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**INTEGRAL ASSESSMENT OF INNOVATIVE COOPERATION OF
AN INDUSTRIAL ENTERPRISE**

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Abstract

The study of innovative potential is a necessary element in assessing the innovative development of an industrial enterprise. Currently, there are various methods for solving this problem, but they do not provide a comprehensive account of all factors, this is due to:- the imperfection of existing methods for evaluating innovation based on traditional economic approaches; - the need to assess the impact of the innovation process on various areas of enterprise functioning. At the moment, the assessment of innovative development completely repeats the analysis of the effectiveness of investment projects, which in our opinion, does not fully reflect the capabilities of the enterprise. The paper proposes methodological provisions for the integrated assessment of the innovative potential of an industrial enterprise, which were tested on the example of oil and gas industry enterprises. The results are:- identified areas that need to be considered when assessing the innovative potential of individual industries and enterprises; - methodological provisions for assessing the innovative potential of the identified areas for specific enterprises are proposed; - the levels of innovative potential of a number of enterprises in the industry are determined, which are compared with the calculated level of industry innovation potential, and on the basis of this, the minimum acceptable level of the integral indicator for assessing the innovative development of enterprises in a certain industry.

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Keywords: Innovation, innovative potential of an industrial enterprise, system assessment, synergistic approach, integrated assessment.



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1. Introduction

Translated from Latin «Innovation» means «movement in the direction», from English – «innovation», «novation», «novelty». The concept of «innovation» is widely used to characterize such terms as: «innovation activity», «innovation process», «innovation solution» and the like. The specific content of innovation is constituted by changes consisting in (Eliseeva, 2017): development and implementation of the latest technologies and equipment; the use of new materials; improving the organization of production of products with new properties; the emergence of new markets.

The innovation process includes the stages of creating, mastering and disseminating innovations. As a result, superiority over competitors is achieved, and innovations recognized as unique in a certain area are formed. Important components of innovation are the availability of scientific and technological novelty and further production implementation. The commercial applicability of innovation is recognized as a potential property, the achievement of which requires some effort. Therefore, innovation should be considered a consequence of the implementation of the innovation process, which has three inherent, important properties: scientific and technological novelty; manufacturing applicability; commercial feasibility.

Innovation as a commercial necessity, reflecting the needs of the market, forms the financial aspect of this phenomenon. Important attention is paid to (Kostygova, 2017; Blagin, Plisetskiy, Shedko, Cobersi, & Vasilieva, 2017):

- materialization of innovations in such forms as inventions, development of new more advanced products, technological and organizational methods of production and labor;
- commercialization of innovations, allowing them to turn into sources of income.

In this regard, it is advisable to consider innovative processes from several perspectives (Kostygova, 2018; Eliseeva, 2018):

- as a process for the implementation of scientific, technical, research, production potential of innovation;
- as the implementation of the stages of the innovation life cycle, including the processes of creating, developing and using innovations.

The innovation process can be represented in the form of series-parallel events of the creation and implementation of innovative ideas. It is necessary to consider the continuity of this process, so we should talk about innovative development. The possibilities of such development are determined by the innovative potential that an economic entity possesses, it is characterized by a combination of means ensuring its innovative development.

2. Problem Statement

Today, there are many different approaches to assessing the potential of innovative development. It should be noted the widespread use of resource, costly, resource-costly, as well as multi-parameter approaches.

Intensive innovative transformations require the development of new criteria for assessing innovative potential and the creation of methodological tools for assessing the level of innovative development of individual industries and enterprises. This problem is relevant in connection with:

- the imperfection of existing methods for evaluating innovation based on traditional economic approaches;

- the need to assess the impact of the innovation process on various areas of enterprise functioning.

Currently, there are two main trends in the development of methods for assessing innovation. The first is related to the formation of integral indicators. The second direction is based on the creation of a system of private indicators that comprehensively reflect the innovative development of the object in question (Patriarca, Falegnami, De Nicola, Villani, & Paltrinier, 2019). From our point of view, the first approach is most acceptable, since it allows us to unambiguously assess the level of innovative development.

3. Research Questions

The implementation of new approaches requires the development of methodological provisions, related to:

- identifying the range of areas that must be considered when assessing the innovative potential of individual industries and enterprises;

- solving the problem of joint assessment of the innovative potential of the identified areas for specific enterprises;

- establishing as a guideline an enough level of innovative potential in the industry.

4. Purpose of the Study

In this regard, the aim of the study is to develop guidelines for the integrated assessment of the innovative potential of specific enterprises in the oil and gas industry. As an object of study, oil and gas industry enterprises were selected as the most representative for Russian industry.

5. Research Methods

In order to improve methods for assessing the innovative potential of enterprises, it is proposed to use systemic and synergetic approaches. This will allow to form a special methodological toolkit and comprehensively assess the innovative development potential of industrial enterprises.

Methodology. To build a model for integrated assessment of the innovative potential of an industrial enterprise, indicators were identified for the following qualification groups for assessing the capabilities of the enterprise (Mannis, 1996):

- indicators of the development of financial and economic potential: the coefficient of financial independence (autonomy, the ratio of borrowed and own funds, maneuverability), solvency ratios (absolute liquidity, coverage, total liquidity), estimates of working capital (asset turnover); short-term debt ratio;

- indicators of the availability of production and technological potential: indicators for assessing fixed assets (capital intensity, capital productivity, capital ratio, fixed assets movement ratios, fixed assets depreciation rate);

- indicators of the development of scientific and technological potential: the costs of scientific and technical development, the share of the costs of scientific and technical development to total costs, the high technology output;

- indicators of market development: profitability, profit and costs per 1 ruble of sales;

- performance evaluation indicators: profitability: assets, current assets, investments, equity, products, production assets; asset turnover, labor productivity.

For comparability of indicators included in the classification groups, it is proposed to use their average values, determined by the formula:

$$k = 2^{-\frac{F}{f}}, \quad (1)$$

Where k – estimated indicator;

F – average value of an indicator;

f – indicator of the studied object.

The coefficient k has a value from zero to one. Value The coefficient k has a value from zero to one. Value $k = 0,5$ characterizes the average level or absence of changes, i.e. $F = f$. Value $k > 0,5$ speaks about the positive dynamics of the innovation process, and the importance $k < 0,5$, on the contrary, about the negative. Limitations of the use of the coefficient are represented by negative values of indicators F and f . In such a situation, the study of private indicators is carried out separately in comparison with normative values. In the case when $F < f$ In such a situation, the study of private indicators is carried out separately in comparison with normative values. In the case when $F > f$, but f negatively, we assign the value k to its minimum value, namely 0. Thus, according to the results of the transition from relative to absolute indicators, we obtain a new system of values comparable to each other.

The second stage in the development of an integrated indicator for assessing the innovative development of an enterprise is the determination of the function of the dependence of indicators for each of the components of innovative potential considering its rating:

$$y_i = \frac{1}{m} \sum_{j=1}^m r_j k_{ij} \quad (2)$$

where k_{ij} - the value of the j -th indicator for each of the components of the i -th classification component of the assessment of innovative development;

r_j – rating position of the j -th quotient;

τ - the number of indicators in the classification group of innovative development assessment.

The final integral indicator of assessing the innovative potential of an enterprise is defined as the sum of the innovative potentials of all its components

$$y = \frac{1}{m} \sum_{j=1}^m R_j y_i \quad (3)$$

where R - the rating number of the i -th indicator of the assessment of innovative opportunities.

Approbation of a technique. Calculation and analysis of the integral indicator, the assessment of innovative potential was carried out at the enterprise of the oil and gas industry. Based on the calculated indicators f of the research object for three years and certain industry-average indicators F formed based on

three leading enterprises in the oil and gas industry, the estimated indicator k was determined. The obtained values are presented in table 01.

Table 01. The value of the indicator k for the enterprise-object of study

Name of indicator	The value of the indicator for years		
	n year	(n+1) year	(n+2) year
autonomy at own expense	0,6	0,6	0,5
the ratio of borrowed and own funds of the enterprise	0,6	0,5	0,4
maneuverability of financial sources	0,4	0,6	0,5
maneuverability of financial sources	0,5	0,6	0,5
current liquidity of property	0,5	0,5	0,5
short-term debt and liabilities	0,4	0,3	0,6
asset turnover	0,4	0,5	0,4
capital intensity of production assets, rub./rub.	0,0	0,0	0,0
capital productivity of production assets, rub./rub.	0,7	0,7	0,8
capital-labor ratio of personnel, thousand rub./person	0,8	0,7	0,8
capital gains	0,4	0,5	0,5
disposal of fixed assets	0,3	0,2	0,3
fixed assets updates	0,4	0,3	0,2
depreciation of fixed assets	0,5	0,4	0,4
level of costs for scientific and technical development, thousand rubles	0,2	0,1	0,2
share of costs for scientific and technological development in the total amount of costs	0,5	0,5	0,5
level of high technology output	0,5	0,5	0,5
profitability of sales	0,5	0,5	0,5
the share of profit in revenue from sales of products, rub./rub.	0,5	0,5	0,5
share of costs in revenue from product sales, rub./rub.	0,5	0,3	0,4
profitability of the total assets of the enterprise	0,5	0,6	0,5
return on current assets	0,6	0,7	0,6
return on investment	0,5	0,6	0,5
return on equity	0,4	0,5	0,4
sales profitability	0,5	0,5	0,5
labor productivity, amount of production/person per year	0,5	0,5	0,5

Source: authors based on the PJC «NOVATEK» (2016-2018).

Further, according to the proposed methodology, according to formula 2, an integral indicator was determined for assessing the innovative potential of the enterprise-object of study. The resulting total values of the integral indicator and its deviations from the permissible and possible values for the groups of indicators are presented in table 02.

Table 02. The value and assessment of the integral level of innovative development of the enterprise of the research object

Name of indicator	The value of the indicator for years		
	n year	(n+1) year	(n+2) year
Innovation development indicator	1,55	1,56	1,56
Possible indicator value	4,20	4,20	4,20
Actual deviation	2,65	2,64	2,64

Source: authors based on the PJC "Gazprom" (PJC "Gazprom", 2016; PJC "Gazprom", 2017; PJC "Gazprom", 2018); PJC "Tatneft" (2016-2018); Center for corporate disclosure (2016-2018).

6. Findings

The obtained indicator of innovative potential for the three considered on average was equal to 1,56. This indicator has a relatively stable value and a slight upward trend. However, the indicator of innovative opportunities is much lower than the possible value. In the analysis of industry average values of the enterprise, the research object has an insufficient level of innovative development, but the research object has a stable market position, which follows from the analysis of assessment indicators.

7. Conclusion

In the work, the main results of the analysis of modern approaches to assessing the innovative activity of an enterprise were presented and a methodology for the integrated assessment of the innovative potential of an enterprise with certain industry average assessment indicators was proposed. Testing the methodology made it possible to draw a conclusion about the real potential development of the enterprise of the research object within the framework of its industry. The advantage of integrated assessment was the objective determination of the level of innovative development of a fairly sustainable enterprise. Thus, the integral indicator makes it possible to determine the degree of innovative development and to rank enterprises within one industry.

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