Classification and features of projects in the oil and gas industry

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Abstract. Project management has been widely used in various fields and sectors of the economy over the past years. Projects implemented in the oil and gas industry have significant differences between them. To choose the optimal approach to managing an oil and gas project, firstly, the distinctive features of the project type should be identified in advance. The use of project classification makes it possible to optimize methods and tools for managing specific projects and increase the efficiency of their implementation. The article analyzes the classification of projects. The main classification features and types of projects most commonly used in scientific literature and practice are identified. In the course of the research, it was found that the presented approaches to the classification of project management do not sufficiently take into account the branch of economy in which they are implemented. Therefore, the classification of projects in a particular sector of economy may have its own classification features applicable only to the specific industry. The oil and gas industry is considered as a separate branch of economy. The article considers the most well-known oil and gas production projects implemented in recent years. The analysis of the projects has shown there is a number of features that are different from other projects. Therefore, for detailed classification of oil and gas projects, the author's classification features of projects significantly affecting the financial costs and timing of implementation of oil and gas projects are presented.

1. Introduction

In recent years, more and more literature on project management has been published. The variety of projects being implemented is extremely large. Project classification allows to clearly rank promising and ongoing projects, and, as a result, set achievable goals and realistic deadlines for attaining targets, and attract optimal resources for their successful implementation.

Projects in the oil and gas industry have their own characteristics, including attraction of large investments, usage of capital-intensive technologies, execution of a large amount of work, and presence of special forms of partnerships (joint venture or production sharing agreement). Projects differ both in terms of scale and timing of implementation and in the type of activity: oil production and transportation, development of new fields and infrastructure construction. Moreover, they differ in such characteristics as the level of coverage/number of participants (national, international), ways to
raise funds (borrowings, loans, project funding), by reason of occurrence (reengineering, reorganization, restructuring), and other [1]. There are many project classification systems in the literature. Thus, projects are divided according to class, type, scale, duration, complexity, and other factors [2].

2. Theory
The analysis of the classification of projects by various authors shows that a lot of researchers classify projects by similar criteria (table 1). The classification criteria shown in Table 1 are the most common.

| Author | Classification features | Project types |
|--------|-------------------------|---------------|
| I. I. Mazur, V. D. Shapiro, V. I. Voropayev, I. P. Voicu, A. V. Polkovnikov, M. F. Dubovik, V. N. Burkov, D. A. Novikov | By project scale (size) | 1. Small<br>2. Medium<br>3. Large (megaproject) |
| I. I. Mazur and V. D. Shapiro, V. I. Voropayev, I. P. Voicu, A. V. Polkovnikov, M. F. Dubovik, V. N. Burkov, D. A. Novikov | By the composition and structure of the project and its subject area | 1. Monoproject<br>2. Multiproject<br>3. Megaproject |
| I. I. Mazur and V. D. Shapiro, V. I. Voropayev, I. P. Voicu, A. V. Polkovnikov, M. F. Dubovik, V. N. Burkov, D. A. Novikov | By main fields of activity | 1. Social<br>2. Economic<br>3. Organizational<br>4. Technical<br>5. Mixed |
| I. I. Mazur, V. D. Shapiro, I. P. Voicu, A. V. Polkovnikov, M. F. Dubovik, V. N. Burkov, D. A. Novikov | By the nature of the subject area | 1. Educational and training<br>2. Research<br>3. Investment<br>4. Innovative<br>5. Combined |
| I. I. Mazur and V. D. Shapiro, V. I. Voropayev, I. P. Voicu, A. V. Polkovnikov, M. F. Dubovik, V. N. Burkov, D. A. Novikov | By the duration of the implementation period | 1. Short-term<br>2. Medium-term<br>3. Long-term |
| I. I. Mazur and V. D. Shapiro, V. I. Voropayev, I. P. Voicu, V. N. Burkov, D. A. Novikov | By the complexity level of project implementation | 1. Simple<br>2. Complex (organizationally complex, technically complex, complex in terms of resources, complex in an integrated manner)<br>3. Highly complex |
| I. I. Mazur, V. D. Shapiro, I. P. Voicu | By the requirements for quality and ways to ensure it | 1. Defect free<br>2. Modular<br>3. Standard |
| I. I. Mazur and V. D. Shapiro, V. I. Voropayev, I. P. Voicu, G. Diethelm | By status of participants | 1. National<br>2. Foreign<br>3. Cross-national |

Sources: compiled by the authors based on data analysis [3,4,5,6].

Table 1. Project classifications
However, some authors implement new approaches to project classification. For example, D. Locke [7] believes that all projects could be classified into 4 categories:

1. Projects in the field of engineering, construction, petrochemical, mining and quarrying operations (carried out across the territory affected by factors that are remote from the contractor’s head office).
2. Industrial projects for the development of new products or for the production of equipment parts (projects are implemented at the factory or across the main territory of the organization).
3. Management projects (imply management involvement or coordination of activities to achieve an end result that cannot be defined as a piece of equipment or construction object).
4. Research projects (aimed at research with a high risk of failure).

Based on Locke's classification, oil and gas projects could be classified as category 1. However, the majority of projects in the oil and gas industry are implemented through scientific research so they should be classified as category 4.

A. V. Vlasov [8] supplements the classification of projects in the oil and gas industry with such classification features as the climatic conditions at the project site and the landscape area of the project implementation which significantly affect the financial costs, terms of implementation, and also have an increased level of risk. It is difficult to disagree with A. V. Vlasov because the peculiarity of the climate in the Russian Federation is determined by its large geographical extent, size and length. The project implementation budget will depend directly on climate conditions.

Vlasov divides the classification of the project landscape territory into 2 types: land and water territory. However, in our opinion, the landscape territory should be divided into water, land and mixed territories. An example is Sakhalin 2, which is being implemented on Sakhalin island. The project is developing the Piltun–Astokhsky and Lunsky oil and gas fields located in the sea of Okhotsk. The extracted oil and gas flow through the Trans-Sakhalin pipeline system through the united onshore technological complex to the ‘Prigorodnoye’ production complex which includes a liquefied natural gas plant and an oil shipment terminal.

It should be noted that projects implemented in the oil and gas producing region have significant differences between them. For this, the implemented large oil and gas production projects such as Yamal LNG, Sakhalin-2, Snohvit Project, Power of Siberia have been analyzed [9,10,11,12].

The analysis of these projects has a number of features that are different from each other:

1. Each project has a specific course of action;
2. Projects are implemented in harsh climatic conditions;
3. The fields are located mainly in undeveloped areas significantly remote from the centres of industrial and energy development of large regions.
4. Observed could be the dependence of oilfield objects of industrial and civil construction on the volume of recoverable reserves of oil (gas), the size of the oil (gas) reservoir, quality characteristics of the hydrocarbon product.
5. There is no proper infrastructure across the territory of the project implementation;
6. There are high energy costs, complex logistics of oil and gas pumping;
7. The project execution is accompanied by the construction of small settlements in remote areas which is tied to natural reserves;
8. Projects are implemented across water area with a significant distance from land which places additional difficulties on the project implementation;
9. The project implementation is due to significant financial costs;
10. The timing and overall duration of the project are not clearly defined and are largely probabilistic.
11. The implementation of projects involves the introduction of a huge number of innovative technologies.
12. Projects are implemented with the direct support and participation of the state.
3. Experiment

For detailed classification of oil and gas production projects, it is proposed to highlight the following classification features (Table 2).

The classification presented by the author should be considered in more detail. It should be noted that the main characteristic of an oil and gas project is the field of implementation, i.e. the activity for which the project is being implemented. This paper highlights areas of activity that are distinctive and specific to the oil and gas sector, such as: exploration, transportation, oil and gas processing, and other. This division will help to identify the characteristics and specific risks in oil and gas projects.

**Table 2. Classification of projects in the oil and gas industry (developed by the author)**

| №  | Feature                  | Project type                                                                 |
|----|--------------------------|------------------------------------------------------------------------------|
| 1  | Project focus            | Geological exploration<br>Transportation<br>Oil and gas processing<br>Sales of petroleum products<br>Liquefied natural gas projects<br>Modernization of the oil refinery<br>Plant capacity increase |
| 2  | Scale                    | By costs: small, medium, large<br>By structure: monoprojects, multiprojects, megaprojects<br>By time: short-term, medium-term, long-term<br>By coverage: regional, state, international |
| 3  | Status of participants   | Being implemented:<br>By company itself<br>By a group of companies<br>With the support of the state<br>As a joint venture<br>Internationally |
| 4  | Extent of project funding| State<br>Private (own, borrowed, or attracted funds)<br>Combined |
| 5  | Distance from markets for product sales | Transportation costs to reach product markets:<br>Low<br>Moderate<br>High |
| 6  | Distance from settlements | A settlement is located close to the project site<br>There is no settlement |

One of the important differences between projects in the oil and gas sector is the scale, i.e. the size. Small projects include those that require capital investment of 10 to 15 million dollars [1]. Such projects are quite simple to implement, including: reconstruction of fields with small reserves, introduction of new equipment and technologies. Medium-sized projects are characterized by a large amount of investment and the presence of more complex business processes, for example, projects to develop a new field or conduct global events to maintain production levels. In turn, large projects include projects that require huge investment of $500 million or more.
Moreover, projects are divided into mono-, multi- and megaprojects by structure. A monoproject is a specific project with a specific goal and limited resources allocated to it. A multiproject consists of several monoprojects. A megaproject is a targeted programme that includes multi- and mono- projects united by a common goal and resources [13]. Main characteristics of a megaproject are duration of 5-7 years, capital intensity (the project is financed by both borrowed funds and project funds), impact on the economic and social environment of the region or country.

Generally, large megaprojects are implemented in conjunction with major oil and gas partners along with the support of the state.

A fairly high percentage of megaprojects is being implemented in the oil and gas sector. The volume of investment in the industry is steadily growing as it is necessary to increase production capacity to meet the demand from emerging markets and search for new fields.

Thus, the Yamal LNG investment project [11], is being implemented on the Yamal Peninsula, beyond the Arctic circle, based in the Yuzhno-Tambeyskoye field. The project is being implemented on the basis of a joint venture with the Russian oil and gas company Novatek and several major international partners that have a certain share in the equity capital of Yamal LNG: Novatek 50.1%, total 20.0%, China National Petroleum Corporation (CNPC) 20.0% and the Chinese state Silk road fund 9.9%.

The Yamal LNG scale of implementation could be attributed to megaprojects: the duration is 35 years, it affects the economic and social environment of the region and the country, and it is financed by borrowed and own funds.

The main goal of the investment project is to create a production of liquefied natural gas with a capacity of up to 16.5 million tons per year based in the Yuzhno-Tambeyskoye field on the Yamal Peninsula. Despite the fact that the project is private, the state is interested in its implementation and provides support from its side. This is due to the fact that one of the main goals of the state is to increase Russia's presence in the world energy market. In the international LNG market, the main exporters are the following countries: Qatar, Australia, Malaysia, Algeria, Indonesia and other [14]. In 2014, 19 countries were exporting liquefied natural gas. Russia ranks 8th in the world in terms of LNG exports, with a market share of 4.5%. By 2035, the share of Russian LNG exports is planned to increase to 12% due to the expansion of production [15].

It should be noted that the goal and strategy of the project correspond to the energy strategy of Russia until 2030 as well as the strategy of social and economic development of the Yamalo-Nenets Autonomous district. Thus, Yamal LNG is a strategic project for Russia.

Notably, due to the harsh cold climate conditions of the Arctic, less specific energy is required for gas liquefaction compared to the amount necessary for similar projects located in the southern zones, which allows for higher production volumes.

Furthermore, state resources and services were provided for the project implementation on preferential terms. Thus, the state allocates a large amount of investment to the development of the region’s infrastructure, namely, the construction of a seaport, an icebreaker and tanker fleet, and the Sabetta airport.

The next step in support of Yamal LNG is the adoption of a law on the liberalization of LNG exports. Until 2013, Gazprom has had a monopoly on the export of liquefied gas in Russia while other companies must have entered into agency agreements with the monopoly. However, in 2013, the Russian State Duma passed a law according to which companies could directly supply liquefied gas abroad if their license provides for the construction of an LNG plant or allocation of the extracted gas for liquefaction to such a plant. Thus, owing to the introduction of the new law, Novatek would be able to supply LNG to other countries without intermediaries after the launch of the plant.

It should be noted that LNG production in Russia is a new direction for the development of the industrial sector compared to other countries such as Qatar or Indonesia. According to a study conducted by the Norwegian analytical centre ‘Sigra Group’, the Yamal LNG project will not bring economic benefits to the state. However, despite the economic inefficiency, the implementation of Arctic projects leads to new competencies for Russian companies and an increase in their international
To minimize risks, companies sign a joint venture agreement. On the one hand, this interaction contributes to risk differentiation but, on the other hand, it adds complexity to project management.

When implementing such megaprojects, there is a high risk of violating the obligations of one of the stakeholders, and thus the project implementation is put at risk. With the number growing, project management becomes more complex, requires more control and establishment of an effective communication system, also there might be an increase in the risk of evasion of obligations or violation of conditions by one of the project participants.

At the stage of project planning, it is important to determine the markets for product sales, to provide for the total costs incurred in connection with the maintenance and operation of main gas pipelines as well as all structures intended for storage and transport of oil and gas.

The costs of gas transportation largely depend on the properties of the gas, the transportation distance and the diameter of the main gas pipeline.

The cost of pumping oil and petroleum products through separate main pipelines is not equal. It is influenced by the diameter of oil and oil products pipelines, the viscosity of products, the pipeline load level, natural and climatic conditions.

It should be taken into consideration that when calculating prices for gas, oil and petroleum products for consumers, the costs of their transportation, storage and marketing are taken into account and along with covering the costs the profit is also considered.

In our opinion, for a more detailed classification of oil and gas projects, such classification feature as the place of the project realization to the markets is to be highlighted and, in this feature, transportation costs of delivering product to consumer are characterized as: low, moderate, high.

Also, when classifying projects, the distance from settlements should be taken into account. The presence of a settlement close to the project site could lead to saving of costs for building its own infrastructure, and the settlement would be provided with an opportunity to develop the socio-economic situation.

4. Conclusions

Thus, the classification features of oil and gas projects presented by the authors make it possible to determine the specifics of the project implementation in the oil and gas industry and apply appropriate approaches to the project budget.

In the theoretical aspect, the additions to the classification of oil and gas projects presented by the authors ensure the logic and consistency of further scientific research in the implementation of project management in the oil and gas industry. In practical terms, the presented additions to the classification of oil and gas projects enable optimization of methods and tools for managing specific projects and make it possible to increase the efficiency of their implementation.

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