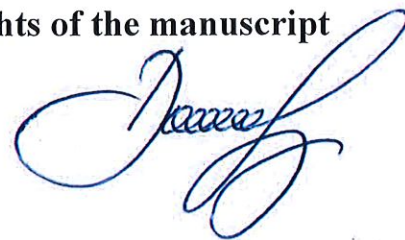


**Federal State Budgetary Institution of Science
Institute of National Economic Forecasting
Russian Academy of Sciences**

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A handwritten signature in blue ink, appearing to be 'Dashkov', written in a cursive style.

DASHKOV Roman Yurievich

**DEVELOPMENT AND ADAPTATION OF PROJECT MANAGEMENT
METHODS FOR LIQUEFIED NATURAL GAS PRODUCTION PROJECTS**

Specialty 5.2.6. - Management

**Abstract for the degree of Candidate of Economic Sciences
candidate of economic sciences**

Scientific supervisor:

**Nikolay Ivanovich Komkov,
Doctor of Economic Sciences, Professor,**

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Relevance of the dissertation research. In modern realities to ensure the national, economic and environmental security of any country, increase competitiveness and efficient use of energy and resources, one of the priority tasks is the development of the energy sector.

According to the Energy Strategy, the energy balance of the Russian Federation is one of the most environmentally friendly - nuclear power, hydropower and other renewable energy sources account for more than a third of electricity generation, and natural gas accounts for about half.

Taking into account urbanization, the prospect of increasing energy demand and increasing capacity of various industries in the future, it is natural gas that will play an increasingly important role in the global energy balance. Natural gas is a unique energy carrier that has certain advantages over other fuels: a variety of industrial and domestic applications, relatively low costs and environmental safety.

Gas is transported to the place of its distribution and use by two main methods - trunk pipelines and liquefied natural gas (LNG) tankers. LNG production worldwide is developing at a higher rate than trunk pipeline transportation due to more flexible delivery conditions and security of global natural gas supplies.

It is important to emphasize here that LNG production requires large-scale investments in exploration and production of raw gas, development of gas gathering transportation systems, gas processing, fractionation and liquefaction plants, construction of storage tanks and offshore facilities in the form of loading and receiving berths, regasification systems, as well as the use of marine vessels to deliver LNG to consumers.

Under the conditions of unstable macroeconomic environment and new challenges, the main problems that Russian LNG producers have to face and promptly solve are: high share of imported equipment, production, manufacturing and maintenance technologies; complexity of equipment and materials procurement due to economic sanctions; chartering of foreign tanker ships for marine transportation; solving legal issues of various directions; transformation of the western management system in corporate governance in companies, established on the basis of the law on Production Sharing Agreement, the principles of which are not adapted to the current realities.

The existing methods of managing LNG production projects, especially large-capacity projects, due to their complexity, do not meet the current conditions and

requirements of the rapidly changing external environment. The implementation of such projects should be accompanied by the application of management technologies and tools, system analysis and integrated methods of performance evaluation, adaptive to the external environment in conditions of uncertainty and risks.

Improvement of LNG project management processes is necessary due to the limitations and inflexibility of traditional management methods, which do not allow taking into account all factors associated with LNG production (capital intensity, import dependence, lack of financial resources, LNG price volatility, market competition, possible risks and difficulties in production). Budget overruns and schedule delays are common in oil and gas projects, but the impact of these factors on LNG production is more profound than currently recognized due to the complexity of the work, increased environmental requirements and changing customer demand. Subsequently, new risks arise that domestic LNG producers have not previously faced.

One of the insufficiently studied aspects of LNG project management is the lack of flexibility and adaptability of the management system to the requirements of the external environment, as well as the resulting risks. An urgent problem, both scientifically and practically, is the development of objective and comprehensive project performance indicators and metrics to monitor the results of LNG projects, taking into account the impact of possible risks.

In conceptual and research terms, the methods of LNG project management, including risk management, have not been sufficiently studied yet. The importance and objective necessity of developing new modern methods and tools for managing such projects predetermines the practical relevance of this dissertation research.

The degree of development of the scientific problem. The bases for the development of project management methods were created by foreign researchers within the framework of PERT and GERT systems, as well as by Russian developers of network planning and management systems (NPM). Among the scientific publications devoted to the general theory of project management it is necessary to emphasize the works of V.M. Anshin, V.N. Burkov, V.I. Voropaev, I.I. Mazur, N.G. Olderogge, M.L. Razu, A.S. Tovba, V.D. Shapiro, G.L. Tsipes, and others.

A significant contribution to the development of theoretical and methodological foundations of oil and gas project management was made by: A.F. Andreev, A.N. Dmitrievsky, V.D. Zubareva, A.A. Konoplyanik, E.A. Krainova, V.G. Martynov, A.M. Mastepanov, A.S. Sarkisov, A.A. Sinelnikov, M.V. Gracheva, and others.

Another area of research is devoted to methods of project monitoring and control, which include the works of A. V. Polkovnikov, D. Bower, M. Vanhook, H. Golafshani, U. Lipke, H. Hamushi.

The issues of risk management in project activities are represented by the works of Y. Vehmas, S. Grimaldi, J. Kaivo-oja, J. Luukkanen, I. Maianne, J. Panulo-ontto, S. Rafele, D. Hillson.

However, the insufficient coverage of the impact of internal and external factors on LNG project management has predetermined the need to improve management technologies, evaluation and analysis methods, and adjust the goals and strategies of LNG projects.

The scientific and practical problem investigated and solved in the thesis is the development of additional indicators for assessing and analyzing the status and dynamics of LNG production projects, improvement of LNG project management systems taking into account complexity and uncertainty, creation of mechanisms for coordination and harmonization of project and operational activities of oil and gas companies.

Aim and objectives of the research. The aim of the study is to develop and adapt methods of LNG production project management under conditions of uncertainty and risks.

Research objectives:

- to develop a mechanism for coordination and harmonization of project and operational activities of the company's structural units in the implementation of LNG production projects;
- to propose a method for managing LNG production projects under conditions of operational, strategic and contextual uncertainty;
- analyze and evaluate the performance of a large-scale project using the earned duration management method adapted to the project phases;
- propose a mechanism for integrating risk management with the LNG project management system, which is divided into phases, the execution of which affects the final investment decision.

Object of the study: companies in the oil and gas sector.

Subject of the study: mechanisms and methods of management of large-scale LNG production projects.

Theoretical and methodological basis of the research. The dissertation research is based on theoretical and methodological provisions contained in the works of domestic and foreign scientists in the field of project management and investment management, as well as on the regulatory legal acts of the Russian Federation, internal corporate standards and regulations. To solve the tasks set in the thesis, methods and tools of expert evaluations, simulation, interpretive structural modeling, methods of managing the earned volume and earned duration of projects were used. MS Excel and Primavera software products were used as tools.

Information base of the research. Materials of design and construction contractors' organizations on large-scale projects of LNG plant process lines construction and internal corporate materials and reports were used.

The validity and reliability of the research results are determined by a wide coverage of monographs, scientific articles of Russian and foreign scientists, which are published in specialized and periodicals, the use of information resources and standards of the Project Management Institute (PMI, USA), materials and recommendations of scientific and practical conferences and seminars of the International Project Management Association (IPMA), the national association of project management SOVNET and the international association for the development of value engineering AACE.

Correspondence of the thesis to the passport of scientific specialty. The field of research of the thesis corresponds to the requirements of the Passport of specialty 5.2.6 - Management p. 16. Theory and methodology of project management. Processes, methods, models and tools of project and program management. Risk management (risk management), p. 29. Development of methods for making investment decisions in organizations of various types.

Scientific novelty of the dissertation research consists in the development of new methods and mechanisms of management, assessment and analysis of risks in the process of development and implementation of LNG production projects.

The main results of the dissertation work, possessing scientific novelty and obtained personally by the applicant:

- a mechanism for coordinating project and operational activities is proposed when the Project Office delegates the authority to implement the LNG project phases

to the company's structural divisions. The coordination mechanism is based on the construction of networks of goals and strategies that allow tracking the state of the external environment and the influence of the stakeholders involved, which makes it possible to update the agreed goals and strategies of project and operational activities and take corrective management actions;

- A project management method for LNG production projects "Goals-Phases-Metrics+Strategies (GPM+Strategies)" was developed, where the project is divided into technical phases linked to the LNG production facilities to be created (design and construction of the raw gas transportation system, production line, LNG jetty) and non-technical phases (raw gas procurement, LNG marketing, project financing, approval by the Russian government). Compared to classical project management methods, new elements of contexts and assumptions for the project phases have been additionally introduced, allowing to monitor the state of the external environment. This gives this method, in our opinion, adaptive abilities, because significant deviations in the cost and timing of the project phases, registered by interpretive models acting as a metric, encourage managers of the "Project Office" and structural units of the company to further analyze the impact of the external environment and update the goals and strategies of the project phases;

- adapted the "Earned Duration Management" method for LNG production projects divided into phases. In order to optimize the performance of project phases, additional indicators were introduced, which, in the author's opinion, provide a more in-depth, objective and comprehensive analysis of work performance, completion dates and evaluation of the project schedule. These indicators differ from the traditional ones in that they allow not only to monitor the execution of aggregated project phases linked to the LNG production facilities to be created, but also to take into account the impact of risks.

The procedure of consolidation of works in the form of project phases and their measurement with the help of mastered duration indicators makes it possible to obtain aggregated information for the company's management on the need to accelerate the progress of large-scale projects;

- A mechanism for integrating risk management processes into the LNG project management system has been developed based on a new procedure for combining the hierarchical structure of project phase breakdown with the hierarchical structure of risk breakdown. This combination allows to identify and classify the project phases that are most exposed to risks and whose performance affects the final

investment decision. This allows to assess the necessary reserves in terms of cost and time, as well as to identify risks that lead to exceeding budgets and delays in the execution of phases and the project as a whole, which require the development of risk response strategies.

The theoretical significance of the results of the dissertation research lies in the fact that new management methods and tools for monitoring and control of large-scale projects under conditions of uncertainty and risks are proposed in the theory of project management.

The practical significance of the results of the research consists in:

- optimizing the process of formulating the goals and implementation strategy of LNG production projects;
- providing necessary information to the management of Sakhalin Energy to make strategic and tactical decisions on the timing and costs of the project during its life cycle;
- assessment of project creativity in order to optimize the completion dates of individual phases and the project as a whole;
- the possibility of eliminating unforeseen costs associated with delays in the construction process by contractors;
- increasing the efficiency of interaction and coordination of the Project Office with all other structural divisions of the company.

The results of the study were used by Sakhalin Energy in planning the construction of the third process line of the LNG plant, construction of the booster compressor station of the Onshore Processing Facility (OPF), as well as in preparing methodological and analytical materials for the work of the Committee of Executive Directors (CED).

The proposed management methodology is used in the educational process of some professional retraining programs for students of the private educational institution of additional professional education "Gazprom Corporate Institute" and RANEP.

Approbation and implementation of the research results. Methodological and practical results of the study were reported and discussed at the IV International Scientific and Practical Workshop "Effective Management of Complex Oil and Gas

Projects" (EPMI-2015), Ukhta, October 20-23, 2015, V International Scientific and Practical Workshop "Effective Management of Complex Oil and Gas Projects" (EPMI - 2017), Saratov, September 18-21, 2017, XII All-Russian Scientific and Technical Conference "Actual problems of development of oil and gas complex of Russia", Moscow, February 12-14, 2018, XXIX International Conference "Problems of safety management of complex systems", Moscow, December 15, 2021.

The developed methods of assessment and analysis of the project management system were used in Sakhalin Energy at the stage of planning the construction of the third process line of the LNG plant and at the stage of construction of the OPF compressor station,

Publications. The results obtained in the course of the research were published in 12 printed works. Which in turn represent, among others, publications in five articles in scientific journals, which in turn are recommended by the Higher Attestation Commission for the publication of the main results of the thesis for the degree of Candidate of Economic Sciences. The author's personal contribution is 3 p. l.

Structure and scope of the work. The dissertation consists of an introduction, three chapters, conclusion, bibliographic list (206 names); it is set out on 180 pages of typewritten text, contains 57 figures, 21 tables.