

Economic Risks of Enterprise Innovation and Investment Project Life Cycle

Georgiy Nikolaevich Kutsuri, Ekaterina Anatolievna Levchenko, Madina Azhmambetovna Azhmuratova, Lola Dodohonovna Sanginova, Karina Yurevna Bagratuni, Tatyana Borisovna Terekhova

Abstract: The aim of the present study is to analyze the sources of risk of industrial enterprise, as well as to develop risk map to minimize the risks of industrial enterprise in the context of the life cycle of a particular innovation project. To solve this goal, the expert survey method was used in order to determine the risk factors of an industrial enterprise and the basic risks of innovation and investment projects in the industry. The obtained data were used to carry out risk mapping of innovation and investment projects in the industry in accordance with the individual stages of the innovation life cycle.

Based on the research results, the risk factors arising from the uncertainty of the external environment of the industrial enterprise were identified, as well as the developed risks classification was proposed. Besides, certain risks of the industrial enterprise have been attributed to the individual stages of the innovative project life cycle in the industry that will allow effectively managing the risks typical of each individual stage.

Index Terms: innovative and investment activity, economic risk, risks of innovation and investment project, innovation life cycle.

I. INTRODUCTION

Modern enterprise, as a complex economic system, is constantly exposed to the external environment. It is assumed that the enterprise is affected by external factors, in particular, risks that are destabilizing in nature. More precisely, the risks disrupt the enterprise functioning stability and prevent the development of a modern enterprise, which is a complex economic system.

The development of contemporary economic society increasingly requires the use of progressive forms and

methods of economic activity, which would contribute to the competitive growth and efficiency of domestic production. Taking this into account, the implementation of new technologies is a promising pathway to develop entrepreneurship and attract investment funds that ensure real conditions to implement innovative tasks.

Some of the key modern problems of economy management of the enterprises are the problems associated with their investment activity. Inefficient investment policies and inefficient use of leveraged direct investment can be one of the major reasons for holding back economic development. The lack of reliable recommendations for the preparation of investment projects, assessment of the effectiveness of their implementation, and identification of investment risks poses a threat to the investment attractiveness of domestic enterprises. The variety of available risk assessment recommendations for investment projects encourages the search for reliable methods and mechanisms to manage them.

Innovation and investment process in any enterprise is accompanied by certain complications that are associated with threats to its economic security and effectiveness. In connection with the above, the identification of probable risks of innovation and investment activities and the development of measures to neutralize them or mitigate the negative impact are still an urgent task.

Depending on the enterprise business profile, it is necessary to identify specific sources of risks typical for business under consideration, to propose methods to minimize the risks arising from these sources.

The main task in risk management is the systematic use of methods available to managers, as well as methods and techniques to solve problems related to risks, namely, setting the context, analysis (identification and evaluation), determining the methods of impact, monitoring, and communication. Risk management can be carried out at different levels – at the state level, at the enterprise level, and at the individual level.

At the state level of management, the problems associated with the economic risk protection of the country are solved. At the individual level, risk management takes place in the context of the preparation of the individual for the analysis and assessment of the risk of their own activities and the activities of those involved in the production process. The risk management at a level of a particular enterprise is of special relevance since each individual production unit is specializing in meeting certain social needs through the manufacture of products.

Manuscript published on 30 June 2019.

* Correspondence Author (s)

Georgiy Nikolaevich Kutsuri*, Financial University under the Government of the Russian Federation, (Financial University), Moscow, Russia.

Ekaterina Anatolievna Levchenko, Financial University under the Government of the Russian Federation, (Financial University), Moscow, Russia.

Madina Azhmambetovna Azhmuratova, Financial University under the Government of the Russian Federation, (Financial University), Moscow, Russia.

Lola Dodohonovna Sanginova, Financial University under the Government of the Russian Federation, (Financial University), Moscow, Russia.

Karina Yurevna Bagratuni, Financial University under the Government of the Russian Federation, (Financial University), Moscow, Russia.

Tatyana Borisovna Terekhova, Financial University under the Government of the Russian Federation, (Financial University), Moscow, Russia.

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an [open access](#) article under the CC-BY-NC-ND license <http://creativecommons.org/licenses/by-nc-nd/4.0/>

Timely identification of possible threats to innovation and investment development contributes to the economic security of the enterprise. Safety of innovative-investment activity consists of identifying and countering internal and external threats to the effective activity of industrial enterprise aimed at promoting the growth of business profitability and implementing the objectives of the statutory activities of the enterprise.

II. LITERATUR REVIEW

The contemporary scientific community lively discussed the issues of implementation of innovations, the attraction of investments, and management of economic threats to enterprise performance. Innovative development of the enterprise is the key to the profitability of its activities. Schumpeter defined innovation as "the embodiment of scientific discovery, a technical invention in new technology or in a new kind of product" [1].

As noted by Yu.I. Efimychev and O.V. Trofimov, the organizational and economic mechanism for the development of investment and innovation activities of industrial enterprises is a diverse and multifaceted problem, associated with the development of technological processes and the updating of technology, the organization of production and its resource provision, the conjuncture in the financial markets and labor markets for industrial production, the status and dynamics of the financial and economic support system of enterprises, etc. In addition, these issues should be

addressed systematically and comprehensively, be synchronized at the state level, as well as at the regional level, and the level of individual producers [2, p. 42].

According to O.A. Bulavko and A.V. Zastupov, in the modern context, the reorientation of industrial production to the investment and innovative way of economic development based on integrated implementation of new technologies and state-of-the-art engineering equipment of the new generation is an imperative condition for accelerating its technical and technological modernization, as well as the basis of sustainable and progressive economic development. Such transformations are based on the maximum use of the existing potential and capabilities of science, since the implementation of the results and achievements of modern science is the main imperative of sustainable and progressive economic development that ensures positive dynamics of expanded reproduction [3, p. 45], while the skillful combination of innovation with the effective use of attracted investments ensures the competitiveness of enterprise products in the goods and services market.

The researchers consider generally the innovation and investment process as a means of development of the innovative activity of the enterprise by attracting investment. At that, there are different approaches to the definition of the category of innovation and investment activity (Table 1).

Table 1. The essence of the category of innovation and investment activity

The author	The essence of the category	Notes
A.V. Petrov	The system process reflecting integrative provision of interaction among production, innovations, and investments at the level of the region due to integration of communications both "from below" – from the enterprises, and "from above" – from the central leadership, in order to achieve social and economic effect of the region development [4].	Disadvantage: not quite the correct application of the term "provision", which in nature is a phenomenon, rather than a process that is inherent in "activity".
A.M. Eroshkin, M.V. Petrov	A combination of practical actions of investors and innovators aimed at the implementation of investments in innovation [5].	Positive point: the need to combine the efforts of the innovator and the investor, which can sometimes be represented by a single entity.
S.V. Yurin	A complex dynamic system, based on a set of financial and economic levers and incentives that combines technological processes and forms of production organization based on the latest achievements of science and technology with the forms of their multilateral financing [6].	The main objective is to find and effectively use financial resources to bring scientific and technical ideas and developments to specific products and technologies that are in demand in the market.
M. Di Ubaldo, I. Siedschlag	A complex dynamic stochastic system consisting of processes different in nature, which includes generally innovation process (R&D or search for relevant innovations, quantitative, qualitative and structural transformations); as well as processes of organizational, economic, investment, and socio-cultural support of innovations [7].	

According to P.P. Kovalev, the effectiveness of innovative activity of industrial enterprises depends on the existing system of their investment and innovative development mechanisms, which form the relationship between the



organizational, economic, and financial mechanisms that generally determines an effective strategy of innovative development, and ensures the adaptation of innovations to market conditions. One may agree with the scientist's opinion that the innovative development mechanism contains organizational, economic, and financial approaches, methods and principles of enterprise's innovative policy and strategy formation, which provide competitive growth, level of social and economic development, and quality of life of those who work [8, page 36].

Based on the study of D.Kh. Gallyamova and A.I. Kashin [9], one may identify the main components of the investment and innovation development mechanism, which provide an organizational mechanism (organization, development, and implementation of innovations), economic mechanism (management, planning, and marketing of innovations), and financial mechanism (financing and stimulation of innovations) that allows determining an effective strategy of investment and innovation development, and ensures the adaptation of innovations to market conditions.

The organizational mechanism should ensure the emergence of innovations, the financial mechanism – to create conditions for innovation financing, while the economic mechanism should ensure the commercialization of innovations and their further development. All types of investment and innovative development mechanism are

interconnected and allow providing an effective innovative process of the enterprise.

In addition, the investment and innovation development mechanism should be based on the interaction of entities, state authorities, and local governments, which have financial, material, mineral, intellectual, and information resources for effective innovation activities in the region. At the same time, all subjects of innovative activities should have a certain degree of freedom with a combination of a high level of responsibility within certain regional development priorities [17, 18].

According to S.D. Ilyenkova, the effectiveness of the investment and innovation development mechanism depends on the reasonable choice of innovative projects in accordance with the priorities, the availability of sources of financing, and obtaining optimal effects from their implementation [10, p. 46].

Implementation of the innovation and investment process is associated with economic risks in different areas of activity. The essence of the economic risk category from the viewpoint of various researchers is presented in Table 2.

Table 2. The essence of the economic risk category

The author	The essence of the category
M.V. Gracheva	Economic risk is an objective and subjective category in the activities of business entities associated with overcoming uncertainty and conflict in the situation of inevitable choice [11].
E.M. Korolkova	Risk is the threat that an event, action, or inability to act will adversely affect an organization's ability to effectively implement its business objectives and strategic plans [12].
V.N. Vyatkin, V.A. Gamza, A.V. Mayevsky	Risk is not only the probability of danger or failure, the removal of uncertainty under specific circumstances by the business entity, overcoming uncertainty and conflict in a situation of inevitable choice but also a combination of the possibility of achieving both undesirable and especially favorable deviations from planned results [13].
V.M. Granaturov	Risk is the possibility of a positive (chance) or negative (loss) deviation in the course of economic activity from the expected or planned values [14].
Berglund, H., Hellström T.	Innovative risk is the threat of loss of resources, insufficient income, or the emergence of additional costs by the innovation process entities [15].

The main groups of external and internal threats to the innovation and investment process were systematized by S.E.

Naryshkin (at the level of the state and enterprise) (Table 3).

Table 3. Internal and external threats to the innovation and investment process [16]

Threats to innovation and investment process	External threats	Internal threats	
		at the state level	at the enterprise level
1. Political	Instability of political relations (economic sanctions, etc.)	Force majeure (natural disasters, man-made accidents, etc.)	Lack of clear innovation policy
2. Economic	Changing the political and economic orientation of the investor country	Instability of legislation on investment and innovation process	Lack of ties with potential investors, low level of technical and technological potential

3. Informational	Loss of market standing due to international economic espionage	Lack of information support, low level of monitoring	Low level of business information security
4. Financial	Financial crisis	Instability of the national currency, financial crisis	The precarious financial condition of the company
5. Personnel-related	The brain drain abroad	Low level of innovation specialists training	Low level of human resources of the enterprise

III. METHODS

A. General description

The set goal was achieved through the expert survey method used to determine the risk factors of an industrial enterprise, as well as the main risks of innovation and investment projects in the industry. The obtained information was used when carrying out risk mapping of innovation and investment projects in the industry in accordance with the individual stages of the innovation life cycle.

B. Algorithm

Three expert groups of 10 people in each group were selected:

- the first group (industrialists) included managers, as well as technical and engineering employees of industrial enterprises of various profiles;
- the second group (creditors) included executives and managers of various levels of financial institutions (regional branch of a commercial bank, the financial department of a financial and industrial group, and leasing company);
- the third group (third-party) was a mixed group consisting of representatives of audit firms that analyzed the activities of an industrial enterprise, as well as representatives of supplier enterprises for the needs of industrial enterprises, economists, and economic journalists.

C. Flow chart.

The main research stages are presented in Fig. 1.



IV. RESULTS

For effective risk management of an industrial enterprise, it is necessary to determine the risk factors inherent in the particular industry under consideration that will allow conducting an effective qualitative risk analysis and identifying the enterprise risks.

According to experts, the threats arising from the external environment of industrial enterprises include economic, political, market, production, technological, competitive, social, international, and environmental risk factors.

Innovation strategy of industrial enterprises is usually implemented within the framework of innovation and investment projects. Based on environmental factors, experts have identified the main risks of innovation and investment projects in the industry (Table 4).

Table 4. The main risks of innovation and investment projects in the industry

Macroeconomic risks	1) risk of changes in government regulatory policy; 2) risk of changes in tax legislation; 3) risk of instability of the current macroeconomic situation; 4) risk of adverse changes in the foreign economic status of the country in which the project is implemented; 5) risk of political instability and adverse social change;
Criminal and legal risks	6) risk of vandalism; 7) risk of sabotage; 8) risk of terrorism; 9) risk of emergence of error in the license; 10) risk of non-execution of a contract; 11) risk of infringement of intellectual rights; 12) risk of legal disputes with counterparties; 13) risk of legal disputes with owners or staff;



Published By:

Blue Eyes Intelligence Engineering
& Sciences Publication (BEIESP)

© Copyright: All rights reserved.

Project risks	14) risk of failure of the design work plan, technological preparation of production and assimilation of production; 15) risk of a shortage of required labor force or commodity stocks and supplies; 16) risk of late delivery of works, services, and commodity stocks and supplies; 18) risk of change of contractors; 19) risk of design error; 20) risk of costs for finishing, revision, and warranty repair of products; 21) risk of poor project management and planning errors;
Production risks	22) risk of short-delivery of raw materials and components; 23) risk of production disruptions in the process chain sections external to the enterprise; 24) risk of innovative changes in competitors; 25) risk that competitors have a higher level of technology;
Environmental risks	26) risk of additional costs for environmental protection during the product operation; 27) risk of environmental restrictions on components or product specifications; 28) risk of man-made accidents;
Trading risks	29) risk of market monopolization; 30) risk of the highest accounting price in comparison with the market price or specified in the tender proposals; 31) risk of difficulty entering the market; 32) risk of insufficient income of potential consumers of products, which does not allow purchasing the required batches of the product;
Monetary and currency risks	33) liquidity risk; 34) risk of decreasing financial stability; 35) inflation risk; 36) currency risk 37) risk of arising overdue receivables;
Investment risks	38) interest rate risk; 39) credit risk; 40) risk of lost profit; 41) risk of direct financial loss.

The next step in the course of enterprise risk analysis is risk mapping. The risk map is a fairly universal way of compact description of enterprise risks as a preparatory stage for the strategy development to minimize risks. The risk map is a graphical or textual description of a limited number of risks of the organization, presented in a form of a rectangular table, whose one axis indicates the strength or risk significance, while the other one indicates the probability or frequency of its occurrence.

According to the basic principles of risk mapping, adopted in contemporary business models, a risk map is built based on expert assessments. The horizontal axis displays the scale of importance of negative consequences (by increasing importance), while the vertical axis shows the increasing

probability. Reference number of a certain risk is displayed in individual cells of the map. At that, the map indicates the zone with risks both of the lowest potential loss, as well as zones of risks capable of maximum damage. The latter deserves the special attention of risk managers since these risks should be minimized as soon as possible.

In addition to the classical risk mapping, many enterprises develop their own methods of constructing a risk map. In this article, risk mapping is conducted in the context of individual stages of the industrial innovative project life cycle.

The risks previously identified by the experts are arranged in the form of the matrix (Table 5). Risks inherent in the corresponding stage of the innovation life cycle are marked with sign "+".

Table 5. Innovation and investment project risks in the industry belonging to specific stages of the innovation life cycle

No	Risk designation	Development of innovation	Assimilation of production	Production
Macroeconomic risks				
1	risk of changes in government regulatory policy;	+	+	+
2	risk of changes in tax legislation;	+	+	+

3	risk of instability of the current macroeconomic situation;	+	+	+
4	risk of adverse changes in the foreign economic status of the country in which the project is implemented;	+	+	+
5	risk of political instability and adverse social change;	+	+	+
	Criminal and legal risks			
6	risk of vandalism		+	+
7	risk of sabotage	+	+	+
8	risk of terrorism		+	+
9	risk of emergence of error in the license	+	+	
10	risk of non-execution of a contract	+	+	+
11	risk of infringement of intellectual rights	+	+	
12	risk of legal disputes with counterparties	+	+	+
13	risk of legal disputes with owners or staff			+
	Project risks			
14	risk of failure of the design work plan, technological preparation of production and assimilation of production;	+		
15	risk of a shortage of required labor force or commodity stocks and supplies;	+	+	
16	risk of late delivery of works, services, and commodity stocks and supplies;		+	
17	risk of change of contractors;	+	+	
18	risk of design error;	+		
19	risk of costs for finishing, revision, and warranty repair of products;		+	+
20	risk of poor project management and planning errors;	+	+	
	Production risks			
21	risk of short-delivery of raw materials and components;		+	+
22	risk of production disruptions in the process chain sections external to the enterprise;		+	+
23	risk of innovative changes in competitors;		+	+
24	the risk that competitors have a higher level of technology;		+	+
	Environmental risks			
25	risk of additional costs for environmental protection during the product operation		+	+
26	the risk of environmental restrictions on components or product specifications	+	+	+
27	risk of man-made accidents		+	+
	Trading risks			
28	risk of market monopolization		+	+
29	risk of the highest accounting price in comparison with the market price or specified in the tender proposals		+	+
30	risk of difficulty entering the market		+	
31	risk of insufficient income of potential consumers of products, that does not allow purchasing the required batches of product		+	+
	Monetary and currency risks			
32	liquidity risk;	+	+	+
33	risk of decreasing financial stability;	+	+	+
34	inflation risk;	+	+	+
35	currency risk		+	+
36	risk of arising overdue receivables;		+	+
	Investment risks			
37	interest rate risk;	+	+	+
38	credit risk;	+	+	+
39	risk of lost profit;		+	+
40	risk of direct financial loss	+	+	+

Based on the resulting Table, a chart is constructed, in which the height of the column determines the risk value, while the color indicates the type of risk with the corresponding reference number.



At that, the risks are grouped into individual stages that will allow quickly identifying the most significant risks inherent in a particular stage of the innovation life cycle, and accordingly, develop a strategy to minimize these risks.

This method of risk mapping is used by many foreign companies (for example, Microsoft) [19] without dividing into individual stages of the life cycle, when planning current activities, rather than assessing the risk of innovative projects.

V. CONCLUSION

The main pathway of further development of innovations in contemporary society is not only the search for measures that would help reduce the likely risks of their development and implementation. In this context, the most important is to ensure a balance of interests of the enterprise engaged in the innovative activity, the investor, the state, and consumers of the innovative product. Currently, the development of domestic industry based on enhancing the creation and implementation of innovations serves the foundation of economic security of the state.

Risks of innovation and investment activities are interdependent on the innovation policy of the enterprise, as well as the innovation and investment policy of the state in general.

In consequence of the analysis of risk factors for industrial enterprises, the risks characteristic of a particular field of activities were identified, as well as belonging of the industrial enterprise risks to individual stages of the innovative project life cycle in the industry that will allow effectively managing the risks characteristic of each individual stage.

The further research is on the plane of deepening theoretical, methodological, and applied developments to minimize the risks of industrial enterprise, which will allow significantly improving the existing practice of risk management in domestic industrial enterprises.

REFERENCES

1. Schumpeter, J.A., "The theory of economic development. Capitalism, socialism, democracy". Moscow: Eksmo, 2007, p.234
2. Efimychev, Yu.L., and Trofimov, O.V., "Konceptual'nye osnovy strategii innovacionnogo razvitiya promyshlennyyh predpriyatiy" [Conceptual framework of the innovative development strategy of industrial enterprises]. Monograph. Nizhni Novgorod, Publishing House of Lobachevsky State University of Nizhny Novgorod, 2010. p.273.
3. Bulavko, O.A., and Zastupov A.B., "Mekhanizmy stimulirovaniya investicionno-innovacionnogo razvitiya predpriyatij promyshlennogo kompleksa" [Mechanisms to stimulate investment and innovative development of enterprises of the industrial complex]. Bulletin of the Samara State Economic University, 8(142), 2016, pp. 42-47.
4. Petrov, A.V., "Investiccionnaya politika regiona: orientaciya na innovacii" [Regional investment policy: Focus on innovations]. Creative Economy, 6(7), 2012. pp. 54-59.
5. Eroshkin, A.M., Petrov, M.V., and Plisetsky, D.E., "Finansirovanie innovacionnogo razvitiya: teoriya i praktika" [Financing of innovative development: Theory and practice]. Moscow: Institute of Europe of the Russian Academy of Sciences, 2012, p.184
6. Yurin, S.V., "Formirovanie finansovyh institutov dlya uskoreniya innovacionnogo razvitiya i rynochnyh mekhanizmov finansovogo obespecheniya innovacionnoj deyatel'nosti" [Formation of financial institutions to accelerate innovative development and market mechanisms for innovative activity financing]. Creative Economy, 5(1), 2011, pp. 82-85.
7. Di Ubaldo, M., and Siedschlag, I., "The impact of investment in innovation on productivity: Firm-level evidence from Ireland", ESRI Working Paper, 571, The Economic and Social Research Institute (ESRI), Dublin, 2017. Retrieved from www.econstor.eu/bitstream/10419/174304/1/WP571.pdf
8. Kovalev, P.P., "Ocenka kachestva innovacionnogo potenciala promyshlennogo predpriyatiya" [Quality assessment of the innovative potential of the industrial enterprise]. Economics: Yesterday, today, tomorrow, 8(2A), 2018, pp. 33-46.
9. Gallyamova, D.Kh., and Kashin, A.I., "Sbalansirovannoe razvitiye investicionnoj i innovacionnoj deyatel'nosti na metalloobrabatyvayushchih predpriyatiyah" [Balanced development of innovation and investment activities in metalworking enterprises]. Monograph. St. Petersburg University of Management and Economics, 2011, p.138
10. Dudin, M.N., Prokofyev, M.N., Fedorova, I.J., and Frygin, A.V., "The world experience of transformation of innovative approaches to the assurance of financial stability of social economic systems". Life Science Journal, 11(9), 2014, pp. 370-373, DOI:10.7537/marslsj110914.56
11. Dudin, M.N., Kucuri, G.N., Fedorova, I. Ju., Dzusova, S.S., and Namitulina, A.Z., "The innovative business model canvas in the system of effective budgeting". Asian Social Science, 11(7), 2015. pp. 290-296. DOI: 10.5539/ass.v11n7p290
12. Ilyenkova, S.D., Yagudin, S.Yu., and Guzhov, V.V., "Upravlenie innovacionnym proektom: uchebno-metodicheskij kompleks" [Innovation project management: Training and methodology complex]. Moscow, Eurasian Open Institute, 2009, 182 p.
13. Gracheva, M.V., and Lyapina, S.Yu., "Analiz i upravlenie riskami innovacionnoj deyatel'nosti" [Analysis and risk management of innovative activity]. Manual. Moscow: YUNIPI-DANA, 2006, p. 351.
14. Korolkova, E.M., "Risk-menedzhment: upravlenie proektnymi riskami" [Risk management: Project risk management]. Tambov: Publishing House of Tambov State Technical University, 2013, p.160.
15. Vyatkin, V.N., Gamza, V.A., and Mayevsky, F.V., "Risk-menedzhment" [Risk management]. Moscow: Yurayt Publishing House, 2016. p. 365.
16. Granaturov, V.M., "Ekonomiceskij risk: sushchnost', metody izmereniya, puti snizheniya" [Economic risk: Essence, measurement methods, ways of risk mitigation]. Moscow: Business and Service, 2002. p. 162
17. Berglund, H., and Hellström, T., "Enacting risk in independent technological innovation". International Journal of Risk Assessment and Management, 3(2/3), 2002, pp. 205-221.
18. Naryshkin, S.E., "Investiccionnaya bezopasnost' kak faktor ustojchivogo ekonomicheskogo razvitiya" [Investment security as a factor of sustainable economic development]. Economic Issues, 5, 2010. pp. 16-25.
19. Lipina, S.A., Lochan, S.A., Fedyunin, D.V., and Bezpalov, V.V., "Government promoting communication tool in innovation development of companies". European Research Studies Journal, 20(4B), 2017, pp. 536-547.



Published By:

Blue Eyes Intelligence Engineering
 & Sciences Publication (BEIESP)

IJEAT

www.ijeat.org

Exploring Innovation