

MINISTRY OF SCIENCE AND HIGHER EDUCATION  
OF THE RUSSIAN FEDERATION

Federal State Budgetary Educational Institution  
of Higher Education

RUSSIAN PRESIDENTIAL ACADEMY OF NATIONAL ECONOMY AND  
PUBLIC ADMINISTRATION

NORTH-WEST INSTITUTE OF MANAGEMENT

Manuscript



**SEMKOVA Darya Nikolaevna**

**DEVELOPMENT OF INVESTMENT MECHANISMS FOR INNOVATION  
ACTIVITIES OF OIL AND GAS SECTOR ENTERPRISES  
IN THE RUSSIAN FEDERATION**

Speciality 5.2.3 - Regional and Sectoral Economics

DISSERTATION  
for the degree of Candidate of Sciences (Economics)

Scientific adviser:  
Doctor of Sciences (Economics),  
Professor E.A. KUKLINA

SAINT-PETERSBURG  
2026

**Relevance of the research topic.** The draft Strategy for the Development of the Mineral Resource Base of the Russian Federation through 2035, with an extended planning horizon to 2050, prepared by the Ministry of Natural Resources and Environment of the Russian Federation, incorporates a baseline scenario that includes ensuring sustainable reserves and increasing mineral production. It also includes a target scenario that includes measures to expand the mineral resource base. The strategy's priority areas include significantly increasing the degree of raw material processing, creating infrastructure for the implementation of new technologies, accelerating the digitalization of subsoil use, and accelerating management decision-making. Implementation of these areas will contribute to the sustainable development of the sector and improve Russia's environmental safety.

Oil and gas companies are of strategic importance to the Russian economy, driven by the need to ensure energy security as a key element of national security. Innovative activities by industry companies contribute to improving the efficiency of industry enterprises to successfully address the challenges of ensuring national energy security (a prerequisite for sustainable development) and establishing economic sovereignty (a prerequisite for the country's survival). Implementing innovative development projects in the industry requires significant financial investment, and in this case, public-private partnerships (PPPs) can be an effective tool for attracting additional resources. However, to attract private investment in projects with long payback periods, the state must ensure a more detailed regulatory framework, as the state is key to creating a favorable investment climate in the oil and gas industry, and PPP agreements are traditionally among the most complex types of agreements concluded by governments.

A particular feature of the current stage of hydrocarbon resource development in Russia is the need for oil and gas companies to operate in an increasingly complex resource base and the impact of sectoral sanctions, which reduces the ability to utilize budgetary funds. Therefore, the need to expand non-governmental financing sources, i.e., attracting financial resources in the form of private capital, is becoming increasingly important.

The mining business, including the oil and gas industry, has always been characterized by increased risk. The potential risk of oil and gas projects (including innovative projects) is determined by a combination of natural factors arising from the geological conditions of the mineral resource deposit. Natural risk factors at the level of a hydrocarbon trap or reservoir include aspects related to trap integrity (such as its structure type, the method of hydrocarbon closure and retention, and the characteristics of sediments that ensure the necessary strength), reservoir quality (content of sediment types, features of sill spaces, fluid characteristics, and other field parameters), as well as the characteristics of the oil and gas source rocks, and other factors. In addition to natural risks, hydrocarbon field development is associated with specific stage-specific risks, primarily project-related, stemming from unconfirmed reserves and the ineffectiveness of technical and technological design solutions. Under these conditions, investors are wary of investing in innovative development projects at resource companies, preferring to invest in less risky projects in other industries. This, coupled with the limited investment resources of oil and gas companies, reduces the level of innovation activity at enterprises and hinders the industry's innovative development.

With various investment sources available for innovative projects, oil and gas companies must apply a separate investment mechanism for each specific innovative project. This is due to the specific nature of such projects, including increased uncertainty of project results, increased risks in assessing the timeframe for implementing innovative projects, and other factors.

The current situation in the oil and gas industry is characterized by the need to extract hydrocarbons from fields that have already been sufficiently explored. The development and exploitation of new fields (northern Krasnoyarsk Krai, Nenets Autonomous Okrug, the Caspian, Okhotsk, and Barents Sea shelves, etc.) requires large-scale investments, including the development of transport infrastructure, as they are located in hard-to-reach areas. Furthermore, these new fields are significantly remote from sales markets. Therefore, virtually all major investment projects in these regions are at the limit of profitability and unattractive to private capital, necessitating government participation in the innovative development of the oil and gas industry.

The relevance of this dissertation topic stems from the need and opportunity to develop investment mechanisms for innovative activities in oil and gas companies, which determined the choice of the research topic, its subject, object, goals, and objectives.

**The degree of development of the scientific problem.** Numerous scientific papers by both domestic and international authors are devoted to the analysis of the problems and development prospects of this subject area. Thus, the problems of investment and innovation activities of economic entities are devoted to the works of such researchers as J. Schumpeter, B. Twiss, B. Santo, E.J. Dolan, D.E. Lindsay, R. McConnell, L. Brew, J.M. Keynes, D. Jonck, L.J. Gitman, P.N. Zavlin, R.A. Fatkhutdinov, B.A. Reisberg, N.D. Kondratyev, V.V. Kovalev and others. The problems of ensuring innovation activities of enterprises in the extractive industry were studied in the works of E.E. Veselkova, V.V. Gruzdov, A.G. Zel'dner, E.A. Kuklina, N.A. Kulagina, B.B. Rubtsov, I.I. Smotritskaya et al.

An analysis of the current state of investment support for innovative activities in oil and gas companies suggests that the specifics of interaction between the state and private investors within the framework of PPPs, as well as methods for mitigating PPP risks in hydrocarbon field development, remain insufficiently explored. The feasibility of using venture capital as a promising source of investment for innovative activities at Russian oil and gas companies remains an open question. Certain aspects of green financing, including the effectiveness of digital solutions, have also been insufficiently explored.

**Current state of the problem.** Interaction between the government and oil and gas companies is essential for implementing innovative activities, due to the scale of projects and long investment payback periods. The research topic remains insufficiently explored in terms of expanding the possibilities for applying priority investment mechanisms to develop an innovation system in the Russian oil and gas industry, as well as minimizing the risks of investing in innovative projects through PPPs.

**Purpose and main tasks of the dissertation research.** The purpose of this dissertation research is to develop proposals and scientifically substantiated recommendations for improving mechanisms for investing in innovative activities of enterprises in the oil and gas sector of the Russian Federation.

**The main tasks** of the dissertation research include:

- identify industry-specific criteria for determining priority mechanisms for financing the production and innovative activities of companies in the Russian oil and gas sector;

- develop a model for generating investment resources, including appropriate mechanisms for investing in key areas of innovative development for companies in the oil and gas sector of the Russian Federation and indicators for assessing the effectiveness of innovative project financing mechanisms;

- propose indicators for the financial sustainability of PPP projects and the repayment of debt financing, as well as risk mitigation measures based on risk classification by stages of the resource project life cycle;

- justify the feasibility of implementing a blockchain platform for the verification procedure of "green" projects and the issuance of "adaptation" bonds, and formulate recommendations for the use of artificial intelligence and scenario modeling of risks to minimize them in the implementation of PPP projects.

**The object of the dissertation research** is investment in innovative activities of enterprises in the oil and gas sector of the Russian Federation.

**The subject of the dissertation research** is improving the mechanisms for investing in innovative activities of oil and gas companies.

**The theoretical and methodological basis of the dissertation research** is the works of domestic and foreign scholars devoted to the problems of investing in innovative activities. The methodological solution to the problems under study is based on dialectical methods of cognition, ensuring a comprehensive and objective nature of the research. General scientific research methods, methods of systemic and comparative analysis, methods of strategic planning theory, statistical methods (regression analysis; descriptive statistics presented by the tabular method and

calculation of statistical indicators), methods of expert assessments, and a modeling method were used as the methodological basis of the work.

**Compliance with the passport of the scientific specialty.** The dissertation in terms of the object, subject, and purpose of the research corresponds to specialty 5.2.3 - Regional and Sectoral Economics: clause 2.12 - Public-Private Partnership in Industry; clause 7.5 - Digital Transformation of Economic Activity. Models and Tools of Digital Transformation; p.7.15 - Venture mechanisms for supporting innovative activities.

**The hypothesis of the dissertation research.** The main ideas of the study, which need to be proven, are as follows.

1. Decisions regarding investment mechanisms for innovative projects of oil and gas companies should be based on a model for generating investment resources across key areas of innovative development, in accordance with the performance indicators of the financing mechanisms.

2. The development of project financing in the Russian oil and gas sector is facilitated by improved legislation regarding risk allocation between investors and the state, as well as the use of artificial intelligence in assessing investment returns and scenario risk modeling.

3. Increasing the use of "green" financing instruments for the innovative development of Russian oil and gas companies through the issuance of "green" bonds is possible through the digitalization of the "green" project verification stage, which reduces the labor intensity and cost of the verification procedure.

**The scientific novelty** of the research results lies in the development of theoretical principles and methodological approaches to the development of investment mechanisms for innovative activities of enterprises in the oil and gas sector of the Russian Federation.

**The main results of the dissertation research:**

- specific industry criteria have been identified that make it possible to identify project financing using public-private partnership (PPP) mechanisms, the creation of venture funds by large oil and gas companies, and the issuance of green bonds as

priority mechanisms for financing the production and innovation activities of companies in the Russian oil and gas sector;

- a model for generating investment resources has been developed, including appropriate mechanisms for investing in key areas of innovative development for companies in the Russian oil and gas sector, and indicators for assessing the effectiveness of innovative project financing mechanisms;

- indicators for the financial stability of PPP projects and the repayment of debt financing (debt service coverage ratio with cash flow, debt coverage ratio with cash flows during the period before its repayment, project life cycle coverage ratio), as well as risk mitigation measures based on the classification of risks by stages of the resource project life cycle;

- the feasibility of implementing a blockchain platform for the verification procedure of "green" projects and the issuance of "adaptation" bonds is substantiated, and the use of artificial intelligence and scenario modeling of risks in order to minimize them during the implementation of PPP projects is recommended.

**The theoretical and practical significance of the dissertation research** is reflected in the development of theoretical concepts regarding sources of financing for innovative activities of economic entities, the combination of financial instruments in the production and innovation activities of companies in the Russian oil and gas sector, the theoretical justification of general approaches to assessing the effectiveness of using sources of financing for innovative projects, and the economic efficiency of using digital transformation tools. The practical application of the research results includes the development of a model for the formation of investment resources and a system of parameters for assessing the effectiveness of using funding sources; the use of digital transformation tools in assessing the payback of PPP projects and the application of "green" financing.

**Approbation of study results.** The dissertation materials were presented at three international and all-Russian conferences: the XI International Scientific and Practical Conference "State and Business." The Digital Economy Ecosystem" (St. Petersburg, 2019), the International Scientific and Practical Conference "Current

Theoretical and Applied Issues in the Management of Socioeconomic Systems" (Moscow, 2019), the XIII April Scientific and Practical Conference of Young Scientists, Postgraduate Students, and Students of the North-West Institute of Management of RANEPA (St. Petersburg, 2022), and the XIV International Scientific and Practical Conference "State and Business. Current Problems and Trends in Regional Economic Development" (St. Petersburg, 2022).

**Publications.** Nine scientific papers, totaling 7.55 pp, have been published on the topic of the dissertation research, including three articles in scientific journals recommended by the Higher Attestation Commission of the Ministry of Education of the Russian Federation, totaling 4.9 pp.

**List of the author's publications.**

1. Semkova, D.N. "Problems of Investing in Innovative Activities of Oil and Gas Enterprises of the Russian Federation" // State and Business. Digital Economy Ecosystem: Proceedings of the XI International Scientific and Practical Conference, St. Petersburg, April 24–26, 2019 / North-West Institute of Management, RANEPA under the President of the Russian Federation. – St. Petersburg: Russian Presidential Academy of National Economy and Public Administration, North-West Institute of Management, 2019. – Pp. 221–223.

2. Semkova, D.N. Analysis of the Features of Financing Innovative Activities of Oil and Gas Enterprises: Global Experience and Russian Practice // Current Theoretical and Applied Issues in Managing Socio-Economic Systems: Proceedings of the International Scientific and Practical Conference, Moscow, December 20, 2019. – Moscow: Federal State Budgetary Educational Institution of Continuing Professional Education "Institute for the Development of Continuing Professional Education", 2019. – Pp. 70–73.

3. Kuklina, E.A., Semkova, D.N. Digital Technologies as a Key Tool for Improving the Efficiency of the Russian Oil and Gas Industry in the Current Operating Conditions // Management Consulting. - 2020. - No. 4 (136). - P. 53-65.

4. Semkova D.N., Babaev E.A. Analysis of the Current State and Prospects for the Implementation of the Public-Private Partnership Mechanism in the Oil and Gas

Industry of the Russian Federation and the Republic of Azerbaijan // Management Consulting. - 2020. - No. 9 (141). - P. 145-159.

5. Semkova D.N. Analysis of Financing of Innovative Development Programs for Companies in the Oil and Gas Sector of Russia (Based on Open Source Data) April Conference / Scientific Works of North-West Management University of the Russian Presidential Academy of National Economy and Public Administration. Volume 13. Issue 2 (54). St. Petersburg, 2022. P. 248-260.

6. Semkova D.N. Financial and Investment Support for Innovative Activities of the Russian Oil and Gas Complex // Management Consulting. 2022. No. 6. pp. 169–183.

7. Semkova D.N. Application of Digital Technologies for Verification of Green Financial Instruments // Internet-Mobile Economy. Collection of scientific articles by academic staff, postgraduate students, master's students, and students. Issue 2, 2023. pp. 107–109.

8. Semkova D.N. Minimizing Risks in the Implementation of Public-Private Partnership Projects in the Oil and Gas Industry // Internet-Mobile Economy. Collection of scientific articles by academic staff, postgraduate students, master's students, and students. Issue 5, 2025. pp. 154–156.

9. Semkova D.N. Minimizing Risks in the Implementation of the Public-Private Partnership Mechanism (Using the Example of the Oil and Gas Industry in Russia) // The Internet-Mobile Economy. Collection of scientific articles by academic staff, postgraduates, masters, and students. Issue 6. [Text] / team of authors; edited by Ph.D. in Economics T.V. Vasilieva. - Moscow: Ippolitov Publishing House. 82-85 pp.

**The structure of the dissertation research** is determined by the stated purpose and the main tasks. The study consists of an introduction, three chapters, a conclusion, a list of references, and appendices, totaling 231 pages.