RISK MANAGEMENT METHODOLOGY OF INVESTMENT PROJECTS WITH ENVIRONMENTAL IMPACT

ELENA GINDU¹, AUREL CHIRAN¹, BENEDICTA DROBOTĂ¹*, ANDY-FELIX JITĂREANU¹

¹University of Agricultural Sciences and Veterinary Medicine "Ion Ionescu de la Brad" Iași, Department of Agroeconomy, M. Sadoveanu Alley, No 3, 700490 Iasi, Romania

Abstract: In projects, a strategic component is to identify all risks that might influence their success, prevent and manage them effectively. Risk management is essential to add value to an investment and improve results. With the economic and financial crisis in recent years, increasingly, more companies have realized the importance of using a system of risk management, given the multitude of variables that can influence the success of a project. These include: legislative changes, global political and economic instability, natural disasters, climate change, human resources, liquidity risk, environmental impact, risk of erroneous calculation of total project costs, risk of failure into initial project schedule, prolongation risk, the risk of failure of internal rate of return (IRR) and net present value (NPV) etc. The study proposes a new method of risk assessment and management in the investments projects with environmental impact and its application in a case study. The method will take into consideration besides the economic and financial indicators, hard to be understood by smaller investors, a set of simple and important questions that they have to analyze before deciding to start an investment project. The new methodology will have a comprehensive approach from identifying the investment opportunity, writing investment project until its implementation. This will take into account macroeconomic variables and the microeconomic environment that can influence the success of project implementation. The main advantage of applying the new methodology are: knowing all the variables that influence the success of a project realization; awareness of the importance of applying an effective risks management related to investment projects with environmental impact, increasing the quality and success of projects.

Keywords: environment, management, projects, risk

1. INTRODUCTION

The objective of risk management is to ensure that significant risks are identified and appropriate measures are taken to manage them. That includes identifying, analyzing, evaluating and treating all types of risks, both internal and external to the company [1].

Usually, development projects from many areas like industry, agriculture, also have an environmental impact that also must be taken into consideration in risk assessment [2]. Among the used methodology, we can mention: assigning a significance of each environmental component for the evaluated project an integrated method as a combination between global pollution index and matrix of significance scale [3, 4], environmental cost–benefit
analysis that refers to social evaluation of investment projects and policies that involve significant environmental impacts [5], data envelopment analysis that uses shadow prices instead of relative prices etc. [6, 7].

Dikmen et al. [8] consider that “calculating the overall risk level of each project by multiplying the relative impact with the relative probability of each risk and then adding the scores compares the risk of projects and provides a relative risk score”.

Another approach to assess different risk types is the stochastic methods which dealing with duration risk or cost risk while the risk has been seen as a synonym for variability of expected duration or estimated cost. Also, human factors, personal experience, intuition, and judgment have to be considered in risk assessment and management. Taroun et al. [9] propose a method to assess risk impact as a percentage of project net present value (NPV), a common use economic project appraisal criterion to reflect the impact of damage on an intangible objective arising from a risk.

Hillson [10] proposes assessing both threat and opportunity within qualitatively and quantitatively models simultaneously. Dey [11] “seeks to identify the best strategy, project scenario, for managing project risk through the expected monetary value of each risk response strategy”. Cagno et al. [12] quantify the risk load allocated to each project element by identifying sources of uncertainty, activities affected and risk owners in monetary terms.

Ward and Chapman [13] argue that all project risk management methods have a small focus on the project management uncertainty, because the term risk encourages a threat perspective and is associated with events rather than a significant uncertainty.

Risk management and a presence of a risk manager with soft skills can make a very good impact on project results, by taking into consideration the uncertainties of the project, using risk management methods and the critical success factors of any business environment [14-16].

The study aim is to propose a new approach to assess and manage risks in investment projects, also taking into the account the environment element.

2. EXPERIMENTAL SETUP

For this study, a number of 23 investing projects with European grants were analyzed, implemented during the period 2004 - 2014, in agribusiness sector: farm machineries, dairy farms, cereal silos and milk processing units.

The research methodology is the qualitative research with nonstructural interviews for gathering data and data analyze. The nonstructural component (the free discussions) gives the flexibility in the investigation and offers the opportunity to correlate elements apparently with no connection. The interview is a simple research method, however, requires special abilities to plan and conduct it, analyze the content, give a meaning to information, make connections between elements (how one element influence each other), being a complex task that involves intensive work.

The questions were related to the issues encountered in projects implementation and the variables that influenced the project results.

More types of risks were identified with the open questions, analyzed and categorized into main groups. For risk identification it was considered all situations that negatively influenced the project results (decrease in economic and financial indicators of the investments, prolongation of the project, cancelation of the project, additional costs for investment, environmental issues etc).

3. RESULTS AND DISCUSSION

The main risk categories identified were analyzed on three levels: macroeconomic risks, business risks and project risks (Figure 1).
The first category, **macroeconomic risks** involves: global, political and economic instability, legislative changes, climate change and natural disasters (Table 1).

Table 1. Macroeconomic risks that influence a project success.

<table>
<thead>
<tr>
<th>No.</th>
<th>Variables</th>
<th>Examples</th>
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</table>
| 1   | Global, political and economic instability | Price dynamic (inflation rate, salaries, energy, changes goods and services prices).  
          |                                        | Demand data (population, demographic growth rate, specific consumption, demand formation, volume of traffic, and market volumes of a given commodity). |
| 2   | Legislative changes                     | New laws, taxes, new standards in raw materials, equipment, etc.           |
| 3   | Climate change                          | Heat & drought in agricultural production.                                |
| 4   | Natural disasters                       | Floods, fire.                                                            |

In the analyzed projects, the best impact was due to frequent changes in public procurement laws for investments. The economic instability also had a big impact in the period 2008-2010 when most of the projects had liquidity issues that delayed the implementation or diminish the total value of the project. Also, many investors decided not to submit projects to be financed. The climate change factor is becoming more and more important since the agricultural production level is very much related to climatic factors like precipitation, wind, heat, drought, hailstone, etc. Of course, there are insurance that can cover this risk, still, the forecast income of the project is affected and at the same time the liquidity indicators and other project indicators that must be respected for all the implementation years (between 1 and 3 years) and also 5 years after a project implementation, like profit rate minimum 10%, rate of return on invested capital minimum 5%, coverage rates by cash flow more or equal 1.2, a positive NPV and cash flow etc. Failure to follow into the indicators level can leads to withdrawal the funding from the projects.

The second group of risks analyzed are related to five business risks: development, manufacture, marketing, finance and growth risks (Figure 2).
When the business risks as a whole are analyzed as regarding a project, it raise a set of questions, like:
- can the new developed product be integrated into the existed business?
- it exists the needed capacity for the new product to be manufactured?
- can the new product be effectively sold on the market?
- can the sales generate a positive cash flow in the company?
- the positive cash flow can generate a continuous growth of the business?

Besides macro economic and business risks, the projects also have specific risks that must be considered, like: project team, budget, technical aspects, technology transfer, financial risks, environment risk, project schedule (Table 2).

### Table 2. Project risks that influence a project success.

<table>
<thead>
<tr>
<th>No.</th>
<th>Variables</th>
<th>Examples</th>
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<tbody>
<tr>
<td>1</td>
<td>Project team</td>
<td>Low qualification, competencies, communication, which results in a defectors teamwork.</td>
</tr>
<tr>
<td>2</td>
<td>Budget</td>
<td>The resources are not enough; the incomes are hard to be made.</td>
</tr>
<tr>
<td>3</td>
<td>Technical aspects</td>
<td>The idea/technology is not correct.</td>
</tr>
<tr>
<td>4</td>
<td>Technology transfer</td>
<td>The technology cannot be applied as planned and, therefore, the products cannot have the forecast characteristic.</td>
</tr>
<tr>
<td>5</td>
<td>Financial risks</td>
<td>Risk of an erroneous calculation of total project costs, the risk of failure in the internal rate of return (IRR) and net present value (NPV).</td>
</tr>
<tr>
<td>6</td>
<td>Environment risk</td>
<td>Air, water and soil pollution, environmental regulations.</td>
</tr>
<tr>
<td>7</td>
<td>Project schedule</td>
<td>Prolongation of the project that determine more costs.</td>
</tr>
</tbody>
</table>

Every investment project brings a challenge to the manager of the company because it has to be analyzed the impact on the whole business on long, medium and short-term. In some cases, a European projects can show good results on short term, however, on medium or long term can be seen some hidden costs and the opportunity of a project implementation can decrease. Some of these costs are related to:
- a long implementation term - a European project takes more time than an own financed one (2-3 years more time);
• the prices of equipment/construction, raw materials, increase in that period;
• change in technology – new standards arise, some materials are not manufactured anymore;
• the suppliers are chosen within a public auction mainly based on price (cannot be taken into consideration the credibility of the supplier, after sales services, the quality of the products can be lower);
• project score: employee number can artificially increase and also the costs;
• projects indicators must be maintain five years after the implementation.

All the risks identified for a project must be quantified by: the probability of appearance (minimum value – maximum value), costs estimation, the impact and the effect of every known risk on the project success, the positive risks (income resulted from the appearance of some changes like a good change in legislation).

Further, measures for each risk must be established, the risk management variants includes:
• avoiding risks, or loss prevention – ways to prevent a loss from occurring, with methods like trainings for employee safety;
• assuming risks – by accepting that a loss can occur and be ready for consequences;
• reducing risks, or loss reduction;
• transfer the risk - insurance.

Also, an important aspect is establishing a person who will supervise the appearance of every risk, and if risk appears, the right measures will be taken.

4. CONCLUSIONS

The main aspects necessary to be analyzed when deciding to implement an investment project with European grants are:
✓ a market study (the market where the business must have a growth potential);
✓ a business study – can actual business support a new investment? Can the business be profitable without the project? The project must be seen as a part of the business that can grow it faster.
✓ which are the hidden costs of the project?
✓ what positive results can bring a change in the plans?
✓ everyone involved in the investment process should consider the risks and be involved in this process;
✓ significant barriers to risk management: lack of human resources/expertise; complexity of the processes; potential benefits are not clear; resistance to change at the executive level; existed technology is not inadequate; lack of financial resources;
✓ proactive risk management is better than a reactive one – being prepare for unlikely events is the most important lesson from the recent crisis;
✓ how much money should be invest on prevent the loss that might never happen?

By taking into account an effective risk assessment and management, when an investment project is considered to be implemented, the companies can register an increase in competitiveness in their business.

For the success of the projects, a project risk manager is recommended to be assigned, with strong business development (that can understand the business as a whole) and also soft skills (stress, time and change management, interpersonal relationship skills, leadership) that can prevent the appearance of negative events, conflicts and take appropriate measure when a risk appear.

REFERENCES