European Proceedings of
Social and Behavioural Sciences
EpSBS

www.europeanproceedings.com
e-ISSN: 2357-1330

DOI: 10.15405/epsbs.2020.12.04.57

ISMGE 2020

II International Scientific and Practical Conference "Individual and Society in the Modern Geopolitical Environment"

PROBLEMS OF MEASURING THE INNOVATION ACTIVITY OF ORGANIZATIONS

Marina V. Ledeneva (a)*, Kristina A. Abramova (b)
*Corresponding author

(a) Plekhanov Russian University of Economics, Volgograd branch, 11, Volgodonskaya st., Volgograd, Russia, 400131, mledenjova@yandex.ru
(b) Financial University under the Government of the Russian Federation, 49, Leningradsky Prospekt, Moscow, Russia, 125933

Abstract

The article considers the essence of the organization's innovation activity, its links to the concept of innovative activity, the criteria of innovative enterprises in the Russian Federation and abroad. The authors analyzed the main innovation indicators of organizations used in Russian statistics, as well as existing approaches and methods for measuring the innovation activity of organizations. They conclude on the statistical shortcomings of innovation in the Russian Federation, including the lack of indicators of the economic effect and efficiency of innovations as well as the differentiation of innovations by the importance. Many methods use trade secret indicators suitable for an individual enterprise only but not for the macro or mesoscale level, and some innovation attributes proposed by economists are difficult to practice. The authors propose the statistical differentiation of innovations according to the degree of importance, as well as the calculation of enterprises' indicators of the effect and efficiency of innovations according to a single simple and understandable method, for example, increased profit from the introduction of innovation, and efficiency as a ratio of profit growth to R&D expenses. At the same time, statistical collections will publish data on the total economic effect of enterprises in the country or its regions or averaged data on the economic efficiency of innovations weighted by the value of R&D expenditures.

Keywords: Economic effect, innovation activity, innovative enterprises, individual enterprise, innovation attributes, R&D expenditures.

https://doi.org/10.15405/epsbs.2020.12.04.57
Corresponding Author: Marina V. Ledeneva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

1. Introduction

According to Schumpeter (1982), innovation activity is one of the factors for the survival of enterprises in the market, as entrepreneurial innovations create the potential for development and contribute to the accumulation of production and commercial experience. The innovative activity involves the improvement of the manufactured goods, services, organizational and technological structure of production or marketing policy, and thereby increase the competitiveness of products.

2. Problem Statement

Measuring the organizations' innovation activity in dynamics allows us to evaluate the effectiveness of state innovation policy, the implementation of its directives, improve the incentives used, monitor and evaluate the effectiveness of incentives. At the micro-level, measuring the innovative activity will help to choose an innovative strategy and monitor the effectiveness of its implementation.

The innovative activity of an organization is a complex and multi-component concept which complicates the task of evaluating it. This determines the topic of this study.

3. Research Questions

In general, innovation is a type of activity related to the transformation of ideas into a new or improved product introduced on the market, into a new or improved technological process used in practice, or into a new approach to social services.

The concept of innovation is inextricably linked with the concept of innovation activity. The innovation activity of organizations is a type of business activity and characterizes the degree of organization`s participation in the implementation of innovative activity in general or of its types over a certain period (Balashov et al., 2010). Many researchers identify it with innovation. Others mean innovation activity as the intensity of innovation. So, Trifilova (2003) understands innovation activity as the intensity of the implementation by economic entities of activities for the development and involvement of new technologies or improving products in the economy. Baranova and Cherepanova (2011), Barancheev et al. (2011), Gunin (1999), Balashov et al. (2010) noted that the innovative activity of an enterprise is a complex characteristic of its innovation including, among others, the ability to mobilize innovative potential (Baranova & Cherepanova, 2011), susceptibility to innovations, the degree of intensity of actions taken to transform innovations (Barancheev et al., 2011), timeliness of ongoing actions to create, implement and commercialize innovations (Balashov et al., 2010). Thus, innovative activity characterizes the readiness of the enterprise to update the main elements of the innovation system: the staff competencies, technologies, equipment and its susceptibility to everything new.

The main indicators characterizing the level of innovative activity are:

- share of R&D costs in the total cost of the company;
- share of innovative products in the volume of shipped products;
- share of scientific and technical staff in the structure of the company’s staff;
- ratio of acquired and sold technologies;
- coefficient of commercialization of intellectual property;

https://doi.org/10.15405/epsbs.2020.12.04.57
Corresponding Author: Marina V. Ledeneva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

- R&D cost effectiveness (Gokhberg et al., 2019).

Russian statistics has two main indicators of innovative activity of organizations:

- cumulative level of innovation activity, i.e. the ratio of the number of organizations implementing simultaneously innovations of all types: organizational, marketing, technological or innovation of individual types/combinations to the total number of organizations examined over a certain period;
- costs of marketing, organizational and technological innovations.

These indicators consider various forms of ownership, the size of organizations and type of economic activity. Similar indicators consider certain types of innovation: the proportion of organizations implementing innovations of certain types in the total number of organizations; costs of technological innovation including product and process, marketing and organizational innovation by type of innovation.

Statistical reporting of innovation is affected through the following forms:

- Form No. 1-technology "Information on the development and (or) use of advanced production technologies",
- Form No. 1-TC "Information on the work of the graduate school and doctoral studies";
- Form No. 2-science "Information on the implementation of research and development";
- Form No. 3-information "Data on the use of information and communication technologies and the production of computer technology, software and the provision of services in these areas";
- Form No. 4 innovation "Information on the innovative activities of the organization";
- Form No. 2-MP innovation “Information on technological innovations of a small enterprise” (rented out once every two years for odd years).

In the statistics of innovations of the Russian Federation, the reporting unit is innovatively active enterprises, i.e. enterprises that have completed innovation over the past three years. This means that these enterprises offered new or improved goods and services, introduced new production processes into practice. In certain regions of the Russian Federation, there are additional criteria for classifying enterprises as innovatively active (Table 1). For example, in Moscow, an innovatively active enterprise should have a medium-term strategic plan for the implementation of innovative projects in certain areas of activity. In St. Petersburg, innovatively active enterprises are required to have a share of innovative products in the total volume of products produced by the enterprise at the level of 7-20%, in the Tomsk Region - at least 30%, in Moscow - at least 40% for the fifth year of activity (Antipin & Antipina, 2015).

Table 01. Criteria for classifying enterprises as innovatively active in selected regions of the Russian Federation (Antipin & Antipina, 2015)

Criteria	Moscow	St. Petersburg	Tomsk region
The share of innovative goods, works, services in their total volume	Not less than 40% for the 5th year of activity	7-20%	Not less than 30%
R&D costs	R&D and acquisition of rights to the results of scientific and technical	The costs of technological innovation in an	-

https://doi.org/10.15405/epsbs.2020.12.04.57
Corresponding Author: Marina V. Ledeneva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

	activities, attracting highly qualified specialists for science and innovation	organization are higher than organizational and marketing	
Share of R&D expenses	-	Share of R&D expenses in the total amount of expenses of the organization is 3-15%.	The share of costs for innovation, R&D in the total annual volume of shipped goods of own production, performed by own forces of works and services is at least 10%.
Availability of own or acquired intellectual property	The number of applications for registration of rights to the results of intellectual activity is at least two during the planning period for each project implemented as part of the strategic plan	The organization uses its results of intellectual activity or implements acquired intellectual property	The presence of rights to intellectual property results and personalization equals equivalent to them protected by applicable law
Getting the effect of innovation	The economic effect of the sale of innovative products	The ratio of profits from innovation to the costs of innovation	The annual increase in shipped goods of own production performed on-site work and services at current prices is at least 25%

Foreign approaches to the criteria for classifying enterprises as innovative and active differ from Russian ones. According to the European approach, for small innovative enterprises, the share of R&D expenses should be at least 15%. A feature of the American approach is that the United States should be the place of the functioning of such enterprises.

4. Purpose of the Study

The article considers the essence of the organization's innovation activity, its links to the concept of innovative activity, the criteria of innovative enterprises in the Russian Federation and abroad. The authors analyzed the main innovation indicators of organizations used in Russian statistics, as well as existing approaches and methods for measuring the innovation activity of organizations.

5. Research Methods

There are three main approaches to assessing the innovative activity of an organization (Table 2).

https://doi.org/10.15405/epsbs.2020.12.04.57
Corresponding Author: Marina V. Ledeneva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Table 02. Approaches to assessing the innovation activity of organizations

Approaches	Essence of the approach	Advantages	Disadvantages
Cost-effective	The basis of the approach is the assessment of various material and intangible resources of the organization consumed and used in the innovation	The possible implementation of the method based on public data of the organization	This method does not allow to evaluate the effects of innovation, as well as the degree of organization's participation in research
Result-based	It assesses the number of innovations introduced and the effects of their implementation: economic, social, environmental, etc.	It assesses the organization's ability to innovate effectively	The data needed for evaluation are often a business secret; it does not allow to assess the degree of organization participation in research
Statistical	It classifies organizations as innovatively active or innovatively passive by the satisfaction degree of selected criteria for innovation activity	The possible implementation of the method based on public data of the organization	It does not consider the effects of innovation

6. Findings

Existing authoring techniques use one or more of these approaches. So, the method of Barancheev et al. (2011) estimates only the cost-effective component of innovation activity. Researchers propose to evaluate the innovative activity of organizations by an expert method on a 10-point scale on four components: innovative susceptibility; resource endowment; quality of communication and the innovation process; degree or depth of competency. The first component evaluates financial and human resources, and the next three assesses the internal quality characteristics of the organization. The level of innovative activity is the total score for four indicators, and in relative terms, it is the ratio of the actual value of the level of innovative activity to the maximum number of scores (40).

Fathutdinov (2011) offers the following formula for assessing the innovative activity of an organization:

$$IA = \frac{1}{7}\sum_{i=1}^{7} A_i \quad ,$$

where:

IA - the innovative activity of the organization;

A1 - the quality of an innovative competition strategy;

A2 - the level of mobilization of innovative potential;

A3 - the amount of attracted investments;

A4 - the quality of the methods used in innovative changes;

A5 - the validity of the implemented level of innovation activity;

A6 - the response of the firm to the nature of the competitive strategic situation;

A7 - the speed of action during strategic innovation changes.

https://doi.org/10.15405/epsbs.2020.12.04.57
Corresponding Author: Marina V. Ledeneva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Based on the resource potential of the organization and the competence of its developers, the quality of the innovative competition strategy and the speed of actions during strategic innovation changes, the dynamics of the introduction of innovations, are the result indicators of innovation activity, the rest are resource indicators.

Reutov (2011) suggests evaluating the innovative activity of an organization in three blocks: resource, result-based and statistical. The resource block has two components: qualitative for assessing the internal characteristics of the organization and quantitative for evaluating financial and human resources. For the productive block of the methodology, the author identifies such characteristics as innovative competence, dynamics of the innovation process, indicators of renewability, economic effect, social effect, environmental effect, scientific and technical effect and managerial effect.

The indicators evaluated in the framework of the statistical block of the methodology are the characteristics of innovation activity, presented in the form of federal state statistical observation No. 4-innovation "Information on the organization's innovation activity", approved by resolution of the Goskomstat of Russia dated 06.09.2010 No. 305: the completed innovations and the degree of participation of the organization in the development of these innovations.

Each indicator requires a comparison with the established base value and results in value from 0 to 1. The basic values can be indicators for previous periods, the corresponding indicators of competitors, median or arithmetic industry average values, the established target value.

To assess the complex indicator of innovative activity of the organization Reutov (2011) suggests using the graphical method. In its framework, the integral value of innovation activity is defined as the area of the polygon, the coordinates of the four vertices correspond to the values of the quantitative and qualitative components of the resource component, as well as the values of the result-based and statistical components of innovation activity.

Trifilova (2003) uses a cost-based approach to assess the innovative activity of organizations and such indicators as the coefficient of the provision of intellectual property, the development rate of new technology, the innovation growth rate, the development rate of new products, the coefficient of personnel engaged in research and development work.

The main problems in assessing the innovative activity of organizations are:

1. The lack of statistical data to assess the effectiveness of the innovative activity of organizations according to the above methods. Many techniques use indicators that are trade secret and suitable only for an individual enterprise but not at the macro- or mesoscale.

2. Many of the innovative activity indicators offered by economists are difficult to measure in practice. For example, they require expert assessment methods and are incomparable across different enterprises.

3. There is no differentiation of innovations by their importance. So among the shortcomings of the existing approach, Prozorova (2018) notes that regular changes in technological processes, minor or external changes in products that leave its structural design unchanged and do not have a sufficiently noticeable effect on parameters and properties are not considered as innovations. Ilyshev and Putilina (2007), on the contrary, proposes to exclude the improvement of all kinds from the composition of innovations considered by the Federal State Statistics Service because modernized and modified products

https://doi.org/10.15405/epsbs.2020.12.04.57
Corresponding Author: Marina V. Ledeneva
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

have a low degree of novelty and bring negligible economic effect. Besides, the criteria for the significance of technological changes are practically absent, or certain enterprises use subjective ideas about this process.

7. Conclusion

It seems to us that the solutions to the problems identified may look as follows. The statistical indicators of organizations` innovative activity should include indicators of economic effect (Suzdalova et al., 2017). The statistical accounting requires the calculation of enterprises' indicators of the effect and efficiency of innovations according to a single simple and understandable method, for example, increased profit from the introduction of innovation, and efficiency as a ratio of profit growth to R&D expenses (Ergunova et al., 2017). Accordingly, statistical collections will publish data on the total economic effect of enterprises in the country or its regions or averaged data on the economic efficiency of innovations weighted by the value of R&D expenditures (Politsinskaya et al., 2019). This will make it possible to operate with R&D performance indicators not only at the micro but also at the meso and macro levels when developing and evaluating incentive measures for innovative business activity at the state level.

It is also advisable to differentiate innovations by their importance, their division into significant technological changes, for example, fundamentally new products or technologies not previously produced by domestic and foreign manufacturers, and improvements of all kinds, which should be reflected in statistical indicators. A wider differentiation is also possible, for example, radical innovations that are new for the country, the industry and the enterprise.

References

Antipin, D. A., & Antipina, O. V. (2015). Federal target programs as a form of budgetary financing of innovation. *Bulletin of the Irkutsk State Technical University, 6*, 158.

Balashov, A. I., Rogova, E. M., & Tkachenko, E. A. (2010). *Innovative Activity of the Russian Companies: Problems of Measurement and Terms of Growth.* Publishing House of St. Petersburg State Polytechnic University.

Barancheev, V. P., Maslennikova, N. P., & Mishin, V. M. (2011). *Innovation Management*. Yurayt Publishing House.

Baranova, I. V., & Cherepanova, M. V. (2011). *Methodological Approaches to Assessing the Innovative Activity and Innovative Potential of a University*. http://novinkor.com/biblioteka/innoworld/71-innoactive.html

Ditkovsky, K. A., Fridlyanova, S. Yu., Gokhberg, L. M., Gorodnikova N., Kuznetsova, I. A., Lukinova, E. I., Martynova, S. V., Ratay, T. V., & Rosovetskaya L. (2019). *Indicators of Innovation Activity*. HSE.

Ergunova, O., Lizunkov, V. G., Malushko, E. Yu., Marchuk, V. I., & Ignatenko, A. Yu. (2017) Forming system of strategic innovation management at high-tech engineering enterprises. *IOP Conference Series-Materials Science and Engineering,* 177.

Fathutdinov, R. A. (2011). *Innovation Management*. Peter.

Gunin, V. N. (1999). *Innovation Management: 17-module Program for Managers "Organization Development Management*". INFRA-M.

Ilyshev, A. M., & Putilina, V. Yu. (2007). Alternative approaches to measuring innovation activity in the region. *Economic Analysis: Theory And Practice, 12,* 17.

Politsinskaya, E., Lizunkov, V., & Ergunova, O. (2019). Organization of student project based activities through individual learning routes. *International Journal of Emerging Technologies in Learning, 14*(11), 186-193.

Prozorova, B. S. (2018). Measuring innovation activity of high-tech organizations. *Management of Economic Systems: Electronic Scientific Journal, 7.* http://uecs.ru/marketing/item/5029-2018-07-09-08-05-51

Reutov, A. U. (2011). Development of a comprehensive evaluation method of innovative activity of the organization. *Management of Economic Systems: Electronic Scientific Journal, 10*. https://cyberleninka.ru/article/v/razrabotka-metodiki-kompleksnoy-otsenki-innovatsionnoy-aktivnosti-organizatsii

Schumpeter, J. (1982). *The theory of Economic Development: an Inquiry into Profit, Capital, Credit, Interest and the Cycle of Business Conditions*. Progress.

Suzdalova, M. A., Lizunkov, V. G., Malushko, E. Yu., Sytina, N. A., & Medvedev, V. E. (2017). Innovative Forms of Partnership in Development and Implementation of University-Business Cooperation. *The European Proceedings of Social and Behavioural Sciences EpSBS, XIX*, 450-455.

Trifilova, A. A. (2003). *Management of Innovative Development of an Enterprise*. Finance and statistics.