DEFINING THE EXTENT OF INVESTMENT PROJECT RISK

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ABSTRACT: The paper presents a method for risk evaluation of an investment project, which is suitable especially with respect to the purpose and subject of the project risk.

KEY WORDS: Project, risk factors, volatility, net current value, certainty coefficient.

1 INTRODUCTION

Risk is a phenomenon people meet in almost every situation during their lives. A man lives in the nature and in the society, he performs his duties, both in the economic and personal life, he is subject to the influence of environment which he lives in, he has his ideas, his own way of thinking, he enters various commitments and cooperation relationships, he takes care of his offspring, acquires education, creates new and unique values. In his judgement, he follows specific rules required by the society, but he also asserts his own ideas. He evaluates his own behaviour and he is responsible for acts of other people, and he leads them towards his own benefit as well as to the benefit of the society. The human activities are not straight forward but, on the contrary, they are very diverse and very often even contradictory. The events which we call risks lie in the contrariness. [5]

The identification of the risk factors, formulation of their importance and the assessment of the project risk extent represent, above all, the scope of the investment project risk analysis.

2. RISK IN INVESTMENT DECISION MAKING

The success of projects depends, to a certain level, on the quality of their preparation. The preparation should take into account both the risk and the uncertainty. The risks are undesirable, unexpected or unplanned events which jeopardise accomplishment of the project objectives, which have a negative impact on the project, and they occur with a certain probability.

The success of investment projects, either the increase of production capacities, launch of new products, technologies, etc., can significantly contribute to the growth of the company. On the other hand, their failure can cause performance decrease or it can put further existence of the company in danger.

The economic results of the investment projects depend on many factors (the so called risk factors). These factors influence the revenues and costs of these projects. The uncertainty of their development and hence the unreliability of their prognosis remain a fundamental problem of these factors. The real life experience deals with this difficulty by ignoring the risk and uncertainty. The decision making, regarding the risks and uncertainties, is transferred into decision making for „certainty of risk factors development", as a result of this approach.

Table 1 Factors influencing the project risks [5]

Factor	Lower risk	Higher risk
What to create?	Similar to previous work.	Completely new thing.
How to do it?	Well known.	Unknown.
Duration of the project?	Short (smaller change the world will change).	Long (the overall conditions may change) or very short (no time for solving the problems).
Previous experience with the submitter (client).	Successful.	Hostile and unfavourable.
Importance of the project for your organization management.	The highest priority.	Not important.
Availability of qualified sources.	Ample.	Some required skills are missing or they have other tasks.
The project team members experience.	Appropriate experience and they cooperated before.	Lack of appropriate experience and common team work.
What the project team members believe in and their attitudes.	They are sure the „three imperatives" can be fulfilled.	They take exceptions as far as meeting the conditions of the „three imperatives"are concerned or they are convinced they can not be fulfilled.
Source of the critical components and materials.	More reliable sources.	Only one source with uncertain reliability.
Project reputation (if it is ongoing for some time).	Excellent.	Very bad.

3 DEFINING THE EXTENT OF INVESTMENT PROJECT RISK

Each investor would like to gain financial benefits at minimum risk, i.e. it will be best to include this risk in the investment calculations. The risk is determined by means of the following factors:

- investment project volatility and
- current net value taking into account the certainty coefficient.

These two criteria will, with a certain degree of probability, reveal whether this project is solvable or not.

Volatility expresses the volume of risk investment into certain asset. It is usually recalculated to annual volatility and it can be expressed either in absolute value or relatively. In case of the financial instruments, the volatility increases with the time frame root on which it is measured.

Calculation procedure:

1) Calculate the expected revenues from the investment project.

$$\overline{PP} = \sum_{i=1}^{n} PP_i * Pst_i \quad [1]$$

where:

$\overline{PP}$ ... expected value of financial revenues (average revenues),

PP_i ... financial revenue of i-th variation,

Pst_i ... probability of achieving the financial revenues of i-th variation.

2) Calculation of the mean-root-square error.

$$s = \sqrt{\sum_{i=1}^{n} \left(PP_i - \overline{PP}\right)^2 * Pst_i} \quad [1]$$

where:

s ...mean-root-square of the financial revenues

3) Calculation of variation coefficient.

$$V_k = \frac{s}{\overline{PP}} \quad [1]$$

where:

V_k ... variation coefficient

A production company anticipates these potential financial revenues from a project with a certain degree of probability and it wants to know the „risk" it takes.

Table 2 – Probability of achieving the revenues

Estimate	Anticipated revenues in thousands of CZK	Probability of achieving the revenues
Pessimistic	4941	0,1
Neutral	24706	0,6
Optimistic	37058	0,3
Total		1

The expected revenues from a project would come to 26 570,1 th. CZK (see Table 3).

Table 3 Anticipated revenues from a project

Estimate	Anticipated revenues in thousands of CZK	Probability of achieving the revenues	Expected revenues in thousands of CZK
Pessimistic	4941	0,1	494,1
Neutral	24706	0,6	14823,6
Optimistic	37058	0,3	11252,4
Total expected financial revenues			26 570,1

The risk is most commonly quantified by means of mean-root-square error (s) which is used for reviewing the probability lay-out of achieving the future expected revenues. The mean-root-square error of financial revenues amounts to 9 047,96 th. CZK.

A risk amounting to 34 % is linked with the project financial revenues.

The higher profitability we require, the higher the investment project risk we would face, and the result of that would be the lower net current value.

4 NET CURRENT VALUE TAKING INTO ACCOUNT THE CERTAINTY COEFFICIENT

The certainty coefficient expresses the degree of probability that we will achieve the expected cash flow. It is necessary to keep in mind that the certainty coefficient needs to be determined for the individual cash flows during the whole investment operating time.

Calculation of the certainty coefficient:

$J_k = $ <u>*certain cash flow*</u>   [1]
     risk cash flow

where:

J_k ...certainty coefficient

It is necessary to discount it by the risk-free rate of return, in order to determine the certainty coefficient.

Calculation of the net current value (ČSH) taking into account the certainty coefficient:

$$\check{C}SH_{J_k} = \frac{\sum PP_n * J_k}{(1 + i_R)^n} - \frac{\sum KV_n * J_k}{(1 + i_R)^n} \quad [1]$$

If the net current value is positive – it means the project is feasible.

Necessary calculations for mentioned above example are in tables 4 and 5. We will suppose a risk-free rate of return of 5,5 %.

Table 4 Determining the certain cash flows

Year	KV	Risk PP	Certainty coefficient	Certain cash flow
2008	-9 842,00		1,00	-9 842,00
2009		3 952,80	0,95	3 755,16
2010		9 882,40	0,90	8 894,16
2011		19 764,70	0,80	15 811,76
2012		29 647,04	0,75	22 235,28
2013		29 647,04	0,70	20 752,93
2014		29 647,04	0,65	19 270,58
2015		29 647,04	0,60	17 788,22
2016		29 647,04	0,55	16 305,87
2017		29 647,04	0,50	14 823,52

Table 5 Calculation of the net current value

Year	Certain cash flow	Discount rate	Discounted cash flow
2008	-9 842,00	1	-9 842,00
2009	3 755,16	0,9479	3 559,52
2010	8 894,16	0,8985	7 991,40
2011	15 811,76	0,8516	13 465,29
2012	22 235,28	0,8072	17 948,32
2013	20 752,93	0,7651	15 878,07
2014	19 270,58	0,7252	13 975,02
2015	17 788,22	0,6874	1,2 227,63
2016	16 305,87	0,6516	10 624,91
2017	14 823,52	0,6176	9 155,01
Net current value			94 983,16

The net current value of the company is positive → 94 983,16 thousand CZK, which means that the given investment plan can be recommended for realization.

The advantage of this method lies in the fact that the certainty coefficient can be assessed for every single cash flow separately, and this way we can achieve a more realistic investment project evaluation.

5 CONCLUSION

The realization of investment plans and projects is a part of long-term strategic decision making and it results, above all, from strategic objectives of the-company. The long-term strategic decisions take place in the environment of risks and uncertainty, because it is impossible to predict the future development, and a concrete scenario depends on many chance quantities.

Both internal and external factors must be taken into consideration when making strategic investment and financial decisions, as they affect the company and the surroundings. The main long-term general objective of a company is to increase the company value. The quality and successful realization of the investments can bring a distinct contribution to this objective. The risks can be further evaluated using sensitivity analysis or by means of basic tools of investment decision making, such as the economic criteria of investment project evaluation.

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