

**METHODICAL RECOMMENDATIONS
TO RISK ANALYZING TECHNIQUES**

Annotation. The paper present classifications and methodological features of risk level assessment of investment projects related to innovation that are the subject of special consideration in the development of innovative financial plan activities at the stage of pre-investment planning.

Анотація. Подано класифікації і методичні особливості оцінки рівня ризику інвестиційних проектів, пов'язаних з інноваційною діяльністю, які є предметом особливого розгляду в процесі розробки фінансового плану діяльності інноваційного підприємства на стадії передінвестиційного планування.

Аннотация. Представлены классификации и проанализированы особенности методик оценки уровня риска инвестиционных проектов, связанных с инновационной деятельностью, которые являются предметом особого рассмотрения при разработке финансового плана деятельности инновационного предприятия на стадии прединвестиционного планирования.

Keywords: innovative activity, venture capital, innovative enterprises, investment projects, investment risk, quantitative and qualitative assessment of risks, investment sensitivity, simulation modeling, break-even analysis, coefficient of variation.

Nowadays, one of the most important problems is the creation of innovative enterprises. In this context, measures for establishing infrastructure environment are of great importance for the intensification of the investment process in the field of innovative activity. However, the question of assessing the feasibility of such activity in each case remains open. The innovative design is the main point of the assessment of risk.

So the aim of this paper is to generalize different risk analyzing techniques in order to take into account the factors of uncertainty involved in innovation and investment projects.

The primary concerns in the system of indicators that include measuring of real innovative and investment projects are the following:

- the volume of invested costs;
- the level of net cash flow;
- the level of risk.

The concept, classification and methodological features of the estimation of risk investment projects that is connected with innovative activities, are the subject of special consideration while developing the financial plan of the activity of an innovative enterprise at the stage of pre-investment planning.

The concept which takes into account the factor of risk is an objective assessment of its level with the goal to ensure the formation of the required rate of return of investment operations and to develop a system of actions that minimizes its negative financial consequences for the investment activity of an enterprise [1, p. 148].

Risks that accompany investing activity form a broad variety of enterprise risks, which is determined by the overall concept – the investment risk.

Investment risks include financial investment risks and investment project risks. The last one involves risks of the investments to reproduce the fixed assets and risks of the investments on innovations.

At present, due to the requirements of venture capital to the economic and financial information contained in the business plan of the innovative project, special attention is paid to the problem of forming the methodological instruments of quantitative assessment of innovative companies' investment risk. An investor wants to get the answers to the following questions:

1. What is the probability of existence of the projects investment risk?
2. How large is the potential financial loss while realizing the projects investment risk?

Quantitative risk assessment is the definition of the probability of the risk factors of the investment project and the identification of the consequences of their occurrence [2, p. 58].

Qualitative assessment can be relatively simple, its main task is to identify risk factors, potential areas of risk, and then all possible risks.

The results of qualitative analysis are important primary information for quantitative analysis (Table 1).

Table 1

Distribution of risks analysis methods

| Qualitative risk assessment | Quantitative risk assessment |
|-----------------------------|------------------------------------|
| Economic and statistical | Analysis of investment sensitivity |
| Expert method | Simulation modeling |
| Analog method | "Cost – volume – profit" analysis |

Methodological approach to assessing the level of investment risk includes economic and statistical, expert and analog methods of implementing an assessment. This classification should include operational assessment as a method of analyzing the degree of business risk. Economic and statistical methods are the basis for the assessment of the level of investment risk. If the company lacks for the necessary informative data for economic and statistical methods then expert methods of estimation of the level of investment risk are used. Using the analogy techniques at the pre-investment stage of the innovative project planning is almost impossible, because there is no basis for comparison. Particular attention should be paid to assessing the level of project risk of innovative enterprises, based on a synthesis of economic and statistical method and expert method.

Analysis of investment sensitivity of the project is the assessment of the impact of any parameter of the project on the results, when the other parameters remain unchanged [3, p. 92].

Analysis of investment sensitivity involves the consistent implementation of the following steps:

calculation of initial data (factors);

calculation of the critical points of the investment project (last safe value of the parameter, at which the break-even level of production is reached);

calculation of the sensitivity end by the factors (it shows the percentage by which one may reduce the indicator that does not allow the company to get into the zone of losses);

ranking of the indicators of project performance in terms of their impact on the NPV.

Analytical sense of this method of risk assessment is as follows: the greater the range of fluctuations of initial parameters of the project, by which the indicators of its efficiency match to selected criteria of the enterprise, the less risky it is.

Analysis of sensitivity is a good illustration of the impact of a variety of inputs on the final result of the project. The main disadvantage of this method is the evaluation which is based on the approaches of elimination. It is advisable to use this method together with other methods of quantitative risk analysis of the investment project at the stage of the ranking factors according to their impact on the result.

Simulation modeling is a procedure with the help of which a mathematical model of determining any financial measure (e.g. the NPV) undergoes to a series of simulation runs using the computer. In the course of the simulation consecutive scenarios are developed with the use of initial data, which during the analysis remain random quantity. The simulation process is carried out in such a way that the random selection of the values of certain probability distributions did not violate the existence of known or suspected relationship of correlation among the variables. Simulation results are collected and analyzed statistically in order to estimate the measure of risk [4].

One of the methods of quantitative risk analysis is an analysis of "cost – volume – profit" which helps to assess the degree of structural operational risk. Calculations are made for the entire planning horizon, in order to get an idea of the planned dynamics of key indicators of operational analysis (stocks of financial strength, profitability threshold). All the above figures are the typical indicators of classic break-even analysis, and their interpretation is also known. It is necessary to admit that innovative companies are characterized by the high value of the stock of financial strength. It means that there is a reserve of lower revenues, while maintaining profitability of the manufacturing. This will let to reduce the marketing risk associated with incorrect assessment of the demand for pre-investment stage of planning.

In theory and practice of risk management two basic approaches to the classification of the investment project risks in terms of financial losses are developed. According to the first approach in order to conduct comparable assessment of the level of risk according to every real investment projects, the variability of considering endpoints indicators of their effectiveness is defined in relative term, by calculating the coefficient of variation. The higher the estimated value of this coefficient of the considering project, the higher overall level of risk correspondingly. In the investment practice, the following criteria of the overall risk of the project are used according to the values of the coefficient of variation of elected indicator of its final effectiveness [1, p. 259]:

up to 10 % means a low level of project risk;

from 11 to 25 % means the average level of project risk;

from 25 to 50 % means a high level of project risk;

over 50 % means the critical level of project risk.

According to the second approach four areas of project risk are emphasized (Table 2).

Table 2

Areas of project risk

| Area of project risk | Characteristics |
|-------------------------|---|
| Area without any risk | Certified financial result in the amount of the estimated sum of profit |
| Area of acceptable risk | Possible financial losses in the amount of the estimated sum of profit |
| Critical area of risk | Possible financial losses in the amount of the estimated sum of income |
| Catastrophic risk area | Possible financial losses in the amount of equity |

This approach is used in the classification of the project risk of investments for reproduction of fixed assets. This is due to the fact that it is possible to predict more accurately the NPV of a project as investment risk of such projects is the logical continuation of the operational risks of an enterprise.

So, the qualitative and quantitative analysis of the investment projects risks that are associated with the investments in innovation is more actual today. The main qualitative methodics that are underlined in this article are economic and statistical, expert and analog methods. They allow to take into account the specifics of venture project in order to identify all possible risks. The proposed quantitative approach methodology such as analysis of investment sensitivity, simulation modeling and "Cost – volume – profit" analysis allows to consider the impact of major factors of uncertainties that are associated with the creation of a new business model, during the processes of planning of innovative activity and the analysis of the level of investment risk of the project.

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