

Innovative directions of oil and gas industry in Kazakhstan
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Инновационные направления нефтегазовой промышленности Казахстана
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Abstract: *innovative economy is the direction of Kazakhstan economic growth through the implementation of new technologies, based on the borrowing and adaptation to local conditions. Elaboration of new innovative upgrades in the field of oil production will raise the country's competitiveness in the global market and improve the standard of living of the population. The author suggests directions of development of the oil and gas sector, such as the reduction of tax burden on the oil and gas sector and implementation of new technologies by attracting investment.*

Аннотация: *инновационная экономика для Казахстана – это путь экономического роста посредством внедрения новых технологий, основанный на заимствовании и адаптации к местным условиям и разработке новейших инновационных модернизаций, способных поднять конкурентоспособность страны и уровень жизни населения. Автором предложены направления развития нефтегазового сектора, такие как снижение налоговой нагрузки на нефтегазовый сектор и внедрение новых технологий за счет привлечения инвестиций.*

Keywords: *innovation, oil, gas, oil and gas sector.*

Ключевые слова: *инновация, нефть, газ, нефтегазовый сектор.*

Kazakhstan is one of the rich countries of the world for reserves of oil, gas, uranium, gold, copper and other minerals. In the bowels of Kazakhstan are located more than 90 kinds of minerals, which are due to a variety of geological structures of rocks and found its origin even from the ancient Archean formations. During of independence period, the country formed a powerful scientific and technical base of research which is the result of combining in a single unit of the scientific heritage of the Soviet Union and the domain of domestic research for the independence period. During the period of the Soviet Union it is worth noting the successful development of all the sciences, and in this period many scientists of Kazakhstan received the world calling for his contribution to the development of science, such as geology, chemistry, physics, energy and others. Since obtaining independence one of the main challenges for our country was the organize our own knowledge base. In connection with it the Ministry of Science and New Technologies of country has been established and adopted the Law «On science and scientific-technical policy of the Republic of Kazakhstan».

Our country is part of a group of countries that are rich in minerals and subsoil mineral resources and their diversity. Its mineral resources formed deposits of fuel and energy complex (hydrocarbons, coal and uranium), ferrous and non-ferrous, precious and rare metals [1]. Country subsoil mineral resources are a major source of social and economic development of the state. The key sector of Kazakhstan economy is the oil and gas sector, which generates almost one-third of the country's GDP. In addition to stable cash flows in the economy, oil and gas sector ensures the development of related industries such as: engineering, transportation, construction, maintenance services, including the production and maintenance of machinery for oil and gas sector of country. We all understand that in the market conditions of economic development, as well as taking into account changes in the economic and geopolitical situation in the world, our country needs to develop all sectors of the economy, in particular oil and gas sector. To do this, need to create the conditions of permanent update of information about the geological structure of the subsoil, the emergence of new ideas and concepts, research in geology should be developed in advance of the procedure.

In terms of scientific and technical support for Kazakhstan oil and gas sector the level of quality of research and research volume are in a critical state, that is, research in the field of exploration went down to a minimum level. Geological researches are not founded on the base of new technologies; the development and production of domestic equipment do not virtually exist. There are several scientific geological organizations belong to different departments, which do not provide to government the scientific and reasonable assessment of the mineral potential of the countries interior. The state authorized body for geological subsoil research of the country has not a common branch institute.

In connection with all abovementioned existing problems in the sector of scientific and technological development of the oil and gas industry, the state provides for measures for the implementation of innovative technologies for the geological researches. This is as the Program of geological exploration in Kazakhstan for 2015 - 2019 years, which will stimulate and move the oil and gas sector's development to one step higher. First of all the new technologies should be implemented in the field of geophysical, geochemical researches. The issues on creation of industrial research and technology center to research of the country's subsoil reserves are taken in consideration. On the basis of the Nazarbayev University, the university which combines the advantages of the national education system and the world best scientific and educational practice with the research direction will be realized the scientific and methodological support of industry and information-analytical support of oil and gas sector's enterprises in Kazakhstan. It will be provided for complexes of laboratory analyzes of the rocks and the ability to process and analyze the vast amount of geological, geophysical and geochemical data. As a result of researches, the depth of investigation and

reasonable proposals for the development the industry state programs will be increased in the mineral resources sector of Kazakhstan. The process of replenishment of mineral reserves becomes more and more difficult and all the more urgent becomes the problem of the development of science of geology based on powerful innovation for the full potential subsoil disclosure in Kazakhstan , with the identification of difficult to recoverable deposits. Below in picture 1 shows the results of SWOT-analysis of the development of science of geology in the country:

Strengths:	Weaknesses:
the government support	unsystematic nature of the research base
huge potential of forecasted resources of all kinds of resources,	the backlog of Science Geology from world achievements and its isolation from the oil and gas industry
favorable conditions for the opening of new fields	inefficient use of finance funds
prospects to develop of public-private partnership in the oil and gas industry	poor inter-agency coordination and lack of coordination from the Ministry of Energy side
common scientific and technological policy to reduce the energy intensity of production	lack of qualified scientific personnel and the influx of young staff
the favorable situation on the world market of raw materials	imperfect mechanisms for commercialization
political and economic stability in the country	aging of production assets
Threats:	Opportunities:
incomplete and non-system of reliable information on the industry in making radical decisions	transformation of the geological industry with Code of RoK " On Subsoil and Subsurface Use"
an imperfection of normative and technical documentation for exploration suspends the development of oil and gas industry and metallurgical industry	application of innovative technologies for the geological researches of the regional subsoil of the Caspian Basin
do not using of the new and innovative technological processes leads to environmental deterioration	creation of a unified information system of computer monitoring of subsurface condition of oil and gas reserves
the absence of an approved methodology documentation for scientific and applied research leading to a decline in the science	creation of an independent state body in the field of geology and exploration
the critical delay in understanding the need for a strategic state regulation of the industry	attracting large-scale investments

Fig. 1. SWOT analysis of development the Geology science in Kazakhstan

Consider the situation of Kazakhstan geology, prevailing since the 90s of the last century, which led to the fact that mining in Kazakhstan is much more than adding new fields. That is the development and appraisal kept to a minimum. The Kazakh people can be proud that the hidden potential of our subsoil is so huge. Only powerful, technically equipped Geological Survey may in the future provide our people with effective explore and gain more and more resources. Our President has set the task to revive the country exploration industry, which cannot be solved without the strong infrastructure of industry. In other words, without specialized education, domestic science, research and competent professionals a solution to this problem is simply impossible.

Strategy «Kazakhstan-2050» - a new policy for government. Leader of the Nation Nursultan Nazarbayev voiced in his message: «The result of 15 years is that oil production increased by 3 times, natural gas - 5 times. Revenues from natural resources are directed to the National Fund. This is our reliable shield against possible economic and financial shocks. This security is guarantee for current and future generations» [2].

Analyzing the situation in Kazakhstan, to determine the order on what we should pay attention to revive the domestic exploration, we understand that the development of oil market development program ensures its stable functioning and development. The economy development over the last 10 years has set for a modern society, a number of complex problems caused mainly by the following factors: crisis of energy and raw materials, the uneven development of technological capabilities in the various countries of the world. Resolving these important issues are closely linked with prospects for primary energy sources, improvement of methods and their production, processing and end-use of appropriate technologies [7]. Today, the Government of Kazakhstan is working under the transformation of the geological industry with the Code «On Subsoil and Subsurface Use» , which are trying to take into account international experience in this field, as well as own, using the best practices. According to the global trend consumption of increasing the natural resources activities conducting geological researchers to identify them. The annual increasing of production requires to increase the volume of exploration work for replenish mineral reserves.

The development of geological sector is a fundamental factor in the economic development of the Republic of Kazakhstan and, accordingly, one of the most effective tools for the implementation of natural resource policy, ensuring efficiency and environmental management. It may be development of Kazakhstan geology as a science based on the introduction of new technologies and processes. Mineral Resources of Kazakhstan exhausted, worsening the quality of reserves structure, it requires the widespread use of innovative technologies in the exploration and production of minerals. In this case, changes in direction of development of geological science and choice of innovation strategy based on scientific research are crucial important. World experience shows that the intensive use of high-efficiency

technologies, horizontal drilling, enhanced oil recovery techniques, three-dimensional seismic survey can reduce on 2-3 times the costs of exploration and production. In average, new technologies allows a 20-30 % reduction in capital expenditures at a fixed level of oil production which is confirmed by the best practices of leading oil and gas companies [3].

Methodology. In the early last century the Austrian scientist and economist Joseph Schumpeter has put forward the scientific concept of development the innovative economy. This concept states that a successful way output from the crisis is entering a new product, rather than the economy of raw materials and price regulation. He gave a clear definition of the word «innovation» - is a new product, new technology, a new organization of production, new markets. And the sources for development should serve as internal processes, new combinations. Following Schumpeter's idea the great role in the development of innovations played the opening which was done by Russian scientist N. Kondratyev. He revealed the existence of long conjunctural waves in the tactical development of society, and thereby identified economic development as a process of uneven and cyclical [5]. Schumpeter put forward the idea of the three cyclical pattern of oscillating processes in the economy. Each level cycles Schumpeter called the names of the scientists who discovered them. Most are long Kondratiev cycles - their frequency vibrations can reach from 47 to 60 years. Next level cycles, Clément Juglar cycles have duration of ten years. The third level is Kitchin cycle of three years and four months. All three cycles of level are interlinked and interdependent. In the analysis cycles are allocated internal and external factors affecting the causes and nature of the cycle. The external factors include - the discovery of large deposits of natural resources affecting the markets of these resources and aggregate supply, the creation of new technologies, inventions, innovations, changing the structure of the industry [8]. Based on the Schumpeter's concept, we see that in the last century, he noted a huge impact of natural resources on the development of innovation in the economy. Also, according to his theory of innovation - it is not only some kind of improvement or invention, but a tool for profit. Since then, the concept of innovation is not very evolved, it's following definition - an innovation that has value, or significantly increases the efficiency of a process or production.

To meet the increased energy needs of the national economy of Kazakhstan taking into account the export obligation, requirement for country to develop the innovative potential of the oil and gas sector through the introduction of innovation scientific and technical progress. For this is necessary to achieve high levels of profitability, access and implementation of the best new technologies and processes in the industry. Mineral Resources of Kazakhstan exhausted, worsening the quality of reserves structure, all this requires the widespread use of innovative technologies in the exploration and production of minerals. In this case, it is crucial change in direction of development of the industry and a choice of innovative strategy based on research. Powerful production of petrochemical products is in force, usually a few companies, such as oil and chemicals, and the oil companies allow the production of hydrocarbon raw materials and energy, and chemical - technology and research and development [4]. Therefore, the implementation of innovative technologies should be focused to the development of oil and gas sector. Many works of domestic and foreign scientists are subjected to questions on formation of innovation strategy: I. Ansoff, O. A. Timofeeva, and N. Sokolova. The works of many scientists and economists are devoted to individual theoretical and practical aspects of oil and gas sector. Significant contribution to the research of the problem made by Kazakhstan scientists: A. Abishev, E. Sadykov, J. B. Abisheva, N. S. Baltybekov, N. K. Nadirov, U. Kozhantaeva, A. Akhmetzhanov, M. A. Eralieva, G. H. Sadikov, E. A. Turkebaev, S. Smirnov and etc. However, it should be noted the lack of degree of elaboration the some problems in the development of Kazakhstan oil and gas sector. The author has developed a strategy of innovative development of Kazakhstan oil and gas sector (Fig. 2), which provides a balance between the government leverage and development and new technologies implementation.

Kazakhstan Oil and Gas Sector

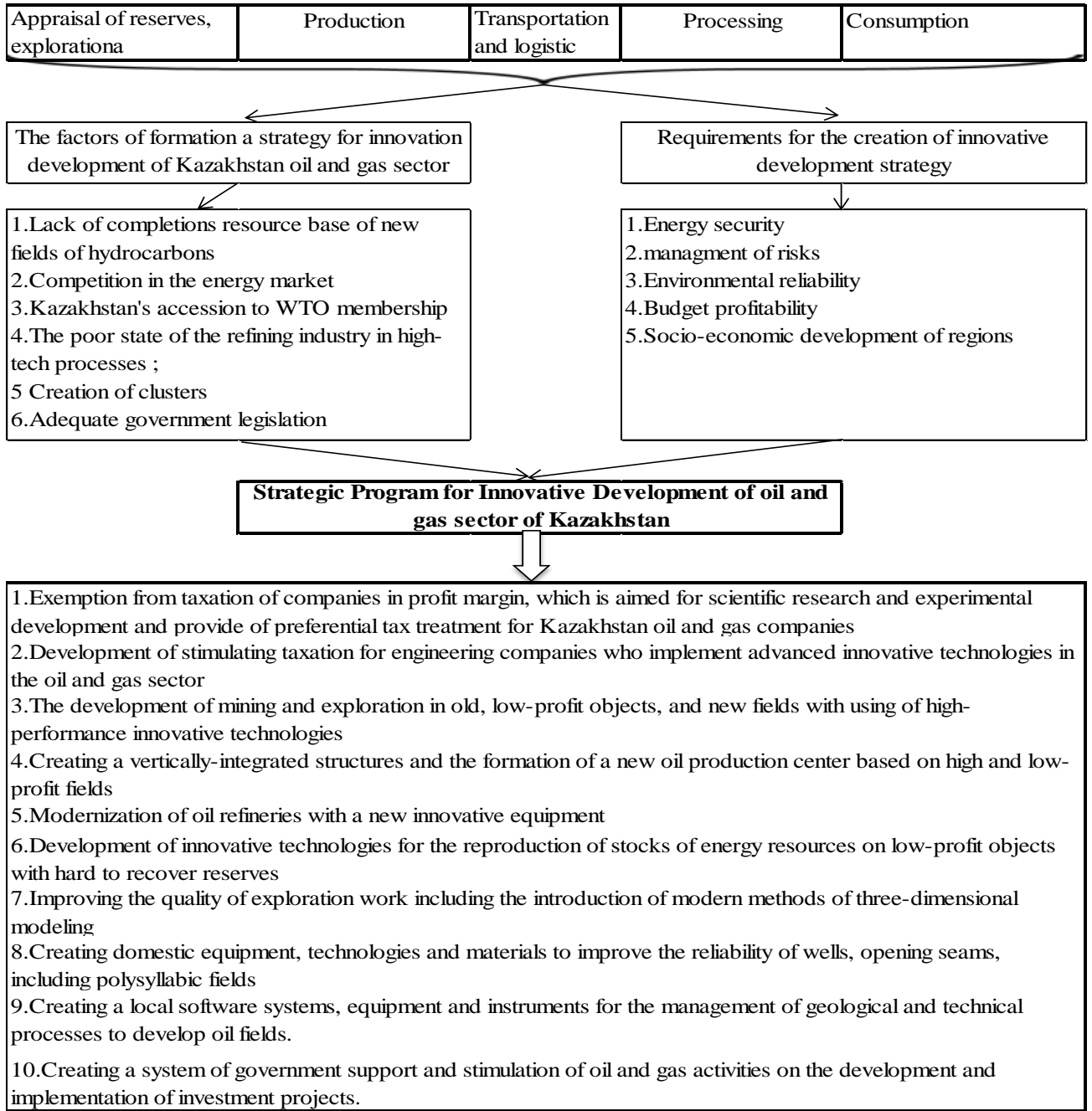


Fig. 2. Strategic Program for Innovative Development of oil and gas sector in Kazakhstan

Kazakhstan Oil innovative strategy calls to make the loud and clear priorities, aimed at developing a new structural, regional and technical policy in the country energy supply. One of the strategy priority aims at efficient use and saving of crude oil, with a high environmental impact factor. All saved resources will be the main source to provide the necessary oil exports, in line with its rational increase in production. Innovative Development Strategy anticipates a weakening of the state levers that is, reducing the tax burden on oil and gas sector, and the opportunities for the development and introduction of new technologies, through the reproduction of stocks of energy resources on low-profit objects with hard recoverable reserves [6]. The mechanism of the development of such fields will encourage mining companies to develop low-profit objects and hard recoverable reserves and obtain favorable tax conditions. In particular, the government will be able to minimize the costs of the establishment and maintenance of strategic reserves and ensure the energy security of the country. Consider the most significant deals in the directions of reforming the current system of oil and gas industry and a little more detail describe the proposals for the strategic program of innovation development of Kazakhstan's oil and gas sector:

1. Tax burden of companies that operate in the oil and gas sector in Kazakhstan is very high. At too high volatility of the tax burden, financial assets can be displayed abroad or freeze that automatically play on the economic

slowdown and will not allow to implement of innovations in the industry. Therefore it proposed to introduce several directions to stimulate innovations for oil and gas companies:

- Development of stimulating taxation for engineering companies who implement advanced innovative technologies in the oil and gas sector.

- Exemption from taxation of companies in profit margin, which is aimed for scientific research and experimental development.

- Providing favorable tax treatment for Kazakhstan companies of oil and gas sector, the tax rate on oil production must be calculated taking into account the debit wells, i. e. low-profit objects with hard recoverable reserves, depending on prices of crude oil and from opening time of oil field.

2. Intensive using of high-performance technologies in the form of horizontal drilling, the use of enhanced oil recovery, and three-dimensional seismic researches.

3. Formation of new centers of oil and gas exploration by the simultaneous development of raw material base and logistics system.

4. Construction of factories for the processing of associated natural gas and reconstruction of refineries on the basis of innovative high-tech equipment.

It should be noted that more favorable conditions should be available for appraisal and exploration, as opposed to development. This is due to the fact that exploration is a field of activity with a high cost, high risk, and to a greater extent is influenced by economic conditions than development. Today «easily recoverable» oil is running out and need to look for hydrocarbons at great depths, which require a significant investment and new technologies. Drilling of the well depth of 5 km costs about 15-20 mln. dollars. The investor before investing money, wants to be sure that the drilling will be productive. Accordingly, now a major role is given to scientific research and innovation which will explore in detail the resources.

To achieve all of these recommendations are possible through doing the following tasks:

- ensure the expanded reproduction of the mineral resource base of oil and gas industry through rational use of proven oil and gas reserves;

- reduce the tax burden on the oil and gas companies;

- decrease of losses at all stages of the technological process;

- increasing the depth of processing and production oil;

- complex extraction and use of all the valuable associated components;

- development of the major centers of oil production in the Caspian basin;

- modernization of refineries by the innovative equipment;

- increase the level of utilization of associated gas and its processing, taking into account the changing composition;

- improving the investment climate and attract investment;

- enter with new petrochemicals products to the overseas market.

All the above mentioned will affect to further development of the oil and gas sector, attracting new investment, the completion of the budget and the development of innovative economy.

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