MANAGEMENT OF INVESTMENT PROJECTS PERFORMANCE

I. Ryzhenko, Candidate of Technical sciences, Associate Professor
Kirghiz-Russian Slavic University. B.N. Yeltsin, Kyrgyzstan

This article deals with the problems of the investment projects management efficiency. We have analyzed specific risks that should be considered in the course of development of performance indicators of the investment project. Approaches to solving this problem have been identified and substantiated. On the basis of the research the author offers a number of methods for evaluating the stability and efficiency of the project, as well as the procedure of calculating the expected project outcome; the author has also formed the stages of simulation modeling, which allows estimating the possible range of efficiency variation for different project environments.

Keywords: performance management of investment projects, simulation modeling, risks of projects, indicators of efficiency of investment projects.

Conference participant,
National Research Analytics Championship,
Open European-Asian Research Analytics Championship

http://dx.doi.org/10.18007/gisap:tsca.v0i8.1428

In conditions of instability of the national economy development (including natural and manmade disasters, political situation, etc.), when developing the investment project performance indicators, one should consider the risks and uncertainties of the project, i.e. incomplete and inaccurate information about the terms of the project, and risk, i.e. the possibility of conditions that could lead to negative consequences for all or individual participants.

Thus, the traditional approach to solution of this problem is based on development of the project implementation scenarios, which create certain positive or negative deviations from the baseline scenario, corresponding to the values of performance indicators. The risk associated with occurrence of certain conditions of the project depends on the party, whose interests are the basis for its estimation.

The project is considered to be stable if at all possible scenarios it is effective and financially realizable, and possible adverse effects are eliminated by measures under the project activities.

In order to assess the sustainability and effectiveness of the project in conditions of uncertainty it is recommended to use the following methods:

1) Aggregative assessment of sustainability;
2) Calculation of the break-even levels;
3) The parameters variation method;
4) Assessment of the expected project outcome, taking into account the quantitative characteristics of uncertainty.

All methods except for the first, include the development of project scenarios in the most likely or most dangerous conditions to the participants, and assess the financial implications of such scenarios. This makes it possible to include the need for prevention or redistribution of the resulting losses in the draft measures. If these measures do not ensure sustainability of the project implementation, a more detailed study of the effect of uncertainty on the feasibility and effectiveness of the investment project will be required.

If there is information on the various project scenarios, the likelihood of their implementation and the values of the basic project parameters in relation to each scenario, the general indicator of performance can be defined - the expected effect of the integral (expected NPV). Evaluation of the expected project performance, taking into account the uncertainty, is being produced in the presence of information about different project scenarios and the likelihood of their implementation. Calculations are made in the following order:

1) The entire set of possible project scenarios is described;
2) For each scenario the cash flows of the project are examined;
3) For each scenario, each step of the billing period and the summarizing performance indicators are determined;
4) The financial feasibility of the project is checked. Breach of feasibility is seen as a necessary condition for termination of the project (this takes into account losses and gains of participants associated with liquidation of the company because of its insolvency);
5) Background information on the uncertainties is presented in the form of probabilities of individual scenarios, or intervals of the change of these probabilities. This defines a class of admissible (consistent with available information) probability distributions of the project performance;
6) The risk of infeasibility of the project is estimated - the total probability of scenarios under which the conditions of the financial feasibility of the project are violated;
7) The risk of failure of the project is assessed - the total probability of scenarios under which the integral effect (NPV) is negative;
8) The average damage from the project is estimated (if it is ineffective);
9) The generalizing performance indicators of the project are defined on the basis of performance of individual scenarios, taking the uncertainties into account.

The main indicator used to compare different projects (design options) and select the best of them, is an integral indicator of the expected effect (NPV). Methods for determining the parameters of the expected effect are used depending on the available information about the uncertain conditions of the project.

The probabilistic description of the project conditions can be applied when the project effectiveness is affected, first of all, by the uncertainty of natural - climatic conditions (weather, characteristics of soil and mineral reserves, the possibility of earthquakes or floods, etc.), or the processes of operation and depreciation of fixed assets (decreasing state of structures and buildings, equipment failure, etc.). Fluctuation in the prices of the production manufactured and resources consumed can also be described by the probability distribution.

In the case where the number of scenarios is finite and their probabilities are given, the expected effect of the integrated project is calculated as follows:

$$NPV_{exp} = \sum_k p_k NPV_k , \qquad (1)$$

where NPV_{exp} - expected integral effect of the project;

p_k - probability of the scenario;

k = 1,2, ... - number of scenarios;

NPV_k - integrated effect of the scenario.

The risk of failure of the project and the average loss from the project (if it is ineffective) are determined by the following formulas:

$$p_{inef} = \sum_k p_k , \qquad (2)$$

$$У_{inef} = (-\sum |NPV_k| p_k) / p_{нэ} ,$$

where p_{inef} - risk of failure of the project;

U_{inef} - the average loss for scenarios with negative values of integral effects.

Let's consider the option, when at a certain stage the project is terminated due to the unforeseen circumstances (natural and man-caused disaster, changing market conditions, political events, wars, etc.). Accordingly, we will introduce additional terms and conditions of an integral evaluation of the expected effects of the project into the formula (1):

$$NPV_{exp} = \sum_k p_k (1 - p_н) NPV_k , \quad (3)$$

where p_H - the probability of termination of the project.

The condition of the project is defined by the minimum possible damage in the event of unforeseen circumstances:

$$(-\sum |NPV_k| p_k) / (1 - p_н) \rightarrow \min \quad (4)$$

When determining the parameters of the investment project in conditions of uncertainty of the project we face difficulties in describing the analytical expressions of interdependence of the project parameters due to absence or insufficiency of information about the occurrence of various events. Simulation modelling using the Monte-Carlo method provides the possibility to analyze scenarios in conditions of insufficiency of information on the project. The result of this analysis supports the probability distribution of possible project outcomes.

Simulation modelling by the Monte Carlo method allows us to construct a mathematical model for a project with uncertain parameter values, knowing only the probability distributions of the project parameters and also the relationship between changes in parameters (correlations) – in order to obtain the project profitability distribution.

The following steps are taken when forming scenarios with the use of simulation modelling:

1) Intervals of possible changes of original variables, within which these variables are random, are defined;

2) Types of the probability distribution within specified intervals are determined;

3) The correlation coefficients between dependent variables are established;

4) The resulting figures are calculated;

5) The resulting figures obtained are treated as random variables, to which such characteristics as expectation, variance, distribution function and probability density correspond;

6) Probability for the resulting performance to get into a certain interval, as well as the probability of exceedance of the minimum permissible value, etc. are determined.

Analysis of the resulting parameters at the generated scenarios allows to evaluate the possible range of their variation under different conditions of the project. Probabilistic characteristics are used to:

- Make investment decisions;
- Rank projects;
- Justify the formation of reserve funds.

The probability distribution of possible project outcomes acts as the result of this comprehensive analysis. If the risk analysis determines that the decision-making level for low-profit projects is improved, the chances to get a satisfactory income will exceed the probability of unacceptable losses.

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Information about author:

1. Irina Ryzhenko – Associate Professor, Candidate of Technical sciences, Kirghiz-Russian Slavic University. B.N. Yeltsin; address: Kyrgyzstan, Bishkek city; e-mail: ryjenko@bk.ru