Risk-Oriented Technique of Real Investments Management: Consepts

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Abstract

One of the main objectives of real investment management is increasing in company's revenues and market value. Long time lag of income from investments, the scale of investments, and a high level of uncertainty in their implementation makes the questions of project risk management actual. We focused on systematization of methods to measure, report and manage project risks. The paper suggests the concepts of risk-oriented methodology of project risk management. We assumed similar results ranking of investment projects in terms of risks, using Monte Carlo simulation and the fuzzy sets theory for risk assessment. In this study, was formed the empirical base, including investment projects of Russian pharmaceutical companies. The obtained results confirmed our hypothesis.

Keywords: *investment risks, project risks, simulation modeling, Monte Carlo simulation, fuzzy sets, pharmaceutical companies*

1. Introduction

Efficiency of the investments is the essential condition to provide stable activity of the company. As for Russian companies such financial value drivers as profitability, financial policy and level of risk are positively related to shareholder value creation [1], so it is rather important to search for and implement new effective methods and tools of real investments management, that on the one hand could led to increase company value, and on the other hand could provide more accurate forecast and evaluation of project risks.

High complexity of investment projects that include multiplicity of project solutions regarding technical, technological, organizational, human resource, financial and other aspects as well as impact of uncertainty factors in the process of implementation of investment project requires a high level of expertise on the part of managers. Real investment management not only calls for evaluation of chances to increase business income and company value but also should take into account the level of project risks and develop effective measures to reduce them. This highlighted the clear need for risk evaluation prior to implementation. So, it's important to understand management's view of risk, identify methods adopted to highlight potential risk, and explore possible risk assessment in project management [2].

2. Risk-Oriented Approach

International financial institutions like the World Bank, the European Bank for Reconstruction and Development and the Asian Bank widely employ principles of project approach to investment activity management.

Project approach consists in a combination of various functions, aspects and methods of management aimed at the achievement of effective results and search of compromise solutions between objectives, expenses, efficiency and other investment project features.

In the framework of risk-oriented technique, Russian companies should resolve a number of tasks i.e. to evaluate implementation of a certain investment project in terms of its reasonable practicability, evaluate project expected efficiency and level of risks, optimize a complex of real investment projects in the context of portfolio-balance approach and reasonable compromise between risk and profitability, review and evaluate investment project as a source company value increase.

Risk-oriented approach under real investments management is based upon high status of management function of project risks. Among the phases of investment risks management we singled out the following: qualitative and

quantitative analysis, assessment of risks under the evaluation of expected efficiency and choice of alternative variants of investment projects, choice of methods to influence project risks, monitoring and control of further project implementation considering current efficiency and the actual level of risks.

3. Qualitative and Quantitative Analysis of Risks

The main objective of qualitative analysis of risks is to discover a total number of real investment projects and analysis of risks interrelation; and also to discover factors for each identified type of risks that make sufficient impact in a general level of risk.

Understanding of the risk management entails understanding of the underlying factors that contribute to project risks. These risks are often the same, regardless of the nature of a project. The first step in risk assessment is risk identification [3,4].

In this study, all real investment projects risks are grouped into general and specific risks. Group of general risks includes risks that are the same for all participants of investment activity and investment forms. Level of these risks is determined by the impact of external factors and does not depend on a quality of company's management. According to the experience of Russian companies, the most important types of general risks include the following: external-economic, internal-economic, political, social, inflation, conjuncture and legislative risks. Level of system's risks does not depend on quality of company's management. Group of specific risks consists of the following: country, regional, sector, revocable, operational, credit and market liquidity risks. Certain types of the risks that belong to this group require detailed description in practice. Among operational risks could be distinguished the following: engineering, legal, marketing risks and risks of non-effective management.

As part of specific risks portfolio investment risks include risks of imbalance in investment portfolio, risks of insufficient diversification, capital and selective risks.

One of the most challenging tasks at the stage of quantitative analysis of project risks is to search for and apply such methods and tools that could evaluate possibility to achieve expected result, evaluate all possible approaches including possible failures in the context of uncertainty. The primary task of this stage consists in qualitative assessment of risk factors influence on efficiency of investment project.

It is reasonable to apply statistic and probability methods, decision trees, interval method of risks evaluation, marginal analysis, correlation and regression analysis, deterministic factor analysis and optimization models among qualitative methods of investment risks evaluation.

Authors assume that in the framework of the risk-oriented technique and according to the results obtained from the analysis of investment project it is quite reasonable to create a map of risks that can be presented in the form of three-dimensional matrix with the following measurements: list of sufficient risks; life-cycle phase of investment project that is correlated with risks; scope of possible damage.

Selection and application of relevant methods and tools of quantitative evaluation of uncertainty of investment projects is more challenging task to perform. In order to solve this problem company management may use expert methods, game theory methods, simulation modeling and fuzzy-set theory methods.

4. Method

We have formed empiric base that includes investment projects of companies dealing with pharmaceutical products. One of the tasks set by Russian government for the near future is to increase a rate of medical product consumer and bring it up to average European level. So, it is reasonable to describe pharmaceutical branch as one of most advanced industrial sectors in Russia.

Working on this paper we have analyzed investment projects of Russian pharmaceutical companies working in the following areas: production of powder for injection (Biosynthes PLC), production of solid medicinal agents (Pharmaceutical Plant No.1 of Kaliningrad), expansion of production volume and promotion of sales of 'Polysorb' sorbent (Polysorb LTD), industrial production of national phospholipid medications (Pharmasynthes PLC), ointment production (Nizhpharm PLC).

The Monte Carlo simulation widely applied in financial decisions [5,6,7,8,9,10]. During implementation of the Monte Carlo simulation we have evaluated the expected efficiency of each investment project under conditions of 30% of variable expenses and sales volatility; number of quantitative indexes, representing risks was calculated and cumulative profile of project risk was designed.

Some studies contain discussion and practical application of the fuzzy set theory in decision-making

[11,12,13,14,15]. Next, we tried to reduce the uncertainty to the situation of risk using fuzzy-set theory. Results achieved in the course of application of simulation modeling of net discounting value of investment projects are displayed in the form of symmetric three-corner fuzzy set i.e. [NPV_{min}; NPV_{av}; NPV_{max}].

Then we calculated the value of stability coefficient for each investment project (lambda) using the formula 1:

$$\lambda = \frac{NPV_{av}}{\Delta} \quad (1)$$

Where: NPV_{av} is expected average value of NPV of the project;

Δ - a range of NPV values of expected average value or $NPV_{av} \pm \Delta$.

Further we used the risk-function that makes it possible to proceed from evaluation of uncertainty to the situation of risk (formula 2):

$$RI = \frac{1}{2} + \frac{\lambda}{2}(\ln \lambda - 1) \quad (2)$$

Where: RI is risk-function.

5. Results

Results we have gained by Monte Carlo simulation made it possible to reduce the situation of uncertainty to the situation of risk and range analyzed investment projects with respect to the level of risk. Results of ranging of investment projects are shown in the Table1.

Table 1: Monte Carlo simulation results of investment projects ranking

Investment project	NPV variation coefficient, %	Rank
production of solid medicinal agents	15,1	1
industrial production of national phospholipid medications	11,4	2
production of powder for injection	9,0	3
expansion of production volume and sales promotion of 'Polysorb' sorbent	7,2	4
organization of ointment production	5,3	5

Results of calculation of stability coefficient value (lambda) and variability for each of the investment projects are displayed in the Table 2.

Table 2: Results of investment projects ranging achieved by using fuzzy-set theory

Investment project	Risk coefficient value lambda	Rank
production of solid medicinal agents	0,45	1
industrial production of national phospholipid medications	0,23	2
production of powder for injection	0,18	3
expansion of production volume and sales promotion of 'Polysorb' sorbent	0,08	4
ointment production	0,01	5

Sometimes various qualitative risk analyses of the same problem can reach significantly different conclusions [16]. Comparison of investment project ranks in the Table 1 and the Table 2 shows that there are no fundamental differences between two methods of uncertainty rank evaluation.

6. Conclusion

At the stage of investment risks management it is reasonable to use such methods as diversification, risk aversion, risk sharing, compensation and localization.

Risk insurance belongs to the methods of risk aversion. Foreign insurance practice uses complete insurance of investment risks. However, Russian legislation allows only partial insurance of a project: property, plant, equipment, personnel and some emergency risks.

Methods of risk compensation imply creation of certain reserves i.e. financial, material, information reserves. Financial reserves can be created through allocation of additional funds to cover unexpected expenses. Material reserves

mean creation of special insurance reserve, for instance, raw materials.

Localization of risk is regarded as creation of separate companies to carry out high-risk activity types.

Companies should make a wide practical use of all the range of legal, financial, insurance and organizational tools to decrease the risk level of real investments. The following measures can be recommended: involve companies and experts with expertise in similar projects to develop and implement projects; receive financial guarantees from the third parties for other project participants; use highly liquid liabilities; creation and analysis of different scenarios in adverse situations.

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