

Evaluation of Efficiency of Innovation Development of Russian Corporations

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Abstract. Innovation development is one of the key factors for enhancing competitiveness of the Russian economy. Large corporations play an important role in this process. It is necessary to assess the efficiency of innovative development of Russian corporations. The article aims to study features of innovative industrial corporations, describe innovation development indicators. The need for including a risk component in the system of innovation development indicators was substantiated. The article describes ways to achieve goals for each innovation direction. An approach to constant monitoring of implementation of innovative development strategies was described. An algorithm for evaluating innovation development of industrial corporations was suggested. The developed approach can be used to assess the efficiency of innovation strategies and establish relations between innovations for the effective development of innovation activities of Russian corporations.

1. Introduction

An important role of innovation activities, changes in the pace, directions and mechanisms of innovation development are key factors that determine the development of countries. In modern conditions, the most important task of the Russian economy is transition to an innovative path of development, diversification of the economy and creation of conditions for implementing the innovative potential. The success of these activities depends on innovative activities of Russian industrial corporations. An effective system of strategic management of innovation activities will allow Russian industrial corporations to overcome their technological lag and become competitive in the global market. N. Rosenberg and L. E. Birdzell associate the economic development of Western countries with a continuous search for opportunities and changes that are favorable for innovation development [1]. To select and implement innovative development strategies, it is necessary to assess all forms of innovation activities which encompass all economic aspects.

2. Problem statement

To intensify innovation development of Russian corporations, it is necessary to study theoretical aspects of the innovation economy, the concept "innovation" and classifications of innovation processes and activities.

Formation of theoretical foundations began at the beginning of the 20th century. Joseph Schumpeter, one of the founders of the innovation theory, considered the integration of companies as an organizational innovation aimed at being big enough to compete on the global stage. He introduced

a concept “entrepreneurial company”, a special economic agent which is competitive due to new products, new technologies, new sources of raw materials or new types of management. The goal of a company is to seek a strategic advantage based on product, technological or organizational innovations rather than to maximize profits through cost minimization [2].

In the economic literature, there is no single definition of the concept “innovation”. Innovation is characterized as a process, result, method, object. For example, B. Santo considers the innovation as “a social, technical, and economic process which contributes to creation of better products and technologies through the practical use of ideas and inventions; if it focuses on economic benefits, it can bring an additional income ... [3]. B. Twiss defines the innovation as a process “... in which an idea or invention acquires an economic meaning” [4]. P. Drucker described innovation as a “special tool of entrepreneurs by which they seek to implement a new type of product or service” [5]. All definitions involve the following characteristics: novelty, socio-economic efficiency, effectiveness, production demand and applicability.

In the draft strategy of the Ministry of Economic Development “Innovative Russia-2020”, innovation involves “bringing a new product or service to the market, implementing a new production process, developing a new business model, creating new markets” [6-21]. The recommendations of the Organization for Economic Cooperation and Development (OECD) for collecting and analyzing data on innovations define the term as follows: “Innovation is implementation of a new or improved product or process, a new marketing or organizational production method. This product, process or method should be new or substantially improved. Thus, innovations are an important competitive advantage which can bring high profits and / or other benefits.

Innovative companies are “organizations regardless of their legal forms and types of activities. They develop and create new products or improve existing ones, implement technological and managerial processes or perform other types of innovation activities ... They are considered innovative during the monitoring period regardless of efficiency and stages of the innovation process” [11].

The innovative activity is determined by abilities to create and implement innovations in order to enhance competitiveness and retain the market share and expand and improve production, and upgrade products. In terms of the strategic approach, the innovative activity of industrial corporations involves innovation activities in the sphere of production and management in order to ensure competitive advantages and achieve long-term goals of innovative development. Thus, features of innovative industrial corporations are as follows: 1) goal-setting on the basis of innovations; 2) development and implementation of the innovation strategy; 3) modification of the corporate management system in accordance with the innovation strategy; 4) the positive dynamics of corporate innovation development.

The level of innovation development is determined as the ratio of the number of innovative corporations to the total number of corporations for a certain period in a country, industry, region, etc. [11].

The economic efficiency of innovations can be determined by such indicators as labor productivity, production and transaction costs, energy intensity, a production volume. Implementation of an innovation strategy should reflect the efficiency of innovation activities determined by the ability of a company to achieve maximum results with minimum costs of labor, material, and financial resources and time.

The current practice of evaluation of corporate performance by sales results or profitability does not allow for the objective assessment of innovation results. It is necessary to develop an approach for assessing innovation efficiency which would reflect the innovation strategy of the corporation and its components.

Owing to financial and non-financial goals of innovative strategies for the development of industrial corporations, their implementation requires a system of innovation performance indicators (financial and qualitative) characterizing the degree of innovation development goal achievement. The approach to the implementation of an innovative strategy for the development of industrial

corporations is based on the balanced scorecard method developed by D. Norton and R. Kaplan [1]. The system of innovation development indicators should take into account:

- 1) compliance with interests of stakeholders;
- 2) minimization of innovation risks;
- 3) development material and technical resources;
- 4) growth of the potential to enter new markets when implementing an innovation strategy;
- 5) the impact of the innovation strategy on the social sphere.

It is necessary to select those indicators that will allow for assessment of the degree of innovative development goal achievement (Table 1).

To select the indicators, it is necessary to form an expert group. The assessment procedure can be formalized by applying a scoring system. The indicators that received more points should be included in the system of key indicators of innovation development.

The system of innovation development indicators includes the following components:

- 1) financial resources;
- 2) customers;
- 3) process;
- 4) development and training;
- 5) risks.

Table 1. Innovation development indicators for an industrial corporation.

Components of the system of innovation development indicators	Innovation development indicators
Financial resources	Internal and external R&D costs Share of R&D costs Profit on sales of product and technology licenses Profit on sales of innovative products The level of cost reduction due to implementation of innovative solutions
Customer	Customer loyalty rate Customer Satisfaction Index Market share Number of new orders
Risk	Commercial risks Financial risks Production risks Ecological risks
Process	Number of patents and patent applications Number of developed technologies for reducing the time of data processing, number of internal innovative products The ratio of developed and purchased technologies Number of technology licenses sold Cycle time for product development The share of innovative products
Training and development	Staff turnover rate, % Staff training costs Employee satisfaction The share of employees having academic degrees Training of employees

The need to include the risk component is due to the high degree of uncertainty of innovation activities.

Effective risk management requires a comprehensive risk coverage. To predict and prevent consequences and probable deviations, effective risk management mechanisms are required.

When assessing risks, initial conditions of possible events or circumstances, potentially dangerous events, mitigating factors and characteristics, the nature and frequency of negative consequences of identified hazards are studied. These criteria and measures are applied to all activities and include the values of uncertainties of the estimates. The purpose of risk assessment is to make decisions based on risk analysis which sets the priority for making decisions on risks that have to be eliminated.

It is advisable to analyze the risks of innovation activities taking into account their peculiarities and using various methods [2]. It is necessary to analyze all types of risks: the external macroenvironment (government policy, social policy, economic policy, international economic relations, etc.), the external microenvironment (relations with suppliers, customers, banks, competition), and the internal environment (management and production).

The efficiency of innovation activities can be assessed at two levels:

1. for each direction of innovation activities (component).
2. the degree of achievement of strategic goals of innovation activities as a whole.

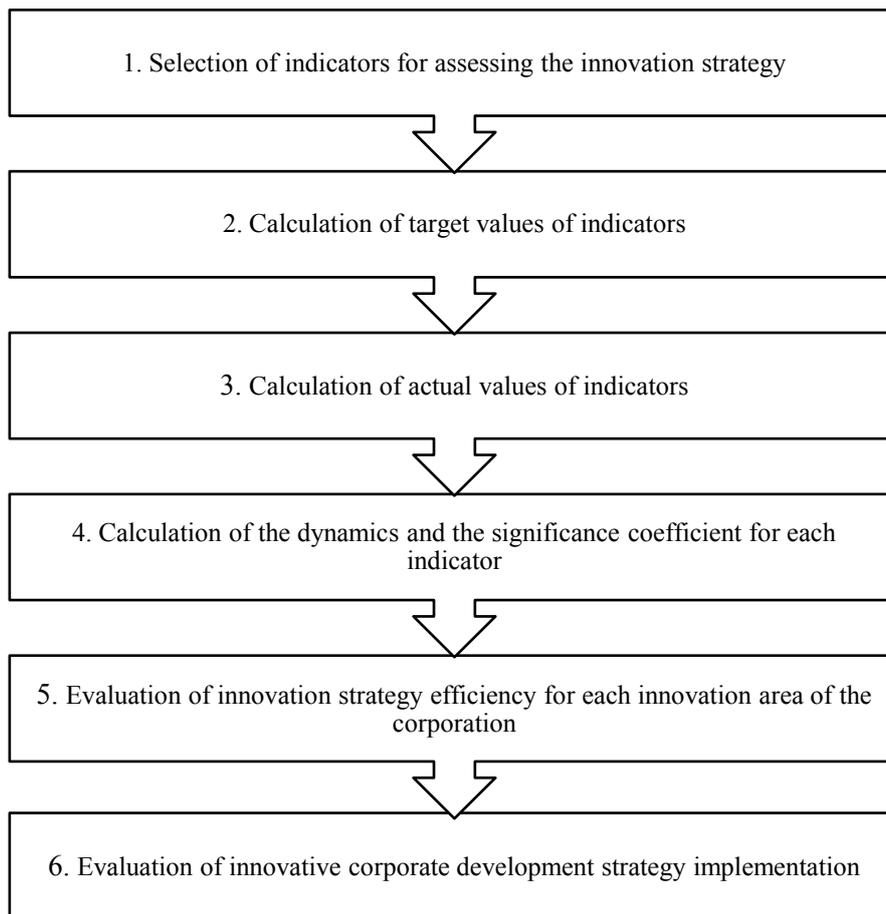


Figure 1. Algorithm for evaluating innovative strategy efficiency

The algorithm for evaluating the efficiency of innovation development (Fig. 1) consists of six successive stages. The approach involves evaluation of the efficiency of individual components of the

system of innovation development indicators and their impact on the efficiency of the innovation strategy as a whole. The results of these stages reflect a specific situation that characterizes the innovation strategy.

The choice of criteria for evaluating the innovation strategy efficiency depends on the conditions, technical and organizational capabilities of the industrial corporation at this stage.

3. Conclusion

Innovation activities of companies depend on their operating conditions. Some companies maintain the current level of competitiveness and implement innovations using existing technological solutions in order to ensure the level of resource efficiency. Other companies seek to corner the market and ensure a fundamentally higher level of efficiency and profitability than their competitors.

The innovation development of a corporation depends on its ability to create and implement innovations in order to enhance competitiveness in the long run. Although the corporation cannot develop or be competitive without innovation activities, its innovation development depends on the comparative efficiency of using funds to achieve current or strategic goals.

In Russia, the experience of innovative activity of industrial corporations in market conditions is still insufficient. Therefore, at this stage, it is important, studying theoretical studies and using the experience of countries with developed market economies, to develop their own theoretical and methodological recommendations for the organization of innovation in an individual Corporation and the country as a whole. Evaluation of the effectiveness of the implementation of innovative activities of the industrial Corporation consists of six successive stages. The proposed methodological approach is a process of evaluating the effectiveness of each component of the system of indicators of innovation and their impact on the effectiveness of innovation of the Corporation as a whole. The results at each of these stages in each case reflect the particular situation that characterizes the implementation of the innovation strategy for this component.

Innovative development indicators characterize the dynamics of innovative development of a corporation and allow for the evaluation of efficiency of innovative activities and priorities of the corporation at this stage.

References

- [1] Rosenberg N 1995 How the West became rich (the Economic transformation of the industrial world) *Novosibirsk: Ekor*
- [2] Schumpeter J A 1982 The theory of economic development (Study of business profits, capital, credit, interest and cycle conditions) *M.: Progress*
- [3] Santo B 1990 Innovation as a tool for economic development *Moscow: Progress*
- [4] Tviss B 2009 Managing innovation *Moscow: Economics*
- [5] Drucker F 2009 Business and innovation *Moscow: Williams*
- [6] The Innovative strategy of Russia – 2020 <http://NOVUS.BIZ/media/download/resources/Innovative Russia-2020>
- [7] Yakovets Y V 2004 the Epochal innovations of the XXI century *Moscow: Economics*
- [8] Gurkov I B and Filippov S 2013 Innovation processes in Russian manufacturing subsidiaries of multinational corporations: an integrated approach from research *Journal of East West business* vol 19 4
- [9] Williamson O 1996 The economic institutions of capitalism Firms, markets, and "relational" *Contracting Saint Petersburg: Lenizdat*
- [10] Prahalad K 2014 Business innovation: creating value jointly with the user: TRANS. from English (Moscow)
- [11] 2011 The Oslo Manual: guidelines for collecting and analyzing data on innovation (Moscow)
- [12] Rebyazina A 2011 Innovative activity of Russian companies: results of an empirical study *Russian management journal* vol 9 3
- [13] Hasbro G 2007 Open innovation Creating and profiting from technology *Moscow: Generation*

- [14] Kaplan R 2011 *The Balanced scorecard: from strategy to action* Moscow: *Olimp-Biznes*
- [15] Dorzhieva E L 2014 *The Strategy of corporate development: innovative vector* Irkutsk: *Publishing house Irkutsk state technical University press*
- [16] Karacharovskaya V 2014 Effect of innovation activity in Russian economy at the macro - and meso-levels In kN.: In the XIV April international academic conference on problems of development of economy and society: in 4 books Book 3 M.: *Publishing house of NRU HSE*
- [17] 2014 OECD, *Main science and technology indicators; key figures* (Paris)
- [18] Scherer F M 1970 *Industrial market structure and economic performance* Chicago: *Rand McNally*
- [19] Swann P 2006 *Universities and business innovation in the UK: indicators and insights*
- [20] Teece D J, Pisano G 2014 *Dynamic capabilities of firms: an introduction* *Industrial and corporate change* **3(3)**
- [21] Bashkov O V, Bryansky A A, Belova I V, Solovov D B 2019 Investigation of the Stages of Damage Accumulation in Polymer Composite Materials *Materials Science Forum* **945** pp. 515-521. [Online]. Available: <https://doi.org/10.4028/www.scientific.net/MSF.945.515>