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INNOVATION COMPONENT IN OIL AND GAS COMPANIES OF RUSSIA

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Abstract

The article is devoted to the consideration of the innovation component in the oil and gas sector of Russia, which is of great importance for its economy and which has undergone major changes during the years of market reforms. The Russian economy is largely dependent on the oil and gas sector, so the issues related to its innovative development are really significant. Innovation in this sector is a promising but relatively new activity for Russian companies. Their transition to the path of innovative development is often hampered by the lack of modern innovation infrastructure and professional management. The authors noted the most important processes affecting the development of the innovation component in oil and gas companies of Russia. Using specific examples, the authors show that Russian oil and gas companies are gradually forming their innovation ecosystems, thanks to which they have the opportunity to carry out innovative activities on the basis of market principles. The authors assess the level of development/maturity of the innovation ecosystem of several Russian oil and gas companies, propose the necessary criteria and scale for evaluation. The classification of factors affecting the internal ecosystem of innovations, used for the analysis, is based on their division into “hard” and “soft” ones. The indicators highlighting the condition of innovative activity of the companies are chosen. It is concluded that the formation of the corporate innovation ecosystem will contribute to the innovative development of the corporation itself, and the region in which it is based.

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Keywords: Innovation ecosystems, oil and gas companies, oil and gas industry.



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1. Introduction

Innovative development of companies in the modern world is an important factor in the development of the economy. Due to the high dependence of world economic growth on raw materials and their shortage in some countries, the role of innovation in resource-based industries has become extremely significant. Leading oil and gas companies around the world actively invest in innovative projects, make new technological solutions, train staff, develop new types of innovative activities with the expectation of increasing their competitiveness and profit growth. However, Russian oil and gas companies lag far behind foreign counterparts in terms of innovation infrastructure development and innovation activity. One of the current trends in improving innovation is the formation of a corporate ecosystem of innovations. Inherently, the innovation component in an oil and gas corporation can be regarded as a corporate innovation ecosystem.

The concept of “innovation ecosystem” was introduced by Charles W. Wessner (2007) and received its interpretation in the works of Bramwell (2012), Karanatova and Kulev (2015) Reynolds and Uygun (2018) and other scientists (Metcalf & Ramlogan, 2008; Mercan & Goktas, 2011; Jackson, 2011; Pavel, Polyakov, & Kudryashova, 2019).

In this study, the authors use the definition of the innovation ecosystem proposed by Reynolds and Uygun (2018, p. 181), who argue that “innovation ecosystems refer to the economic relationships between actors (university faculty and students, entrepreneurs, industry leaders, government officials) and entities (market and non-market organizations) whose functional goal is to enable innovation”.

The largest Russian companies which work in the oil and gas sector, lead the rating of the largest companies in Russia (Rating of 600 largest companies in Russia, n. d.) in terms of sales volume (Table 01) and are considered as industry leaders and engines of technological development.

Table 01. Russia's largest companies by volume of sales, 2018

Rating place	Company	Sales volume (mln rubles)	Profit before tax (mln rubles)	Net profit (mln rubles)	The head-office location	Direction of activity
1	PJSC “Gazprom”	6 524 711.00	1 018 006.00	766 879.00	Moscow	oil / oil and natural gas industry
2	Oil Company “Lukoil”	5 475 180.00	524 184.00	420 422.00	Moscow	oil / oil and natural gas industry
3	Oil Company “Rosneft”	5 030 000.00	395 000.00	297 000.00	Moscow	oil / oil and natural gas industry

Source: Expert ONLINE Rating Agency (Rating Agency Expert).

The Russian economy is largely dependent on the oil and natural gas sector (Simola & Solanko, 2017), so the issues related to its innovative development are very important and relevant. Innovation in this sector is a promising but relatively new activity for Russian companies (Guseinov, 2011). Their transition to the path of innovative development is often hampered by the lack of both modern innovation infrastructure and professional innovation management.

2. Problem Statement

The development of the innovation component in Russian oil and gas companies is influenced by several processes.

2.1. Transformation in the sector caused by market reforms

With the beginning of market reforms, the old system of research and development in the oil and gas sector of Russia was destroyed: "... in fact, the former centralized system of R & D with all its attributes: planning, organization, financing, implementation was destroyed" (Zemtsov & Silkin, 2005, 45). Until 1991, scientific and design organizations, which included 41 institutes and 11 design bureaus, worked in the oil industry. 12 institutes were the main ones in the areas of activity of the oil and gas industry (Gumerov & Bazhaikin, 2014). Scientific problems of the oil industry were solved by domestic scientists who introduced technologies in Cuba, Vietnam, Syria, etc. This contributed to the promotion of domestic science and the assertion of the country's authority in the world. However, in comparison with foreign companies, the level of applied technologies was low, and the susceptibility of domestic oil and gas enterprises to new technologies was weak, as they developed without being involved in competition with the world's leading companies and their technologies.

2.2. Growing dependence on foreign technology

In the conditions of changing business model, Russian companies began to prefer to acquire new technologies and equipment from foreign companies. This led to the fact that the dependence of the Russian oil and gas sector on the supply of modern equipment from abroad began to grow (Zemtsov & Silkin, 2005; Silkin, 2014; Nikulina & Miroshnichenko, 2016). The share of imports of oil and gas equipment was increasing. There were objective reasons for this:

- 1) during the years of reforms, tens of thousands of scientists and developers left Russia;
- 2) science funding had fallen several times;
- 3) the low competitiveness of scientific research conducted by Russian scientists compared to the world level was revealed;
- 4) companies got the opportunity to freely acquire technology abroad.

The innovative development of Russian oil and gas companies became dependent on the inflow of foreign technologies and equipment. The imposition of economic sanctions made the flow of technology through this channel more complicated.

2.3. The role of big business in the formation of innovation component

Big business in Russia at the beginning of this century could be attributed to one of the most sluggish, disinterested participants in innovation processes. Like the entire Russian economy, big business was in the process of economic transformation, there was a change of ownership (Borkova, Sopina, & Vatlina, 2015) and a decrease in innovation activity. Currently the situation has changed: the main processes of adaptation to market economy conditions are completed, the necessary innovative infrastructure has been created in the country, the national innovation system has been formed, etc. The

study of innovative activity of Russian enterprises (Dvoretzkaya, 2018, 4) shows that in Russia “the correlation between innovative activity of organizations and their size can be traced: larger enterprises are engaged in innovative activity much more intensely. In the segment of the largest enterprises (more than 10 thousand people of staff, more than 80% is the output of innovative products, which is 10 times higher than the national average (8.4%)”. However, compared to the world level, the innovative activity of Russian companies remains relatively low (Pogodaeva & Zhaparova, 2015a; Pogodaeva & Zhaparova, 2015b; Borkova, Sopina, & Vatlina, 2015) and needs new forms that correspond to modern global trends in the development of the economy based on innovation.

In this study, the authors proceeded from the hypothesis that it is possible to ensure sustainable innovative development of Russian oil and gas companies in modern conditions by forming an internal corporate innovation ecosystem in large companies.

3. Research Questions

In order to understand what the innovation component (innovation ecosystem) of Russian oil and gas companies is like and to what extent it is developed, it is necessary to consider the following questions.

- 3.1. What blocks make up the structure of the company's innovation ecosystem?
- 3.2. What criteria can be used to perform a comparative analysis of the innovation ecosystem of oil and gas corporations?
- 3.3. How is it possible to assess the degree of maturity of emerging corporate innovation ecosystems?

4. Purpose of the Study

The purpose of the study is:

- determination of the state of the innovation component (internal innovation ecosystem) of several large Russian oil and gas companies, leaders in innovation activity;
- determination of the degree of maturity of functioning innovation ecosystems to understand the directions of its further development.

5. Research Methods

The article uses general logical methods: analysis and synthesis, abstraction, structural-logical and comparative methods, elements of system analysis, which involves the study of economic objects represented as systems, their structuring and subsequent analysis. It also uses content analysis of literary sources, reports of companies on the results of their activities in terms of issues related to research problems. These materials are evaluated and interpreted.

To analyze the development and maturity of the innovation ecosystem, the authors have done the following:

- three Russian oil and gas companies were selected based on the criteria of open documents on the implementation of innovative activities;
- classification of internal innovation ecosystem factors in “hard” and “soft” was used;
- the indicators to determine the state of innovative activity of companies: R&D costs (billion rubles); revenue (billion rubles), knowledge intensity; compliance with the target values were chosen;
- the blocks which are used for the comparison to be carried out were highlighted: research and development block, production block, personnel block, innovation process block.

For the purposes of the research, the authors use the concept of “innovation event”, which is understood as various types of scientific conferences, seminars, exhibitions and competitions, including international, dedicated to science and innovation, the participant or organizer of which is the company under study. Innovation events are referred to the “soft” factors of the ecosystem, which alongside with the “hard” ones (Table 02) determine the formation of the internal ecosystem of innovations.

Table 02. Classification of internal innovation ecosystem factors

Hard factors	Soft factors
1. Strategy – the program of innovative development	1. Personnel (social policy, developed recruitment and training system)
2. Structure	2. Competencies – (corporate University, prominent scientists)
3. Systems and procedures - occupational safety, environmental protection, quality control	3. Shared values – mission and values that form the basis of corporate culture
	4. Style (in production – authoritarian style, and in research centers – personality-oriented)

To determine the maturity stage of the innovation ecosystem, the authors propose a scale based on an integrated quantitative assessment of the factors influencing the formation of the innovation component (Table 03).

Table 03. Maturity stages of the corporate innovation ecosystem

Quantitative assessment	The name of the step (stage)	The essence of the stage
1-3	1 stage	Origin, concentration of resources, accumulation of scientific research potential of the company and formation of resources for the development of the future ecosystem
3.1-3.9	2 stage	Formation of the innovation ecosystem, innovation policy of the corporation and directions of its development, the primary emergence of the ecosystem
4-4.7	3 stage	A surge in innovative development with the transition to the formation of an environment in which there is interaction aimed at the creation and development of innovations
4.8-5	4 stage	Maturity of the innovation ecosystem – a well-developed innovation infrastructure with the use of soft factors is created

Source: developed by the authors.

The proposed steps / stages make it possible to determine the maturity of the innovation ecosystem and help the innovation management of the company to more consciously develop measures for its improvement.

6. Findings

The authors offer the following interpretation of the notion “innovation ecosystem of oil and gas company”: a complex environment formed by the participants of the innovation process (individuals and institutions), which has an external and internal component and is exposed to hard and soft factors, as well as providing a flexible adaptation of the company in its industry to increasing competition in the market

In accordance with the proposed methodology, the companies selected for the study were analyzed in terms of indicators that form the innovation component of their activities (Table 04). The authors relied on the actual data of the companies of PJSC “Gazprom”, PJSC “SIBUR”, PJSC OC “Rosneft”, on their financial statements and innovative development programs (The official website of PJSC “Gazprom”; The official website of PJSC “SIBUR Holding”; The official website of PJSC OC “Rosneft”).

Table 04. The science intensity of the companies PJSC “Gazprom”, PJSC “SIBUR”, PJSC OC “Rosneft”¹

Company	Indicator	2015	2016	2017	2018
PJSC “Gazprom”	R & D costs, billion rubles	9.9	6.3	8.2	No data
	Revenue, billion rubles	4 334	3 934	4 313.03	No data
	Science intensity	0.23%	0.16%	0.19%	No data
PJSC OC “Rosneft”	R & D costs, billion rubles	36	20.2	29.90	No data
	Revenue, billion rubles	3838.094	4318.055	4893	No data
	Science intensity	0.94%	0.47%	0.61%	No data
PJSC “SIBUR”	R & D costs, billion rubles	1.03	1.63	1.81	2.14
	Revenue, billion rubles	344.53	361.49	373.71	486.06
	Science intensity	0.30%	0.45%	0.49%	0.44%

Source: compiled and calculated by the authors.

On the basis of indicators of the activity science intensity, factors of internal innovation ecosystem, the criteria for the state of innovation ecosystem of each company in the selected blocks were identified and evaluated, which allowed to determine the stage of the corporate innovation ecosystem development by the degree of its maturity (Table 05).

Table 05. Assessment of the maturity stage of the innovation ecosystem of selected corporations

Block	Criterion	Significance of the criterion (%)	PJSC “Gazprom”	PJSC OC “Rosneft”	PJSC “SIBUR”
		x	y	y	y
Creative block (science)	Own research centers	25%	5	5	5
	Cooperation in science, technology and innovation (Universities, development	20%	5	5	4

¹ Compiled by the authors on: annual report of PJSC “Gazprom” for 2017, 144 p.; Report on financial results of PJSC “Gazprom” for 2016 (p. 13), 2017 (p. 15), 2018 (p. 10); PJSC “SIBUR Holding” Accounting Statements and Audit opinion of the independent auditor on December 31, 2017; 2016 explanation to the balance sheet and financial results report, 5 p.; Report on financial results of PJSC “SIBUR Holding” for 2016, 2017, 2018; Annual report of PJSC OC “Rosneft” for 2017 107 p., 2016 170 p., 2015 201 p.; Audit report of the independent auditor on the financial statements of PJSC “Rosneft” for 2018, 10 p., 2017, 10 p., 2016, 10 p.

	institutes, etc.)				
Production block	Directions of activity and related innovative development	5%	4	4	5
Personnel training block	Educational level of employees (personnel training level)	15%	5	5	5
Innovation process block	Availability and effectiveness of innovation management	10%	5	4	5
	Availability of innovative development program or its analogue	5%	5	5	4
	Availability of KPIs in priority areas of innovative development	10%	5	5	3
	Availability and effectiveness of innovation events	5%	4	4	5
	Focus on sustainability	5%	5	5	4
Result: $\sum_{i=1}^n(x \times y)$			4.9	4.8	4.5
Development stage of the company's ecosystem			4	4	3

Source: compiled and calculated by the authors.

The results presented in the table show that PJSC “Gazprom” and PJSC OC “Rosneft” have the most developed / mature corporate innovation ecosystems. At the same time, PJSC “Gazprom” has completed the formation of hard factors, and soft factors are subject to improvement. At PJSC OC “Rosneft”, the hard factors require improvement in the part of the innovation management system, its formation in a more organized structure, and the soft factors are also subject to development. The innovation ecosystem of PJSC “SIBUR” is not mature enough according to the results of the assessment. It is necessary to develop hard factors - to formalize the innovation management system in a more organized structure, as well as to develop a program of innovative development and KPI. Soft factors require close attention and are subject to development.

7. Conclusion

The growth of competition in world markets and the depletion of Russia's resource base push to the forefront the use of advanced technologies of the world oil and gas industry in the methods of extraction and processing of hydrocarbons. For Russian companies in modern conditions, it becomes extremely necessary to search and develop innovative solutions with their subsequent implementation, which can be carried out in the presence of a mature innovation component in the form of a corporate innovation ecosystem.

Innovative development of companies in Russia is extremely uneven. In this research, the leading innovatively developed companies were considered, whose corporate innovation ecosystem is already fully formed. However, the bulk of companies in this sector lags behind foreign companies in innovative development.

The purpose of the corporate innovation ecosystem is to combine and concentrate various types of resources of the corporation for the effective implementation of its innovative activities. It should ensure the collaboration of all participants in the external and internal innovation ecosystem.

In the regions of Russia with raw materials specialization focused on hydrocarbon extraction, there is some lag in innovative activity and development of innovation infrastructure, but the stimulation of innovative development can help to overcome the historically developed specialization of the regions.

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