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## Investments in the processing sector of the oil and gas complex of Republic of Kazakhstan

### Introduction

The Republic of Kazakhstan has huge oil and gas reserves, making it one of the world's largest exporters of these resources. However, the export of raw materials does not contribute to the diversification of the economy or increase the country's competitiveness on the world stage. Investing in oil and gas processing could be a solution to the problem. The processing of raw materials can add value to products, increase government revenues, as well as create new jobs, and contribute to the socio-economic development of regions. Investing in the processing sector of the oil and gas complex of the Republic of Kazakhstan is associated with certain risks. The main risks are changing market conditions, changes in tax legislation, as well as environmental and social problems. In addition, the selection of investment projects should be based on an analysis of relevant factors, such as the regulatory

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framework, technological features, and economic efficiency. Thus, investments in the processing sector of the oil and gas complex of the Republic of Kazakhstan have great potential for developing the country's economy and increasing competitiveness on the world stage.

According to O.I. Egorov et al. (2021) the success of the sustainable development of the Republic of Kazakhstan largely depends on the investment policy, which is aimed at changing the structure of the country's economy and modernizing outdated technology and equipment. However, in light of the lack of domestic financial resources for the introduction of modern technologies and equipment, the solution of this important strategic task cannot be achieved without attracting foreign investment. Following U.S. Karabalin and A.K. Tukayev (2019), all the main components for the creation and development of petrochemical industries in the Republic of Kazakhstan are available: sufficient reserves of raw materials (oil and gas), a wide range of international proposals for petrochemical technologies and equipment, as well as a real demand for products of the petrochemical industry.

A.M. Ashikbayeva et al. (2019) consider that the main reasons hindering the development of petrochemical production in the Republic of Kazakhstan are the lack of capacities for processing hydrocarbon raw materials, wear and tear of technologies at oil and gas processing and petrochemical enterprises, as well as an underdeveloped pipeline system for the supply of extracted raw materials and finished products. A.B. Otarbayeva and A.A. Arupov (2020) argue that in order to maintain the competitiveness of the oil complex of the Republic of Kazakhstan, it is necessary to switch to new high-tech technologies, which will require investments not only in equipment and technological processes, but also in education and development of human capital. At present, the integrated use of hydrocarbons in processing, and not just an increase in production, is more important.

According to E.E. Ergozhin et al. (2019) despite the fact that recent years have been favourable for the development of oil and gas production, the economic development of the country has not led to an increase in the potential of the processing complex, which is directly related to the financial health of the state, the size of investments and the creation of processing industries and infrastructure. It is necessary to carry out structural transformations in the country's industry, increasing the share of oil and gas processing and petrochemical industries. It should be noted that in order to attract investment in the processing sector of the oil and gas complex of the Republic of Kazakhstan, the state can actively work to improve the investment climate, reduce bureaucratic procedures, simplify registration and licensing procedures, and ensure the stability of the tax policy.

The purpose of the study is to analyse the oil and gas industry of the economy of the Republic of Kazakhstan, to identify factors that influence the attraction of investments in the processing sector of the oil and gas complex, as well as to determine the prospects for the development of this industry in the conditions of the modern world market. The implementation of this goal will make it possible to make decisions at the level of government, investment companies, and the business community, as well as to develop strategies for the development of the processing sector of the oil and gas complex of the Republic of Kazakhstan.

## 1. Materials and methods

When writing this work, official documents and reports, namely reports of the National Statistical Service of the Republic of Kazakhstan (2023), reports of the Ministry of Energy of the Republic of Kazakhstan (2023), reports of the National Bank of the Republic of Kazakhstan (2023), government programs and strategies related to the development of oil and gas industry and investment were studied. A scientific study on the topical issues of investing in the processing sector of the oil and gas complex of the Republic of Kazakhstan was carried out using methods that reveal the content of the object. With the help of an analytical method, the current state of the processing sector of the oil and gas complex of the Republic of Kazakhstan was studied, and the problems that could hinder investment attraction were identified. Statistical data on the state of the country's industry was analyzed, including the volume of production, export, and import of petrochemical products, the share of processing within the country, and other indicators. The use of the statistical method made it possible to study and interpret data related to this sector of the economy, as well as to conduct a deep analysis of the investment market in the processing sector of the oil and gas complex of the Republic of Kazakhstan (Government of the Republic of Kazakhstan 2021).

The functional method helped to consider what factors influence investment growth in the processing sector and what measures can be taken to stimulate investment activity. It also contributed to the determination of the relationship between the volume of investment in the processing sector and the level of productivity of enterprises operating in this sector. Thanks to the system analysis method, it was possible to understand the structure and relationships between various system elements, including processing industries, oil companies, transport and energy infrastructure, and government agencies responsible for regulating and developing the industry. Using the deduction method, it was possible, based on the analysis of the collected data and established patterns, to draw conclusions about what measures can be taken to improve the efficiency of investments. The synthesis method helped to combine various ideas, concepts, and strategies into a coherent understanding of the further development of the processing sector of the oil and gas complex in the Republic of Kazakhstan. Through their analysis, the comparison method was used to determine the most effective strategies for investing in the processing sector.

The study was conducted with the disclosure of some aspects, including theoretical and practical components. The theoretical aspect includes the study of the oil and gas market in the Republic of Kazakhstan, including data on production, export, and import of petroleum products, as well as an assessment of the current situation in the world energy markets. The study of the causes and factors affecting the investment attractiveness of the processing industry of the oil and gas complex, including an assessment of tax regulation, the investment policy of the state and the competitive environment in the world market. Another aspect of the study was the analysis of the current state of investment activity in this sector of the economy of the Republic of Kazakhstan, identifying the main problems and prospects for

attracting investment and determining the most effective tools and mechanisms for regulating investment activity. The final part is, based on the results obtained, to consider the necessary recommendations to highlight specific problems in the efficiency of investments that will contribute to the solution of issues and the development of industry in the Republic of Kazakhstan. As a result, these actions were applied to consider the feasibility of investing in certain types of industry, for the successful development of the economy and the country as a whole.

## 2. Results

Today, as already mentioned, the Republic of Kazakhstan has vast oil and gas reserves, which have already been explored and produced at industrial facilities, and promising and forecast resources. By the beginning of this century, proven geological reserves of oil and gas condensate amounted to 21 billion barrels (2.9 billion tons), which is approximately equal to 2% of world reserves, and 1.8 trillion m<sup>3</sup> of gas. More than 200 oil and gas fields have been discovered on the territory of the country, while the main reserves are concentrated in 14 large fields in the Western Republic of Kazakhstan. Such giants as Tengiz with recoverable oil reserves of more than 1 billion tons (7.3 billion barrels), Karachaganak with recoverable reserves of oil and condensate of about 700 million tons (5.1 billion barrels) and 1.3 trillion m<sup>3</sup> of gas, and Kashagan with recoverable reserves of about 1.5 billion tons are especially significant among oil and gas fields. In addition, all these structures extract a significant amount of associated gas, the qualitative composition of which indicates a real possibility of obtaining high economic results in its complex processing (Mouraviev 2021).

State policy can be directed to the use of direct investment in the industry, which contributes to the development of related industries, increasing the value added of natural raw materials. For example, oil and gas production stimulates the development of the petrochemical industry, the production of specialized equipment for gas and oil development, as well as shipbuilding for the transportation of hydrocarbons (Lu et al. 2019).

The Republic of Kazakhstan possesses significant reserves of oil and gas. As of the beginning of the 21st century, proven geological reserves of oil and gas condensate amounted to 21 billion barrels (2.9 billion tons) of oil and 1.8 trillion cubic meters of gas. Production levels have steadily increased in recent years due to investments and modernization projects. For example, in 2021, oil production in the Republic of Kazakhstan reached approximately 1.78 million barrels per day, while natural gas production was about 55 billion cubic meters. The Republic of Kazakhstan is a significant exporter of both oil and natural gas. Approximately 85% of the oil produced is exported, which amounted to about 1.5 million barrels per day in 2021. Regarding natural gas, the Republic of Kazakhstan exported about 20 billion cubic meters in 2021. Major oil export destinations include European countries, China, and neighboring Central Asian countries. The main routes for transporting oil are the Caspian Pipeline Consortium (CPC) pipeline to Russia's Black Sea port of Novorossiysk

and the Atyrau-Samara pipeline. Natural gas is primarily exported to Russia and China, with the Central Asia-China gas pipeline being a key route for gas exports to China. The Republic of Kazakhstan holds a leading position among the largest oil exporters globally, ranking within the top 15. In terms of natural gas exports, the Republic of Kazakhstan is also a significant player, especially in exports to China and Russia. The geopolitical instability caused by Russia's armed aggression against Ukraine has impacted the Republic of Kazakhstan's oil export strategies. Europe's effort to reduce dependency on Russian energy has compelled the Republic of Kazakhstan to seek alternative routes and increase exports to China. This situation has also accelerated efforts to diversify export routes to ensure stable access to international markets (National Statistical Service... 2023).

The Republic of Kazakhstan maintains relatively low domestic prices for oil products and natural gas compared to international markets, partly due to government subsidies and price controls. Gasoline and diesel prices in Kazakhstan are lower than in neighboring countries. However, they have gradually increased in recent years. Domestic natural gas prices are also kept low to support the local population and industries. The Republic of Kazakhstan's oil and gas sector attracts significant investment from both the state and foreign investors. In 2021, the Republic of Kazakhstan's oil exports were valued at approximately \$34 billion. The country has seen substantial investments in refineries and infrastructure development modernization projects. For instance, investments in modernization projects at the three main refineries (Atyrau, Pavlodar, Shymkent) amounted to several billion dollars. The Republic of Kazakhstan maintains a surplus in crude oil trading due to its substantial production levels and export capacity. This surplus is a critical factor in ensuring the country's economic stability and growth, especially amid fluctuations in global oil prices. The Republic of Kazakhstan's oil and gas sector plays a crucial role in its economy. With significant reserves, steady production, substantial exports, and ongoing investments, the country holds a favorable position in the global energy market. Geopolitical changes, particularly Russia's actions, necessitate strategic shifts in export directions and market diversification. Despite these challenges, the Republic of Kazakhstan continues to leverage its energy resources to drive economic growth and maintain a surplus in crude oil trading (National Statistical Service... 2023).

Most of the oil produced in the Republic of Kazakhstan is exported, and only a small share (slightly more than 15%) is used for processing in the domestic market. There are three large oil refineries for oil refining in the Republic of Kazakhstan, which are located in Atyrau (Western region), Pavlodar (Northern region), and Shymkent (Southern region). These plants play a major role in the Republic of Kazakhstan's oil refining and petrochemical industry. Figure 1 shows the dynamics of the production and consumption of petroleum products in the Republic of Kazakhstan from 2000 to 2021.

As can be seen from the figure, the production, and consumption of petroleum products show an increasing trend. This is the result of the implementation of investment projects to modernize all three refineries. The main products of the processing sector are petroleum products such as petrol, diesel fuel, kerosene, and fuel oil, as well as petrochemical products

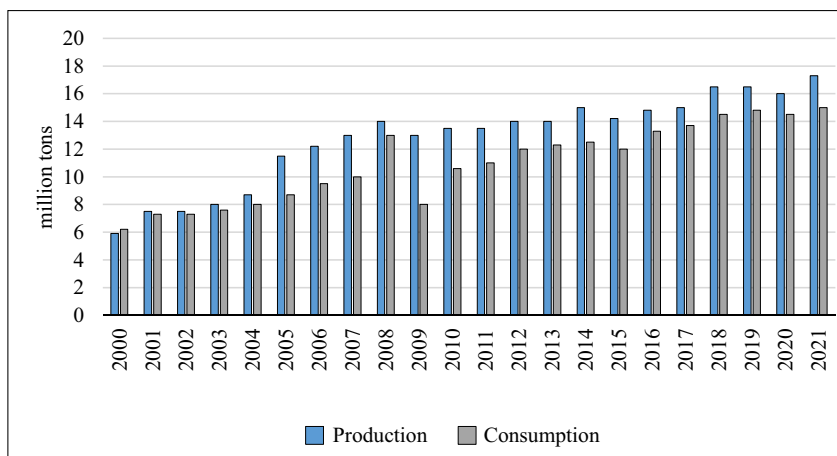


Fig. 1. Dynamics of production and consumption of petroleum products in the Republic of Kazakhstan  
Source: Ministry of Energy of... 2023

Rys. 1. Dynamika produkcji i konsumpcji produktów naftowych w Republice Kazachstanu

such as plastics, rubber, and synthetic fibres. These products are widely used in various sectors of the economy, such as transport, construction, and agriculture (Arriola-Medellín et al. 2019; Novanda and Medyawati 2023).

As a result of investments in the modernization of the Atyrau Refinery, the number of process units increased from 10 to 24 units. In 2021, the share of production of light oil products at the refinery increased from 41% to 59% compared to 2011 with the transition to K-4 and K-5 product quality. The volume of investments amounted to 782 billion tenge. Investments in the modernization of the Pavlodar petrochemical plant made it possible to increase the number of process units from 13 to 16 units. The Pavlodar plant is the only one of the three main refineries that produce road bitumen. The plant is also the largest producer of diesel fuel, producing 35% of the country's total production in 2021. As a result of the implementation of the investment project at the Shymkent Refinery, the share of light oil products production increased from 59% in 2011 to 79% in 2021. The plant began to produce sulphur.

It is necessary to strive not only to produce intermediate products, but also to create more complex petrochemical industries. The quality of their work directly depends on the level of use of primary resources and the need for final products, which are widely used in various sectors of the country's economy (Meyer et al. 2011). For clarity, Table 1 has been compiled, which demonstrates the effect of increasing the output of three plants before and after the implementation of investment projects.

As a result of the modernization of three refineries, the total increase in the production of light oil products amounted to about 4.3 million tons per year. Petrol production increased by 70%, diesel fuel – by 20%, aviation fuel – by 2.4 times. The Republic of Kazakhstan's

Table 1. The effectiveness of investments in the modernization of the Republic of Kazakhstan plants for the production of refined products and petrochemicals

Tabela 1. Skuteczność inwestycji w modernizację zakładów w Republice Kazachstanu zajmujących się produkcją produktów rafinowanych i petrochemikaliów

Indicator	Production volume before modernization of the refinery (million tons)	Production volume after modernization of the refinery (million tons)	Increase (million tons)
Total volume of oil products refining	14.16	17.5	3.340
Automobile petrol	2.951	5.502	2.551
Diesel fuel	3.979	5.512	1.533
Aviation fuel	0.301	0.92	0.619
Benzene	0	0.133	0.133
Paraxylene	0	0.497	0.497

Source: Ministry of Energy of... 2023.

domestic demand for light oil products is fully covered by its production without imports, and the surplus is exported. The implementation of investment projects for the modernization of three refineries in the amount of \$6 million contributed to a change in the structure of marketable petroleum products. The share of fuel oil production decreased while the share of other petroleum products increased (Figure 2).

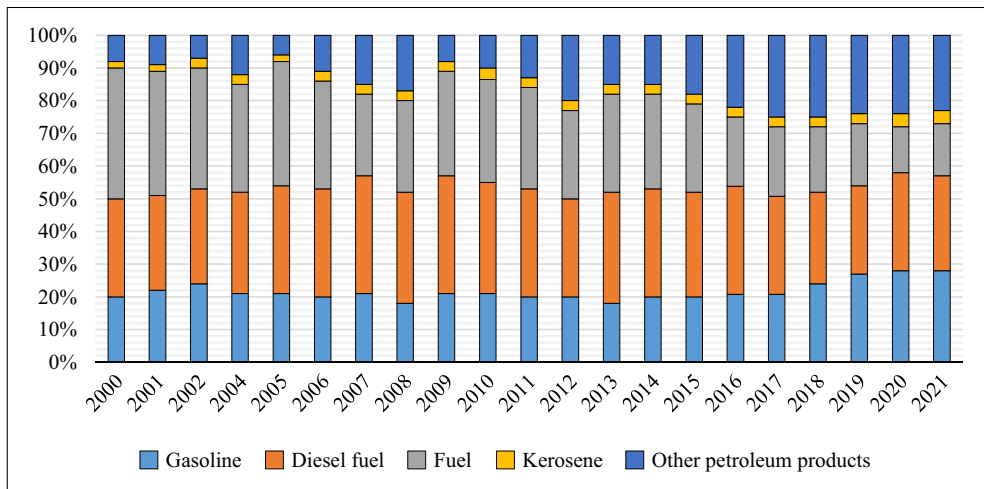


Fig. 2. Dynamics of the structure of oil products production in the Republic of Kazakhstan  
Source: Ministry of Energy of... 2023

Rys. 2. Dynamika struktury produkcji produktów naftowych w Republice Kazachstanu

Table 2. Forecast indicators of the effectiveness of investments in the development of petrochemistry in the Republic of Kazakhstan

Tabela 2. Przewidywane wskaźniki skuteczności inwestycji w rozwój petrochemii w Republice Kazachstanu

Indicator	Year									
	2020	2021	2022	...	2025	2026	2027	2028	2029	2030
Investment size, \$ billion	214	308	136	...	890	2,529	–	–	–	–
Growth in petrochemical production by 2020, excl. tons	100	1.1 time	1.6 time	...	5.5 time	6.5 time	6.6 time	9 time	10 time	10 time
Number of employees in the petrochemical industry of the Republic of Kazakhstan	1,070	1,070	1,995	...	2,765	2,765	3,698	3,698	3,698	3,698
Labour productivity in the petrochemical industry, \$	103	116	105	...	332	404	532	617	624	614
The share of exports of petrochemical products in the total volume of non-commodity exports of the Republic of Kazakhstan	1%	1%	1%	...	2%	3.4%	5%	5%	5%	5%

Source: National Statistical Service of... 2023.



However, the output of petroleum products in the Republic of Kazakhstan is quite small compared to US and Chinese refineries. These countries have the largest volumes of oil refining in the world markets. The United States, for example, produces about 1,000 or more items of oil refining and petrochemical products (Ruble 2019). The variety of products manufactured at Kazakh refineries is about 15–20 items. Basically, these products are represented by products of primary oil refining. Deep oil refining is possible only with the development of the petrochemical sector of the economy of the Republic of Kazakhstan.

The petrochemical industry in the Republic of Kazakhstan is just beginning to develop. After the implementation of the investment project for the modernization of the Atyrau refinery, the plant began to produce petrochemical products – benzene and paraxylene. Currently, a petrochemical cluster is being formed in the Republic of Kazakhstan on the territory of the Atyrau region – the Special Economic Zone “National Industrial Petrochemical Technopark” (SEZ “NIPT”). As of 2021–2022, a number of investment projects are being implemented in the Republic of Kazakhstan to organize new production facilities for the production of petrochemical products of deep processing with high added value (polypropylene, polyethylene, and butadiene rubbers and polyethylene terephthalate), which will have the greatest impact on the country’s economy. Nine different types of petrochemical products will be produced (Makhanov et al. 2022; Liadskyi and Diadyk 2023). Table 2 presents projected indicators of the effects of investing in the development of petrochemicals in the Republic of Kazakhstan. With indicators from official sources noted up to 2023, it was possible to extrapolate the data annually until 2030.

Investments in the creation of a petrochemical cluster will increase the volume of petrochemical production by 10 times in 2030 compared to 2020, and labour productivity should increase by 6 times with the creation of an additional 4 thousand jobs. The economic efficiency of the construction of a plant for the production of petrochemical products – butadiene on the territory of the SEZ “NIPT” was assessed by determining net cash flows, discount rates and risk assessment (Table 3).

Table 3. The efficiency of an investment project for oil production

Tabela 3. Efektywność projektu inwestycyjnego w zakresie produkcji ropy naftowej

Indicator	Meaning
Net present value (NPV), \$ thousand	238,763
Internal rate of return (IRR), %	14.9
<b>Payback period (PBP), years</b>	14.4
Profitability index (PI)	1.4

Source: SEZ National Industrial... 2022.

To calculate the economic efficiency of the project, a period of time was taken – 20 years, and the project evaluation period included the construction and operation periods. As a rule, based on the practice of international financial organizations that finance the implementation of projects of a state nature, the discount rate was taken at the level of 10%. The assessment was carried out in 2022. The calculated indicators of the economic evaluation indicate the effectiveness of the project, since  $NPV > 0$ ;  $PI > 1$ ;  $IRP = 14.9\%$ ;  $PBP = 14.4$  years.

In November 2022, earthworks began on the territory of the National Industrial Petrochemical Technopark Special Economic Zone (NIPT SEZ) (Atyrau region) for the construction of a plant for the production of petrochemical-butadiene products, which once again confirms the effectiveness of the project. Although the discount rate of 10% adopted for calculations is not high for the state of the economy of the Republic of Kazakhstan for 2022, it is important to take into account that over these 2 years (since 2020) the cost of raw materials has also increased, which in any case will have an impact on the formation of the selling price of goods and will lead to an approximate achievement of the payback period of the project according to the assessment of the effectiveness of the investment project. In the modern period of development of world economic systems, the issues of transition to a “green” economy and low-carbon production are acute. The European Union is gradually reducing the activity of oil refining and is pursuing an investment decarbonization policy aimed at developing the production of petrochemical products only for deep processing. Japan and South Korea are in favour of reducing plastic consumption. However, the demand for plastic products is constantly growing in developing countries. So far, there is no alternative in the world: by 2030, the consumption of petrochemical products will account for more than 30% of the demand for crude oil, and by 2050, about 50% (Favenec 2022; National Bank of the... 2023).

Investing in the oil and gas industry can have both positive and negative social and environmental impacts. Among the positive consequences are the creation of new jobs, the improvement of the economic development of the region and the country as a whole, the development of infrastructure, the increase in national income, as well as the support of national security and sovereignty. However, investing in the oil and gas industry can also lead to a number of negative social and environmental impacts. This may be due to damage to public health caused by air, water and soil pollution, damage to ecosystems and biodiversity, as well as social problems associated with population migration, violation of the rights of indigenous peoples, and forced migration. In addition, investment in the oil and gas industry can lead to increased regional conflicts and tensions (Tomlinson 2017). Therefore, when investing in the oil and gas industry of the Republic of Kazakhstan, it is necessary to consider and balance both economic, social and environmental aspects to ensure the sustainable development of the region and the country as a whole.

An analysis of the world market for oil refining and petrochemistry allows us to conclude that the Republic of the Republic of Kazakhstan has the opportunity to enter the sectoral world markets on the basis of equal partnership. Strong demand from Southeast Asia and

Eastern European countries for petrochemical raw materials (aromatic substances and olefins) creates an opportunity for the Republic of Kazakhstan. This demand, coupled with a decrease in the production of refined products in the European Union, presents favorable conditions. Additionally, there is an increase in the share of consumption of petrochemical products in developing countries. Moreover, factors such as the high cost of alternative energy sources and the impossibility of a quick transition of the world economy on the production and consumption of electric vehicles contribute to this opportunity. These situational conditions in the world industry markets allow Kazakhstan to develop its own oil refining and petrochemical industry. This development can facilitate the export of value-added oil products and deep processing while also addressing domestic import substitution issues by covering domestic market demand (Gavrysh et al. 2024).

For any system to function stably, it is necessary to achieve a balance between its elements. In the oil and gas industry, this balance refers to the production factors that are key to achieving high efficiency. Among these factors are the potential for the production of oil and gas resources, the volume of their export and processing, the level of infrastructure development and, in particular, the routes of oil pipelines. The balance of these factors is a necessary condition for ensuring the effective functioning of projects in the oil and gas industry (Ahmad et al. 2016). The priorities for increasing investment in oil refining and petrochemistry for the Republic of Kazakhstan are the growth of import substitution of petrochemical products in the domestic market, the creation of a petrochemical cluster, an increase in the share of exports of oil refining and petrochemical products in the total export of the Republic of Kazakhstan's value-added non-commodity goods, a multiplier effect for other sectors of the national economy, and changes the structure intersectoral balances towards the growth of processed products.

### 3. Discussion

A scientific study conducted among the subjects of the processing sector of the oil and gas complex of the Republic of Kazakhstan confirms the importance of this topic at the present time. Investments in this industry are of great importance for the development of the country's economy and ensuring its energy security. The oil and gas processing at local refineries makes it possible to obtain high-quality petroleum products and petrochemical that can be used in the domestic market and for export. In recent years, the Government of the Republic of Kazakhstan (2021) has been actively working to attract investment in the processing sector of the oil and gas industry. One of the most promising areas is the construction of new oil refineries and gas chemical plants, and the modernization and expansion of existing ones. In addition, the Republic of Kazakhstan continues to work on expanding the production of fertilizers and gas-based plastics. This is due to the fact that the Republic of Kazakhstan is one of the largest gas producers in the world, and investors see the potential in using this resource to produce higher-level products (Sikhimbayev and Sikhimbayeva 2016).

This study shows that investments in the processing sector of the oil and gas complex of the Republic of Kazakhstan have great potential not only for the development of the country's economy, but also for increasing its competitiveness in the international market. However, for maximum effect, it is necessary to pay attention not only to investments in production, but also to the development of human capital, infrastructure and environmental safety. It is necessary to pay more attention to the environmental and social impacts of investing in this industry and take measures to minimize their negative impact on the environment and the population. For this, various measures can be taken, such as the use of modern technologies and equipment with low levels of emissions and pollution, the establishment of strict standards and requirements for environmental safety in the process of oil and gas production and processing, systematic monitoring of the state of the environment and taking measures to protect it, as well as participation in social programs to improve the living conditions of the population living near oil and gas facilities. Thus, the right direction of investment can help with this problem.

N. Salmanzadeh-Meydani et al. (2023) also studied the main methods for assessing the economic efficiency of the oil and gas industry, and also touched upon the development of processing industries. To assess the effectiveness of investments, a comprehensive system of indicators was developed that combines quantitative and qualitative indicators of the internal and external environment of the enterprise. All indicators were grouped according to macroeconomic, sectoral, enterprises, scientific research, resource base, ecology, and state/society. This approach allows you to get complete information for analysing the general state of the enterprise. This method allows for the taking into account of many aspects when evaluating the effectiveness of investments in the oil and gas industry, including social and environmental aspects. Overall, this approach to valuation can help investors and the government make more informed decisions about investments in the oil and gas industry and the development of downstream industries, taking into account many factors.

M.S. Shabbir and O. Winsdom (2020) conducted an analysis of the economic efficiency of investments in the processing industry. It includes determining the cost structure, assessing production capacity, analyzing the market and competitors, and assessing the potential return on investment. This approach is based on quantitative indicators and financial calculations. It allows one to evaluate the return on investment in the long term. The main tool for economic analysis is the calculation of financial indicators, such as net profit, profitability, and return on investment. These indicators allow one to evaluate the effectiveness of investments and decide on their feasibility. This approach allows one to predict the possible results of investments and evaluate their impact on economic performance in the future. However, to successfully apply this approach, it is necessary to have accurate data and take into account various factors that can affect the results of the study. It should also be considered that economic models may not completely represent real processes and depend on the quality of available data and the chosen methodology (Liepert 2024).

A. Rentizelas et al. (2020) evaluate the social and environmental consequences of investments in the oil and gas industry. It includes an assessment of the impact of investments on

the environment, health, and quality of life of the population, as well as social justice. This approach is based on qualitative indicators and allows assessing the impact of investments on the long-term sustainability of the region. This is especially important at a time when social and environmental issues are becoming more pressing and require action to be taken to address them. An assessment of the social and environmental consequences of investments can serve as a basis for developing measures to minimize the negative impact of investments on the environment and the population, as well as for making decisions on the further development of the processing sector of the oil and gas industry. The assessment of the impact of investments on the environment, health, and quality of life of the population, as well as social justice, is an integral part of assessing the effectiveness of investments in the oil and gas industry. At the same time, it is important to use not only quantitative but also qualitative indicators to obtain complete information about the impact of investments on the long-term sustainability of the region.

In their work, M. Blondeel et al. (2021) analyzed the impact of the geopolitical and geo-economic situation and the risks associated with it on investments in the processing sector of the oil and gas complex. The analysis of political, economic, and social risks helps to identify potential threats for investors and reduce possible risks. An important aspect is the analysis of foreign trade and the geography of deliveries, as this can significantly affect the cost of products and the possibility of their export. Assessing potential geopolitical conflicts is also important in understanding possible changes in legislation and government policy that could affect investors and businesses in the industry. It should be noted that the analysis of foreign trade and the geography of deliveries makes it possible to assess how much oil and gas products are in demand on the world market and which countries are the main consumers and suppliers of these products. The assessment of political, economic and social risks allows investors to understand what factors may affect their investments and take appropriate measures to minimize risks.

In their research, A. Sircar et al. (2021) also assessed the innovative potential of the oil and gas sector, which is an important approach to the study of investment opportunities. The authors assessed the technological capabilities of the industry and its readiness for changing market conditions. The analysis of research papers, innovative projects, patents, and licenses is considered an important step in identifying technology leaders in the industry that can provide a competitive advantage in the market. It is worth adding that the assessment of innovative potential will identify promising areas for investment in research and development of new technologies, which can lead to the creation of new business models and an increase in the income of oil and gas enterprises.

In their work M. Nejati and M. Bahmani (2020) investigated investments in the processing sector using analytical models. One such model is the Economic Equilibrium Model (EEM), which assesses the impact of investment on a country's macroeconomic performance through factors such as output, consumption, oil and gas prices, inflation, and unemployment. Another example of an analytical model used in oil and gas investment studies is the structural dynamics (SD) model. This model allows for determining the optimal strat-

egies for the development of the industry based on the analysis of technological processes, market conditions, consumer demand and the competitive environment. In general, the use of analytical models makes it possible to take into account many factors that affect investments in the processing sector of the oil and gas complex, and determine the optimal strategies for the development of the industry, which allows making informed decisions in the field of investment.

Investing in the processing sector of the oil and gas complex is an important task for the economy and can have both positive and negative consequences. In order to make the right choice, it is necessary to make a comprehensive assessment of the investment project, which includes an assessment of economic efficiency, socio-environmental consequences, geopolitical and geo-economic risks, and the innovative potential of the industry.

## Conclusions

In the course of the study, oil and gas reserves in the Republic of Kazakhstan were characterized. Oil and gas fields such as Tengiz, Karachaganak, and Kashagan have been identified. Three large oil refineries have been identified, which are located in Atyrau, Pavlodar and Shymkent. These plants play a major role in the oil refining and petrochemical industry in the Republic of Kazakhstan. The dynamics of production and consumption of oil products in the Republic of Kazakhstan have been determined, and an increasing trend has been observed. It was found that investments in oil refineries affected the number of process units and the share of oil production, and the production volume of such products as petrol, diesel fuel, aviation fuel, benzene, and paraxylene increased due to investments. Also, forecast indicators of the effects of investing in the development of petrochemistry in the Republic of Kazakhstan and an assessment of the economic efficiency of building a plant for the production of petrochemical products – butadiene on the territory of the National Industrial Petrochemical Technopark Special Economic Zone were determined. The positive and negative social and environmental consequences of investing in the oil and gas industry are highlighted. Further prospects for the development of the oil and gas complex of the Republic of Kazakhstan have been determined. These include the possibility of entering the sectoral world markets on the terms of equal partnership, the development of the oil refining and petrochemical industry for export, the growth of import substitution of petrochemical products in the domestic market, and the creation of a petrochemical cluster.

In conclusion, it can be noted that investments in the processing sector of the oil and gas complex can be effective, but require a comprehensive assessment, taking into account various aspects. To fully assess the effectiveness of investments in the processing sector, it is necessary to conduct additional research. For example, it is possible to consider the impact of investments on the employment and social well-being of the population, as well as assess the risks and potential threats for investors associated with changes in market conditions and the geopolitical situation. Further research can be aimed at developing a comprehensive

methodology for assessing investments in the processing sector of the oil and gas complex, taking into account all of the above aspects. It is also possible to conduct a comparative analysis of the effectiveness of investments in various sectors of the economy in order to determine the most promising areas for investment.

*The article was prepared based on the results of the study of the scientific project No. AP14871274 “Investment Appraisal for the Development of the Oil Refining and Petrochemical Sectors of the Kazakhstani economy”, funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan.*

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**INVESTMENTS IN THE PROCESSING SECTOR OF THE OIL AND GAS COMPLEX OF REPUBLIC OF KAZAKHSTAN****Keywords**

environmental impact, modernization of production, investment climate, market conditions, development prospects

**Abstract**

The research topic related to investments in the processing sector of the oil and gas complex of the Republic of Kazakhstan is a hot topic, since this industry is one of the key sectors of the country's economy and plays an important role in the country's economic development. However, it needs modern technologies and new investments to improve its efficiency. Without constant investment and modernization of production, the industry may become less competitive and unable to fulfil its role in economic development. The purpose of this work is to study the current state of the oil and gas industry and identify the potential for attracting investment. The research employed various methods, including analytical, statistical, functional, system analysis, deduction, comparison, and synthesis methods. In the process of conducting the study, the current situation in the processing sector of the oil and gas industry in the Republic of Kazakhstan was analysed, including its structure, main players and existing investment projects. The market situation in the oil refining market in the Republic of Kazakhstan was studied and the prospects for this industry were assessed. The investment climate in the country and its attractiveness for investors, especially for investments in the processing sector of the oil and gas industry, have been studied. Promising projects in the processing sector of the oil and gas industry in Republic of Kazakhstan have been identified and include their cost, risks and potential profitability. The social and environmental impacts of investing in the Republic of Kazakhstan's oil and gas industry have also been studied, including issues of employment, environmental sustainability and social responsibility. The practical value lies in the use of the identified results, solving issues related to investing in the processing sector of the oil and gas complex in order to bring this process to a new level.

**INWESTYCJE W SEKTORZE PRZETWÓRCZYM KOMPLEKSU  
NAFTOWO-GAZOWEGO REPUBLIKI KAZACHSTANU****Słowa kluczowe**

wpływ na środowisko, modernizacja produkcji,  
klimat inwestycyjny, warunki rynkowe, perspektywy rozwoju

**Streszczenie**

Temat badań dotyczący inwestycji w sektorze przetwórczym kompleksu naftowo-gazowego Republiki Kazachstanu jest gorącym tematem, ponieważ ten przemysł jest jednym z kluczowych sektorów gospodarki kraju i odgrywa ważną rolę w jego rozwoju gospodarczym. Niemniej jednak potrzebuje nowoczesnych technologii i nowych inwestycji, aby poprawić swoją wydajność. Bez ciągłych inwestycji i modernizacji produkcji przemysł może stać się mniej konkurencyjny i niezdolny do wypełniania swojej roli w rozwoju gospodarczym. Celem tej pracy jest zbadanie obecnego stanu przemysłu naftowo-gazowego i określenie potencjału przyciągania inwestycji. W badaniach zastosowano różne metody, w tym analityczne, statystyczne, funkcjonalne, analizy systemowe, dedukcyjne, porównawcze oraz metody syntezy. W trakcie badań przeanalizowano obecną sytuację w sektorze przetwórczym przemysłu naftowo-gazowego w Republice Kazachstanu, w tym jego strukturę, głównych graczy i istniejące projekty inwestycyjne. Zbadano sytuację rynkową na rynku rafinacji ropy naftowej w Republice Kazachstanu oraz oceniono perspektywy tego przemysłu. Przystudowano klimat inwestycyjny w kraju i jego atrakcyjność dla inwestorów, zwłaszcza w kontekście inwestycji w sektor przetwórczy przemysłu naftowo-gazowego. Zidentyfikowano obiecujące projekty w sektorze przetwórczym przemysłu naftowo-gazowego w Republice Kazachstanu, ich koszty, ryzyka i potencjalną rentowność. Przeanalizowano także społeczne i środowiskowe skutki inwestycji w przemysł naftowo-gazowy Republiki Kazachstanu, w tym kwestie zatrudnienia, zrównoważonego rozwoju środowiskowego i odpowiedzialności społecznej. Wartość praktyczna polega na wykorzystaniu uzyskanych wyników do rozwiązania kwestii związanych z inwestycjami w sektorze przetwórczym kompleksu naftowo-gazowego, aby wynieść ten proces na nowy poziom.