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**Global Challenges and Prospects of the Modern Economic
Development**

**FEATURES OF CORPORATE INNOVATION RISK
MANAGEMENT**

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Abstract

The study is relevant due to the rapid development of scientific and technological progress in the context of the digitalization of the economy and the introduction of innovative technologies into business processes. However, in order to successfully compete, modern companies need to correctly assess the risks associated with innovation in order to make effective management decisions in a timely manner. Since innovations require large capital investments from companies, the process of individual selection of optimal risk management tools for a corporation, taking into account the totality of factors of the macro and microenvironment in which it conducts financial and economic activities, becomes important. The article investigates the issues of interpretation and comprehensive classification of innovative risks, methods of their quantitative and qualitative analysis and assessment, which are the basis for making management decisions. Innovation risk is caused by a high degree of uncertainty in the result of the introduction of new technologies, and therefore risk management is a particularly important area of the corporation's activity, which is actively engaged in innovation. In the case of illiterate analysis and incorrect assessment of innovative risks, the company may lose its competitive position in the market and fail to recover the costs of attracted investments, which often leads to complete ruin and financial ruin. On the contrary, effective management of the system of investment and innovation risks will allow the corporation to actively promote its product and receive excess profits through the introduction of new technologies.

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1. Introduction

The active digitalization of the economy prompts most corporations to focus on looking for opportunities to introduce innovative technologies into business processes. It should be noted that due to the use of innovations in various sectors of the economy, new high-tech goods have become available for production, the competitiveness and investment attractiveness of corporations are increasing. The scientific and technical base allows Russian corporations to actively introduce innovative products and technologies; nevertheless, in comparison with other countries, we do not show the proper level of involvement of innovations in the economy. Nowadays, all innovative technologies in Russia are financed mainly from the state budget and specialized funds.

When introducing innovative technologies, the issue of financial risks and building competent systems for their management is of paramount importance, which determines the financial stability of the company. The financial management strategy of a modern company must include an appropriate system for managing financial risks generated by innovation.

2. Problem Statement

Innovation risks are a part of financial risks and represent the risks associated with the development and implementation of new technologies in the production and sale of goods and services. The main issue in considering the characteristics of innovative risks is the direct connection with large investments, since the introduction of new scientific and technical solutions is always associated with the attraction of free funds. Nevertheless, not every Russian company can afford to invest in innovations that may not bring a useful effect and even serve as a factor in the deterioration of the financial stability of the organization.

The practice of corporation's work shows that innovative risks have several factors of occurrence, therefore, their management systems must be worked out in detail and include a set of tools and methods for risk reduction. The main goals of innovation risk management are stability of the financial position of the corporation, achieving efficiency in the implementation of innovations and ensuring strategic sustainability of development. The nature of innovation risks is directly related to the demand for products. In the event that it is incorrectly estimated, the corporation may suffer losses of the expected level of profit from innovations. The digital and innovative economy generates high competition in the world of scientific and technological progress, in connection with which companies are exposed to the risk of unfair borrowing of technologies by competitors, which threatens the preservation of the leading position and financial stability of the corporation. Other reasons may be the emergence of new equipment for production or the creation of a new product on existing equipment, this issue also becomes important when using the results of scientific and technological progress. Innovative activity at all stages of the project life cycle is associated with various uncertainties, which are manifested in the lack or absence of reliable and complete information about the market and its participants, about the costs and financial and economic results of the project.

3. Research Questions

To conduct the study, the authors formulated the following questions:

- to disclose the classification and types of innovation risks;

- to analyze methods for assessing investment risks of investment in an innovative project;
- to assess the effectiveness of the corporate innovation risk management system;
- to describe the management tools;
- to reveal the main methods used to manage innovative risks;
- to propose a strategy for optimizing the innovation risk management system.

4. Purpose of the Study

The purpose of the study is to determine the most effective tools and methods for managing innovative risks that will minimize the financial losses of the corporation. The introduction of innovations should be economically justified, since it requires large investments. The low level of use of the achievements of scientific and technological progress in Russian corporations demonstrates not only their high cost, but also the absence of available financial support schemes for their implementation. Thus, the main goal of a detailed study of innovative risks and their management systems is to develop models that will increase the economic efficiency of corporations, maintain their financial potential and increase competitiveness in the global market. The introduction of innovations is very important for the socio-economic development of society, but it is extremely financially risky, in connection with which modern corporations need a system of effective tools to minimize risks.

5. Research Methods

During the research, both theoretical and applied methods of analysis were used. A scientific approach to the topic under study was carried out through a comparative analysis of scientific literature. Also, economic and mathematical models were analyzed, which show high results when implemented in practice. By analyzing the theoretical foundations of the topic, a classification of innovative risks was derived. For the purpose of economic justification of the introduction of innovations, it is advisable to apply the following risk assessment methods:

- method of hierarchical decomposition;
- method of sensitivity analysis;
- scripting method;
- a method for assessing the return on investment;
- Monte-Carlo method.

Each of these methods is actively used in risk management to manage risks and help determine the extent of damage from a potential risk.

6. Findings

The introduction of innovative technologies corresponding to the level of scientific and technological progress is an important part of the competitiveness and development of any large corporation. Moreover, it is a guarantee of increased investment in the company. Innovative activity is accompanied by a high level of risk, since the outcome of the introduction of new technologies is always unpredictable and can change the company's position both in a positive way and in a negative one. In this

regard, in an innovation-oriented economy, it is always necessary to introduce preventive measures to research and predict a risk situation, as well as to predict the consequences of risks in a systematic way. Preliminary calculations and measures help the corporation to ensure financial stability in the future and not to lose its competitive advantage.

A correctly calculated and implemented risk management system prevents a decrease in financial results and the loss of part of capital in the process of innovation, and also reduces the company's costs for its implementation in the production process. In Russian realities, the main problem of a complete transition to innovative production is the lack of adequate experience and resources for the integrated management of innovative activities, which should be accompanied in an environment favorable for additional financing of projects. To understand the situation of introducing innovations in various sectors of the Russian economy, let us consider the level of costs for their introduction into production (Table 1).

Table 1. Investment in innovative technologies of Russian companies by type of economic activity

Economic activity	Costs for innovations, million rubles			Share of costs for innovation in total costs, %		
	2016	2017	2018	2016	2017	2018
Service sector, including:	54681,7	55565,9	61734,7	2,4	2,4	2,6
Research and development	-	470136,8	488564,4	-	86,4	32,9
Activities in the field of telecommunications	-	36272,2	40802,9	-	6,7	2,7
Computer software development	-	15802,3	17931,2	-	2,9	1,2
Industrial production, including:	777518,6	886785,8	893881,3	1,8	1,7	1,5
Extraction of crude oil and natural gas	-	89916,9	104389,8	-	10,5	7,0
Production of chemicals and chemical products	-	48189,8	67220,2	-	5,6	4,5
Production of motor vehicles	-	32310,1	38951,4	-	3,8	2,6
Agriculture, including:	15073,6	15942,0	22033,3	0,01	0,2	0,03
Growing annual crops	-	8355,0	13317,0	-	52,4	0,9
Animal husbandry	-	6443,0	6493,9	-	40,4	0,4
Constructing	7,3	196,4	49,7	0,9	1,0	1,2

Source: authors based on (HSE Data Books, 2020).

Based on the data in the table, it can be seen that the share of costs for innovation is extremely low and does not have a steady upward trend. These statistics are due to the high level of uncertainty and the caution of companies to actively invest in innovative technologies. It is worth noting that up-to-date data for narrower industries have been available only since 2017, which does not allow for a detailed analysis of all areas. Nevertheless, given the rapid digitalization of the Russian economy, the real level of investment in the technological development of companies shows a disappointing result.

As mentioned earlier, innovative risks have a number of unique features that reveal their essence.

The main feature of innovative risks is their over-speculative nature. As noted, innovative projects have a high degree of uncertainty in the result, which leads to further problems, possibly inefficient use of capital. In this regard, the main principle of innovative risk management is the adaptability of the management system. In other words, the risk management system should show positive efficiency: the costs of risk management mechanisms should not exceed the predicted damage both before the application of

risk mitigation measures, and the costs of the entire risk management system should be less than the possible damage from the onset of risk.

The next important feature of innovation risk management is the simultaneous and parallel processing of a large number of secondary and different in scale risks: currency, market, technical, inflationary, etc. This combination inevitably leads to an increase in the cost of the risk management system and complicates the process of calculating the costs of the overall management system... To avoid the onset of associated risk, it is necessary to identify in advance all interconnections of risk situations and take them into account when predicting the maximum scale of risk. Thus, we can conclude that the second feature of innovation risks is an integrated approach. Comprehensiveness considers the damage from the onset of risks in the aggregate, which makes it possible to assess not only the result of the impact of management tools on the risk, for which they are intended to combat, but also to identify the relationship with other characteristic risks.

Permanent volatility in the implementation of innovations forces corporations to quickly adapt to innovations and promptly make adjustments in the risk management system, as well as develop a decision-making structure in which some of the risks, under certain conditions, will have to be taken without significantly losing the company's position. Since innovation risks are included in the sphere of financial risks, the following principles should be taken into account: awareness of risk acceptance, manageability of accepted risks, independence of management of individual risks, economic rationality of management, accounting for the financial structure of the organization, as well as accounting for financial policy in certain aspects of innovation, etc.

Strategic financial risk management and risk management are synonymous terms and include steps such as analyzing the level of financial risks and the possibility of minimizing them, setting clear criteria for making decisions regarding risks, assessing results and choosing effective tools.

Measures to improve the quality of a risk-based approach to innovation risk management are:

- focus on increasing the competitiveness of the corporation in the market;
- analysis and identification of already existing financial risks in the innovation detail of the corporation;
- determination of the company's risk appetite;
- revealing the level of influence of financial risks using the methods of risk-based approach.

It should be noted that it is much more profitable for an innovative corporation to have a full-time risk management department, since this reduces the cost of attracting external experts and increases the confidence of the company's shareholders. Moreover, the process of attracting foreign investors is becoming especially relevant and more accessible, taking into account the fact that today investment in Russian companies by foreign investors is at a very low level. This is also due to the restrained participation of Russian companies in innovative activities.

Innovation activity at all stages of the life cycle is associated with various uncertainties, which are manifested in the lack or lack of information about the market and its participants, costs, financial and economic results of the project. All this affects the quality of the decisions made on the innovative project. Since innovative risks include a whole range of risk situations, the authors have compiled their most complete classification (Table 2).

Table 2. Classification of corporate innovation risks

Risk name	The essence
The risk of originality	The probability that the idea will become morally obsolete and become unclaimed by the time of its implementation. This will lead to inefficiency of all investments in the company's activities, and the development will not be compensated by financial results.
Information risk	The technology could have been developed before it became relevant for application, and therefore it becomes problematic to implement it due to already outdated methods of application.
Technological risk	An innovation cannot be relevant and financially successful without the proper level of technical implementation.
Legal risks	New developments are not always fully legally enshrined in legislation, which can lead to the impossibility of registering an innovation.
The risk of financial inadequacy	Innovative projects can be unreasonably expensive, and therefore even a positive financial result from implementation will not be able to cover all implementation costs.
Marketing risks	This risk is realized when entering a market that has been poorly analyzed, and therefore pricing will become incorrect. This risk is realized through a low level of product sales and, as a result, a low financial result.

Source: authors based on (Sklyarova, 2011)

The analysis of the effectiveness of the introduction of innovations largely depends on the correct calculations of risks, for this, a forecast of the economic justification is made in the form of a list of certain indicators. The fundamental calculation factors in this case are forecast indicators that generate cash flow necessary to support all areas of the corporation's activities and forecast indicators of value added. Moreover, the rate of return of the project should not exceed the weighted average cost of capital and net present value, and the payback period of the investment should not be unattainably long-term.

Innovative projects have qualitative and quantitative characteristics. Quantitative criteria are expressed in precise calculated indicators obtained by risk management methods. The fundamental concept of all methods is the laws of mathematical statistics, on the basis of which it is possible to mathematically accurately calculate the level of all risks that accumulate in the sphere of investment risks. The main difficulty in calculating innovation risk is the novelty and uniqueness of each individual project, in connection with which the lack of previous data often becomes a problem for accurate calculations.

Risk analysis methods include:

- the sensitivity analysis method is a quantitative method that is based on risk assessment by calculating the indicator of net present value (NPV);

$$Sensitivity = \frac{\text{Percentage measurement of NVP}}{\text{Percentage measurement of the indicator}} \quad (1)$$

- a simulation model of project risk assessment - this model is based on three possible scenarios for the development of a risk situation, for each of the scenarios the corresponding NVP is calculated;

$$NVP = \sum_{t=0}^T CF_t / (1 + E)^t = \sum_{t=0}^T R_t / (1 + E)^t - \sum_{t=0}^T I_t / (1 + E)^t \quad (2)$$

CF_t – cash flow during the project implementation period t

R_t – expected income from the project in monetary terms

I_t – investments for period t in monetary terms

T – project implementation time

E_t – discount rate per arrival t

- return on investment assessment method;
- Monte-Carlo method - this method allows the development of random scenarios for risk assessment. A feature of the method is the expression of risk not only on the basis of NVP, but also all derived values of this indicator.

Factors influencing the efficiency of corporate innovation are one of the most pressing issues of the economy, which is considered by many researchers in search of tools to increase efficiency and achieve high economic growth and development of corporations.

Among the external factors affecting innovation, the following are distinguished:

- analyst forecast (Guo et al., 2019);
- national policy (Wei et al., 2020);
- competitive environment (Wei et al., 2020);
- the state of world markets (Romanova et al., 2020);
- the policy of central banks and international financial institutions (Romanova et al., 2020).

Internal factors include:

- company size (Wei et al., 2020);
- incentives for equity (Wei et al., 2020);
- internal differentiation of wages (Ederer & Manso, 2013);
- knowledge management (Guo et al., 2019);
- management style (Wei et al., 2020).

Among other factors, the researchers noted the risk factor, the so-called ESG risk, which includes a system of environmental, social and management risks (ESG risks) associated with environmental, social and corporate governance factors within companies in Russia (Egorova et al., 2019).

Chinese researchers, in their article, considered such a factor as the welfare of employees as a factor influencing the effectiveness of innovation, which is the main factor that can solve the problems associated with the innovation activities of a corporation (Wei et al., 2020).

Among the methods of risk management, researchers stand out such as: risk insurance, hedging, blockchain technologies, maintaining and increasing the competitiveness of goods; reduction of operating and production costs; creation of additional sources of cash flow, etc.

Let's consider them in more detail. Insurance, as one of the key innovative risk management tools, involves transferring risk to insurance companies. In most cases, the objects in the insurance of innovative risks are the risks of untimely completion of the planned works and the risks of not reaching the planned capacity. Also, in conjunction with innovation risks, intellectual property objects are also insured.

In the case of innovative risks, insurance is one of the most reliable sources, since it meets all the requirements of the specific risk. When insuring funds to cover losses from the onset of innovative risks, the corporation will be able to receive much faster than from other sources, while the amount of compensation will be determined by the real value of the object accepted for insurance, the insured amount and the amount of the insurance premium paid. Moreover, a partial insurance method is possible, which will reduce the insurance premium, but leave some of the risk with the corporation.

The main factor for taking risks for insurance is statistical data and the ability to mathematically determine the probability of an insured event. In this regard, insurance companies are reluctant to insure

this type of risk, and insurance products in this area are developing slowly, despite the fact that the course towards the introduction of innovative technologies was taken quite a long time ago.

The authors present several options for stimulating the development of insurance in the field of innovation:

1. State regulation of insurance in the field of innovative technologies will help to achieve the most rapid development of insurance products, but only on condition that directive control is not transferred exclusively to the state. Moreover, this measure must be financially justified so that budget funds are spent rationally. No less important is the reduction of insurance premiums through government support and subsidies, which will also serve as an additional factor in stimulating the development of companies' innovation base.

2. Development of mutual insurance societies in corporations united by one field of activity. These associations will make it possible not only to distribute the risk between the members of the mutual insurance society, but also to exchange scientific and technical base, which can serve as an additional factor in the development of innovations. It should be noted that the creation of a mutual insurance society in Russia by large companies can also become an impetus for strengthening the position of this method and achieving the former popularity of the application.

Mutual insurance, like any method of risk management, has its pros and cons. By distributing damage between the participants, the mutual insurance method allows companies to independently decide on the size of the insurance fund and the ability to use the fund at any time. At the same time, the main disadvantages of mutual insurance are the lack of capital management by a professional insurer and the likelihood that the fund amount will be insufficient to cover large losses from an insured event. To overcome weaknesses, the most reasonable would be government support at the stage of development of insurance products in the field of innovative technologies, and then active support of mutual insurance companies, updating and detailing the regulatory framework for this type of insurance. Price volatility in the global market, unstable balance, supply and demand and various geopolitical perturbations have led to increased risks for companies, and a reduction in net revenue. And in this regard, the problem of hedging risks is becoming the most urgent. With the help of hedging, it is possible to significantly reduce the risks of changes in asset prices by fixing them at a certain level using financial instruments such as swaps, options, futures and forwards. This mechanism allows corporations to minimize currency, interest rate risks, and the risk of changes in prices for raw materials and final products. This tool, to improve the efficiency of management and stabilize investment and financial flows, is actively used by such developed countries as the USA, the EU, etc. In contrast to the United States, China, on the contrary, is cautious in using hedging of risks, having had a negative experience in the past associated with the devaluation of the Yuan and the lack of qualified personnel to manage this instrument. The weaknesses of hedging are the lack of one hundred percent guarantee of protection of the company from the occurrence of risk, and it also does not work when it is necessary to cover the production and operational risks of the company. Therefore, it is necessary to combine it with other methods of corporate risk management, taking into account a balanced approach to their management, and leveling the negative consequences (Mavlonov & Kotlova, 2017).

The development of digital technologies in the modern innovative economy leads to a transformation of its foundations, and now the economy relies on the management of big data bases. The

introduction of digital technologies entails the need to ensure the reliability of information and trust in the data. The security and safety of data is provided by the blockchain technology, which consists in a decentralized method of controlling operations, excluding intermediaries, maintaining the confidentiality of the process with full openness of the database of operations, which ensures the reliability of the method of protecting the transmission and storage of information at a level that meets modern requirements. At the same time, the possibilities of the new technology are limited primarily by legal uncertainty and the presence of legal risks. The use of an innovative blockchain system, and on its technologically new basis, a software product operating on the principle of "smart contracts", is most in demand among logistics companies that need to ensure optimal supply management, which also helps to reduce the company's risks, increasing the efficiency of using time and resources. fulfilling the basic requirement of high-quality and efficient logistics: "at the exact time" - "at the specified place" (Chernysheva, 2018).

The use of innovative technologies, such as blockchain, in the near future will be especially in demand in large corporations to optimize operational processes by automating and unifying the work of employees, which is built on standard operations and does not require a creative approach. As a result, some of the company's low-skilled personnel will be released. Blockchain technology contributes to the manifestation and development of the creative potential of corporation employees, given that the human factor is a fundamental factor in the development of any economy, thus, blockchain technology in the future will become a driver of the digital economy and will contribute to the formation of new opportunities and interesting prospects (Shalneva & Azarenko, 2019). In addition, the use of blockchain technology in microinsurance for making automatic payments will significantly reduce costs and eliminate the risk of fraud (Khuzhamov et al., 2021).

7. Conclusion

Innovative risks, on the one hand, are extremely dangerous for corporations and are reluctant to be accepted by Russian companies due to the high probability of large losses. On the other hand, a focus on innovation with a well-built risk management system helps companies become market leaders and generate super profits. Timely adaptation to the development of scientific and technological progress can serve as a start for the company and strengthen its position in the market.

The main limiting factor is the low level of risk-orientation and the fear of large investments that may not be justified. Recognition and classification of risks, their qualitative assessment, the correct method of analysis and a competent economic and mathematical model of minimization can help companies to properly minimize and prevent risks, and therefore, achieve a positive financial result that will not only recoup investments, but also serve as a factor in the rapid growth of innovation in a corporation.

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