WAYS TO IMPROVE RISK MANAGEMENT IN COMPLEX PROJECTS

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Abstract: *Risk is present in all human activities; it can be associated with health, security, economy or environment. The goal of risk management is to control, prevent or decrease potential damages. Technically speaking, risk management means all the activities coordinated so as to orient and monitor an organization from the risk perspective. Risk management helps formulate the most adequate decisions by taking account of uncertainties and their effects upon the accomplishment of proposed goals, and argues the need to lay down and implement coercive, preventive actions typical of the management of a company. The benefits of good risk management and also the consequences of bad management shall undoubtedly be felt by an organization's board, employees, shareholders, customers as well as by all other entities concerned with organizational performance. Projects generally include a number of risks in common with those in business as well as certain typical ones. In complex projects, it is this very feature – complexity – which generates the need to implement risk management for the purpose to diminish, remove, and monitor the risks which can influence the development of a project.*

Key Words: *risk, risk management, complex projects, planning*

JEL Classification: M10, M11

Introduction

The aim of the present paper is to present various aspects related to risk management in complex projects and also the opportunities to improve it. Risk management is more and more frequently regarded as a general function of organizational management whose target is to identify, analyze and control the causes and effects of uncertainties and risks within an organization. Successfully accomplishing a complex project at a maximum level of efficiency requires the planning, ensurance, allocation and monitoring of available resource consumption. Projects involve the achievement of intercorrelated activities that can be modelled by means of networks. The analysis of such systems allows a manager to plan, control/supervise and reorganize resources so that organizational targets should be reached properly and duly. Programming a project's activities envisages the most economical gradual execution of these activities.

Research Methodology

In order to introduce the ways to improve complex projects' risk management, I have considered organizing my paper into two directions: its former part presents theoretical aspects, whereas the latter includes an empirical research by verifying the improvement methods of complex projects' risk management. For this purpose, in order to show theoretical aspects, the methodology I have used has involved the following stages: the conceptual delineation of the complex project notion, the identification of aspects referring to planning as a stage of project management, the introduction of applicable methods to identify and analyze the risks entangled by project accomplishment, and the set-up of directions regarding the ways to improve risk management in complex projects. The practical validation of theoretical aspects in terms of the improvement of risk management in complex projects is found in the latter part of my paper which has involved taking the following steps: ranking an investment project into the category of complex projects, using the specific project risk management tools and formulating improvement methods of the respective project's risk management.

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1. Theoretical aspects about complex projects' risk management

1.1 Complex Projects – Conceptual Definitions

*A **project** can be defined as an individual process involving several coordinated, controlled activities, having beginning and end terms, guaranteeing the accomplishment of a goal according to specified requirements including restrictions of time, cost or resources.*

In the Gower Manual for Project Management, a project is defined as a *« unique, innovative, temporary undertaking put in practice in order to achieve a new growth-related goal »*. As it can be seen, most definitions of the « project » term converge to the inclusion of their main *specific elements:* assigned targets, specially allocated resources, planned activities, devoted team, determined duration.

Due to the level of its degree of uniqueness and complexity, as well as to the difficulties arising while defining the objectives and determining the duration and costs, every project has a certain uncertainty level. Every project is constrained in different ways by the purpose, duration and cost of its targets.

The Gower Manual shows that projects can be defined by two threefold categories:

1- they are **temporary (unrepeatable), novel and unique;**

2- they are **urgent, integrating and uncertain.**

To approach these threefold features, project plans should be: **set up in stages**; **flexible; goal oriented.**

Projects in general and complex projects in particular are characterized by three fundamental elements: budget, time, quality. Yet, all the three elements are generated by the resources needed in the progress of any project. Resources' quantity, quality and scarcity determine both the budget and the quality of a project, and the availability of necessary resources determines a project's accomplishment duration. The resources used in a project include human, material resources, equipment and subentrepreneurs. The availability of such resources can seldom be regarded as certain due to seasonal constraints, work conflicts, equipment flaws, additional resource requests in a company and in a project, delivery delays and other circumstantial uncertainties.

In larger, more complex projects, planning is usually done in several versions:

- a *masterplan* (strategic plan) which refers to the main goals and long-term actions. It is this plan that a project manager uses as a guideline when making overall decisions;
- one or several *detailed plans* corresponding to the other hierarchical levels of a project management structure. The higher the amount of details, the lower the hierarchical level they address.

The next performance stage of project management is ***planning***. It is during this stage that decisions are made referring to the organizational approach to be adopted and the project drafting begins. After having identified an issue during the previous stage, after a number of project-related ideas have been formulated to solve the issue and project goals have been set up, in this stage there is the rigorous selection and planning of goals as well as the preparation of policies, procedures and programmes needed to reach the goals.

- **Preparing and Planning Project Activities**

Planning a project's activities envisages:

- laying down every activity that must be undertaken in project development;
- assigning the person in charge with the respective activity;
- describing the time sequences and manner of activities' interference.

- **Identifying and Planning the Resources Needed in a Project**

The more complex a project, the more difficult the task to estimate its resources. Nevertheless, planning a project cannot be complete without finding solutions for the issue of allocating the necessary resources. There are two ways to programme resources:

- limited time programming – where resources are unlimited, but terms are fixed;
- limited resource programming – where resources are limited, but terms are flexible.

Quantifying the costs of project implementation is done through a budget. The budget of a project must be clear and very well detailed, per stage/activity and centralized according to various types of expenses.

As far as the implementation of a risk management integrated system within a company is concerned, several internationally recognized standards recommend that it should:

- be an ongoing process integrated in an organization's strategy;
- take account of all the risks affecting an organization's performance;
- be integrated in an organization's culture;
- transform a strategy into tactical, operational goals, assigning every manager and employee involved in risk management with certain responsibilities as part of their job descriptions.

1.2. Applicable methods to identify and analyze risks

In order to identify the risks entangled by project development, a number of methods may be used:

- general methods ensuing from other fields of activity: risk table, control lists, event network, flaw network, brainstorming, Delphi technique.
- project management-related methods as is the case of the Risk Breakdown Structure (RBS).

Risk Breakdown Structure (RBS) was suggested for the first time by David Hillson as a resource-oriented class of project risks which organizes and defines a project's full exposure to risks. Risk breakdown structure is a hierarchical structure of potential risk sources.

The most important specific methods applicable in the analysis of risks in any project are the method of expected monetary value, the method of standard normal deviation, the matrix of probability - impact, and the matrix of risk breakdown. The method of expected monetary value means considering several scenarios or events if one takes account of their subjective likelihood of occurrence. The method of standard normal deviation is a method to quantify risks and refers to identifying the risk level associated to a project's certain execution duration proposed by its beneficiary or estimated by the project manager. Relying on the elements of the PERT technique, the method is concerned with the duration of project activities as random variables characterized by average and dispersion. The matrix of risk ranking (the matrix of probability-impact) as a technique for the qualitative examination of risks aims (as the other examination methods do) at intermingling the likelihood and impact of each identified risk in order to find its level of importance to project accomplishment.

1.3 Ways to improve risk management in complex projects

The ways to improve the process of risk management are mainly related with the plan for risks' management which has two suggestions:

a.the former variant focuses on the use of monitoring and control records and applies in simpler projects;

b.the latter variant typical of more complex projects emphasizes the management reports of project risks.

Risk management plan is used all throughout the operation of risk management and includes the procedures to be utilized in risk management, the people in charge, the resources allocated, how to implement contingency plans and how to appreciate the outcomes obtained by means of risk management. The plan for risk management can be formal or informal, detailed or just schematic, yet always substantiated according to performance requirements.

Another suggestion for improvement refers to the use of reports at the end of a project (project completion balances) as ways to characterize the cause, occurrence and

impact of risks. The reports at the end of every project must outline the main difficulties and risks incurred by project accomplishment.

The analysis after project execution is an aspect acquiring more and more significance. This is because the expertise acquired during project implementation shall help avoid mistakes from the past in the new projects. There are also circumstances when projects can end in an abnormal manner. The causes underlying such failures are:

- wrong initial planning;
- insufficiently allocated resources;
- changes in an institution's strategy and interests;
- key people leave the project;
- exceeding the estimated time.

The difficulties encountered in project implementation are frequent. They often result in the failure to comply with project fundamental objectives from the perspective of techniques, costs, terms, therefore quality. These difficulties are more frequent and important if the project is bigger, if it is further from the project managers' usual field of activity, and if the number of project participants is higher.

A risk manager should prepare specialist documents which could help him/her as a reference even long after project completion.

Preparing a list of potential risks relies on the idea of asking all the people involved in a project implementation regarding the factors that could directly or indirectly contribute in the negative influence upon the activities or outcomes ensuing from financing suggestions.

The main ways for managers to get in contact with their partners' ideas about the potential risks that can occur in a project are: *brainstorming sessions* and *interviewing.*

Building a project's risk profile is generally useful when managers can use the expertise they have gained in previous projects to identify the typical risk factors also to be found in the structure of the projects they are currently involved in.

2. Ways to improve the risk management of complex projects – Practical Validation

In order to illustrate the application of risk management in complex projects, I have analyzed a company which by means of its suggested investment project aimed at accomplishing an Integrated Agricultural, Industrial Farm to grow animals and industrialize/process the raw materials coming from other agricultural farms.

The first goal of the company's growth project on a five-year term was the 2008 development of the investment project for the "Building of a Milk and Cheese Factory". The company requested for its project funds a non-reimbursable financial grant from the European Union's funds in compliance with the conditions of the National Programme for Rural Growth and in August 2008 it submitted the necessary documentation and the Financing Application.

After the documentation had been analyzed and the project had been declared eligible, on 20 December 2008 the respective company and the Romanian Payment Agency for Rural Growth and Fishing concluded a financing contract which stipulated that the contracting authority (A.P.D.R.P. - Romania) bound itself to grant non-reimbursable funds of maximum 5,630,791 RON, namely 50% of the project's eligible value.

The complexity of this project lies in its pursued objectives:

►building a milk processing factory with a capacity of 8000 liters/day;

►endowing the factory with machinery and equipment for milk and cheese processing, with a high automation capacity by means of imported Italian technology;

►accomplishing a diversified structure of new products in the category of milk products, namely drinking milk, fresh cheese and ripened cheese;

►providing the dairy factory with the necessary endowment to meet the environment-related, sanitary and veterinary requirements such as: sanitary filters for the personnel, process water treatment plants, laboratories to analyze and test products and technological flows meant to ensure the factory's biosafety;

►investment efforts for the modernization of the entire infrastructure of the existing zootechnical resort, for the establishment of a farm where 1500 animals and other young livingstock can be grown.

The activity of project's risk identification has led to the preparation of a potential ***risk control list (see table no.1)***.

Table no.1 Risk control list

Risk sources	**Identified risks**
1. **Internal factors**	
• Organization of project team	- bad organization of project team in terms of team structure (poorly/inadequately qualified members)
- the way of project management development during project implementation	- bad project management - lack of project management components (for example, risk management) - low attention paid to certain components of project management (for example, risk management)
• cost delays and overruns	- cost delays and overruns (for example, exceeding the investment cost)
• the set of formal and informal relationships among the parties involved in project implementation	- bad communication - occurrence of communication barriers both inside project teams and in companies' relationships with the outside environment
• level of estimated performance	- failure to reach the estimated performance level
2. **External factors**	-
a. ***economic-financial environment*** • macro-risks • micro-risks	- unfavourable changes in the economic context at world and regional levels (for example, the world financial crisis, consumption reduction, changes in the EU's agricultural policy with respect to subsidies offered to the targeted sector) - change of interest rate on reference finanacial-banking markets - failure to accomplish the estimated cash flow - wrong marketing policy
b. ***legal-institutional environment*** • fiscal regulations • monetary regulations • customs regulations • competition-related regulations • regulations in social field legislation	- legislation changes with bad effects upon projects (for example, increasing debts to the public budget/local budget, changes in credit conditions) - emergence of major competitors on the national market - restriction/limitation of access to outlets
c. ***social environment*** • population growth rate • population structure • population density	- impossibility to employ necessary personnel in the required number and qualifications

d. ***operational factors*** • implementation duration • large number of activities that must be led and coordinated • complex relationships that might emerge among project team members • contracting relationships among numerous parties involved	- increase in duration of investment - inadequate coordination of project activities
e. ***natural/ecological environment*** • massive flooding • landslides • strong earthquakes • impact upon biodiversity, population, human health, water, soil, air, climate, cultural heritage and landscape	- massive flooding - landslides - strong earthquakes - negative impact upon biodiversity, population and human health - pollution of water, soil and air - unwanted changes in climate, cultural heritage and landscape

In this project, although it had obtained the required financing from European funds (table no.2) because it had been evaluated as having an acceptable risk level so that to benefit from such financing, unfortunately getting a loan from bank institutions was not possible to cover its own financing sources because the banks thought the credit risk was too high and they consequently did not approve the necessary loan.

Table no.2. Structure of project financing

Euro /Leu exchange rate: 3.6795 of 5 March 2008 Public financing percentage = 50%						
	Eligible costs		**Ineligible costs**		**Total**	
	- RON -	Euro	- RON -	Euro	- RON -	Euro
Non-reimbursable public aid	5,701,932	1,549,648			5,701,932	1,549,648
Financing sources to add to necessary funds of which:	5,701,932	1,549,649	2,452,954	666,654	8,154,886	2,216,303
- self-financing			2,452,954	666,654	2,452,954	666,654
- loans	5,701,932	1,549,649			5,701,932	1,549,649
PROJECT TOTAL	11,403,864	3,099,297	2,452,954	666,654	13,856,818	3,765,951

The major risk with a maximum negative impact which led to the failure of this project was the impossibility to have all the necessary project funds because of a financial-banking risk source. It is believed the importance given to such a risk type was very low and unrealistic which was a major mistake of the decision makers involved in this complex project.

It is thought that the main improvement way of this project's risk management would be the realistic appreciation of risks, namely correctly identifying risks, detailed quantitative and qualitative analysis of risks, and proper approach of risks.

Conclusions

Management can be differrent from one organization to another but in every company it relies on three basic fields: strategic management, operational management, and risk management. Risk management is an iterative process conducted during the entire life duration of a project and it helps identify and analyze risks in order to find the right answers for each one. It is one of the essential components of a project management.

The complexity of a project lies in involving various planning and implementation abilities, various partners or supporters, and it suggests a large number of activities, events and tasks. A complex project usually brings together several subprojects. In the case of a complex project management, it is believed necessary to have very rigorous planning and correlation of the constituting subprojects. These two elements are the key of complex projects' management as they provide a considerable decrease in risks.

In order to improve the risk management of complex projects, it is also necessary to develop the culture of risk management. An organization should monitor and grow its risk management culture as follows:

- by proving the actual leadership of risk management at the highest management level as an example for all the employees;
- by monitoring and communicating the value added through risk management;
- by providing education and training related to risk management ;
- by monitoring the attitudes towards risk management;
- by ensuring that the formalized policies and procedures of risk management are extended in all organizational processes including strategic planning, operational processes and change management.

In the investment and modernization project analyzed above, the principles of risk management can be applied, various tools associated with risk management can be used, the culture of risk management can be improved within an organization, but because financial risks significantly contributed in this project's sustainability and completion, it is recommended that the project should be reassessed, a PEST analysis should be undertaken and risks should be correctly identified, especially those related to finance and banks.

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