

THE METHOD OF FORMING INNOVATIVE PROJECT PORTFOLIO IN A PROJECT-ORIENTED ORGANIZATION

I.N. Omelchenko¹

D.G. Lyakhovich¹

K.V. Dobryakova^{1,2}

logistic@ibm.bmstu.ru

dlyakhovich@ibm.bmstu.ru

dobryakova@corada.ru

kdobryakova@ibm.bmstu.ru

¹ Bauman Moscow State Technical University, Moscow, Russian Federation

² Corada Ltd., Moscow, Russian Federation

Abstract

The method of forming innovative project portfolio is developed by the authors, and it allows to choose the main directions and substantiate the composition of innovative projects when changing project-oriented organization's development trends. The authors made analysis of Russian and foreign scientists and specialist's publications in the field of innovation, innovative development management and project management. The authors consider that the practical significance of the article lies in the possibility using the project-oriented organization in the market's environment conditions of the above method, and this method will improve the efficiency of using its existing resources

Keywords

Project-oriented organization, development strategy, innovative project, portfolio, management process, formation, method

Received 10.10.2018

© Author(s), 2019

Introduction. An interrelated and interdependent projects' group is defined as a project portfolio [1, 2]. Despite the large number of publications by Russian and foreign scientists and specialists in the field of innovation, innovative development management and project management, the problem of forming innovative project portfolio remains relevant [3–7].

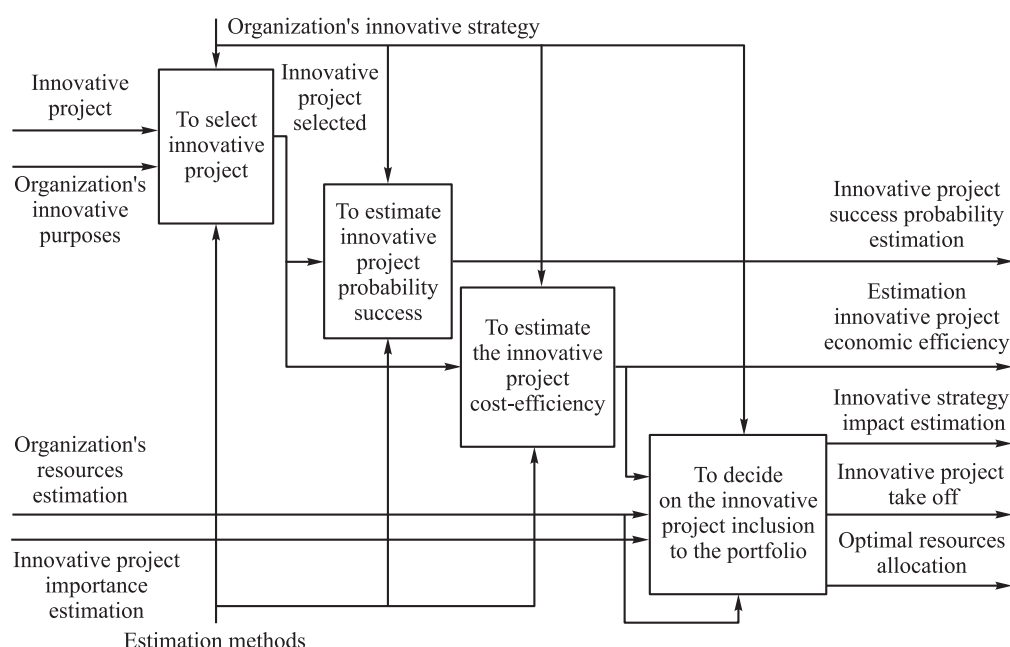
Market conditions require the project-oriented organization constantly respond to changes in demand, so it is necessary to consider the interrelated sequence of stages of the innovative process from the moment the idea was born to the moment of its moral aging. Innovation as an idea brought to an object that satisfies the needs of the consumer is a process, and then you need to talk about the innovative project. An analysis of publications [6, 8–10] makes it possible to identify the principal differences that are characteristic only for an innovative project: a high degree of uncertainty in the parameters of the project; long-term perspective orientation; the need to engage unique resources; small inertia of

projects at the Research and Advanced Development (R&D) stage; high probability of obtaining unexpected projects, but representing independent commercial value of intermediate or final results, etc. In order for an organization to have the opportunity to realize an innovative idea, it is necessary to develop and apply methods, models and mechanisms for managing this process according to the criterion of the maximum effect obtained [11, 12]. Therefore, the problem of developing a method of forming innovative project portfolio in a project-oriented organization is urgent, which will make it possible to select the main directions and substantiate the composition of innovative projects when its development trends change [6, 7, 13–15].

Methods. The theoretical and methodological basis of this paper is the Russian and foreign scientists and specialist's publications in the field of innovation [2, 3, 6, 14, 16], innovative development management [7, 8, 10], project management [17–19], national standards of Russian Federation GOST R 54870–2011, GOST R 56714.2–2015, GOST R ISO 21504–2016.

The systematic approach is a methodological basis of this article: application of methods of structural analysis and design, functional modeling and management of innovative projects, general methodological.

Results. The correlation between the main functions and the structure that determine the process of the forming innovative project portfolio in a project-oriented organization is showed in the figure.



Functional scheme for the process of the forming innovative project portfolio in a project-oriented organization

The process of selecting an innovative project in a project-oriented organization can be considered as a process of consistently forming a portfolio [1, 12]. Decision makers need to know what resources can be spent on each of several possible projects in each period. At the end of each project, the composition of the portfolio changes in the light of innovative projects that are available at this time. The multitude of existing innovative projects consists of projects currently being implemented and projects that are in reserve.

Due to the multidimensional nature of goals and objectives, as well as the lack of measuring and forecasting tools, the evaluation of an innovative project cannot be based only on measuring net cash flow [6, 20]. It is necessary to use other methods of forecasting to make sure that the available possibilities correspond to the innovative goals of the project-oriented organization and can be estimated with a sufficient degree of accuracy in order to calculate the effects that cannot be evaluated in terms of cash flows.

The sequence of decision-making in evaluating innovative projects can be divided into three parts: 1) selection; 2) preliminary estimate; 3) final assessment [1, 12].

The innovative project selection model's purpose is to help its manager establish priority and accumulate suitable projects. There are three main types of this process, which are based on expert estimates, economic indicators and the volume of distribution of capital investments [18]. The first two types are developed and used by practitioners to solve the problem of setting priorities for innovative projects, as regards the distribution of capital investments; they are mainly used to solve the problem of optimal allocation of funds [16–18].

The probability of success of an innovative project is influenced by many factors, which are proposed to be divided into three groups: 1) environmental factors; 2) stage of the innovation life cycle; 3) characteristics of innovation by the depth of the changes. The success' probability of project-oriented organization's innovative project is proposed to be defined as the production of success probabilities for each group [12, 20].

To determine the probability the innovative projects' successful implementation of project-oriented organization, it is proposed to use the methods of expert assessments, to increase the reliability of assessments are coefficients experts' competence, then the success project probability based on the analysis of factors of the macro and micro environment of the organization can be found by

$$p_1 = \frac{\sum_{i=1}^n p_i^{exp} C_i}{\sum_{i=1}^n C_i},$$

where p_i^{exp} is assessment of the probability of success in project-oriented organization's innovative project by i -th expert; C_i is i -th expert competence coefficient; n is experts number.

The impact of the current stage of the innovation life cycle of is proposed to take into account the following:

$$p_2 = \prod_{i=j}^3 p_i^{LC},$$

where $i = 1, 2, 3$ is stage of the innovation life cycle (1 — research, 2 — implementation, 3 — growth); j is current stage of the innovation life cycle; p_i^{LC} is hitting probability target on i -th stage of the innovation life cycle.

The probability of success in project-oriented organization's innovative project, taking into account the influence of the depth of the changes, is defined as $p_3 = 1/(L+1)$, where L is innovation level in terms of make modifications depth [12].

None of the projects should be considered in isolation from the entire portfolio of innovative projects of the project-oriented organization. Portfolio is constantly changing, due to the need to maintain its balance [1, 7].

Evaluation of the economic efficiency of the innovative project of a project-oriented organization can be performed according to the formula that takes into account the discounting of cash flow [10, 18].

Preview period defined as the maximum of a set containing the duration of the planned implementation dates of project-oriented organization's innovative projects that have the most significant impact on the efficiency of its operations.

Conclusion. The authors developed the method of forming innovative project portfolio in a project-oriented organization, and it allows choosing the main directions and substantiating the composition of innovative projects when changing project-oriented organization's development trends. The method's practical implementation will make it possible to increase the efficiency of using the resources available to the project-oriented organization.

Acknowledgments

We express our gratitude and deep appreciation to S.G. Falko, Dr. Sc. (Econ.), Professor, for the valuable advice and comments on the article.

Translated by K. Ivanova

REFERENCES

- [1] Lyakhovich D.G. [Formation of a portfolio of innovative projects in a project-oriented organization]. *Mater. 18 vseros. simp. "Strategicheskoe planirovanie i razvitie predpriyatiy"* [Proc. 18th Russ. symp. "Strategic planning and development of business"]. Moscow, CEMI RAS Publ., 2017, pp. 299–301 (in Russ.).
- [2] Repeshko N.A. The principles of formation of enterprise innovative projects portfolio forming. *Vestnik BGU* [The Bryansk State University Herald], 2013, no. 3, pp. 232–237 (in Russ.).
- [3] Denisov A.V. Theoretical and applied aspects of implementation of the system of innovation project portfolio forming. *Vestnik RGUPS*, 2009, no. 2, pp. 30–34 (in Russ.).
- [4] Evtushenko E.V., Kotov D.V., Khripunova O.Yu. Innovation project portfolio construction. *Vestnik UGNTU. Nauka, obrazovanie, ekonomika. Ser. Ekonomika* [Bulletin USPTU. Science, Education, Economy. Series Economy], 2017, no. 1, pp. 99–105 (in Russ.).
- [5] Efimova O.Yu. Formation mechanism for innovative projects portfolio of organization. *Innovatsii i investitsii*, 2014, no. 11, pp. 8–13 (in Russ.).
- [6] Izmalkova S.A., Nikitin S.A., Golovina T.A. Methodical approach to the formation and realization of portfolio innovative projects of industrial enterprise. *Izvestiya TulGU. Ekonomicheskie i yuridicheskie nauki* [News of the Tula State University. Economic and Legal Sciences], 2015, no. 2-1, pp. 20–26 (in Russ.).
- [7] Knapp M. *Enterprise Portfolio Governance*. Singapore, Springer, 2018.
- [8] Klochkov V.V. *Upravlenie innovatsionnym razvitiem naukoemkoy promyshlennosti: modeli i resheniya* [Management of innovative development of high-tech industry: models and solutions]. Moscow, ICS RAS Publ., 2010.
- [9] Titov S.A. Project and project management in the high-tech industries of the modern economy. *Cloud of Science*, 2014, vol. 1, no. 1, pp. 155–176 (in Russ.). Available at: <https://cloudofscience.ru/sites/default/files/pdf/CloudOfScience01010155.pdf>
- [10] Tukkel I.L., ed. *Metody i instrumenty upravleniya innovatsionnym razvitiem promyshlennykh predpriyatiy* [Methods and tools for managing innovative development of industrial enterprises]. St. Petersburg, BKhV-Peterburg Publ., 2013.
- [11] Dobrova E.D., Badalova A.G., Petrova I.A. Features of the project-oriented management of high-technology enterprises. *MIR (Modernizatsiya. Innovatsii. Razvitie)* [MIR (Modernization. Innovation. Research)], 2016, vol. 7, no. 4, pp. 35–40 (in Russ.). DOI: 10.18184/2079-4665.2016.7.4.35.40
- [12] Omelchenko I.N., Lyakhovich D.G. Organizational and functional model of managing a portfolio of innovative projects of a high-tech enterprise. *Nauchno-tekhnicheskie vedomosti SPbGPU. Ekonomicheskie nauki* [St. Petersburg State Polytechnical University Journal. Economics], 2008, no. 5, pp. 201–206 (in Russ.).
- [13] Darenkov M.Yu. Shaping of project-oriented organizations in Russian conditions. *Vestnik PAPS* [The Bulletin of the Volga Region Institute of Administration], 2009, no. 1, pp. 165–170 (in Russ.).

- [14] Kononenko I.V., Bukreeva K.S. Process model for project portfolio management. *Vostochno-evropeyskiy zhurnal peredovykh tekhnologiy* [Eastern-European Journal of Enterprise Technologies], 2012, vol. 1, no. 10, pp. 52–54 (in Russ.).
- [15] Tolstykh T.O., Krutskaya N.M. Portfolio management of innovation projects in industry. *Organizator proizvodstva* [Organizer of Production], 2014, no. 2, pp. 65–70 (in Russ.).
- [16] Lyabakh N.N., Denisov A.V. Algorithmic, mathematical, informational support of innovative project portfolio formation. *Izvestiya vuzov. Severo-Kavkazskiy region. Ser. Tekhnicheskie nauki* [University News. North-Caucasian Region. Technical Sciences Series], 2009, no. 1, pp. 36–42 (in Russ.).
- [17] Gorbatkov S.A., Farkhieva S.A., Luchnikova N.I. *Matematicheskie metody v upravlenii proektami* [Mathematical methods in project management]. Moscow, Prometey Publ., 2018.
- [18] Matveev A.A., Novikov D.A., Tsvetkov A.V. *Modeli i metody upravleniya portfel'yami proektov* [Models and methods of project portfolio management]. Moscow, PMSOFT Publ., 2005.
- [19] Bea F.X., Scheurer S., Hesselmann S. *Projektmanagement*. Konstanz, München, UVK Verlagsgesellschaft mbH, 2011.
- [20] Dobryakova K.V., Lyakhovich D.G. [Evaluation of the effectiveness and efficiency of innovative projects in a project-oriented organization]. *Sb. dokl. XI vseros. konf. molod. uchen. i spets. "Budushchee mashinostroeniya Rossii"* [Proc. XI Russ. conf. of young scientists and specialists "Future of machine building in Russia"]. Moscow, BMSTU Publ., 2018, pp. 790–791 (in Russ.).

Omelchenko I.N. — Dr. Sc. (Eng.), (Econ.), Professor, Head of the Scientific and Educational Centre for Engineering Business and Management, Dean of the Faculty of Engineering Business and Management, Head of the Department of Industrial Logistics, Bauman Moscow State Technical University (2-ya Baumanskaya ul. 5, str. 1, Moscow, 105005 Russian Federation).

Lyakhovich D.G. — Assist. Professor, Department of Industrial Logistics, Bauman Moscow State Technical University (2-ya Baumanskaya ul. 5, str. 1, Moscow, 105005 Russian Federation).

Dobryakova K.V. — Project Administrator, Department of Management Consulting, Corada Ltd. (Bolshaya Decabrskaya ul. 1, Moscow, 123022 Russian Federation); Master Student, Department of Industrial Logistics, Bauman Moscow State Technical University (2-ya Baumanskaya ul. 5, str. 1, Moscow, 105005 Russian Federation).

Please cite this article as:

Omelchenko I.N., Lyakhovich D.G., Dobryakova K.V. The Method of Forming Innovative Project Portfolio in a Project-Oriented Organization. *Herald of the Bauman Moscow State Technical University, Series Mechanical Engineering*, 2019, no. 1, pp. 84–89. DOI: 10.18698/0236-3941-2019-1-84-89