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## **THE ROLE AND IMPLICATIONS OF RISK MANAGEMENT IN PROJECT MANAGEMENT**

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### **ABSTRACT**

The risk if occurs, will have a negative effect often on one of the project's purposes. In fact a risk has a cause, and if happens, has several effects. For management of the effects them should predict and control. Risk management is a systematic process and used for analysis, answering, and measurement of the risk on projects. The main purpose of it is the effective management of risks. In this paper, first the definitions by experts provides of risk have been reviewed, the risk management process is described. The paper consists of three main parts: Identification of Risk, Risk Analysis, Risk Control, each of them explain the relevant subsection. It should be noted that achieve an optimal risk management the establishment of a risk management team who has skills in the field of alternative processes, software project management, monitoring and control that are involved in the project process is essential.

**Keyword:** Risk, Risk Management, Project Management, Monitoring and Control

### **INTRODUCTION**

Risk is the potential of losing something of value. Values (such as physical health, social status, emotional well being or financial wealth) can be gained or lost when taking risk resulting from a given action, activity and/or inaction, foreseen or unforeseen (Passenheim, 2009). Since risk is problematic always to project and timing of the project process, in recent years has been the topic of project management.

Risk management has important role in project management. Little amount of risk management will affect the project whether it fails or not.

Risk management is the identification, assessment, and prioritization of risks followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of unfortunate events (Hubbard, 2009) or to maximize the realization of opportunities.

Risk management's objective is to assure uncertainty does not deflect the endeavor from the business goals (Antunes, 2015).

The possibility of loss, injury, or other adverse or unwelcome circumstance; a chance or situation involving such a possibility (Oxford Dictionary). Risk is an uncertain event or condition that, if it occurs, has an effect on at least one (project) objective.

#### ***Type of Risk***

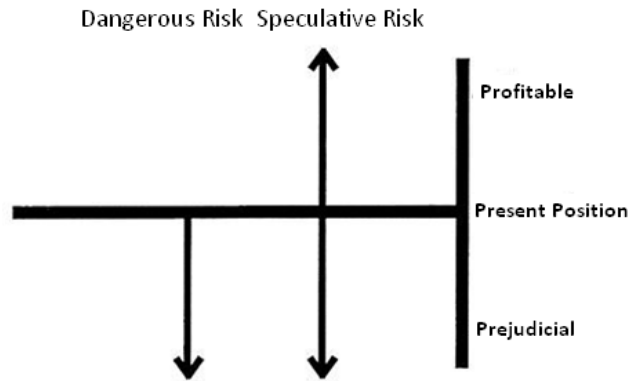
Term risk can be proportional to the use of the various categories (Wideman, 1992). For example, the way the relationship between risk and opportunity depends on the type of look to risk. Sometimes, a situation also provides opportunities for profit and loss potential.

But in most cases, there is no opportunity to profit and loss is only potential. The risk can be divided generally:

- *Speculative Risk*
- *Dangerous Risk*

In the picture below, the difference between these two categories is depicted.

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**Picture 1: Two categories of risks**

Let's consider that the project manager could reduce the risks by starting essential counter measures. The project risks are the risks that an put a project on delays and could decrease the planned budget. The field risk management has dealt with negative or positive sides of the risk. Generally, the project team deal with the safe side of the project. So often, the negative squalls are focused in the risk management.

**Risk Management**

Several risk management standards have been developed including the Project Management Institute, the National Institute of Standards and Technology, actuarial societies, and ISO standards () [4][5]. The procedure of risk management is to reduce the noxious effects of monetary financial loss with:

- 1- Measuring the effects of monetary loss and
- 2- Reduce the amounts of loss or their monetary effects

The monitoring purpose in the projects is to validate each activity in the project. The possible advantage and threads of factors related to these activities should be filed and categorized. If the project team knows the risk management importance of the process, the success eventuality by itself is not to be done by the project manager. All the mortgagers should take care of the problems. Totally, the explorations of risk terms should be done as follows:

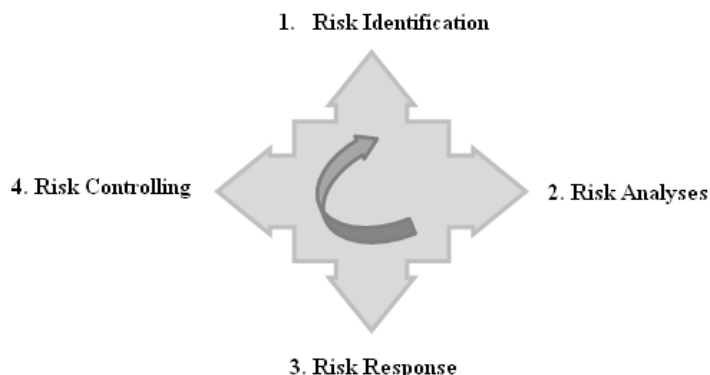
- Project staff
- Risk management team
- Subject matter experts from other parts of the company
- Other project managers
- Company experts
- Customers

There are lots of factors but the team should always be outbreak since they face the project everyday and they should have new information from time to time. Out of stakeholders or experts that should be provided with structural and fundamental information, this is considered to be very important and necessary part of the project. Risk management is considered to be done in all project pragmatic phases. In planning phase the team identifies the risks and mitigation factors and classifies them. In the further allocation of the resources, budget allocation and planning phases, the reverse planning is to be categorized.

After the primal identification phase passed, the risks must be managed until the project is over or done. New risks should've happened, and in that phase the risk management means something. The manager and team should think about the problem at first and cause strategies to obviate the problem. All the re-plan activities can cause changes to the budget, plan and resource allocations as which will trace the project repletion.

The way the team faces the risks apparently is described in primal phases of the project, then it would be categorized and would be executed totally in the cycle of the project. Picture2 shows the risk management process.

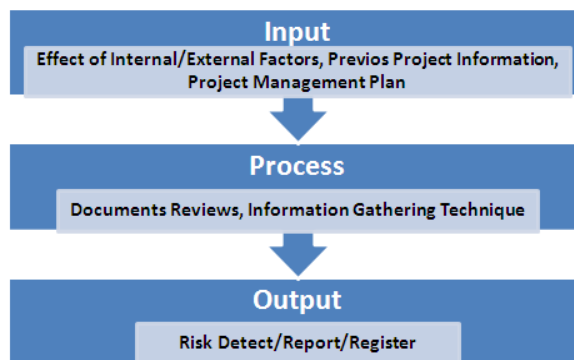
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**Picture 2: Risk management process**

**Risk Identification**

The noted step is one primeval phase and most important tasks since it makes background for further steps. The identification is very similar to transformation process. At first you have inputs and in the end to gain results. In the middle phase we have tools and techniques to reach the transformation process (picture 3).



**Picture 3: Risk identification**

From inputs to risks, inner and outer factors of the project environment should've been noticed. Outer factors are those whom help inner factors and inner ones help the organization. Some examples are as follows:

- Economic conditions
- Social and legal trends
- Political conditions
- Fluctuation in demand

Typical examples of internal factors are:

- organization culture
- Leadership
- Systems and technology
- Staff capabilities/numbers
- Procedures and processes
- Communication effectiveness

Recent project information usually contain experiences, developments, hints failures and risks inside them in which are useful to characterize the risks of recent project. The last characterization of our project is the first step to gather the needed information. If the noted information is kept in one filed archive at first, it will improve the project and the organization. The management scheme includes: Planning, Assumption

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and Decisions, and a numbers of relations ways between stakeholders and goals, cost and baseline. The noted step of: Identification of the risk needs that every person amongst the stakeholders understands the project completely. At that phase you can revise the about the project from different angels and explore the risks from where you have never been noticed before.

In the tools and technique step you start classifying to lysis the information that had been exist in a form. This means the project scheme and the documents:

- Project plan
- aim of Project
- Work breakdown structure (WBS)
- Project manner
- Cost estimates
- Resource plan
- Implementation plan
- Assumptions and Constraints list

Usually the project starts by studying the files of old projects. Using this method you'll find an answer to your questions. "Is the project really realistic in terms of budget, scope and schedule"? Several information gathering methods can be used to identify risks related to the project. The major three used are:

#### **Brainstorming**

This means to gather information and creative technique which will aid you to find risks and find way to resolve them. In this phase a group of members and experts of (Brainstorming) do it about the identifications of the risk and dangers. The set of ideas are generated under siege of a leadership or facilitator. The brainstorming goal is to observe total lists of risks.

#### **The Risk Breakdown Structure**

The subject appears on any certain risk within projects, in which is defined and arranged by some categories and their properties in vertical branches. Normally it will appear all certain risks and the reason of why they took place.

The SWOT analysis is also used to show possible risks. In the 60s and 70s Albert did some research at Stanford University with data from American 500 public organizations, and by gathering this data set he did the SWOT analysis. SWOT is a brevity term and seeks the strengths, weaknesses, opportunities and threats. Often SWOT is the brainstorming basis. With showing strengths and opportunities, sorts of clear or predictable weaknesses and threats will come to be shown. SWOT is suitable to be used for companies, their departments of certain jobs and branches along with for individual people. An advantage of SWOT analysis is that they are and proportionally cheap except the times they are required. SWOT helps us creating new ideas. On the other hand, this could be called a disadvantage as the easiness implies that there is no snatchy information about how to reach an objective or how important a threat is. One cautious use of the SWOT analysis is required and is highly counseled.

These tools and techniques will give the project manager the ability to gather respective information, then to analyze them and clarify risks and opportunities for the project purpose, its scope, cost and budget. The information will then be addressed on the sheet named risk report/register, which is the main deferent of the risk identification step. The risk report contains all identified risks and their elucidation, risk categories, their causes, the possibility of an occurrence, the sole efficacy of one certain risks, possible replication, and their main operant. The process of risk recognition has 4 steps in total (Risks):

1. Lists of identified risks recognized risks with their main causes and risk conjectures are shown
2. List of potential responses – Potential responses recognized here will function as inputs to the risk response planning process
3. Radical causes of risk – Radical causes of risk are basic conditions which take (lace the identified risk)
4. Updated risk Stacks – The identifying process of risks can lead to new risk stacks being which learnt from the previous tense points of risk identification, this step can contain checklists of possible risks,

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views, meetings and brainstorming, reviews of plans, different analysis and... To do this task favorably there is need for one precise knowledge of the project organization, its market, the legal, social, political and cultural environment in which the project operates in it, along with developing of a clear conception of the strategic and operational objectives the organization has, which covers critical factors of success and the threats and opportunities related to the achieve such goals.

The risk identification must take place in a methodical path. This is done to ensure that all important task and possible consequences related to these activities are identified. We could outsource the total risk management process, but an inside approach seems to be more effective when conditions are fully applied.

First, the communication channels should be well-defined and consistent and processes and tools should be well coordinated.

### **Risk Analysis**

The origins of risk analysis explained above the risk identification. Risk analysis contains a full and continuous deliberation which should be realized quantitatively as well as qualitatively for all risks. Our scope is to detect possible interrelationships and give the project manager the ability to identify a kind of important injunction, which also is called prioritizing.

Furthermore, the tasks of the project itself and the organizational goals could be found. The appraisal of the risks should be faced with these factors:

- **Objectivity:** The amplification to the special market should be considered to make the objectivity practicable. To evaluate inner risks, subject evaluation is often essential.
- **Comparability:** The assessment of risks should lead to analogous results. Thus the organization should use a set and methods and data.
- **Quantification:** By means of quantification the organization is able to detect deviation from the targeted goal.
- **Consideration of affiliations:** to study the object this is the hardest part of risk evaluation. Things like compensation and interdependencies can emerge. Not to realize the connections between risks and their rights for the department and possibly for the whole organization can be a big risk. That's why the project team should be careful on what a risk is and the reaction to it can mean not only for the team but for the whole organization

The most commonly used technique to analyze a risk is called scenario analysis. This subject simply consists of the probability of an event to be taken place. The scenario analysis is part of many more approaches to the risk analysis, for example in a matrix, the failure mode and effects analysis (FMEA) or the program evaluation and review technique (PERT). To more details and knowing how it works, reference number 10 to read.

To make the risk analysis more exhibitively, the organization can use the matrix to show the importance of some risks. The matrix shows two aspects of the risk: the impact it would have and the probability of its occurrence.

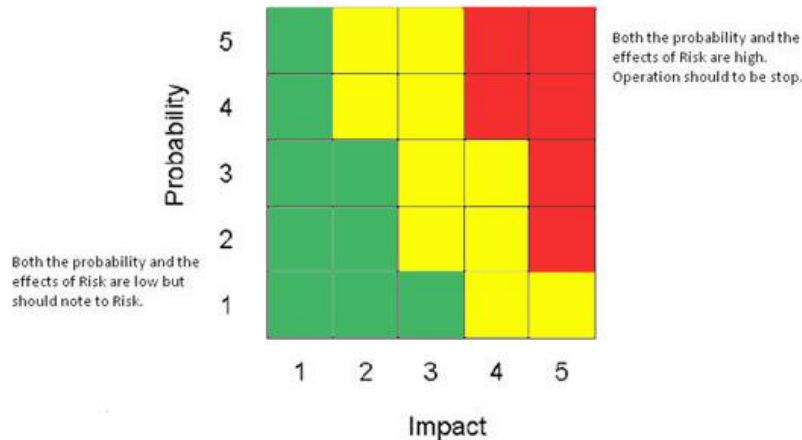
A very often used matrix has 5 times 5 fields, each with various value of probability and effect (see Picture 4). As each combination means something for the project, the matrix is divided into a green, yellow and red zone.

As it is known from traffic lights, the red zone, represents the major risks and has no good sign. The yellow color is moderated and the green light is for minor risks. As it is clear, the red zone is arranged on the right-hand side and the green zone on the left, where the impact is less. In between there is the yellow zone.

The red zone goes very deep into the probability menu since the impact is still so high although the probability is low. In general one can say that the impact is more important, as this comparison shows:

% 10 probability of losing 1 Mio. € is considered to be a more serious risk than a 90% probability of losing 1000 €.

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With matrix help, the project manager can prioritize the risks as he knows which have priority at first. Prioritization also helps to adopt the given means reasonably (Wideman, 1992).

The FMEA (Failure mode and effects analysis) model is similar to the matrix but flourishes the impact and probability by the detection, which means how hard it is to actually realize the risk. The equation of detection is:

$$\text{Impact} \times \text{Probability} \times \text{Detection} = \text{Risk Value}$$

To work with the equation, each dimension has to be evaluated by a five-point scale. Detection shows the project team ability to detect that the risk is dangerous. On the 1 to 5 scale, “1” would mean easy to detect and “5” that the detection would probably only happens when it is considered too late. The outcome of the data has a range between 1 and 125. ‘1’ shows the risk probability is low, an impact of level 1 and would be easy to detect. In other cases the result ‘125’ shows that the team had to work out a high-impact risk whose probability is high and nearly could not be detected. This means the consideration has to be done whether to start the project or not if the risk could not be mitigated or transferred. All and all, the range between 1 and 125 can be used to define the perilous risk nature.

PERT (Program evaluation and review technique) was developed within the U.S framework of Navy’s Polaris-Project. There were many new parts coming from R&D. To solve the planning problem, the team asked all suppliers to estimate production duration. We assumed that with the help of the program evaluation and review technique, the construction of the Polaris rocket would be done after two years, which is about 45% earlier than first estimations.

PERT is similar to the critical path method (CPM) known from the planning theory. The methods developed nearly the same time. The difference is CPM uses most frequent duration and is used for standard projects. In contrast, PERT is used for projects with high uncertainty and little experience. PERT is utilized to compute the probability of meeting different project durations. PERT is useful as it predicts the competition time and its probability. Furthermore, it finds out the activities which has slack time and those that can lend resources to critical activities. Disadvantages are when our estimates can be sort of subjective and also depends on the experience of project members. Furthermore, the beta distribution does not always match the reality. It is said that PERT often runs out the project completion time.

**Risk Control**

The exact last step is the risk control. Which are executing the risk response strategy, monitoring and triggering events, initiating contingency plans, and continuously watching for new risks. In risk control, the changes in management systems are also an essential one. During the project there might be changes in goals, budget, and planning which the project manager deals with. It is project manager to monitor’s duty to predict all possible risks. Risk assessment and updating should be part in every status and progress report system. Also, the project team should have the constant awareness about the unpredictable risks occurrence. Team members don’t want to find out new risks and problems. If in an organization there is

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punishment, then it is clear that the team members will be opposing to speak up about these topics since they think these problems might reflect their bad work. The tendency to suppress such important information is higher when the responsibilities are unclear and the team is under great time pressure from the top management to finish the project in within a short timeframe.

So it is the duty of the project manager to create an environment in which all team members feel free to accuracy to concerns and reflect mistakes so that they should be encouraged to identify problems and new risks and finally the project manager has to have a positive attitude to resolve the risk. It should be the standard for every project, because hiding risks or denying problems is dangerous for the future success.

In very big and multi-process projects the risk identification and assessment step has to be repeated on a regular basis. Outside stakeholders and experts should be enters to assessment so that they also can review the actual risk profiles of the project. Other useful key success factor is the study of responsibility for every identified risk. This step is very important and need to accuracy in the case where multiple organizations are involved in the project. It is very important that the responsibility for each identified risk is marked by the mutual agreement of all relevant stakeholders so that everybody knows who is dealing with what. If total of the risk management process is not formalized, both the response and the responsibility will worthless.

Project audits usually play an important part in the Risk Response Control. An audit can be defined as a systematic and independent analysis. The term “audit” has its origin in the Latin language. The Latin word “audire” means “hear”, so quality audit means a “quality hearing”. With the help of audits it can be controlled if quality work and the results which are gained from that work to the standards and the planned needs. It controls whether the work is done economically and rationally. The main aim of the audits is researching and detection of weak aspects project.

Every audit results in an audit report. Internal inspections must involve the basic information and methods for the assessments and observations in time of project documentation or personnel qualification. Of course non-conformities also have to be reported. Other part of the risk management team is creating a change management system. Commonly you could classify these changes into the following categories:

--Changes in Scope: For example the project customer wants to implement an additional feature or a change in design which really represents a big challenge.

--Implementation of contingency plans: In this situation a risk really occurred. Now counteractive measures have to taken. These actions need resources in terms of cost and schedule and so represent a change to the baseline.

--Improvement changes by project team members: For example a change in suppliers. A new supplier can deliver more cheaply in the same quality. All changes usually represent big challenges to the whole team and project manager.

It is normal that decision-making process may different between big and small projects, for example on big projects it could be that, when we want to change some important requirements of the project we need multiple sign-offs from vary stakeholder whereas changing or switching a supplier could be done by the project manager alone because he has the authorization to do so.

It should be noted that never underestimate the effects of changes to the project. Very often several solutions have adverse effects on the so far completed project. So every confirmed change must be integrated into the final plan through changes in the WBS and baseline schedule. The final plan of record is the current reference in course of schedule, scopes and costs. We must the change control system integrate with the WBS and baseline.

The key success for this system is accuracy to document every single change occurring. Benefits of these requirements are:

- Assign responsibility for implementing change
- Adjust master schedule and budget
- Track all changes that are to be implemented

Briefly, stakeholders and the communication plan will determine the communication and decision-making process to be used in order to make any changes to the project.

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### RESULTS AND DISCUSSION

#### Results

Risk management should be considered as part of project management. To reduce the risk affects in the timing, process planning, control and monitoring of system and risk management plays a key role. Studies show that the risk management various effects on the part of the project and thus on the entire project, such as:

- ✓ Provides a framework for the whole project in which activities happen in a consistent and controlled way
- ✓ Improves the decision-making process, supports the planning process and prioritisation of each activity by having a complete understanding off all project-related activities and project opportunities and threats
- ✓ Reducing uncertainty within the project
- ✓ Securing or even increasing assets of the company
- ✓ Optimizing operational efficiency
- ✓ Developing and supporting the organization's knowledge base

It should be noted that achieve an optimal risk management the establishment of a risk management team who has skills in the field of alternative processes, software project management, monitoring and control that are involved in the project process is essential. The methods such as Risk matrix and scenario analyses can be help to Risk identification and classification of them.

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