Some aspects of risk management in the investment and construction sector

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Abstract. Risk is an important factor that results from the execution of any economic decision and occurs in the conditions of uncertainty and cyclical development inherent in a market economy. Classification and assessment of risks specific to construction organizations is a complex and strategic task based on the application of various models, taking into account the industry’s risk management features. The purpose of this work is to study the methodological and practical aspects of risk assessment for making management decisions in the investment and construction sector. The study focuses on such interrelated concepts as "uncertainty" and "risk" and their impact on business performance in the market conditions. The authors prove that the risks typical for the construction industry in Russia have their own specific features and depend on such significant factors as the level of taxes, the volume of orders, the cost of materials and structures, the availability of sufficient financial resources, and the payment capabilities of customers. Depending on the categories of construction companies, the most significant risks are identified (technological, commercial, investment and innovation risks). The authors studied the essence and features of risk assessment taking into account international standards and practical aspects in the investment and construction complex. The scientific article reveals the role of risk management in risk management in the investment and construction sector, the main problems of using methods to minimize risks for various categories of construction organizations in Russian practice.

1. Introduction

The investment and construction complex is "a socio-economic system in which industry enterprises in the region realize their economic interests by accumulating investment resources and participating in the process of creating and selling the final product of construction" [1].

Despite the important role of the investment and construction complex in solving the problems of economic growth of the state, we can note the contradictory trends that characterize its state in Russia in recent years, namely:

first, the number of construction organizations has recently increased by 80% (from 155 thousand to 278 thousand), while at the same time there is a reduction in the number of state and municipal construction organizations and an increase in private companies, small businesses account for one-fourth of the volume of construction work performed by organizations of private ownership;

secondly, after the decline in construction production in the period from 2014 to 2017, there was a tendency for their growth, in 2018, the volume of work performed by construction organizations is higher than the previous year by 5.3%;
third, there is an uneven volume of construction in the country's regions in 2018. In 34 regions, the volume of construction production increased several times, on the contrary, in 51 regions, construction production decreased, for example, in Mordovia (by 46.5%), Udmurtia (by 30.8%), Novgorod region (by 40.3%), Arkhangelsk (except for the Nenets Autonomous district) (by 40.2%) [2].

In addition, the socio-economic situation in Russia is characterized by an insufficiently high level of stability, and it is difficult to predict investment processes that are influenced by financial (7.25%), economic (4.6%), managerial (3.1%), criminal (2.8%), and social (1.9%) risks [3]. As a result, in the investment and construction sector, risk situations are created due to rising prices for the main types of materials and structures, an increase in accounts receivable, including overdue debts, an increase in debt on loans and loans received, etc.

In these conditions, there is a need to improve the quality of design and competitiveness of enterprises in the investment and construction sector, taking into account risks and uncertainties.

2. Materials and methods
The risks of economic development in a competitive environment and its impact on the business activity of economic entities were considered in the works of well-known scientists F. Night focused on the fact that the concepts of "uncertainty" and "risk" are not equivalent, risk is "the probability of a decision in the conditions of information uncertainty", and also analyzed the formation of business profits taking into account risk and uncertainty [4].

G. Markowitz proved the relationship between the yield of various assets and the risk, which increased the efficiency of managing the total portfolio through diversification, reducing its risk in the conditions of changing market conditions [5]. The construction of the capital asset pricing Model, called the Capital Asset Pricing Model (CAPM), was based on the provisions of the Markowitz portfolio theory W. Sharp justified the assumption that in a competitive environment, the expected value of the risk premium will be directly proportional to the "beta" coefficient [6]. The concept of evaluating the effectiveness of investment projects by G. Birman and S. Schmidt is based on the application of the current value method adjusted for risk [7].

Each stage of the project life cycle corresponds to a specific focus of risk management (table 1)

| Table 1. Stage of the life cycle of the project and the focus of risk management |
|---------------------------------------------------------------|
| The name of the stage | The focus of risk management |
| The concept and definition of the project | The strategic threats and opportunities of the project |
| Preliminary feasibility study of the project | Choosing a preferred project option based on risk analysis |
| The project's design development | Analysis of the design and delivery strategy to determine the final application area |
| The installation commissioning, Release, implementation and implementation of the project | Execution, testing and transfer project in accordance with the agreed scope of application |
| Operation and maintenance of the project | Analysis of the operating results and software maintenance ensuring the operation of the project |
We believe that the most significant provisions of the standard in the field of risk analysis which may be important for the development of the measures to minimize the consequences of the risk situations are the results of qualitative and/or quantitative risk analysis at different stages of design, as well as data on the reliability and cost of the life cycle of project options and further design detail.

In this case, each organization can determine the magnitude of the consequences of risks using the most appropriate methods and criteria for it, in particular, in the scale of consequences of risk situations, such parameters as "people", "environment", "finances", "reputation of the organization" are accepted.

3. Results
Construction is one of the activities where increased risks are generated. Risk factors in the investment and construction sector are presented in figure 1.

![Figure 1. The risk factors specific to the construction activity in Russia](image)

The analysis of statistical data showed that according to the estimates of construction companies managers, the most significant risk factors in Russia are: a high level of tax burden, insufficient volume of orders and high cost of materials and structures, insufficient amount of own resources to Finance projects and customers' insolvency [2].

According to experts, most of the profit losses of construction organizations (from 47 to 50%) are due to internal factors related to the risks of using labor resources, to a lesser extent (about 20%) with the organization and technology of construction, with the use of materials (4%), external factors account for 28% of the profit losses [10].

The construction companies can be divided into two main categories today: construction companies that build typical houses and cottages, the companies that build large, unique objects. For each of these construction companies, the risk situations have their own specifics and management features.

For the first group of the companies, the technological risks can be reduced to zero thanks to the flow method. Cottage construction, for example, is carried out using positively proven technologies. At the same time, the issues of commercial risks in the field of sales, deliveries and investment risks
are very relevant. Risk management related to the external infrastructure of such construction companies is often replaced by diversification of activities. In practice, construction companies prefer to work with their own designers, suppliers, create divisions (firms) that are engaged in transportation, perform the functions of object protection.

However, investment in these activities does not allow you to develop the main (construction) business. This not only reduces investment opportunities, but also increases the risks of newly created firms.

For the second group of the companies which usually have stable financing (for example, budget financing), the technological and innovative risks prevail. Here, the commercial and investment risks are minimized but technological risks increase due to the uniqueness of construction projects. These risks are minimized by observing technology and safety practices, using years of experience accumulated since Soviet times, creating a contingency reserve that is traditionally included in estimates. Meanwhile, it is impossible to completely eliminate the possibility of major risks in the construction of complex and unique objects, and if a risk situation occurs, it may be difficult to cover the damage at the expense of budget funds. In this case, insurance of construction risks plays an important role in the insurance protection of property interests of organizations (insurance of property, personnel, liability of construction companies to third parties). For example, as a result of an accident during the construction of the Tsarev Garden business center (Moscow), it was necessary to repair the load-bearing structures again. The damage amounted to about $ 2 million and was paid by Ingosstrakh which provided comprehensive insurance for the construction of the center.

Currently, the rates for insurance of construction and installation works, depending on the characteristics of the object and the risks, vary from 0.12 to 1.15% of the insured amount. The average insurance rate in 2019 was 0.39%, the average insurance premium was 37.6 thousand rubles, and the average limit was close to 9.6 million rubles.

4. Finding
In practice, the risk assessment techniques based on expert assessment and a point system are usually used to make investment decisions. The algorithm of their application assumes the following sequence:

- the expert method determines the number of points for each risk group or for a specific risk;
- the overall risk assessment of the project is derived based on the weighting factors and the conclusion about the project's risk group is formulated;
- all parameters of the project adjusted with the adjustment for risk.

When assessing the risks, it is necessary to calculate not only the probability of risk, but also the amount of losses from its impact. For each risk indicators such as the "amount of possible losses" and "probability of occurrence" are determined in points which are entered in the corresponding rows and columns of the special matrix. Multiplying the received points (risk probability indicators (P) and losses from it (I)) gives the risk index or risk rank (Ir).

Scales for assessing the risks of investment projects can be developed by organizations themselves, taking into account the scope of the risks. At the same time, risk classification plays a key role in identifying and analyzing project risks.

5. Discussion
For risk analysis in construction, it is possible to base on the classification of factors that affect the innovative and investment activity of entrepreneurship which in the conditions of instability of the Russian economy determine: "organizational and managerial level, human resources, production and technical, financial and economic levels of enterprise development and scientific and technological capabilities of enterprises" [11].

As for the specifics of managing investment activities in construction, domestic experts attach paramount importance to "economic, market-related, and communication risks that the construction industry enterprises are exposed to a greater extent than other types of activities. An urgent task of
strategic importance is the automation of the production management process, which takes into account not only profit and expenses, but also the avoidance of possible damage when evaluating the effectiveness of the process” [12,13,14].

In order to assess the effectiveness of investment projects taking into account risks, attention should be paid to the classification which provides for the division of risks into such two types as:

- systematic (clean), these include factors such as the natural and geographical conditions, environmental, political and a number of commercial risks (property, production and trade);
- non-systematic (speculative) which are determined by management decisions [15].

Risk research in the context of investment project management is inextricably linked to the introduction of innovations [16]. At the same time, identification and management of such risks is subject to difficulties in quantifying them, so it is possible to conduct a qualitative assessment from the position of "minimum, acceptable and critical levels of risk" based on comparison of losses and income and / or the value of property, namely:

- the minimum risks are risks that result in losses that do not exceed the amount of profit;
- the acceptable risks are risks associated with losses within the amount of planned income;
- the critical risks are risks when a full or partial loss of invested funds is possible [17].

It should be noted that organizations perception of specific risks is of high importance at the project level for making decisions about ways to minimize them[17]. We believe that the most significant types of risks for construction companies can be identified as production and technological, socioeconomic, commercial, investment and innovation risks, as well as operational and organizational risks.

6. Conclusion
In the process of risk management in the investment and construction sector, it is necessary to take into account such methods of risk minimization as diversification (distribution of the total risk by combining with other participants), risk compensation (by creating mechanisms for hazard prevention) and insurance.

Insurance plays a key role in risk management and compensation in construction. However, the "stagnation" in the construction market associated with the instability of the Russian economy and the exclusion from the cost estimates of insurance costs for construction and installation works, significantly weakened the protection of the construction market subjects, reducing its investment attractiveness. In this regard, when managing risks in the investment and construction sector, it is necessary to take into account and improve the procedure for selecting contractors, optimize the cost and speed of work; improving their quality; develop information and telecommunication technologies in construction, green construction; improve working conditions and the quality of training of specialists; increase the level of construction safety.

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