topic was chosen, and its methods and tasks were defined.

**Object and subject of research.** As a research object, SOCAR, as well as NGCI, which is part of "Azneft" PU, was selected. The subject of the study is a set of approaches and methods for evaluating the activities of economic entities engaged in oil and gas production in relation to the exploitation of complex oil and gas fields.

**Aims and objectives of the research.** The purpose of the research work is to evaluate the dynamics of oil and gas field exploitation results over a long period, especially economic and technical indicators, to develop the scientific and methodological bases and methods of innovation measures to be applied to ensure production at the modern stage. The goal is also to develop innovative and methodological bases and methods of applying innovations in their development at different stages, based on the formation of approaches to the management of the economic efficiency of oil extraction companies, methodical support for a detailed assessment of the efficiency of the exploitation of oil fields.

To achieve this goal, the following issues were identified and resolved:

Considering the role of the oil and gas industry in the development of the economy of Azerbaijan during the Soviet system and the period of independence from the point of view of our irreplaceable historical memory;

- Analysis of the current state of oil production in Azerbaijan (in the example of "Azneft" PU NGCI);
- Evaluation of the dynamics of the use of deposits of the HQCI operating in the territory of the Absheron Peninsula;
- the need to use modern innovative technologies in oil production to increase the efficiency of oil field development;
- study of the effect of methods of increasing oil production in layers on the efficiency of oil field development;
- determination of the main trends in the dynamics of the use of the main funds, especially the well fund, and directions for their improvement;

- study of the impact of an innovative approach to the analysis of the efficiency of overhaul of wells;
- determination of the efficiency of using the main capital of the oil production company and the impact of additional investments in the main capital on the company's income.

**Research methods.** During the research, discrete mathematics, economic-mathematical, statistical, sociological, abstract-logical, comparative, systematic, intersectoral, cluster, etc. methods and methods were used. Analyzes related to the development of oil and gas production are based on the Oil Strategy of the State of Azerbaijan, its legislative framework, orders and decrees signed by the head of state.

The scientific database of the research is based on the information obtained from the reports of oil producing companies and scientific centers, including the reports of the Oil and Gas Extraction Departments of "Azneft" PU, the database of the State Statistics Committee of the Republic of Azerbaijan, materials of international and republican conferences, innovative development programs of the Republic of Azerbaijan, materials of internet portals. , also organized the data obtained in the process of research work.

**Basic theses for defense:**

- application of economic modeling based on new methods of technical-economic evaluation of the efficiency of innovations in the development of oil fields is necessary;
- there is a need to develop justified provisions for evaluating the economic efficiency of the oil producing company integrated into the field efficiency management concept;
- researching the methods and indicators of the evaluation of the efficiency of indicators of the use of basic funds. Carrying out certain clarifications in the traditional approach of calculating the indicators according to the balance value; It is important to develop a new methodical approach and test it in some of the "Azneft" BUs in order to solve the problems arising in determining the efficiency of the use of the main funds for the NGCİ;
- There is a need to carry out a general analysis of the technical

and economic indicators of the efficiency of the use of main funds in the example of N.Narimanov State University, taking into account the additional methodological directions proposed in the research;

- It is considered important to test the proposed new methodical approach in the evaluation of the efficiency of carrying out major repairs of wells in N.Narimanov N.G.C.I.
- it is of particular importance to study the effect of investments directed to the fixed capital in oil and gas production and the volume of SOCAR's private capital on SOCAR's income from product sales, as well as to study the change in the company's profit figure with econometric models.

**Scientific novelty of the research:** The scientific novelty of the research consists of the following:

- assessment of the current state of the efficiency of oil production development was carried out on the basis of complex accounting of production and organizational indicators in oil extraction enterprises;
- by using modern geological and technical measures, proposals were developed in the direction of extending the operational life of oil and gas fields, as well as increasing profitability and improving other main economic indicators;
- methodical provisions for evaluating the economic efficiency of the oil producing company integrated into the field efficiency management concept have been developed;
- the importance of using innovative approaches in the assessment of fixed assets in oil and gas extraction enterprises is substantiated;
- the analysis of the efficiency of repairs in enterprises, including major repairs of the well fund, as well as additional investments, was carried out using new methods;
- taking into account the results of the monitoring of the current state of the efficiency of the development of oil production, the volume of economic and energy reserves, the formulation of the optimal investment program for energy saving measures is scientifically justified.

### **Theoretical and practical significance of the research.**

The research will be useful in the assessment of the efficiency indicators of oil and gas extraction companies, improvement of the information base of oil and gas complex enterprises and their operation.

- The laws of the Republic of Azerbaijan on the country's economy, including the development of the oil and gas complex, especially the agreements signed by the Republic of Azerbaijan with foreign companies within the framework of the "Contract of the Century", the normative legal acts of the Republic of Azerbaijan that regulate approaches to taxation and efficiency analysis can be used for improvement;

- The results obtained during the research will allow to objectively and scientifically justify the application of innovative approaches during the development of oil and gas fields and to apply the method, model and methodology proposed in the work in practice;

- The practical significance of the work is that the methodological provisions proposed in the dissertation can help to determine the efficiency of economic activity at the planning and monitoring stage, to determine the cause of unprofitable or problematic operation of fields in companies engaged in oil production, and to improve the overall functioning of the structure;

- The methodological materials developed in the research process can be used in the teaching process of specialized higher education institutions, in the preparation of bachelors and masters for the oil and gas industry;

- The reliability and validity of scientific provisions and results are confirmed by the use of systematic and economic and econometric analysis, computer models, static methods, forecasting methods, tools recognized by the scientific community;

- The reliability of the obtained results is ensured by the logic of the research, the use of general scientific research methods, and the connection between the goals and tasks of the research.

**Approbation and implementation.** The new methodical approach proposed to solve the problems arising in determining the efficiency of the use of fixed assets has been successfully tested in



some NQCI of "Azneft" PU. The main provisions, results and recommendations of the dissertation were presented and approved by the author at conferences and seminars. 3 theses and 7 articles reflecting the content of the work (including 1 article and 1 thesis abroad) were published in prestigious journals recommended by the HAC. Among the conference materials, show theses "Main directions of efficient development of oil production based on innovations" (Nakhchivan, 2023), "The role of oil production in the macroeconomic development of the Republic of Azerbaijan" (Moscow, 2023), "Development of an econometric model of increasing oil production in Azerbaijan" (Baku, 2023). can During the research, the author also wrote "Methodological approach to solving the problem of efficiency of fixed assets" (Baku, 2020), "On the general principles of increasing the technological efficiency of operation in oil wells" (Baku, 2022), "Theoretical and methodological aspects of the problem of increasing the efficiency of oil production" (Baku, 2023), "Econometric models for estimating the efficiency of oil production" (Moscow, 2023) were published.

**The name of the organization where the dissertation was conducted:** Oil and Gas Research and Project Institute of SOCAR.

**The volume of the dissertation's structural sections separately and the general volume.** Dissertation consists of introduction, three chapters, conclusion and list of used literature. The total volume of the introduction (12603 characters), chapter I (46316 characters), chapter II (46636 characters), chapter III (86230 characters), conclusion (10846 characters) and bibliography (16423 characters) is 226619 characters. The number of marks of the dissertation is 202631 marks, excluding tables, graphs, and the list of used literature.

## **BASIC CONTENT OF THE DISSERTATION**

In the introductory part of the research work, the relevance and degree of development of the topic, the object and subject of the research, goals and tasks, methods, the main propositions defended, the scientific innovation, theoretical and practical importance of the research, as well as its approval and application are reflected.

The first chapter of the dissertation is dedicated to the issues of **"Azerbaijan's oil extraction industry, the main factors of its formation and development"**. It is noted that during the last 200 years, oil and gas production has undergone great development. In 1846, the first industrial oil well was drilled in the Bibiheybat area of Baku, and the production was fundamentally improved in a technical and technological way. All these innovations have resulted in a rapid increase in oil production in Azerbaijan. Already at the beginning of the 20th century, Baku had become the oil center of the world. According to official data, in 1902, Baku accounted for half of the world's oil production.

Here, "Nobel brothers", "Rothschild", "Mantashov", "Nagiyev", "Asadulla", etc. companies were operating. Monopolistic capitalist relations dominated Baku's oil industry. After the establishment of Soviet power, oil fields were also nationalized in Azerbaijan, and enterprises were created that met the requirements of the ruling ideology.

In the dissertation, the facts reflecting the development of the oil and gas extraction departments of the NGCI, which has a rich history, are given. We believe that it is not possible to correctly assess the development trends of oil production without knowing the historical work done by them and without detailed research.

One of the republic's national parks with a rich history is located in the village of Baku. It can be said with responsibility that most of the first innovations and technologies in the oil extraction industry were applied in this department.

The discovery of the Neft Dashlari field in 1949 was remembered as the first extraction of oil from the sea in the history of the world oil industry. It should also be noted that the oil produced on land from promising fields such as Neftdaslar, Gum Island, Girovdag, Mishovdag paid for the reduced production. At the same time, Sangachal-deniz-Duvanni-deniz, Bulla, Kursangi deposits were discovered in our republic in those years.

But the long-term exploitation of most of Azerbaijan's oil and gas fields had its effect. During the years of the Great Patriotic War (1941-1945), by the decision of the Soviet government, the forced

transfer of oil equipment in the factories of our republic to the East caused serious problems in the oil industry of the republic. As a result, oil wells were not stopped for basic, current maintenance in time, and electricity supply was cut, which created many difficulties in organizing production due to the reasons mentioned above.

At the same time, there were many reasons that made it difficult to increase oil production from the sea. A lot of money had to be allocated to dig new wells and operate them. But offshore wells yielded more oil, and about 60% of them worked by the fountain method. In 1966-1970, more than 60.9 million tons of oil were extracted in Azerbaijan, which was about 11.2 million tons more than the amount extracted in the seventh five-year period.

In 1971, on the occasion of extraction of 1 billion tons of oil in Azerbaijan

A joint decision of the Central Committee of the Communist Party of Azerbaijan and the Council of Ministers was adopted. Heydar Aliyev, the first secretary of the Central Committee of the Communist Party of Azerbaijan, made a speech at this big holiday event and said that these achievements were the result of the selfless work of the Azerbaijani people, our heroic oil workers, who played a big role in the development of the oil industry.

The process of oil extraction includes the development of oil fields, the operation of oil wells, the collection of oil and the water that comes out with it, the extraction of water and mineral salts from oil (the process of preparing oil), and the collection of gases that come out together with oil. Its main technical and economic indicators are determined in advance.

The drilling of oil wells is extremely important in the development of the oil industry of Azerbaijan. Suffice it to say that at least 70-75 percent of the capital resources allocated to oil extraction are directed to the construction of wells, and 40-45 percent of them include drilling works. In the dissertation, the data characterizing the extraction of oil from the well by fountain or by mechanized methods are analyzed and it is shown that although oil extraction by the fountain method is economically important, its period is short. Oil production in the republic is mainly carried out using mechanized

methods. Oil production has been ensured by pumping for almost 150 years. In the former Soviet Union, 3/4 of the oil production was provided by this method. It should also be noted that Azerbaijani scientists have a great role in the application of these methods and the analysis of their results.

The oil and gas production industry is also distinguished by its high quality composition of employees working here compared to other sectors. It is enough to show that 15-16 percent of the workers in the field were engineering and technical workers. Let's admit today that there are some difficulties in this matter.

At the end of the 50s of the last century, the number of operating wells in the oil production industry in the republic was 15,158, and at the end of the 60s, this number was 14,189. 12,400 of them were in operation. Inactive wells accounted for an average of 12-13% of all operational wells. The number of wells in the Marine Oil Union increased from 2,020 in 1965 to 2,164 in 1969. In this work, the analysis of the fund of oil wells was carried out on NQPIs, as well as onshore and offshore oil fields, and relevant results were obtained. Analyzes and observations suggest that the drilling of operational wells is a very complex process that requires high professionalism. Organization of exploitation and exploratory well work requires the training of skilled, important, engineering-minded personnel. Therefore, we should note that in the second half of the last century, important work was done in the republic on the training of professional personnel for this field, and all of these had their positive results.

For a long time, there was an increase in labor productivity in the oil production industry. Of course, such a dynamic is directly related to the growth of production. In the 60s of the last century, labor productivity in the oil extraction industry increased by 23%, in 1960, 34,000 people worked in oil and gas extraction enterprises, and in the 1960s, 28,800 people worked. This tendency has shown itself in the following years. In general, the decrease in the number of workers in the extractive industry is characteristic of almost all countries.

Our research shows that in 1950, 1,308,000 meters of wells were dug in the republic, of which 884,000 meters were operational and

424,000 meters were exploratory. At the end of the 1960s, this indicator decreased more than 2 times to 624,000 meters. The conducted research also proves that it is possible to stop the downward trend of production from the fields in operation for a certain period based on modern intensive methods. In 2023, 74,000 meters of drilling were carried out by the State Oil Company.

By the beginning of 1981, the total operational well fund in the republic was 13,227 units, including 2,373 sea wells and 10,854 land wells. The share of operating wells in the entire operating fund increased from 89.5% in 1970 to 96.5% in 1980. At the same time, the number of inactive wells increased, while the number of producing wells decreased.

In this work, the drilling of wells for oil and gas production over a large period, its results are analyzed, and the possibilities of increasing oil production from the layers are discussed. Based on concrete facts, it is stated that the improvement of production efficiency indicators and material and technical support to a significant extent depends on increasing the efficiency and quality of drilling works, reducing the downtime of wells while waiting for development, and increasing the efficiency of using the operating well fund.

In 1980, compared to 1975, the average depth of the wells completed in operational drilling increased from 2,312 to 2,472 m, and in exploratory drilling from 4,590 to 5,094 m. Experts said that as the depth of drilling increases, the time spent on additional work also increases, and this is mainly the share of auxiliary work. Therefore, the use of advanced methods in the organization of production and labor plays an important role in this direction.

In this work, the cost of each ton of production and the factors affecting its dynamics were also investigated. It became clear that the complexity of the geological conditions, the increase in costs related to the repair of oil industry equipment, is accompanied by an increase in the cost of one ton of oil. In 1960, the cost of digging a 1-meter well was 43 rubles, in 1965, this figure was 61.9, and in 1969, it was 129 rubles. The cost of 1 meter of exploratory well was 206 rubles in 1960 and 420 rubles in 1969 in "Deniz Neft" Union.

It is clear from our conversations with experts and the results of scientific research that the lack of water injection, fluid extraction and lack of infrastructure in many fields, especially the continuous drop in formation pressure, limits the possibilities of increasing production. Onshore oil fields are mainly composed of poorly cemented sands and are in the final stages of development. By the beginning of 1981, the average irrigation of the produced product reached 90%, in some fields it reached 95-97%.

In the dissertation, our research on scientific and technical innovations and their use, especially in the oil extraction industry, made it possible to obtain a number of interesting results. Azerbaijan's oil fields (mainly in the Absheron peninsula) have been developed for nearly 180 years, and during this period more than 1.6 billion tons of oil have been extracted from the depths of the earth.

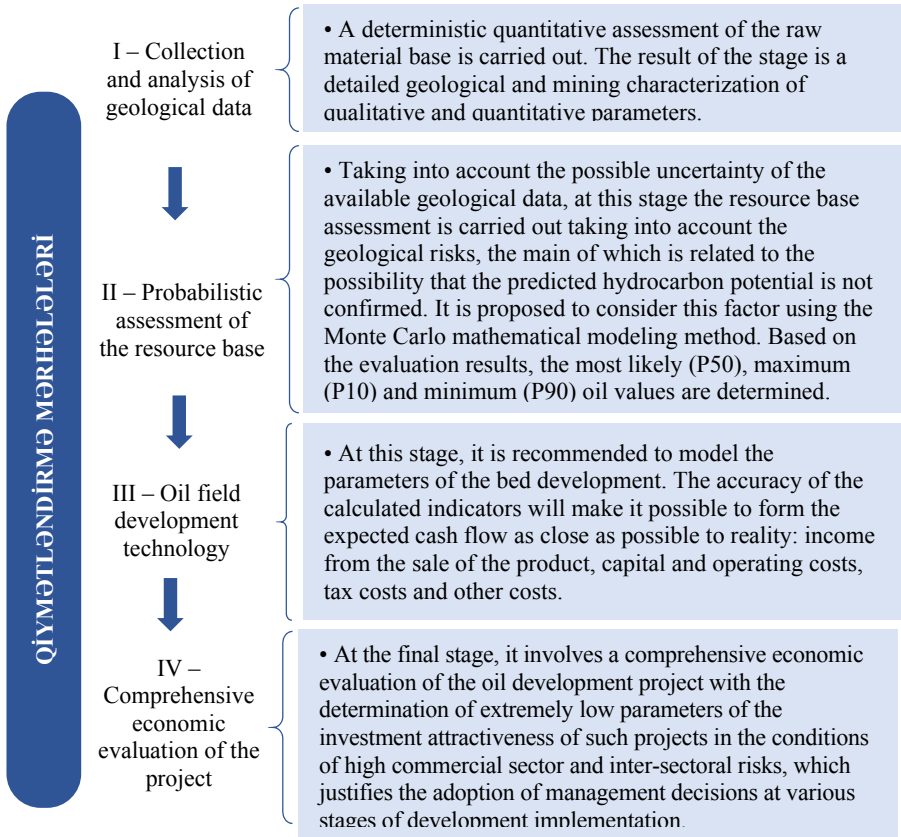
Starting from the 30s of the 20th century, if we take into account the remaining years of independence, the oil and gas extraction industry of Azerbaijan has passed a very difficult, but honorable path. In this very important work, Azerbaijani scientists have made exceptional contributions.

The exceptional services of Azerbaijan's scientists and specialists in the discovery and commissioning of oil and gas deposits are discussed in detail.

It should also be noted that the driller Aga Nematulla was the first to perform inclined drilling with a turbine in the oil industry of Azerbaijan. His team implemented a number of new streamlining proposals in turbine drilling. As a result of this, the time spent on lifting and lowering works in oil extraction and repair works was reduced, and production costs were saved. In the dissertation, the research conducted by the "Neftgaselmitadikhiyatlayiha" institute, which is one of the most important scientific centers of our republic at the modern stage, is discussed, as well as its scientific and practical importance.

The author believes that the algorithm for calculating the efficiency indicators of oil production consists of four main stages: the analysis of geological data about the object under study, the accounting of geological risks, the determination of the technological parameters of

development and the complex economic assessment of industrial importance, including the accounting of investment risks. Schematically, the calculation algorithm is explained as a diagram in figure 1, the emerging risks are evaluated.



**Figure 1. Algorithm for calculating efficiency indicators for the implementation of oil development projects**

Based on the studies of scientists and specialists, attention is drawn to the fact that the economic efficiency of oil production projects should be in accordance with evaluation criteria of a different nature (geological, technological, budget, commercial,

social) that allow the justification of management decisions. Taking into account the investment risks, it is necessary to take into account the joint application of the clarified methodological principles and criteria for the assessment of the economic efficiency of oil production, the methods of determining the limiting mining geological and economic conditions for involvement in the industrial cycle, and the proposed algorithms for solving the opposite issues.

In the second chapter, called **"Main trends in oil and gas production at the modern stage of economic development"**, the issues of oil strategy and its role in the development of the economy of Azerbaijan are brought to the fore. It is noted that oil has been the main export commodity for the Republic of Azerbaijan for many years, but also plays an important role in geopolitics. Azerbaijan remains the most attractive country for multinational companies seeking access to the vast energy resources of the Caspian Sea.

Apart from being one of the oldest and largest oil producers in the world, the Republic of Azerbaijan is one of the main net exporters of this strategically important raw material to the world market.

The dissertation emphasizes that the oil sector has been and will continue to be the engine of the economy in the structure of the country's economy. A strong oil-gas complex is the main factor determining the country's currency reserves in economic development

On September 20, 1994, at the signing ceremony of the "Contract of the Century", the great leader said: *"Today, on this historic day, approximately 150 years after the beginning of industrial production and processing of oil in Azerbaijan, I wish to all generations of Azerbaijani oil workers, in the oil field of our republic I would like to express my gratitude to all the working scientists, specialists, engineers and workers for extracting our natural resources and improving the welfare of our people to a certain extent, for their selfless work, for their great scientific discoveries, and I heartily congratulate them on their achievements so far..."*

The consistent implementation of the oil strategy stimulated the attraction of foreign capital to the economy of Azerbaijan. Even at the end of the 90s of the last century, the global financial crisis and



the sharp drop in the price of oil could not weaken the interest of foreign investors in Azerbaijan, and thus the oil industry experienced a new stage of its development as a priority area.

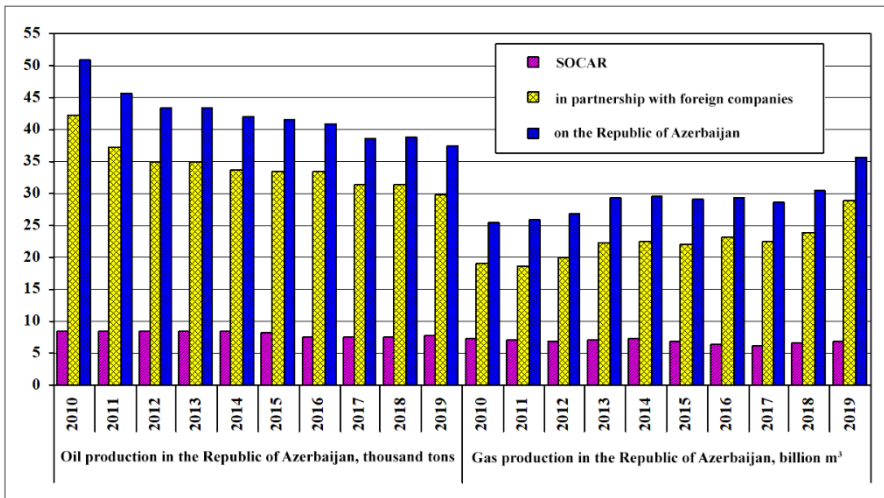
At the ceremony dedicated to the 25th anniversary of the "Contract of the Century", President Ilham Aliyev said: *"The signing of the "Contract of the Century" is a historic event. The benefits of this contract are seen by the state of Azerbaijan and the people of Azerbaijan today. It is difficult to imagine that if the "Contract of the Century" had not been signed, Azerbaijan could have ensured its economic development at that time. At the expense of what we could successfully develop. The "Contract of the Century" has a special place, a special role in our independent history. Signing this contract was not an easy task. The long-term negotiations did not bring results. Of course, both sides tried to get more favorable and acceptable conditions for themselves. I believe that we see the positive side of international cooperation in the example of the "Contract of the Century". Because both the investing party - investors, and the state of Azerbaijan found a balance of interests and signed this contract for themselves under the most acceptable conditions. If the investors are not satisfied with the terms of the contracts, then, of course, there can be no question of signing any contracts. At the same time. The interests of the Azerbaijani state were fully satisfied. Today, the renewed, modernized, strengthened Azerbaijan, which is the result of the execution of the contract, is a clear proof of our words."*

Analyzing the current state of oil production, the author comes to the conclusion that a promising direction for maintaining the level of production in oil and gas regions is the development of high-resistance oil fields. For this purpose, it is appropriate to implement classical adaptation and development of new technologies in response to a number of technological challenges for the efficient extraction of crude oil.

As of 01.01.2020, 81 oil and gas fields have been discovered in the territory of the Republic of Azerbaijan. Currently, hydrocarbons are produced from 59 fields. 22 deposits were not involved in development for one reason or another or their development was

stopped. 40 fields under development are located in the onshore territory of Azerbaijan (including 14 fields operated by Azneft, 26 fields are operated by MM and LLCs), and 19 fields are located offshore (including 13 fields by Azneft, 6 fields by MM and LLCs).

**Figure 2** shows the dynamics of oil and gas production in Azerbaijan, as well as SOCAR and joint foreign companies working with it in recent years. In 2001, annual oil production in Azerbaijan was 50.8 mln. ton.



**Figure 2. Dynamics of oil and gas production in Azerbaijan in 2010-2019**

It should be noted that the well operation method determines many issues in the efficiency of oil and gas field operation. The analysis of the technical and economic indicators of the wells according to the method of operation makes it possible to reveal the resources for increasing the oil production and, accordingly, to improve the results of the production and economic activity of the oil field. In this work, the analysis of oil production in enterprises and departments of SOCAR was carried out. During the analyzed period, 2/3 of SOCAR's annual oil production was accounted for by the gaslift (airlift) operation method, 23% by deep pumps, and 18% by the fountain method. 70% of "Azneft" oil production is accounted for

by the gaslift (airlift) operation method, and 81-90% in MM and OJSC is accounted for by the depth pumps method. The advantage of the gaslift (airlift) operation method is that it allows to improve the use of gas and to use the field more efficiently. The advantage of Airlift is that in the operation of compressor wells, an unlimited source of air is taken as a working agent.

The dissertation examines the main trends in the dynamics of the wells, especially the most active part of them, as the basis of the property and material-technical base of the NGCI, its main production funds. The study of the operating fund of wells and its composition in different directions enables the discovery of ways to improve the use of the main production funds, especially to reduce the inactive well fund. This, as a result, gives impetus to the improvement of the financial situation of NGCI and the increase of oil production. In addition to the 60s and 70s of the 20th century, the analysis of SOCAR's well stock was carried out in the last 5-6 years. The analysis showed that the operating well stock decreased by 7.7% during the period of time taken as the basis for the study, while the decrease of inactive well stock (26.65%) exceeded the decrease of active well stock (2.1%). As of 01.01.2020, SOCAR's operating well stock consisted of 7,972 wells (including 165 gas wells), active well stock consisted of 6,262 wells (including 109 gas wells), inactive well stock consisted of 1,689 wells, and those under exploitation after drilling - 21 wells have been. It would be appropriate to remind that in 1969, there were 14,169 operating wells in the republic, and 1,678 inactive wells. As it can be seen, during 50 years, oil and gas production has increased significantly in the conditions where the number of wells in the republic has decreased by 2 times.

The author notes that over time, although the quality of the main funds of the oil and gas industry has improved, there is still a need to apply the latest technologies and productive equipment. All this brings to the fore the development of a promising strategy for the innovative development of the oil-gas complex.

The transition from the mining method of oil production to the deep extraction of oil from productive layers, the rapid exploitation of resources as the wells deepen, significantly increases the scale of

oil production, and in connection with this, the deepening of oil processing and the development of new advanced technology significantly expands the possibilities.

Experts say that one of the components of the promising sixth technological regime can be the technology of managing the full life cycle of field development based on a computer model.

In such a model, the results of the calculations should be prospective parameters of the collection, preparation and transportation system that can ensure the realization of the production volumes planned by the development strategy and deliver them to the consumer. The conclusion obtained as a result of the analysis is that the factors that determine the successful solution of the processes of attracting oil and gas resources to the economic cycle, search, exploration and field development allow investors to achieve their goals. As a rule, such successes are not of a local nature, but also determine the possibilities of solving the problems of socio-economic development of oil and gas regions.

From our analysis, it is clear that the evaluation of GTT efficiency in the NQCI fields of "Azneft" PU is carried out on the basis of methodical instructions, and the commercial efficiency is carried out on the basis of the realization of the reliability criterion of the wells and the determination and comparison of monetary income and expenses distributed over time related to the subsequent oil production costs. . The author believes that the principles used to evaluate the efficiency of investment projects form the basis of the evaluation of the economic efficiency of geological-technical measures (GTT). The economic efficiency of repair works is evaluated based on the determination and comparison of time-distributed cash inflows (inflows) and costs (expenditures) related to conducting GTT and subsequent production of oil.

Experience proves that regular GTT is necessary to maintain the project level of hydrocarbon production and operational fund of wells in fields with low reserves.

Chapter III of the dissertation, called **"Innovative and economic mechanisms of increasing oil production"**, examines the issues of evaluating the efficiency of indicators of the use of basic funds.

We come to the conclusion that the more old deposits are used in the NGCI, the greater the difference between the indicators calculated according to the balance and residual values. In this regard, it is justified to carry out the efficiency indicators of the main production funds in NQPIs according to the residual value. In this work, a methodical approach was presented for solving the problems of determining the efficiency indicators of the main production funds according to the residual value. These indicators are related to the availability system and, in addition to the wear coefficients, the renewal coefficient of the main funds; the coefficient of failure of the main funds; the relative growth rate of the main funds; the specific weight of the active parts of the main production funds is attributed to the fund yield, fund capacity, fund arming of the main funds.

Mathematical-economical and static methods of analysis were applied in the process of conducting scientific-research works, and various types of graphical views of data were widely used. The comparative analysis of the report of the efficiency indicators of the use of fixed assets according to the balance and residual value shows that the system of indicators calculated according to the residual value (compared to the balance value) can create a more realistic view of the actual state of the fixed funds in the enterprise. It should also be noted that the dependence of the wear of the main funds on the operational period of the fields in the NQCI is also manifested.

The dissertation examines the new methodical basis for improving the efficiency of overhaul of wells and notes that in order to stabilize oil production and increase the rate of its extraction, measures are taken to reduce the number of idle wells, as well as to stimulate low-rate wells.

The analysis also suggests that in order to increase the efficiency of overhaul of wells, it is necessary to increase the level of reliability of the equipment serving the well repair, as well as to improve the material and technical supply of NQPIs. One of the important conditions is to strengthen the financial interests of the major and current maintenance crews of the wells. The conducted studies show that we would like to mention the following about the possibilities of

increasing the efficiency and improving the quality of the overhaul of wells:

In this section of the work, special attention is paid to innovative mechanisms of increasing the efficiency of oil production. One such technology that has been applied in recent years is "ColibriESP" - a technology for mastering, exploration and exploitation of oil and gas wells using an underwater centrifugal pump unit installed on a load-carrying cable without the participation of both offshore and onshore well repair crews. Innovative technologies allow to reduce the installation time by 2.5-3 times without using expensive equipment for overhaul of wells and underground repair of wells, as well as trouble-free operation with maximum increase in production in the barrel of lateral and horizontal wells.

Adoption of innovations in research work should be carried out according to a program that includes the stages of its implementation from the development of project-estimate documents to their application in production.

Here it is justified by concrete facts that one of the main factors that necessitates the transition of oil and gas production to the application of innovative technical solutions is to increase the coefficient of oil and gas production of the fields in operation and to reduce the self-extinguishing of the wells.

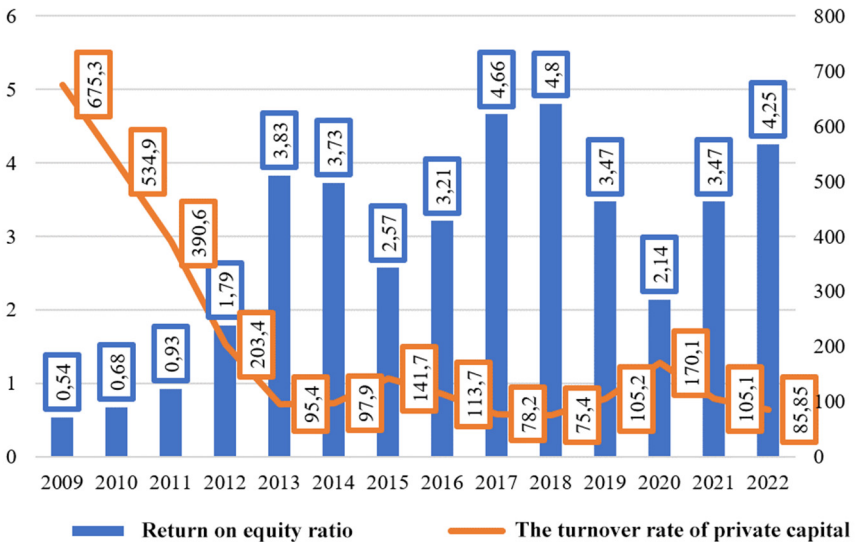
Experience shows that innovative technical solutions allow to increase the oil production coefficient of the fields that are in the long stage of development, to reduce the self-priming of the wells, and should become the basis of the reconstruction program. It is also known that as reserves are developed, especially at the end of development, production costs may increase and costs may exceed production revenue. In such cases, there are ways out that have proven themselves in the world experience, one of which is the field reconstruction programs.

At the end of the work, the issues of econometric models of oil production efficiency assessment were considered.

Our research confirms that indicators such as the transition to market methods of management, the efficiency of oil production, the level of production costs, and the cost of production have become the

focus of management. Regardless of the form of organizational and legal ownership, the financial and economic activity of any enterprise fundamentally depends on the financial resources and private capital of the enterprise. Therefore, in the dissertation, the analysis of SOCAR's sales revenue for the period 2008-2022, the total cost of sales, the annual profit from sales and the volume of its private capital was analyzed and relevant assessments were made.

The following table shows the amount of net profit per manat of private capital. It should also be noted that the efficiency of SOCAR's private capital for 2009-2022 was higher than in other years studied in 2020-2022. In 2022, this indicator was 52.45%, which is the highest indicator for the research period. As can be seen from the graph we prepared (graph 1), the level of return on capital was 4.25 in 2022, which is high compared to 2019-2021. One turnover of its capital was 675.3 days in 2009, and it was 85.8 days in 2022. In general, the turnover of SOCAR's special capital increased by 589.45 days during the studied period.



**Graph 1: Return on equity and turnover ratio of SOCAR for 2009-2022.**

- It should be noted that important work is being done at SOCAR in relation to solving the actual problems of the oil and gas field, developing nanotechnologies in production and applying them to production.

- Thus, the oil obtained by the application of nanotechnologies in the Oil and Gas Extraction Departments of SOCAR developed with increasing dynamics for the years 2011-2019 and reached 5,892 tons in 2019. In 2011, with the application of nanotechnology in 3 wells, the volume of production was 112 tons, in 2019, 5,892 tons of additional oil were produced by applying nanosystems in 20 wells. In 2019-2022, along with the development of new nanosystems, important scientific and analytical research works are being carried out in the direction of improving operating technologies in the oil industry of Azerbaijan.

- The Eviews-12 application software package was used to evaluate the impact of investment and private capital directed to oil and gas production on the factors affecting SOCAR's income from product sales for the period 2008-2022. Econometric models applied with reference to statistical data determined the following:

- 2008-2022-ci illər üzrə Azərbaycan Respublikasında neft və qaz hasilatında əsas kapitalla yönəldirilən investisiyaların 1% artması SOCAR-ın satışdan əldə olunan gəlirinin 0,26% artmasına səbəb olmuşdur (və ya neft və qaz hasilatında əsas kapitalla yönləndirilən investisiyaların bir vahid artması SOCAR-ın satışdan əldə edilən gəlirini 2,513 vahid artırmışdır);

- Based on the statistical data of 2008-2022, the efficiency of using SOCAR's private capital, the level of profitability of private capital, as well as the turnover rate were calculated and evaluated. It was determined that in 2022, compared to 2021, 12.8% profit was obtained for each 1 manat of SOCAR's private capital, which caused an increase in the efficiency of using private capital;

- During the same period, a 1% increase in SOCAR's private capital led to a 1.45% increase in the company's sales output (or one unit increase in the company's private capital increased the company's sales revenue by 4,356 units);

- The calculation of the coefficient of variation used to determine



the variability of annual profit during the studied period gave a result of about 68%. This indicates that the company's profit figure is highly volatile. Considering that the numerical average of the profit (for the years 2008-2022) is about 4.8 billion manats, the expected profit figure for a certain year is positive and has to be estimated in a very wide range.

The “**Conclusion**” section of the dissertation contains methodological and practical proposals and recommendations that can increase the efficiency of oil extraction by evaluating it with modern economic methods. We summarize some of them:

- Based on the goals and objectives of the research work, an attempt was made to summarize the work done by Azerbaijani scientists and specialists in the field of application of progressive methods of discovery and exploitation of oil and gas deposits, which, taking into account the increasing difficulty of solving the problems of maintaining the well stock of Azerbaijan in working condition, the measures to increase the production of the ecological environment should be connected with complex measures that serve to protect;

- Starting from the 60s of the last century, the main factors in oil and gas production and the dynamics of the well stock were identified and assessments were made; Müəyyən edilmişdir: neft hasilatının cari səviyyəsini saxlamaq və neft-qaz kompleksinin iqtisadi səmərəliliyini artımın effektiv mexanizmlərdən biri innovasiyalardan istifadəsi hesabına enerji auditinin aparılması, enerjiyə qənaət edən texnologiyaların tətbiqi hesab edilməlidir;

- the main indicator of the efficiency of the application of innovations in the implementation of oil and gas field development projects is the increase of production by using the main resources, obtaining profit, improving social development indicators;

- when adopting innovations, it is necessary to determine precisely what technological solutions will be used in oil production enterprises and their interaction with the technologies and equipment that are already traditionally used;

- Choosing an object for the implementation of innovative methods is a multi-criteria task. The technical and technological conditions of

the well operation, the economic results of the repair work, the requirements of the development project and the safety of the oil and gas field operation and repair work, which cannot be accurately predicted, as well as the factors related to the creation of emergency situations that are not subject to control, should be taken into account.

In order to ensure the growth of oil-gas condensate production, increase the productivity of the well fund characterized by various technological effects, taking into account geological, technological and economic factors, individual approach methods should be used in the evaluation of the economic efficiency of using a certain method;

- Based on the comprehensive study of indicators characterizing the development, dynamics and use of the oil and gas well fund, implementation of geological and technical measures related to the efficiency of its activity, evaluation of the improvement of the use of innovative technologies to increase the oil yield of the layers as one of the important factors of stabilization and increase of oil production, innovative approaches , (especially in the last stages of development) should be preferred.

- In order to manage the risks arising from the implementation of oil and gas projects, the directions for investigating the causes of their occurrence and taking into account complex factors have been determined;

- The creation of central (state and company) databases on innovative projects in the oil and gas sector and the collection of information on the implemented innovations should be considered as an important factor in reducing the uncertainty of the results of innovation activities in the oil industry;

- It should be considered one of the important tasks to support the implementation of promising directions of scientific-technical and innovative activities in the oil and gas industry.

- Three main types of technological development (accumulation, dynamic change and diffusion of innovations) were considered in the research work, based on the impact of new technologies, technological development on the formation of oil and gas business strategy in the field of exploration, search and development of oil

and gas fields (NQY) and from them to the diffusion of innovations. preferred.

- In the process of long-term exploitation of oil and gas deposits, significant changes occur in their geological and mining parameters and geological-technical characteristics of each well. In the dissertation, a special place is given to the application of innovative approaches aimed at increasing the efficiency of field development and the productivity of wells during their operation within the framework of geological-technical measures to ensure the project level of hydrocarbon production;

- During the development of oil and gas fields, the principles of the formation of the GTT control system were considered, the main criteria of reliability of the well fund, as well as the mechanism and stages of the implementation of innovations during the reconstruction of objects for the implementation of GTT and the extraction of hydrocarbons were studied.

- The development of the country's oil and gas facilities should be formed taking into account the requirements of the sixth regime technologies - digital systems capable of effectively predicting and using innovative modernization opportunities throughout the entire life cycle should be built.

- A methodical approach was proposed to improve the efficiency of using the main funds. The current approach completely (except for two coefficients) does not accept the erosion of the main funds, distorting the real view of their actual condition. Therefore, it is suggested to report the efficiency indicators of the use of fixed assets according to the residual value, in this case, the calculation of the indicators according to the balance price is not excluded.

**The dissertation's main points, obtained results and proposals were published in scientific publications and conference materials as scientific article and theses:**

1. Suleymanov, G.S., Salimova, S.G., Kuliev D.K. A methodological approach to solving the problem of very effective funds // - Baku: "SOCAR Proceeding" journal of scientific works, No. 3, 2020. - pp. 142-147.

2. Suleymanov, G.S., Salimova, S.G., Guliyev, C.K. New methodical approach to the general analysis of the efficiency of carrying out capital repair of wells of the oil and gas producing enterprise // - Baku: News of the Azerbaijan National Academy of Sciences. Economy series, No. 5, 2020. - pp. 87-92

3. Guliyev, C.K. On the general principles of increasing the technological efficiency of operation in oil wells. // - Baku: Azerbaijan Oil Industry No. 3, 2022. - pp. 29-33

4. Suleymanov, G.S., Guliyev, C.K. Innovative mechanisms for increasing the efficiency of oil production. // - Baku: "SOCAR Proceeding" journal of scientific works, No. 1, 2023. 5 p.

5. Suleymanov, G.S., Yadigarov, T.A. Guliyev, C.K. Assessment of effective grounds and main means in the oil passage of the Republic of Azerbaijan // - Baku: "SOCAR Proceeding" journal of scientific works, No. 2, 2023. 8 p.

6. Suleymanov, G.S., Guliyev, C.K. Theoretical and methodological aspects of the problem of increasing the efficiency of oil production. // - Baku: Azerbaijan Oil Industry No. 9, 2023. - p. 47-53.

7. Guliyev, C.K. Econometric models of estimation of the efficiency of mining oil.// - Moscow: Competitiveness in the global world: economy, science, technologies. Scientific journal. No. 11, 2023. - pp. 113-115.

8. Guliyev, C.K. The main directions of effective development of oil extraction based on innovations. // - Nakhshivan: Nakhshivan Institute of Teachers. "Unity of education, research and innovation" 5th Republican scientific conference of doctoral and master's students, 2023/ - p.451-454.

9. Guliyev, C.K. The role of oil production in the macroeconomic development of the Republic of Azerbaijan. // - Moscow: XIII international scientific and practical conference "Contemporary issues of sustainable development of society in the era of transformational processes" (code - MKCB), November 22, 2023. - c. 127-136.

10. Guliyev, C.K. Development of an econometric model of increasing oil production in Azerbaijan. // - Baku: Azerbaijan State

Industrial University (ASSU), Institute of Economics of the Ministry of Science and Education. Republican scientific conference dedicated to the 100th anniversary of the Great Leader H. Aliyev. November 23-24, 2023. - pp. 178-182.

A handwritten signature in blue ink, consisting of stylized cursive letters that appear to be 'Omid'.



The defense of the dissertation will be held on 27 March 2024, at 16:00 at the meeting of the Dissertation Council ED 2.46 of Supreme Attestation Commission under the President of the University and Baku Business University.

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