



**CHALMERS**

# **Project Risk Management**

## An initiative towards opportunity management

Bachelor's thesis in Mechanical Engineering

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Project Risk Management  
An initiative towards opportunity management  
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## ABSTRACT

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Today many organizations are working in projects and in order for a project to be successful, project risk management is an essential part of project management. As with life, projects are risky and every organization should strive to have an effective project risk management process in order to identify and manage risks. The traditional approach to project risk management is emphasizing on identifying and managing threats, mainly focusing on the negative effects of risks. As to this date, some leading standards, such as guidelines from the Project Management Institute, nowadays have broaden the definition of the term risk which also includes opportunities. Opportunity management is focusing on the positive potential effects of risks that could be beneficial for the projects. This thesis is focusing on investigate the project risk management practices within Volvo GTT and give suggestions for implementation of opportunity management. Two investigations at the Range & Project management office in Gothenburg were conducted in order to get an overview of the current project risk management and to get a deeper insight of the project risk management process. The empirical investigations were conducted by the use of questionnaires together with qualitative interviews, in which twenty-one employees that worked closely with risks participated. The results from the investigations revealed some improvements areas of the current process. One was regarding the risk response planning phase where the organization hadn't anchor response strategies for the identified risks. Further, the results regarding the implementation of opportunity management showed the need of identify and managing opportunities alongside with threats. Several participants stated that by implementing opportunity management, the organization could capture the potential benefits available in the projects. Therefore, the conclusion is that organization has an infrastructure that support risk management but there is room for improvement and one way to improve the process is by implementing opportunity management making sure that potential benefits are being captured. The recommendations for the organization is to integrate opportunity management within the organization and improve the current process by sharpen the risk response planning phase. Further, the results are analyzed and compared with theory. In the last part of the thesis, both recommendation and suggestion for future work are presented.

**Key Words:** Project Risk Management, Project Management, Opportunity Management, Risk, Opportunity, Volvo GTT



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# 1. INTRODUCTION

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## 1.1 Background

Within the Volvo Group Truck Technology (GTT), most of the Volvo Group's research, engine development and purchasing operations are located here. At the department of Range & Project management the main task is working with project management. The projects are usually unique, complex and require both commitment and resources. In most projects, there is a clear purpose that gives the project participants prerequisites that describe the objectives and deadlines.

However because projects are complex, many of the projects are not easy to execute and every project is influenced by risks. In order to achieve the project objectives it is important to minimize mistakes and create a basis for well-conditioned decisions. To achieve this, project management requires a well based risk management process, which can be used to minimize or optimize a risk that is any uncertainty that can affect project objectives. In order to be beneficial of identifying uncertainties it is important that knowledge and information is shared within the organization making risk management a cross-functional discipline.(Chapman & Ward, 2011)

The traditional view of risk in project is negative and is often associated with threats that can have negative consequences to the project objectives. But a risk can also provide opportunities, which is a positive risk that is helpful for achieving project objectives. The Project Management Institute (PMI), which is the largest professional organization dedicated to project management emphasizes the broader definition of project risk which include both threats and opportunities. According to both Chapman & Ward (2011) and Hillson & Simon (2012), it is important that the risk management process can capture uncertainties that could be helpful if they occurred. Further, one way of capturing opportunities is to implement opportunity management within the current project risk management process (Hillson, 2004). This approach can enhance benefits and be cost-effective in terms of capturing opportunities. Further, by integrating opportunity management the level of team motivation will increase and improve chances of project success (Hillson, 2004).

Volvo Group Truck Technology is one of the largest truck manufacturers in the world and their ambition is to establish themselves as the largest truck manufacturer. Due to the complexity of the product development projects within this market area it is crucial to have processes that are up to date. It is also important to review the latest guidelines in order to stay competitive. One method to achieve this is to take full advantage of project uncertainties that can be helpful achieving project objectives and this can be done by implementing opportunity management in order to make sure to capture potential benefits. Opportunities exist within every project and it is essential for every organization to tackle both threat and opportunities proactively (Hillson, 2004).

## 1.2 Purpose

The purpose of this thesis work is to give suggestion for implementation of opportunity management

## 1.3 Limitations

The data collected for this thesis work is from the Range & Project management office, focusing mainly at the Volvo Group Technology's office in Sweden. This thesis work is also not taking any consideration to how other departments (e.g. complete vehicle) within the company handles risk, the main focus is in reviewing project risk management. Further, this thesis work is not focusing to find differences between how employers handle risks related to gender, age or nationality.

## 1.4 Research questions

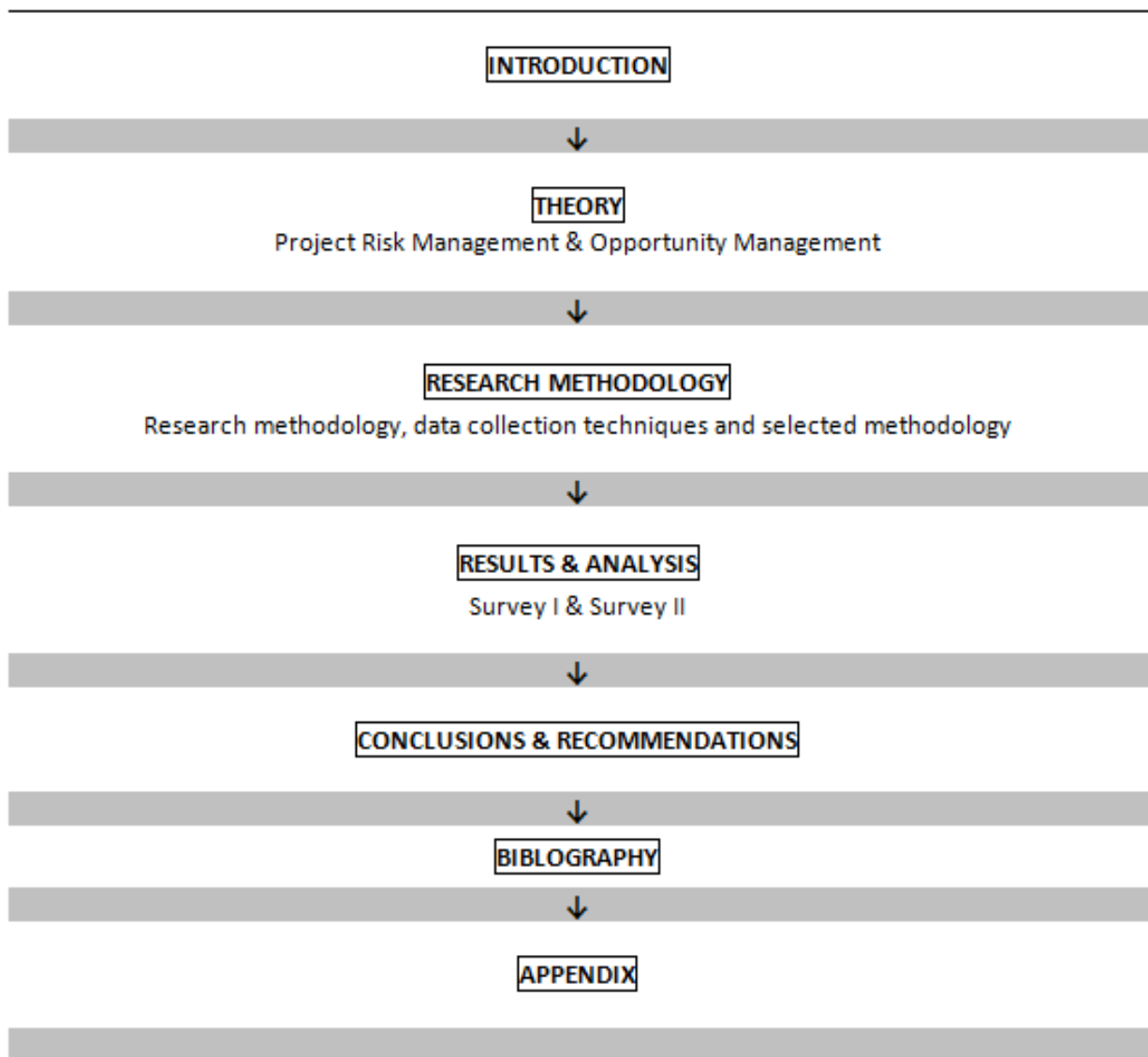
The two research questions below are focusing on the application of the current risk management process and investigating how opportunity management best is implemented within the organization.

- To what extent and in what way is risk management being used within the organization?
- How can opportunity management be best implemented into the current risk management process?

The second question is answered by investigating how opportunity management is best implemented within the organization but also by providing the company a theoretical frame of reference that supports the implementation of the process.

## 1.5 Dissertation structure

The structure below is created upon to fulfill the academic requirements.



*Figure 1-1. The dissertation structure*

## 2. THEORETICAL FRAME OF REFERENCE

---

The aim of this chapter is to present the theoretical framework that is essential in order to understand the following chapters in this thesis work. The chapter is divided into three main sections: Project risk management overview; the opportunity management process; and finally in the last section the researcher will present critical success factors for project risk and opportunity management. The purpose of the first section is; to provide a basic overview of what project risk management is; explain the definition of risk, opportunity and uncertainty; and describe the project risk management process. The purpose of the second section, opportunity management, is to give a detailed description of the opportunity management process. The purpose of the third section is to give an overview of the critical success factor that is required for project risk and opportunity management.

### 2.1 Project Risk Management Overview

#### 2.1.1 What is project risk management?

The Irish writer Oscar Wilde (1854 -1900) declared, “Only the past is certain; the future is at best only probable”. This declaration is today true for many of the ever-changing businesses and their project around the world (Hillson, 2004). Many companies today work within large project and one definition of the term project is by Turner (1992) defined as:

*“An endeavour in which human, material, and financial resources are organized in a novel way, to undertake a unique scope of work of given specification, within constraints of cost and time, so as to achieve unitary, beneficial change, through the delivery of quantified and qualitative objectives”*

- Turner (1992 cited in Chapman & Ward, 2011, p.4)

Projects are unique and often complex involving a wide of resources, including people, finance and facilities. The unclear path ahead for the project is confusing for many organizations and many are looking to find for a solution. According to Hillson (2004) many are looking for a solution to this problem, wondering whether it is possible to find a safe path through the fog of an uncertain future. One way to achieve control and manage this uncertainty is through project risk management.

The definition of Project risk management is by The Project Management Institute (PMI), which is the largest professional organization dedicated to project management, described as: “the systematic process of identifying, analyzing and responding to project related risks” (Project Management Institute Standards Committee, 2000, p.127). According to Cooper et al., (2005), the main purpose of risk management is to identify and manage significant risks.

Further, in most projects the risk management process is coordinated with other management processes (Cooper et al., 2005). In wider perspective, according to the Project Management Institute (2000), project risk management is an important and valuable component of project management and it can improve the value of other project management process. Further, project risk management should not be an optional activity in the project management thus it is essential to achieve a successful project management (PMI, 2000).

### 2.1.2 Definition of risk and uncertainty

It is clear that all projects involve risk and uncertainties due to their uniqueness and complexity. Further, it is important to define the relationship between risk and uncertainty. According to Hillson (2004), risk is aleatoric, whereas uncertainty is described as epistemic. The words aleatoric originate from the Latin word *alea*, meaning dice.

The definition of the term risk is by Hillson (2004, ch.1) defined as: “A risk is an event where the set of possible outcomes is known, and the probability of obtaining each outcome can be measured or estimated, but the precise outcome in any particular instance is not known in advance”. Further, according to Kerzner (2003), risk is the measure of the consequence of not fulfilling a defined project goal.

The definition of *epistemic* derives from the Greek Word *episteme*, meaning knowledge. The term uncertainty is by Hillson (2004, ch.1) defined as: “An uncertainty is thus an unknown event from an unknown set of possible outcomes”. Uncertainty derives when there is a lack of knowledge about the possible outcome and. Further, the relationship between risk and uncertainty is being distinction by Hillson (2004):

*Risk is a measurable uncertainty;*  
*Uncertainty is unmeasurable risk*  
- Hillson (2004, ch.1)

Many different professional standard institutes and guidelines have attempted to create a definition of risk. According to both Chapman & Ward (2011) and Hillson (2004) the traditional definition of risk is negative and often is a synonym for threat. However, there is not a common view of the definition of risks

### 2.1.3 Understanding the components of risk and uncertainty

There are no zero-risk projects and every project is affected by uncertainties (Chapman & Ward, 2011). One factor for every organization is to transform uncertainties into risks (Hillson, 2004). According to both Chapman & Ward (2011) and Hillson (2004) the team should strive to understand the project objective to be met and is by Hillson (2004, ch.1) explained as: “In project management, these objectives are most often expressed as a combination of time, cost, and quality/performance”. This is the first step in order of

understanding of that there must a risk to something but also to recognize the interaction between risk, uncertainty and objectives (Hillson, 2004), this is summarized in figure 2.1.

Risk rises from the interaction between:	
<b>Objectives</b>	What must happen
<b>Uncertainty</b>	What might happen

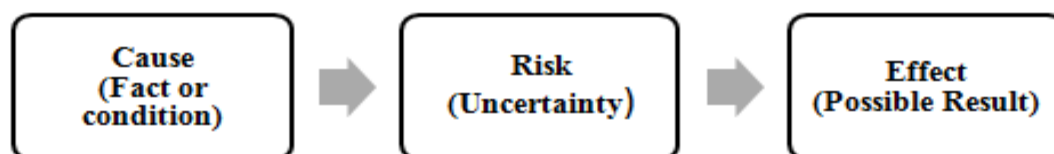
*Figure 2-1. The interaction between risk, uncertainty and objectives Source: (Hillson, 2004)*

Further, according to Chong et.al, (2006), a risk consist of two primary components; a probability; and impact. This is also pointed out by both Chapman & Ward (2011) and Hillson (2004) as a key factor to understanding the two dimensions of a risk. The two dimensions according to Hillson (2004) are summarized in figure 2.2.

<b>Risk has two dimension</b>		
One related to uncertainty	<b>Probability</b>	<b>How often one might expect the risk to occur</b>
One related to effect	<b>Impact</b>	<b>The effect it would have on the projects objectives if the risk actually occurred</b>

*Figure 2-2. The two dimensions of a risk. Source: (Hillson, 2004)*

Further, figure 2.3 shows the relationship between cause, risk and effect (Project Management Institute Global Standard, 2009).



*Figure 2-3. The relationship between cause, risk and effect. Source: (Project Management Institute Global Standard, 2009, p.29)*

### 2.1.5 The definition of the term opportunity

As stated above, all projects are affected by uncertainties. Traditionally the effects of uncertainties and risks are wholly negative (Hillson, 2004). Further, according to Chapman & Ward, (2011), many organizations are relating uncertainty and risk to threats. The relationship between uncertainty and threat is by Hillson (2004) described as: “Some uncertainty might be harmful if it came to pass” (Hillson, ch.1). However, some uncertainties may have favorable outcomes (Pritchard, 1997).

An opportunity is by the Project Management Institute Standards Committee (2000) defined as:

*The outcome from an uncertain event that has a positive impact on the achievement of the project objectives*

-Project Management Institute Standards Committee (2000, p.127)

Further, to enlighten the definitions of the term opportunity, figure 2.4 summarizes several definitions.

---

**An uncertainty that might assist in achieving objectives. Further, an opportunity is an uncertainty with positive effects**

( Hillson, 2004, ch.1)

**An opportunity can be seen as a situation where doing something desirable is easier than usual. Further, opportunity means possible favorable outcome**

(Chapman & Ward, 2006, ch.2)

**A predicted favorable outcome of a project is called an opportunity**

(Pinto, 1998, p.140)

---

*Figure 2-4. Description of issue, problem, cause and effect.*

### 2.1.6 The broader definition of risk

As stated above, the traditionally view of the term risk is negative and to do not include opportunity. However, to include opportunities in the project risk management process, there is a need for broader definition of the term risk. Figure 2.5 lists three examples of a broader definition of the term risk.

---

**Risk – uncertainty of outcome, whether positive opportunity or negative threat**

(UK MoD Risk Management Guidance, 2002 cited in Hillson, 2004, ch.2,

**Risk – any uncertainty that, if it occurs, would affect one or more objectives**

(Hillson, 2004, ch.1)

**Risk- potential negative events and opportunities for improvement**

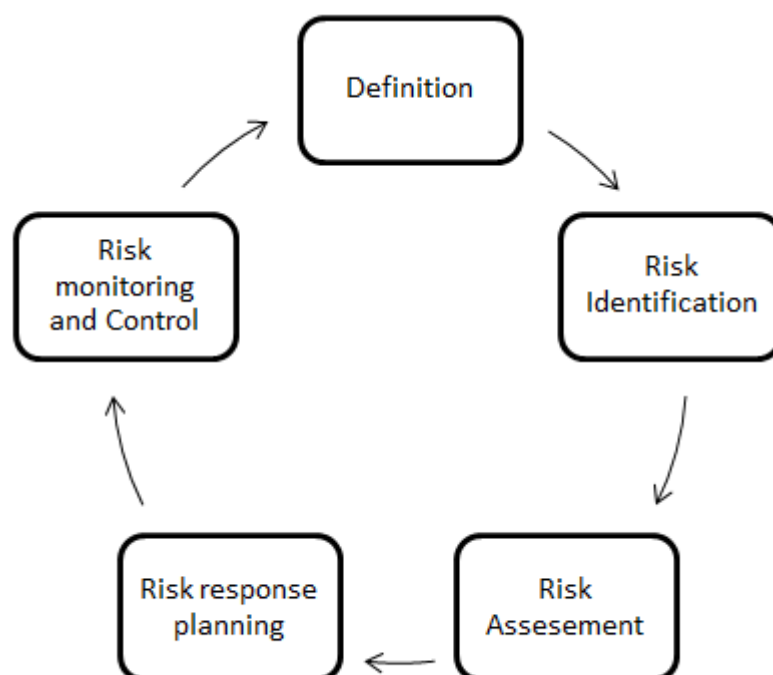
(British Standard BS ISO, 1997 cited in Hillson, 2004, ch.2)

---

*Figure 2-5. The broader definition of the term risk. Source: (Hillson, 2004)*

## 2.2 The project risk management process

Before introducing opportunity management, the purpose with this part is to give a basic overview to an existing approach to risk management. According to both Cooper et al., (2005) and Hillson (2004) a typically project risk management is conducted in five stages. However, it is important to state that the traditionally project risk management is aiming to searching for negative risk or threats. The typical project risk management process is visualized in figure 2.6.



*Figure 2-6. The risk management process. Source: (Hillson, 2004, ch.2)*



A typical risk management process starts with a definition phase; the purpose of this phase is to establish the context. This is both to Cooper et al., (2005) and Hillson (2004) seen as an important phase due to in this phase the objectives for the project are being understood and agreed on. The output of this phase is a definition document with the purpose to record the decision on the scope and details of the risk process, this document is often called a Risk Management Plan (Hillson, 2004). Figure 2.7 summarizes the first phase.

<b>Input</b>	Organizational process, Project Scope assessment and project management plan
<b>Tool and Technique</b>	Planning meeting and analysis
<b>Output</b>	Risk management Plan

*Figure 2-7. The definition phase. Source: (PMI, 2004, p.239)*

Next step in the process is the risk identification phase, this phase is by Cooper et al., (2005) defined as: “Risk identification determines what might happen that could affect the objectives of the project, and how those things might happen”. The risk can be identified by using different techniques such as; risk workshop; brainstorming; or interviews. The output in this phase is a list of possible risks that usually is documented in a risk register. Figure 2.8 summarizes the second phase.

<b>Input:</b>	Project Scope Statement and Risk Management Plan
<b>Tools and Techniques:</b>	Documentation reviews, checklist or interviews
<b>Output:</b>	Risk Register

*Figure 2-8. The identification phase. Source: (PMI, 2004, p.239)*

In the third phase of the traditionally risk process is risk assessment, this is by Hillson (2004, ch.2)

defined as: “The risk assessment aims to establish the overall level of risk exposure of the project and prioritize identified risks in order of importance”. Further, a risk assessment can be performed qualitatively or quantitatively. The output from the risk assessment will allow the project team to see which activities and risks require the most attention (Hillson, 2004). Figure 2.9 summarizes the risk assessment phase.

<b>Input:</b>	Risk Register, organizational process and risk management plan
<b>Tools and Techniques:</b>	Risk Probability and impact assessment or risk analysis using modeling techniques
<b>Output:</b>	Update the risk register

*Figure 2-9. The risk assessment phase. Source: (PMI, 2004, p.239)*

The next step in the risk management process is to decide how to respond to the identified risks. This fourth step is called risk response planning, and both Cooper et al., (2005) and Hillson (2004) agree on that this phase is important and must be taken seriously by the project team. This step is very important and this phase is by Cooper et al., (2005) explained as: “Unless action is taken, the risk identification and assessment process has been wasted”. The output from this phase is to define response strategies in order to tackle the risks. Figure 2.10 summarizes the risk response planning phase.

<b>Input:</b>	Risk management plan and Risk Register
<b>Tools and Techniques:</b>	Strategies for the identified risk and Contingent response strategy
<b>Output:</b>	Update the risk register

*Figure 2-10. The risk response planning phase. Source: (PMI, 2004, p.239)*

The final phase of the risk process is by defined Hillson (2004) as: “To ensure that agreed risk responses are implemented effectively, to communicate risk status to project stakeholder, and to maintain a current assessment of risk exposure” (Hillson, 2004, ch.2). The purpose of the final phase is to monitor and review the risk. This phase is both Cooper et al., (2005) and Hillson (2004) regarded to be an iterative process and it is important that there is a clear communication between the project team and the project stakeholders. Further, this phase is also linking other management processes such as facilitating risk management to continuous improvement (Cooper et al., 2005).

### 2.2.1 The Probability-Impact grid (PIG) and risk threshold

As stated above risk have two dimensions: probability and impact. One common way to estimate an identified risk’s probability and the degree of impact is by using the PIG-grid. Simply, risks can be categorized as high, medium or low. Figure 2.11 shows a basic probability-impact grid.

R=risk index		3 x 3 grid						
PROBABILITY(p)	High	p3=1	R3		R4		R5	
		p2						
	Medium		R2		R3		R4	
		p1						
	Low			R1		R2		R3
		p0=0	i0=0	i1	i2	i3		
			Low		Medium		High	
			IMPACT(i)					

*Figure 2-11. The PIG grid. Source: (Chapman & Ward, 2011, ch.2)*

However, according to Chapman & Ward (2011) as cited in Cox (2008) and Hubbard (2009) PIGs suffer from limitations. One problem is that the tool requires a simplistic

characterization of risk and uncertainty that lack minimum requirement. Further, this shortcoming is by Chapman & Ward (2011 cited in Cox, 2008, ch.2) described as: “The meaning of a risk matrix may be far from transparent, despite its simple appearance, but worse, their evidently attractive simplicity can discourage efforts to produce a more meaningful and useful analysis of uncertainty and risk” . According to Chapman & Ward (2011) there are some disadvantages using the PIG-grid as a common tool in the risk process. Figure 2.12 lists three shortcomings that should be considered before using this tool.

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**A PIG should not be considered as a qualitative analysis, it is a weak quantitative analysis. According to Chapman & Ward (2011), by using the PIG-grid, the team ignores the obvious minimum clarity subjective probability interpretation**

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**The risk must be categorized into one of the nine cells which gives the limitation of the precision involved in explaining estimates of probability of any impact**

---

**The PIG-grid is mainly focusing on negative risk and opportunities are ignored**

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*Figure 2-12. Shortcomings in using PIG-grid*

Literature regarding the PI-scale is united that impact terms must be defined to each of the projects objectives that are included in the scope of the risk process, and each term must be translated into ranges of effect on time, cost or quality. Further, it may also be important to use project specific impact scales, this is by Hillson (2004, ch.5) explained: “Many organizations use a common scale of probability definitions across all projects, but impact scales must be project specific”. Figure 2.13 shows an example of a probability-impact scale for Very High Impact.

Scale	Probability	+/- Impact on project objectives		
		TIME	COST	Quality
<b>VHI</b>	71-99%	>20 days	>200K	Very significant impact on overall functionality

*Figure 2-13. Probability-Impact Scale Source: Hillson, (2004, ch.5)*

Further, it is also recommended to set impact scales. For example the organization must consider what the term “High” might have for impact on time or cost. The organization can choose to use the same set of P-I scales for both threat and opportunities or use different scales for threat and opportunity (Hillson, 2004). For opportunities following positive impacts can be considered: saving time or cost or enhancing performance.

According to both Chapman & Ward (2011) and Hillson (2004), the organization should set a risk threshold that is appropriate to the project. One way of achieving clearer risk threshold is through a clarity efficient approach (Chapman & Ward, 2011). Further, the term is by Chapman & Ward (2011, ch.9) defined as:” a clarity efficient process is the lowest cost (in terms of time and effort or other resources) process for achieving any given level of clarity.

## 2.2.2 Shortcomings in Risk Management Processes

There are a number of common shortcomings in respect of an organizations approach to risk management. One common shortcoming is that many organizations believe that they were following an effective and reasonable framework, although they suspected that their structure was not best practice (Chapman & Ward, 2011) According to Hillson (2004), many organizations need to review its position on risk management against the dimension of importance and effectiveness. According to both Chapman & Ward (2011) and Hillson (2004) there are several common shortcomings in an organizations approach to an effective risk management. These are summarized in figure 2.14.

---

Many in the organization believe that the risk process takes time and money. However, by having an effective risk process the organization can save time and money.

**(Hillson & Simon, 2012)**

The project team lack of a clear and shared understanding of all relevant objectives

**(Chapman & Ward, 2011)**

Many organizations do not fully believe that risk management works and may believe that identified and handling risk is a common sense. However, by having this mindset and leaving risk management to intuition can be costly because the stakes are too high.

**(Hillson & Simon, 2012)**

---

*Figure 2-14. Shortcomings in risk management processes*

Further, another shortcoming that needs to be dealt with is that people in the risk process manage issue than risks. This is by Hillson (2004, ch.9) described as: “Some believe that dealing with issues, problems, or even crises is more interesting and rewarding”. This is by both Chapman & Ward (2011) and Hillson (2004) seen as a shortcoming that needs to be addressed by the whole organization. The mindset should instead be that risk management will prevent issue, s (Hillson, 2004)

## 2.3 The opportunity management process

### 2.3.1 Setting the scene

Literature on managing opportunities in the project risk management provides a number of definitions of the term risk. There are two different approaches to include opportunities in the project risk management process. One approach is according to Chapman & Ward (2011) to abandon the term risk and start using the term uncertainty management. However, according to both Cooper et al., (2005) and Hillson (2004) opportunities can be included in the current risk management process by adjusting some settings. The greatest challenge is to develop the organizations mindset to the term risk to include both threats and opportunities. (Hillson, 2004) The broader definition of the term risk is by Professional Institute Standards Committee defined as:

*Risk – an uncertain event or condition that, if it occurs, has a positive or negative effect on a project objective*

-(Professional Institute Standards Committee, 2000, p.127)

According to Hillson (2004) it would be beneficial to adjust the current project risk management process to include opportunities rather than abandoned the current process or separately handle opportunities in a separate process. This approach is by Hillson (2004, ch.10) explained as: “If, on the other hand, opportunities are handled by a risk management process that already exists, the additional overhead is minimized”. Further, according to both Cooper et al., (2005) and Hillson (2004) this would lead to less work trying to develop a new process and would minimize additional training.

According to both Chapman & Ward (2011) and Hillson (2004) the one step in including opportunity management is for the organization to allow creative thinking and allow managing opportunities proactively and effectively through the whole project lifecycle. One way of achieving this is according to Chapman & Ward (2011) to begin include managing opportunities in the following three management areas; operations management; corporate management; and project management. Further, the first opportunities can be found by in the operation management area, this is by Chapman & Ward (2011, ch.1) explained as: “Operations issues can be a major driver of strategic change, and major opportunities are often first identified by the people at the coal face”. The literature regarding opportunity management is stating that the whole organizations need to have define a broader definition of the term risk. It is important through the entire project lifecycle to communicate within the organization the vital message of identifying and managing all sources of uncertainty, including threats and opportunities.

### **2.3.3 The risk management plan document**

The main output of the definition phase is the Risk Management Plan, which is a document that describes how risk management will be structured and performed on the project (PMI, 2004). Figure 2.15 summarizes several elements that should include in the document in order to achieving an effective risk management process that includes both threats and opportunities.

<b>Aims, scope and objectives of risk process</b>	Besides describing the purpose of risk management for this project, it is also important to describe the term risk. The document must introduce the broader definition of the term risk and describe the term opportunity.
<b>Risk tools and techniques</b>	Confirm the tools and techniques to be used
<b>Risk Reviews and reporting</b>	One of the key factors to a effective risk management process. It should be agreed on which type of report should include in this process, their purpose and distribution.
<b>Project-specific definition of probability and impacts</b>	Define the terms used for qualitative assessment of risk in this particular project. It is also important to confirm risk thresholds.
<b>Project-specific sources of risk</b>	The team can list the types of risk that the risk management process is expected to address for this project.

*Figure 2-15. Key elements in the risk management plan document (PMI, 2004)*

### 2.3.4 The identification phase

According to Cooper et al., (2005), the process for identifying opportunities is similar to those used for identifying threats. However, it is necessary that the organization have understood and agreed on what is meant by the term risk (Hillson, 2004). Further, the mindset of the identification is similar to the traditional risk management process. According to Chapman & Ward (2011), opportunities usually need to be identified and managed with the same resolve as threats as part of the same process. The objective of this phase is by Hillson (2004, ch.4) defined as: “To expose and capture details of as many risks as possible, and to do this proactively, in advance of them occurring, to give the project team enough management space to deal with the risk before they might happen”. The key factor for this phase is that the teams focus to not identify non risks, e.g. causes or issues. The literature regarding opportunities present some techniques and tool for identifying both threats and opportunities on the same process. The most common activity in this phase is the risk workshop. Here can all relevant participants meet and together identify risks which might affect the project and document it. Further, it is important to state that the Risk Identification is an iterative process because new risks become known further in the project (PMI, 2004).

### 2.3.5 Risk Identification: Tools and Techniques

The key for identifying opportunities is to make sure that participants understand the broader definition of risk. One approach could be to identify all uncertainties (Chapman & Ward, 2011). In the part below the examples use the same description of the term risk that is by Hillson (2004, ch.1) defined as: “any uncertainty that, if it occurs, will affect project objectives”. All identified risks should be recorded into the risk register.

### 2.3.7 The SWOT-analysis

One technique that can be useful to identify opportunities is by using the SWOT-analysis. This technique can be used to evaluate strengths, weaknesses, opportunities and threats involved in a project. The SWOT Analysis can for example be conducted in a risk workshop with key project team and stakeholders. However, according to Hillson (2004), one important step is to structure and clearly distinguish between the four terms used in the analysis. These four terms are summarized in figure 2.16.

<b>Strength:</b>	For example a resource the organization can use in order to achieve its objectives	<b>This part emphasizes: Who are we? – relating to the organization itself</b>
<b>Weakness:</b>	For example a defect in the organization that can prevent it from achieving its objectives	
<b>Opportunity:</b>	Potentially favorable elements within the organization that may be positive for the project	<b>This part emphasizes: What are we doing? – considering the specific project</b>
<b>Threat:</b>	Harmful elements within the organization that may damage the project	

*Figure 2-16. The four terms in the SWOT-analysis Source: (Hillson, 2004, ch.4)*

Further, the SWOT-analysis can be conducted during a risk workshop and usually are divided into two steps. The first step is to identify opportunities and threats and the in the second step the team should determine the influence of strengths and weakness. The SWOT-analysis process that is described by Hillson (2004), is been visualized in appendix I.

### 2.3.6 Using Metalanguage

According to Hillson (2004), describing risks using metalanguage can provide structure to the description of the term risk and help the participants to separate risks from their causes and effects. The three-part structured metalanguage for identifying for risk is by Hillson (2004) defined as:

*“As a result of <definite cause>, <risk> may occur, which would lead to <effect on objective(s)>”*



- Hillson (2004, ch.4)

Further, figure 2.17 lists some examples of risk description using metalanguage.

	Cause	Risk	Effect
Keywords	Is, do, has, has not ,are	May, might, could	Will, could
	As a result of using novel hardware	Unexpected system integration errors may occur	Which would lead to overspending on the project
	Because there are three other projects taking place in the same time frame	We may able to utilize skilled staff as they become available from another project	Which would allow us to deliver early to the customer

*Figure 2-17. Risk description using metalanguage Source: (Hillson & Simon, 2012, p.65)*

It is also possible to use a SWOT-analysis combined with the metalanguage technique to find opportunities. According to Hillson (2004) the following metalanguage can be constructed:

*“Because we have <strength>, we might be able to create/exploit <opportunity>, which would lead to <benefit>.”*

- Hillson (2004, ch.4)

The team can consider organizational strength and identify opportunities and think of possible positive outcomes that can be beneficial.

### 2.3.8 Brainstorms

One of the most commonly used methods of this phase is brainstorming. The brainstorm is popular because it is a group activity, and it is beneficial for team building but also it allows the project team work together helping each other identify risks (Hillson ,2004). Further, brainstorming is by both Chapman & Ward (2011) and Hillson (2004) seen as an exercise in creative thinking. According to Hillson (2004) there are some key factors that need to be considered for conducting an effective brainstorming in order to identify both threats and opportunities. These factors are summarized in the figure 2.18.



- ✓ **It is important that the right people are attending the brainstorm session. To achieve an effective Risk Identification, attention must be paid to inviting project stakeholders.**
- ✓ **The role of having a good facilitator is crucial to ensuring a successful outcome. The facilitator need to have good management skills and also encourage quiet people to make their contribution**
- ✓ **The brainstorm session should be a chance for the participants to speak without criticism or judgment. Further, senior managers should not misuse the amount of time in order to display wisdom and experience.**
- ✓ **The task is to identify possible risks to the project objectives**
- ✓ **In order to identify both threat and opportunities the facilitator must together with the team agree of the definition of the term risk.**

*Figure 2-18. Key factors when conducting brainstorming*

Generally, the traditionally brainstorm session is focusing to identify negative risks, due to human nature it is easier that people involved in projects prefer to criticize rather than to praise. In order to identify opportunities there is a need for creative thinking, one method described by Hillson (2004) is the use of de Bono's "Six thinking Hats". This exercise can be seen as a kind of role-play where different opinions are represented by hats of different colors. To achieve creative thinking, the facilitator may consider using the green hat for new ideas, the black hat for threats and the yellow hat for opportunities.

Another alternative in order to find opportunities is for the facilitator to identify risk attitudes among the participants and divide people in two separate brainstorm session, with one session focusing on identifying opportunities (Hillson & Simon, 2012)

### **2.3.9 Two project-specific techniques: Checklists and Constrain and Assumption Analysis**

Some project may require a rapid project-specific technique in order to identify risks. Two techniques that can be conducted easy and quick are: Checklists and Constrain Analysis.

According to Chapman & Ward (2011) the checklists is simple to use and allow focus on finding project uncertainty. A checklist specific for the organizations projects can be drawn by experienced project managers and therefore can be a good source of identifying risks that may be common for the projects within the organization. However, according to Chapman & Ward (2011), checklists have serious shortcomings and should be used with caution. Two common shortcomings are due to the simplistic view of the potential risks and some sources of uncertainty may not apply to all projects. An example of a checklist is visualized in the figure 2.19.

Source of uncertainty	Impact	Likelihood	Exposure
Definition of project			
Concept and design			

*Figure 2-19. An example of checklist Source: (Chapman & Ward, 2011, ch.7)*

Another technique that can be used in the risk workshop is to analyze assumptions and constraints. According to Hillson (2004), this technique is very project-specific and may require input such as the project's business case and the RBS in order to expose assumptions and constraints. Assumptions can be seen as statement and constraints are things that must happen or must not happen. Figure 2.20 visualizes the assumption and constraints analysis template created by Hillson (2004) and also provides an example.

**Instructions:**

- List all project assumptions and constraints in the first column
- Identify whether each might prove false(Y/N)
- Where both answers are yes, mark it as a risk

Assumption or Constraint	Could this assumption/constrain prove false?(Y/N)	If false would it affect project? (Y/N)	Convert to a risk?
Outsourcing is not permitted and all project work must be done in-house(Constraint)	Y	Y	Yes (outsourcing may be permitted for some project work)(opportunity)

*Figure 2-20. The assumption and constraints analysis Source: (Hillson, 2004, ch.4)*

### 2.3.10 Risk Assessment

The third phase in the risk management process is the Risk Assessment phase. The purpose with this phase is evaluating the identified risks. The risk assessment is divided into two parts: Qualitative Risk Analysis and Quantitative Risk Analysis. Figure 2.21 describes the differences between these two analyses.

<b>Qualitative Risk Analysis</b>	The purpose is to evaluate key characteristic of individual risks and to prioritize them (PMI,2009)
	Aims to describe each risks using words and phrases(Hillson, 2004)
<b>Quantitative Risk Analysis</b>	The purpose is to evaluate the combined effect of risk on the overall project outcome(PMI, 2009)
	Focuses on using numbers to represent the dimension of each risk. Aims to perform “statistical analysis to determine the overall effect of risks acting together on project objectives”(Hillson, 2004, ch.6)

*Figure 2-21. Differences between qualitative risk analysis and quantitative risk analysis*

One basic factor in this phase is yet again having clear definition the term risk and understanding that risk has two dimensions: uncertainty and impact. According to Hillson (2004), many organization see qualitative risk assessment as mandatory for all project, where quantitative risk analysis may be seen as optional. Before starting to analyze the identified risks, the project team may consider some of following factors. These key factors are summarized in the figure 2.22.

✓ It is important that the risk assessment are based on agreed-upon definitions of important terms(PMI, 2009)
✓ Descriptive labels may be open to subjective individual interpretation and this problem should be recognized by the project team(Hillson, 2004)
✓ When determining the importance of a risk, consider always the two dimensions of a risk. Further, common factors that are instead used when determining the importance are for example: - <b>Manageability</b> : Some risks cannot be managed and should not be addressed(PMI,2009) - <b>Other factors</b> such as emotions, feelings, group dynamic or intuition (Hillson,2004)
✓ Some risk may need urgent response and therefore it is important that the team have collected high-quality information about the risk. Further, the process should be iterative.(PMI,2009)

*Figure 2-22. Key factors to consider before starting the risk assessment phase*

### 2.3.11 Qualitative Risk Analysis

One way of conducting the qualitative risk assessment graphically is by using the Probability-Impact Grid. The PI-grid is also used in the traditionally risk management process, however according to Hillson (2004), the P-I Grid need some modification to include both opportunities and threats. According to Hillson (2004), there are three options of including opportunities into the P-I Grid. These options are summarized in the figure 2.23.

It is possible to use a single grid, for example if the project decide to use 5x5 P-I Grids, the team can agree to use a naming convention, e.g., “T” for threats and “O” for opportunities

It is also possible to use two separate grids

Use a combined “mirror” grid. Simply by creating a symmetrical double grid.

*Figure 2-23. Three types of PI-grid for including opportunities*

Figure 2.24 shows a separate opportunity grid combined with a probability-impact scoring scheme. The scoring system allows a more detailed analysis and can give better understanding of the top-priority risks (Hillson, 2004)

Scale		Probability Score			Impact Score	
VLO		0.1			0.05	
LO		0.3			0.1	
MED		0.5			0.2	
HI		0.7			0.4	
VHI		0.9			0.8	

Probability	VHI	0.045	0.09	0.18	0.36	0.72(0.8*0.9)
	HI					
	MED					
	LO					
	VLO					
		VLO	LO	MED	HI	VHI
POSITIVE IMPACT						

*Figure 2-24. The separate opportunity grid Source: (Hillson, 2004, ch.5)*

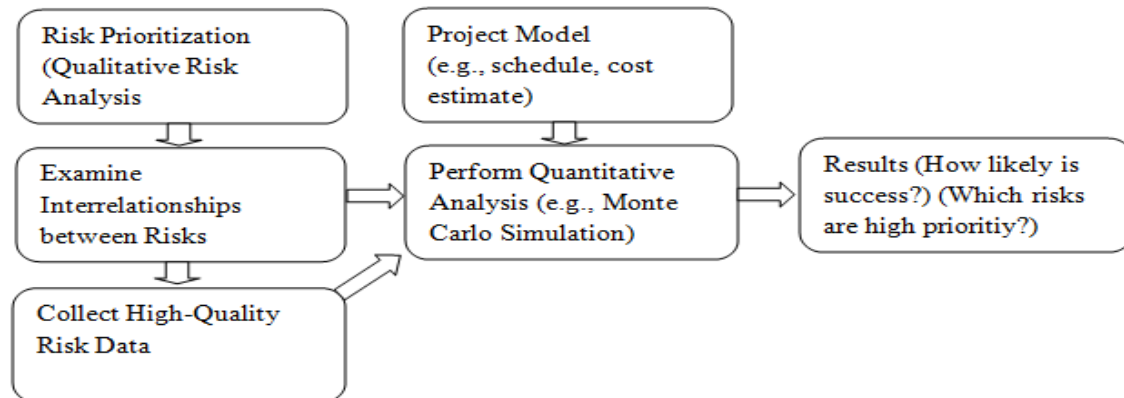
As stated above, it is important that the organization reflect on their risk threshold for every project and therefore can set boundaries that is meeting their risk appetite (Hillson, 2004)

According to both Cooper et al., (2005) and Hillson (2004), there is no need for any big modification in the risk assessment step to include analyzing opportunities. Already familiar techniques available for the traditionally risk process can be used to analysis opportunities. The team can also consider to categorize the risk causes, this can give better understanding of the relationships between the risks and how they can affect the project (PMI,2009).

### 2.3.12 Quantitative analysis

Conducting a quantitative risk analysis may be useful in order to reflect and analyze the effect of risk on the overall outcome of a project (Hillson, 2004). Both Chapman & Ward (2011) and Hillson (2004) emphasize the importance of conducting a risk analysis on larger projects. According to Hillson (2004), risk analysis provides a powerful method to analyze the effect of risk on a project, but this analysis require resource to carry out and understanding the simulation may require expert judgment. Using simulations models may also require extra resources in order to collect high quality input data (Hillson, 2004). One technique to carry

out a quantitative risk analysis is by using computer software tools, the tools can simulate, for example, the certainty of completing a project before a certain date. However, the software tools are relying on that the project team have identified the risks and have collected input data that is reliable. According to PMI (2004), there are several elements of a quantitative risk analysis, figure 2.25 shows the structure of a quantitative risk analysis.



*Figure 2-25. The structure of quantitative risk analysis Source: (Project Management Institute Global Standard, 2009, p.41)*

### 2.3.13 Risk Response planning

Literature on managing risk management is united of the fact that the Risk Response is one of the most importance phases throughout the risk process. Previous steps in the risk process have concentrated on mainly of identifying and understanding the uncertainty that face a project. However without any response actions the previous steps are a waste of time (Hillson, 2004). One key factor for the project team is to take care of the information gathered in the earlier phases and to think of appropriate responses. According to Hillson (2004), it is important to consider three prerequisites before taking any response actions to identified risks. Figure 2.26 lists the three prerequisites.

- 
- ✓ **It is important to ensure that only genuine risks remain at this phase. Having identified and assessed the risks the team should spent most time on the significant threats and opportunities first. The information from earlier phases is crucial due to the lack of time.**
- 
- ✓ **In this phase it is also important that all project stakeholders are identified, some stakeholders may be able to act as owners of risk responses**
- 
- ✓ **The project risk threshold must have been defined and agreed upon before the risk responses phase**
- 

*Figure 2-26. Three prerequisites to consider before starting the risk response planning phase*

According to the Project Management Institute (2009), there are a range of important factors for the success of this phase, the factors are divided into three parts; People; Planning; and; Analysis. One key factor is about the importance of communication between the project team, key stakeholders and other levels of the organization's management. Further, three of the key factors listed by the Project Management Institute (2009) are summarized in figure 2.27.

### **1. Address Both Threats and Opportunities**

"If either threats or opportunities are not fully addressed, the combined set of response strategies will be incomplete and may even be invalid"(PMI, 2009, p.48)

### **2. Develop Strategies Before Tactical responses**

The planning of risk responses should be discussed within the team. Further, it can be helpful to consider risk response plans at a strategic level and then into the tactical level.

### **3. Develop Risk Response Strategies**

The team should plan risk response strategies for individual risks, sets of risks, and project level risks.

*Figure 2-27. Three key factors in the risk response planning phase*

Traditionally risk response strategies are only for threats, however according to both the Project Management Institute (2009) and Hillson (2004) there are four strategies which address individual opportunities. The four opportunity strategies are; exploit; share; accept; and enhance (Hillson, 2004) ;( PMI, 2009).

The **exploit action** is aiming to eliminate the uncertainty associated with a particular upside risk. The main purpose for choosing this action is to eliminate the uncertainty by seeking to make the opportunity definitely happen. (Hillson, 2004). This action is by Hillson (2004) considered as aggressive and should be used for "golden opportunities" with high probability and high impact. The exploit action response can either be direct or indirect, the difference between direct response and indirect response is summarized in figure 2.28.

	<b>Impact</b>	<b>Type of action</b>
<b>Direct response</b>	<b>Ensuring that the potential opportunity is included in the project scope and is definitely locked into the project</b>	<b>Remove the uncertainty over whether or not it might be achieved</b>
<b>Indirect response</b>	In order to allow the opportunity, see if the project can be done in a different way.	For example consider to change the selected methodology or technology

*Figure 2-28. The difference between direct and indirect response Source: (Hillson, 2004)*

When a risk or opportunity has been identified, the objective of the risk response planning phase is by Hillson (2004, ch.7) described as: "to ensure that ownership of the risk response is allocated to the person or party best able to manage the risk efficiency". Traditionally when dealing with threats the objective is to transfer the risk to another party. In order to take full benefits of an opportunity, transferring the opportunity may not be the best action. According

to Hillson (2004), **sharing** an opportunity involves assigning ownership to the group that can best handle the opportunity. The main goal of sharing an opportunity is to maximize the potential benefits if it should occur.

Some risks will remain after choosing a response action and there will be some risks where any response is not likely to be cost-effective. Those risks that cannot be addressed through any other actions could be accepted (Hillson, 2004). Further, by **accepting** a risk, the team will be hoping to get lucky. The main step in accepting a risk is to try set a contingency plan, a contingency plan is by Hillson (2004) explained as: “Review to monitor and control risk exposure and set what actions will be taken if the opportunity should occur”

Another response action is to **enhance** the opportunity and aiming to modify the size of the risk by making it more acceptable. The enhance action strategy is by Hillson (2004, ch.7), defined as: “opportunity can be enhanced by increasing probability and/or impact by identifying and maximizing key drivers”. The purpose with enhancing an opportunity is to seek and strengthen the cause of the risk, searching to target the conditions and maximize the benefits if it should occur. Figure 2.29 is summarizing the response strategies between threats and opportunities. Figure 2.29 also include a priority scheme for selecting response strategies defined by Hillson (2004).

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**1: Avoid or Exploit**

**2: Transfer or Share**

**3: Reduce or Enhance**

**4: Accept**

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#### Threat response strategy

**Avoid** - Aims to eliminates either its probability or impact on the project

**Transfer** - Transfer to a third party who is better able to manage it. The aim for the new party is to be able to take action to avoid or reduce the threat.

**Reduce** - Aims to reduce its probability and/or impact on the project

#### Opportunity response strategy

**Exploit** - Ensure that opportunity is managed by making sure that it will occur

**Share** - Share to a third party who is better able to manage it. The aim for the new party is to be able to take action to exploit or enhance the opportunity

**Enhance** - Aim to increase its probability and/or impact on the project

---

*Figure 2-29. The risk responses strategies*

The output of this phase includes updating the risk register and update the project management plan (PMI, 2009). Further, according to both PMI (2009) and Hillson (2004), it is important to evaluate the responses taken to the risks in order to determine if it is required for additional response planning.

### 2.3.14 Risk Monitoring and Control

The last step in the project risk management process is to monitor, control and review risks. This phase does not require any vast modification to deal with both threats and opportunities. According to Hillson (2004), many standards and methodologies consider this step to be the actual risk management. In this phase the team can see the actual result from earlier phases,



including the result of threat reduction or gained opportunity. One way to measure the effectiveness of project risk management depends upon the way the approved plans are carried out, (PMI, 2000). Further, according to PMI (2000), the primary objectives of the last step in the project risk management is to track identified risks, monitor residual risks, identify new risks and also ensure that risk responses plans are executed. Two important factors are to make sure that the risk responses are done at the appropriate time and that the project team evaluates their effectiveness throughout the project life cycle. According to Hillson (2004), another key factor to achieve successful risk monitoring and control is through good communication. It is vital to communicate the results of the risk process to project stakeholders. Because different project stakeholders have different requirements for the detail required of the risk information, it can be helpful if the project team have performed a stakeholder analysis (Hillson, 2004). The stakeholder analysis will insure the right amount information to the right stakeholders on time.

The risk register can be helpful to control and share information on all identified risks. The risk register document or database can either be simple containing a single line for each identified risks or complex with more detailed information all risk including both quantitative and qualitative risk analysis description. Figure 2.30 lists some risk fields that can be included in the risk register.

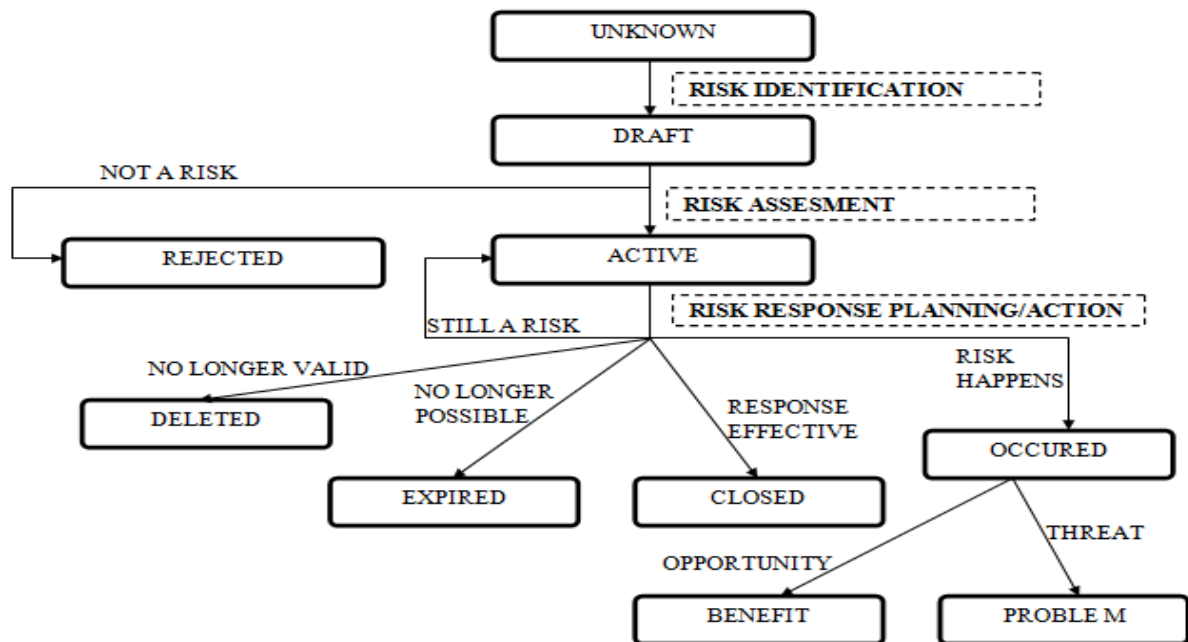
<b>Risk type</b>	Threat or opportunity
<b>Risk description</b>	Detailing the uncertainty
<b>Cause or Impact description</b>	Including background information and trigger conditions
<b>Impact window</b>	Start/ end dates
<b>Detailed risk response actions</b>	
<b>Secondary risks</b>	

*Figure 2-30. Example of risk fields that can be included in the risk register document*

Both the PMI (2009) and Hillson (2004) emphasizes the important fact that risk changes with time and therefore it is important to regularly review and update the risk information documents or database. Further, the purpose of regularly reviewing the risks will provide the current status of each identified risk (Hillson, 2004). According to PMI (2009), it is important that the risk action owner in collaboration with the risk owner continuously monitor the risk trigger conditions. According to Hillson (2004), a risk can have different status values depending on the risk lifecycle. A risk for example may remain “Active” after implementation of risk responses and therefore require continued monitoring and management focus. Figure



2.31 shows the life cycle of risk status values.



*Figure 2-31. The life cycle of risk status values Source: (Hillson, 2004, ch.8)*

According to Hillson (2004), different organization can use their own terms to describe risk status, but is important that the organization understand the different stages of the risk life cycle.

## **2.4 Implementation Issues for Opportunity Management**

The aim of this part is to present opportunity management theory that is essential in order to implement opportunity management into the project risk management process. Further, this part will also present critical success factors for achieving an effective project risk management.

### **2.4.1 Critical Success Factors (CFS) for Project Risk Management**

The literature of project risk management present several critical success factors for achieving an effective project risk management. Whether, the organization aims to handle opportunity and threats, those success factors are vital for a successful project risk management process. As stated in the first part of this chapter, the project risk management theory emphasizes the fact that project risk management is essential in order to successful project management (PMI, 2009). The Project Management Institute (PMI), which is the largest professional organization, dedicated to project management lists six important critical success factors for project risk management. One of these factors are regarding the organizational commitment, which also is by Hillson (2004) considered as a critical success factor. According to Hillson, every organization needs to give the right level of support to the risk process depending on the type of risk challenge they face. Figure 2.32 lists the six critical success factors that are listed in The Project Management Institute (2009) and also shows the four CFS defined by Hillson (2004)

<b>The Project Management Institute (2009)</b>	<b>Hillson (2004)</b>
Recognize the Value of Risk Management	Clear widely accepted definitions
Individual Commitment/Responsibility	A simple scalable process
Open & Honest Communication	Appropriate infrastructure to support the risk process
Organizational Commitment	Attention to risk attitudes
Scale Risk Effort to Project	
Integrate with Project Management	

*Figure 2-32. Critical success factors for project risk management*

### **2.4.3 Understanding Risk Attitudes**

It is important to understand that risk management requires human input and judgment. Understanding risk attitudes is one of the four critical success factors listed by Hillson (2004), it is emphasizing the importance of knowing how the people performing risk management think. According to Hillson (2004), it is important not only to understand individual risk attitude but also risk attitudes of project stakeholders and more importantly understanding the organization risk culture. Further, this CFS is by Hillson (2004, ch.9) clarified as: “For risk management to be effective, the culture must be supportive”. This link the fact that individual

risk attitudes must be understood and managed but also that the organization's approach to risk must be mature (Hillson, 2004).

#### 2.4.4 Individual Risk Attitudes

How people behave is originated of the results from the interaction between an individual's attitude and the environment in which he finds himself (Hillson, 2004). Understanding this interaction can be vital if the organization want to achieve an effective opportunity management. As stated in the first chapter, uncertainties are part of all projects, but some people can have different attitudes toward uncertainty. According to Hillson (2004), some people can perceive uncertainty as favorable, neutral, unfavorable or hostile. Further, it is important to recognize that underlying psychological influences known as heuristics can affect someone's attitude toward uncertainty (Hillson, 2004). Figure 2.33 summarizes three basic risk attitudes defined by Hillson (2004).

<b>Risk Attitude</b>	<b>Description</b>	<b>Attitude toward threats</b>	<b>Actions toward threats</b>	<b>Attitude toward opportunities</b>	<b>Actions toward opportunities</b>
<b>Risk Averse</b>	Uncomfortable with uncertainty and seeks security	Oversensitive and aware	Aggressively avoid/minimize	Undersensitive and unaware	Underreact or ignore
<b>Risk Tolerant</b>	-Comfortable with most uncertainty. -Accepts that uncertainty is part of everyday life	Unconcerned	None	Unconcerned	None
<b>Risk Seeking</b>	Seeks thrill and welcome the challenge of tackling uncertainty.	Underestimate the importance	Accept or ignore	Overestimate importance	Aggressively exploit/enhance

*Figure 2-33. Three basic risk attitudes Source: (Hillson, 2004, ch.9)*

An organization should strive to become risk-aware and this requires a flexible corporate risk culture that is neither risk-averse nor risk-seeking, but rather is risk mature (Hillson, 2004)

#### 2.4.6 Documentation

To implement and achieve an effective risk management, one key tool is documentation. According to Chapman & Ward (2011), documentation is a key feature of all formal management processes. Further, documentation is also one key ingredient of the Project Uncertainty Management Process that is described by Chapman & Ward (2011). Figure 2.34

lists some key motives for documentation defined by Chapman & Ward (2011).

<b>Clearer thinking</b>	By write down ideas people can clarify their initial thinking process
<b>Clearer communication</b>	Can give better understanding if people can explain what they mean. Further it can give a collective us of team input
<b>Familiarization</b>	Provides “new team members” the chance of to “get to speed” quickly. Also useful when training new staff.
<b>A record of decisions</b>	Can provide a record than is useful for reviewing and explaining key decisions
<b>A knowledge base</b>	Capture corporate knowledge
<b>A framework for data acquisitions</b>	Systematic collect and store data for the future

*Figure 2-34. Key motives for performing a well-based documentation within the organization*

### 3. RESEARCH METHODOLOGY

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This chapter aims to present and evaluate the research methods. Further, this chapter is focusing to include a scientific basis and methods to answer the research questions of this thesis work.

#### 3.1 Research approach

Many researchers have for a long time stated that they use either an inductive or deductive research approach (Fisher, 2007). For creating well based arguments that can be beneficial, the researcher should use a research approach that is logical and cogent (Holmqvist et al., 2009). Induction is by Zait & Zait (2009) described as:

*“Inferation of a likely consequence from a multitude of possible states; inferation of likely antecedents as results of observation of multiple consequences; in order to be true, indication needs empirical evidence”*

- (Zait & Zait, 2009, p.907)

Further, the research is conducted in a particular case and with help of empirical finding combine theory and previous research (Holmqvist et al., 2009). The deductive approach on the other hand is by Holmqvist et al., (2009, p.15) described as: “The deductive approach explains by theory for general solutions or occurrences how an empirical problem in one case can be described”. Further, this gives the assumption that conclusion is based on true suppositions (Zait & Zait, 2009, p.907)

According to Dubois & Gadde (2002); Pierce cited in Fisher (2005) both types of approaches are used in reality. This is by researchers identified as an abductive approach (Fisher, 2005). The term abduction is by Josephson (1996) described as:

*“The abductive approach is a way of theory forming, but often used when, an inference is going from data description of a topic to a hypothesis that best explains or accounts for the data”*

- (Josephson, 1996, vol.55)

Figure 3.1 lists the three approaches with giving an example of each approach. The examples below is cited from Svennevig (2003). Observe how the order of rule, case and result changes below each approach.

<b>Deduction</b>		<b>Induction</b>		<b>Abduction</b>	
<b>Rule</b>	All the beans from this bag are white	<b>Case</b>	These beans are from this bag	<b>Rule</b>	All the beans from this bag are white
<b>Case</b>	These beans are from this bag	<b>Result</b>	These beans are white	<b>Result</b>	These beans are white
<b>Result</b>	These beans are white	<b>Rule</b>	All the beans from this bag are white	<b>Case</b>	These beans are from this bag

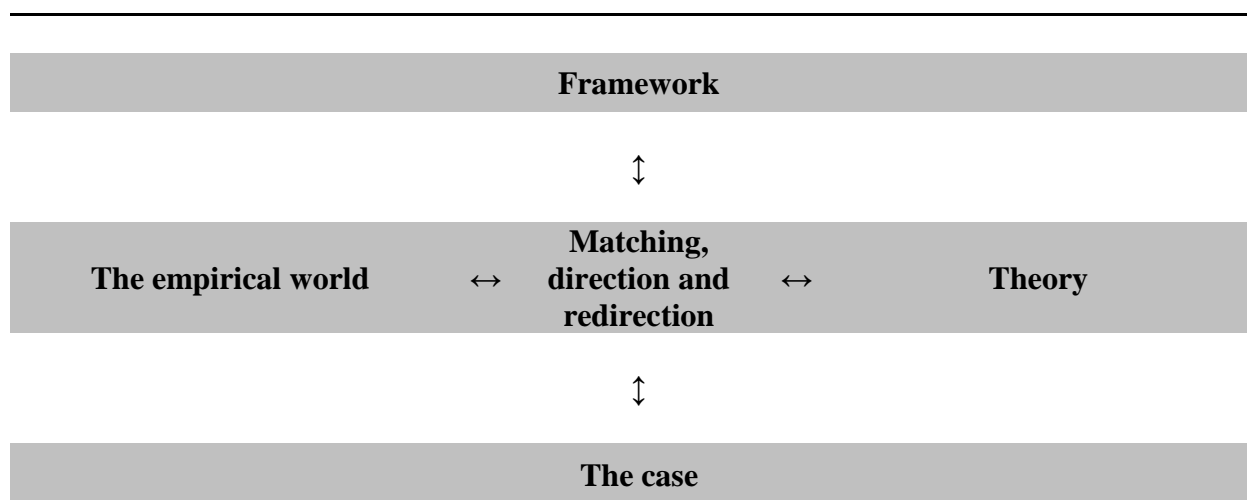
*Figure 3-1. The rule, case and result for three research approaches Source: (Svennevig, 2003)*

Further, the abduction approach is more a forming process of hypotheses and the operations is opened to new ideas. (Holmqvist et al., 2009). The abductive approach can be extended with a systematic combining process (Dubois & Gadde, 2002). The term systematic combining process is by Dubois & Gadde (2002) described as:

*“Systematic combining is a process where theoretical framework, empirical fieldwork and case analysis evolve simultaneously, and it is particularly useful for development of new theories.”*

- (Dubois & Gadde, 2002, p.554)

The systematic combining is according to Holmqvist et al., (2009), being conducted in two processes; first is the process of matching reality and theory; and the second step is the direction and redirection. The systematic combining design is illustrated in figure 3.2.

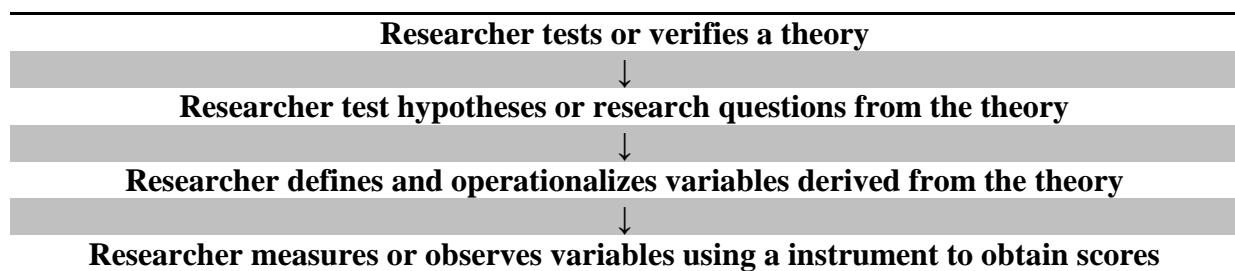


*Figure 3-2. The systematic combining design Source: (Dubois & Gadde, 2002 cited in Holmqvist et al., 2009, p .17)*

## **3.2 Research Method**

### **3.2.1 Quantitative Research Method**

According to Aliaga and Gunderson (2005, n.d.), quantitative research is an “explaining phenomena by collecting data that are analyzed using mathematically based methods”. The main objective using quantitative research method is a about numbers and objective hard data (Andersson, 2006). The quantitative data is evaluated by using statistically method (Höst et al., 2011) The quantitative research method is allowing the researcher to “seek to confirm hypotheses about phenomena” (Mack et al., 2011) and uses highly “structured methods such as questionnaires, surveys and structured observation” (Mack et al., 2011, p.3). Another important issue is according to Höst et.al, (2011, p.30), that “the study design is stable from beginning to end” which makes the method less flexible. According to Bryman (1998, p.94) the research strategy is structured and the relationship between researcher and the subject is somewhat distant. Using quantitative method the analytical objectives will be according to Mack et al., (2011, p.3) “to quantify variation” and “to predict casual relationships”. The approach to a deductive quantitative study is visualized in the figure 3.3.

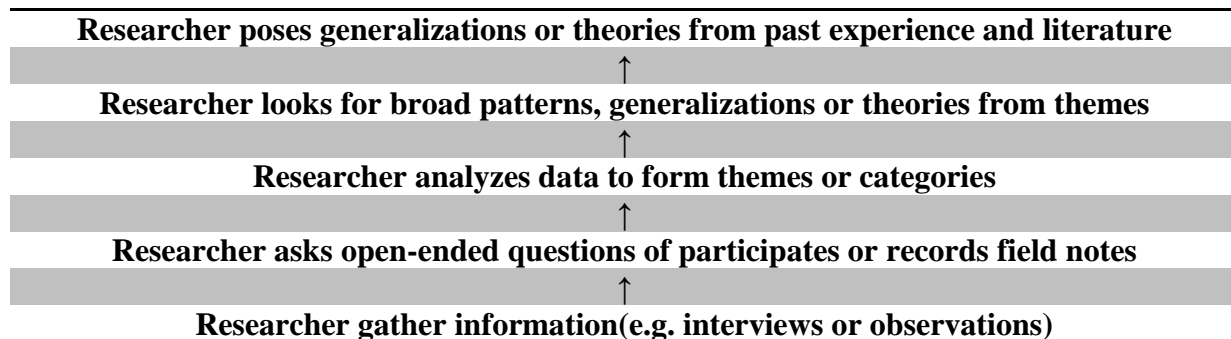


**Figure 3-3. The deductive approach used in quantitative study. Source: Creswell(2014, p.59)**

### **3.2.2 Qualitative Research Method**

The following definition, taken from Bouma (1995, p.206), describes what is meant by qualitative research: “research methods that produces results that are not obtained by statistical procedures or other methods of qualification”. By using qualitative research the researcher can according to Andersson (2006) collect, analyze and interpret data by observing what people do and say. The nature of qualitative research is therefore according to Anderson (2006) “exploratory and open-ended”. Using a qualitative method can according to Doyle (1990, p.276), be useful when the research is based on “nonquantitative observations made in the field and analyzed in nonstatistical ways”. This research method uses very different methods in order to collect information, for example semi-structured methods such as in-depth interview, focus groups and participant observation (Creswell, 2014). The research method is according to Mack et al., (2011), in some aspects of the study flexible and the study design is

iterative, that is “data collection and research questions are adjusted according to what is learned” (Mack et al.2011,p.3).The approach to a inductive qualitative study is visualized in the figure 3.4.



**Figure 3-4. The inductive approach used in qualitative study. Source: (Creswell, 2014, p.66)**

### 3.2.3 Differences between quantitative and qualitative method

According to Mack et al., (2011), the key difference between quantitative and qualitative method is regarding their flexibility. When using quantitative methods such as surveys or questionnaires, for example, the questions asked by the researcher are identical questions in the same order. Another issue is regarding the response categories, according to Mack et al., (2011) the participants may choose “close-ended” or “fixed” responses. According to Bouma (1995), the qualitative research is more subjective and deep.

There are some other differences that is important to take into consideration, figure 3.5 is summarizing the differences described by Mack et al., (2011).

	<b>Quantitative</b>	<b>Qualitative</b>
<b>General framework</b>	Structured methods	Semi-structured methods
<b>Analytical objectives</b>	Quantify variations	Describe variations
<b>Question format</b>	Close-ended	Open-ended
<b>Data format</b>	Numerical	Textual
<b>Flexibility in study design</b>	Stable from beginning to end	Some aspects are flexible

**Figure 3-5. Differences between qualitative method and quantitative method. Source: (Mack et al., 2011)**

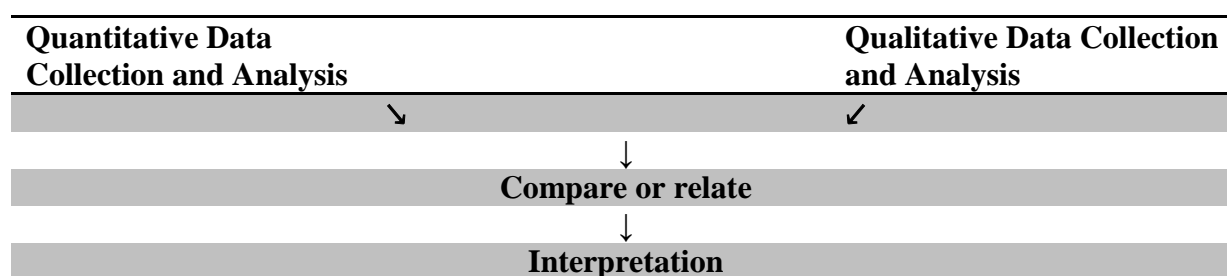
### 3.2.4 Mixed method research method

According to Cohen (1987), all researcher methods are either qualitative or quantitative. There is also a possibility of combining qualitative and quantitative research data in a research study (Creswell, 2014). The mixed approach methods are by Creswell and Clark (2011, ch.5) described as: “Mixed methods research is a research design with philosophical assumptions as well as methods of inquiry”. Further, the methodology involves collecting, analyzing, and mixing both qualitative and quantitative data (Creswell & Clark, 2011). The data can be can be collected from a single study or series of studies (Creswell, 2014).



### 3.2.5 Convergent parallel mixed methods

According to Creswell (2014), this is a form of mixed method design in which the researcher converges or merges quantitative and qualitative data to provide analysis of the current research problem. Further, the researchers methodology is by Creswell (2014, p.219) described as: “The researcher collects both forms of data at roughly the same time and then integrates the information in the interpretation of the overall results”. The convergent parallel mixed method design is visualized in figure 3.6.



**Figure 3-6. The Convergent Parallel Mixed Method Design. Source: (Creswell, 2014, p.220)**

### 3.2.6 Validity and reliability

One way for describing the credibility of a study are using the terms; validity and reliability. The term reliability is by Joppe (2000) described as:

“The extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and If the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable”

- (Joppe, 2000 cited in Golafshani, 2003, p.598)

According to Gibbs (2007) a good reliability would indicate that the researcher’s approach is “consistent across different researchers and different projects”. Golfshani (2003), states that although the researcher may be able to prove the repeatability of the research, the instrument of reliability itself may not be valid. According to Creswell (2014), validity means that the researcher checks for systematic and random errors. Further, the term validity is by Joppe (2000) described as:

*“Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. In other words, does the research instrument allow you to hit “the bull’s eye” of your research object? Researchers generally determine validity by asking a series of questions, and will often look for the answers in the research of others”.*

- (Joppe, 2000 cited in Golafshani, 2003, p.599)

There are some differences between quantitative and qualitative research when considering reliability and validity. According to Stenbacka, (2001) cited in Golafshani, (2003, p.601), discussing reliability in qualitative research can be misleading due to qualitative study aims to generate understanding. However, according to Golfshani (2003, p.601), “reliability is a consequence of the validity in a study”. This indicates that in order to ensure reliability in a qualitative research, the research must examine the trustworthiness (Golfshani, 2003). Further, according to Creswell (2014, p.201), qualitative validity is defined as “the researcher checks for the accuracy of the findings by employing certain procedures”. The reliability in qualitative research is to maintain a consistent approach. According to Creswell (2014), there are some validity strategies for a qualitative research. The researcher can for example triangulate different data sources of information or use member checking. The use of member checking is to determine the accuracy of the qualitative findings and means that the researcher conducts follow-up interviews with the participants in the study and allows them to comment on the findings (Creswell, 2014)

Figure 3.7 is summarizing validity between quantitative research method, qualitative research method and the convergent parallel mixed method.

<b>Research Method</b>	
<b>Quantitative research method</b>	“Construct validity” (Wainer & Braun, 1998), indicating to which data is to be gathered and how it is to be gathered?
<b>Qualitative research method</b>	“Validity is affected by the researcher’s perception of validity in the study and his/her choice of paradigm assumption”(Creswell & Miller, 2000 cited in Golafshani, 2003, p.602
<b>Convergent parallel mixed method</b>	According to Creswell (2014), the convergent approach should be based on establishing both quantitative validity and qualitative validity. “The use of different concepts or variables on both sides could yield incomparable and difficulties can merge the finding”(Creswell, 2014, p.223)

**Figure 3-7. Validity between different research methods.**

### **3.3 Survey research**

One important key in an investigation is to obtain data, this can be carried out by different strategies. By using a survey research, the researcher can provide a both quantitative and qualitative description of trends or opinions of a population by studying a sample of that population (Creswell, 2014). The techniques that are been used to collect data are for example through: interviews; observations and through documents. Those techniques will be further discussed below.

### 3.3.1 Interviews

According to May (1997) interviews is a good technique to use when qualitative data need to be collected. The technique has the advantages of being: flexible; give good insight in people's experience; opinions and attitudes (Creswell & Clark, 2011). In general, interviews are most commonly made face-to-face and the researcher and the person interviewed can see each other and be near each other (Denscombe, 2007). According to Walliman (2001), there is however some disadvantages to take into consideration, for example, interviews require resources such as: time and location. It is also important that the interviewer have done some homework and have the skills to lead the interview (Hillson, 2004). Further, according to Hillson (2004), it is important that the interviewer is active listening and can manage selective questioning. According to Zikmund et al., (2013), the interview can either be depth-interview or semi-structured interview, the advantages and disadvantages are summarized at the figure 3.8.

	Description	Advantages	Disadvantages
<b>Depth Interviews</b>	Typically one-on-one and the interviewer is often a trained researcher.	Can gain insight from each individual and it is good for understanding unusual behaviors	The interviewer should have good skills and sometime this tool is expensive
<b>Semi-Structured interviews</b>	Often it is based on open-ended questions. The answers is in a short essay-type	The results is easily interpreted and is more cost efficient than depth interviews	In general, this tool lack flexibility to produce truly creative explanations

**Figure 3-8. Differences between depth interviews and semi-structured interviews.**  
Source: (Zikmund et al., 2013)

### 3.3.2 Observations

According to Zikmund et al., (2013, par.3), observation is described as: “A systematic process of recording behavioral patterns of people, objectives and occurrences as they happen”. This indicates the less need of questioning or communicating. The data collection can instead be collected through witness and record information while watching a certain event take place (Zikmund et al., 2013). Further, there are according to Zikmund et al., (2013), two types of observations: visible observation and hidden observation. The main difference is that in the visible observation, the observer's presence is known to the subject (Zikmund et al., 2013).

### 3.3.3 Case study

According to Denscombe (2007), case studies can be useful if the researcher wants depth and detail. A case study is by Menyah (2010, n.d.) described as:”A story about how something exists within a real world context that is created by carefully examining an instance”. Further,

the case study involves real life situations that present individuals with an uncertain result (Menyah, 2010). Denscombe (2007) claims the advantages with case studies are: The method focuses on a holistic approach; the researcher have the possibility to use multiple methods; and that the phenomena is studied in a normal condition. However, the disadvantages with case studies are that is not an effective method of for collecting data and the researcher most make choices from among a number of events to people (Denscombe, 2007). Further, the trustiness of the investigation can be questioned because the results only have been collected from one study (Menyah, 2010). To carry out a case study, several approaches to obtain evidence exists, those are summarized in figure 3.9.

Type	Description
<b>Illustrative Case Study</b>	Describing the main characteristic of a real world example. The aim is to clarify an idea or reinforce an argument
<b>Exploratory Case Study</b>	Aiming to understand what happened within a case by looking studying surround context
<b>Explanatory Case Study</b>	Attempts to explain why certain behavior occurred by finding out causes and effects

**Figure 3-9. Variation of approaches to conduct a case study. Source: (Menya, 2010)**

### 3.3.4 Documents

According to Denscombe (2007, p.212), the strategy of a survey can be applied to documents as well as living people. Further, the documentary research can be used when “background information needs to be used as a platform for a research project or when secondary data need to be collected”. As a result of reviewing documents, the researcher can easy obtain data from a wide range of documents recorded (Wharton, 2006). However, the disadvantage of document research is the fact that the credibility or the source can be questioned (Walker, 1999)

### 3.3.6 Questionnaires

According to the Corporate Research and Consultation Team (2008), surveys using questionnaires are one of the most widely-used data-gathering techniques in research. Further, the method is by the Corporate Research and Consultation (2008, p.1) described as: “A method that measure issues that are crucial to the management and envelopment of human resources, such as behavior, attitudes, beliefs and opinions”. The questionnaire is a tool that can be used to collect and record information regarding an issue of interest. There are several ways to conduct a questionnaire; one is to ask the questions during a structured and formal interview. This method is by University of Surrey (2012, module 9, unit 5) described as: “An advantage of this method is that the interviewer may assist if there are any ambiguous questions”. The advantages and disadvantages of a questionnaire are summarized in figure 3.10.

<b>Advantages</b>	<b>Disadvantages</b>
Less expensive and saving time	Distribution of questionnaires might be costly
Collecting large number of quantitative data	Opportunity to clarify issue is lacking
Can be analyzed more “scientifically” and objectively than other forms of research	People may read differently into each question

**Figure 3-10. Disadvantage and advantages of a questionnaire. Source: (University of Surrey, 2012).**

### **3.5 Reasons for selected methodology**

The researcher has decided to use the abduction research approach. The abduction approach is suitable for this research because it is a forming process of hypotheses and the operations is opened to new ideas (Holmqvist et al., 2009).

After reviewing both quantitative and qualitative research method, the author has drawn the conclusion that a convergent parallel mixed research method is the most beneficial due to collecting data on a relative short time. The convergent parallel mixed research method allows the researcher collect both quantitative and qualitative data (Creswell, 2014). The method is allowing the researcher combine several data collection method which is beneficial to compare results and to confirm or disconfirm a finding (Creswell, 2014). Figure 3.11 summarizes the data collection technique used for this thesis work.

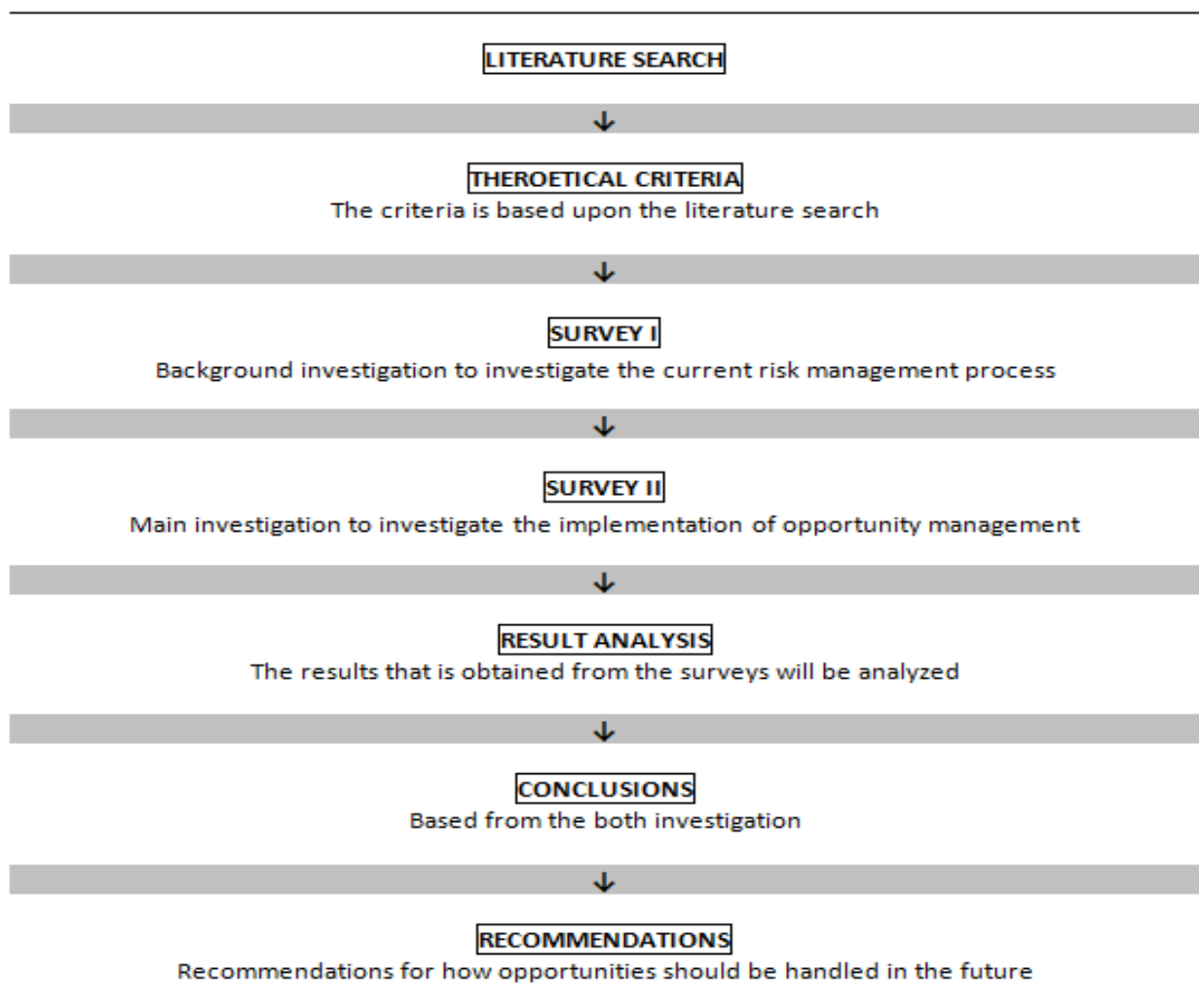
	<b>Data collection technique</b>
<b>Background investigation</b>	Literature search Document research Observations Interviews
<b>Main investigation</b>	Interviews combined with questionnaire

**Figure 3-11. The data collection technique used for this thesis work.**

### **3.6 Application of Selected Methodology**

This part aims to describe how the two investigations has been designed and conducted. Further, this part will also describe the design of the interview performed in the main

investigation. An overview of the research structure is visualized in the figure 3.12.



*Figure 3.12. The research process*

### 3.6.1 Background investigation

The researcher was in the first month introduced to the company's way of working. This was the first start of reviewing documents and getting familiar with the company's risk process. The first step in this thesis work was to review the company's risk guidelines and parallel do extensive literatures search. The purpose of the literature search was to find more about project risk management. After the first step was completed, three interviews were conducted with the company's risk process owner and those responsible of the risk guideline. The interviews were semi-structured, allowing the interviewed to answer questions freely. The purpose of the interviews was to get a quick insight into the current risk process. During the background investigation, visible observations were also made by attending risk meetings. The researcher took notes during these observations and questions were asked afterwards.

### 3.6.2 The main investigation

The main investigation consisted of twenty-one qualitative interviews with questionnaires. The aims of those interviews were to collect quantitative data and ask about the current risk management process but also about opportunity management. The researcher could by asking questions about the project risk management get an idea about how the organization worked with risks and also see if how the organization best could handle opportunities. The quantitative part was conducted by the use of a questionnaire and the purpose was to collect quantitative data. The purpose of collecting quantitative data was to obtain reliability but also to analyze the results statistically. The qualitative part was based on follow-up questions from the questionnaire. The researcher used the same follow-up questions for each interview and the qualitative interviews conducted after the questionnaires were semi-structured. The interviews were held in the company's main building in Gothenburg and took approximately 45 minutes. Further, all interviews were recorded digitally allowing the researcher to review the interviews afterward.

### 3.6.3 Participants

The twenty-one interviews made in the main investigation were conducted with employees with different roles and experience in the organization. To capture the most essential part of the risk management process, the researcher interviewed employees from different parts of the organization. The main investigation started with interviewing employers from the product planning department to see how risks were handled in the planning phase. Second step consisted of interviewing Project Assurance Managers which was responsible for the project risk process. Finally, the researcher interviewed Chief Project Managers which were responsible for the entire project.

### 3.6.4 The design of the questionnaire

The questionnaire was divided into three parts; Project risks; Opportunity management and the last part contained questions about the current risk management process. The first part contained questions about the definition of the term risk, risk culture and risk attitude. The second part covered questions about opportunity management including the interviewee's attitude of tools for identify opportunities. The final part contained questions about the risk management process and covered questions about the effectiveness of the process. In order to collect data for analysis, the questionnaire used the Likert-type scale. The researcher used the 6-point scale instead of the 5-point scale because of that the 6-point scale have no midpoint and the ratings have even number. A complete copy of the questionnaire can be found in Appendix II. The questionnaire was created in Google Drive.

### **3.7. Method discussion**

As stated before, the methods applied in this thesis were designed to be suitable for collecting large amount of data during a relative short time. One of the main research method used in this thesis was a questionnaire together with interviews that allowed the research to be presence in the interviews and provide clarity about the questions. Further, the researcher believe that the main investigation provided good reliability due to the amount of participants but also regarding the participants different title and the amount of experience. However, the reliability can be discussed in one particular area which is regarding the participant chosen for the interviews. The participant chosen for the interviews were provided by the supervisor at the company. According to my opinion, it could have been beneficial to interview a larger group of unknown participants with very different roles within the organization. Moreover, because two investigations were conducted and both quantitative and qualitative data were collected, the researcher believes that the validity in the results is strong. Due to that, it is most likely to believe that the validity is strengthened by the amount of interviews conducted and the two investigations allowed a wide variety of opinions to be captured.



## 4. RESULTS & ANALYSIS

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The aim of this chapter is to present the results obtained from the background investigation and the main investigation. To make it easier for the reader this chapter has been divided into three main parts categorized in chronology order: the first part will cover the results obtained from the background investigation and the second part will cover the results obtained from the main investigation.

### 4.1 The background investigation

As stated before, the purpose of the background investigation was to ask about the current risk management process so that the researcher could get an idea about how the employees worked with risks. Three semi-structured interviews were conducted with different people that worked close to the risk management process. Beside the interviews the researcher participated in training courses to learn more about the project management principles and guidelines.

#### 4.1.1 Results from the background investigation

Due to confidentiality agreement, the researcher will not present any further insight of the company's project management process. However, the background investigation showed that risk management was one of the project management principles. The two main principles for risk management were: Continuously identify and quantify risks; and define and execute action plans and show financial consequences if risk occurs. Further, the researcher also learned about the company's main project management tool called the GDP (April, 2014). The GDP is a project tool box that includes best practices and years of practical experience from several departments. The interviewer also revealed the company's risk management guideline, which described the risk management process and methods. The researcher investigated the risk management documents and took notes for preparing the questions for the main investigation. The researcher also talked with employees during break in the work and several employees stated that working with risks is not fun and the level of attention given to risk management was low. One employee stated: "Unfortunately you cannot see the results of risk management, good risk management means that the risk does not occur". The participants in the three interviews were asked if opportunities were handled in and all three stated that they didn't work with opportunities. Further, they stated that many within organizations handle issues rather than risks. The two main results obtained from the background investigation were: First, the background investigation revealed that there were documents and process available for supporting the risk work. Secondly, the background investigation showed no documents or process for handling opportunities. In a more general view, the background investigation revealed that the employees were somewhat familiar with the concept of risk management and there was an understanding of the methodology from both the risk process owner and the owner of the risk guideline.

### 4.1.2 Analysis

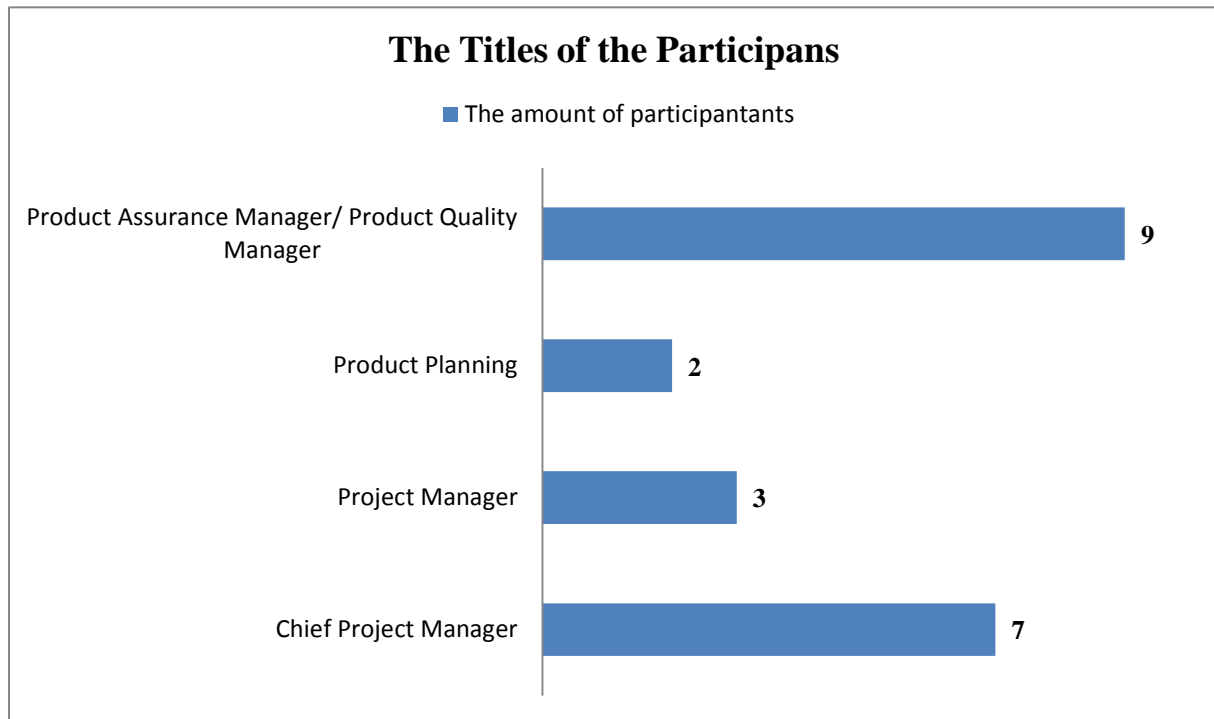
The background investigation provided a first insight into the organization project risk management process. As stated above, at a first insight, many employees said that working with risk were not fun and required resources, i.e., time and money. This finding is in accordance with Hillson & Simon (2012), which describes two common shortcomings in risk management; people that say that they are too busy dealing with issues and that the risk process takes time and money. According to Hillson & Simon (2012), by not performing risk management more issues will arise later that will reinforce the problem and by failing to response to risk will result in risks will go unmanaged. As stated from the results from the background investigation, the organization provided documentation that described the risk management process. However, risk was not the most emphasized part in the GDP or in the meetings the researcher attended. According to both Chapman & Ward (2011) and Hillson & Simon (2012), one of the critical success factors is a supportive organization that shows working with risks are important. According to Hillson & Simon (2012), a supportive organization recognizes the extra work that is needed to carry out risk management and that risk management is fundamental to ensuring project success. The supportive organization will give the required resource that is needed and will provide a suitable framework to facilitate the risk process (Hillson & Simon, 2012). The organization had a risk management guideline that described the methods and tools for carrying out risk management, however according to Hillson & Simon (2012), it is crucial to provide an appropriate level of infrastructure to support the risk management work. The implementation level may also be driven by the organizational risk appetite. As stated above, in a more general view, the background investigation revealed the linkage between the defined risk process and how this is applied in reality, for example, in steering committee meetings and week meetings. This finding is accordance with both Chapman & Ward (2011) and Hillson & Simon (2012), which state that risk management needs to be a simple and scalable process and implemented in such manner that fits the organization. According Hillson & Simon (2012), the risk process might be implemented as set of simple questions, for example, “what are we trying to achieve?” Further, there was no structured description in the risk documents of different tools to use in the risk identification, nor was there a clear description of risk response strategies and the risk assessment was not both qualitative and quantitative. This finding is in accordance with Hillson & Simon (2012) which state that each organization must have an efficient procedural framework that supports the process and ensures support from the organization.

## 4.2 The main investigation

### 4.2.1 The Participants

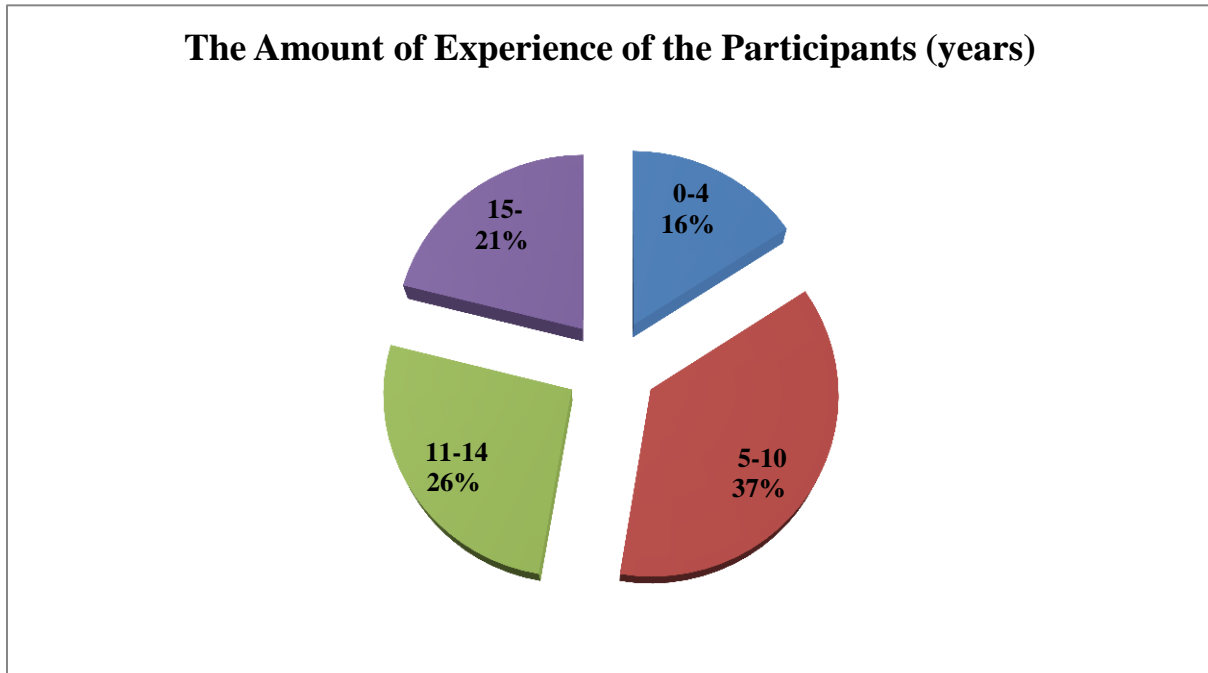
As stated before, the purpose of the main investigation was to get a deeper insight of the risk management process and to understand how the employees applied the process and further

investigate if opportunities were handled in the projects and to test implementation issues for opportunity management. Twenty-one semi-structured interviews were conducted with different people employees with different roles within the organization. The interviews took approximately 45 minutes, in the first fifteen minutes the researcher used a questionnaire to collect quantitative data. The researcher took notes during the questionnaire and did follow-up questions afterwards. Figure 4.1 shows the title of the participants.



*Figure 4-1. The titles of the participants*

Many of the participants had several of experience within the organization and many had experience of working with project management and were familiar with risk management. Figure 4.2 shows the amount of experience of the participants.



*Figure 4-2. The amount of experience of the participants*

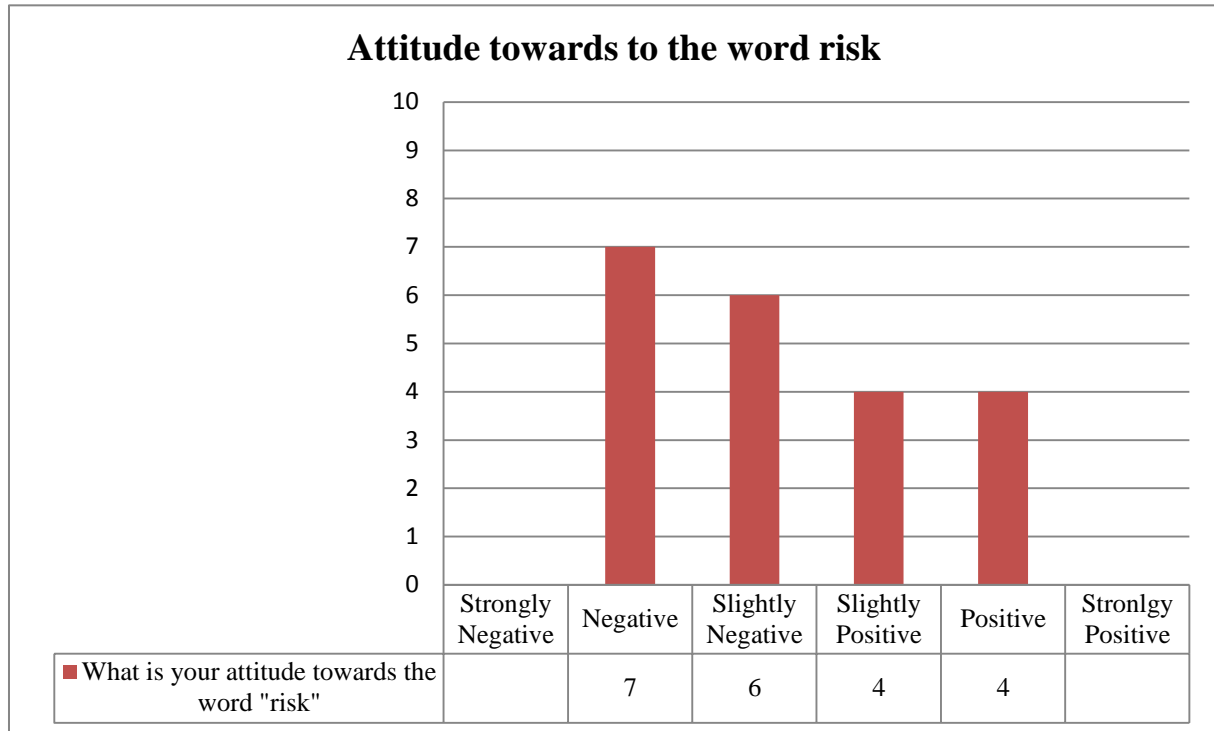
Further, the questionnaire was divided into three parts: Project risk; Opportunity management; and Project risk management. The first part contained five questions about project risks, the questions were about preferred definition of the term risk and questions about risk attitudes. The second part contained seven questions about opportunity management, the questions covered aspect of implantation issues and tools. The final part contained nine questions about project risk management and covered aspect of the whole organization's approach to risk management. The main results from the interviews containing both the questionnaire and follow-up question are presented below. To make it easier for the reader, the results are presented section-by-section. First, the results from the questionnaire are presented statistically and then the results from the follow-up questions are presented in writing.

#### **4.2.2 The Quantitative Results from the questionnaire:**

##### **4.2.2.1 Part I: Project risks**

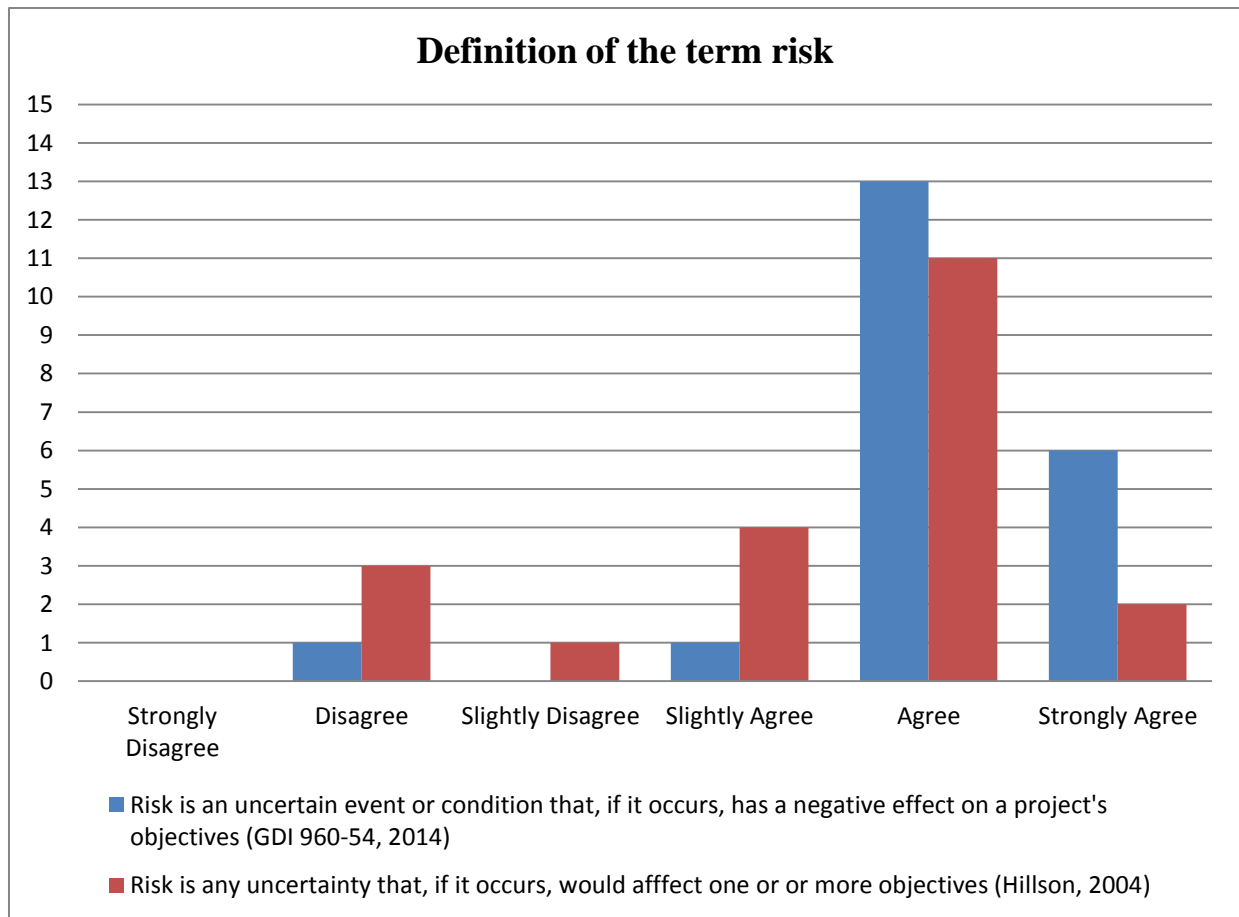
The first question asked was about the participant's attitude towards the word risk. The results show that there are different opinions of the meaning of the word risk. However, most of participants thought the word was negative. Figure 4.3 show the results from the first

question.



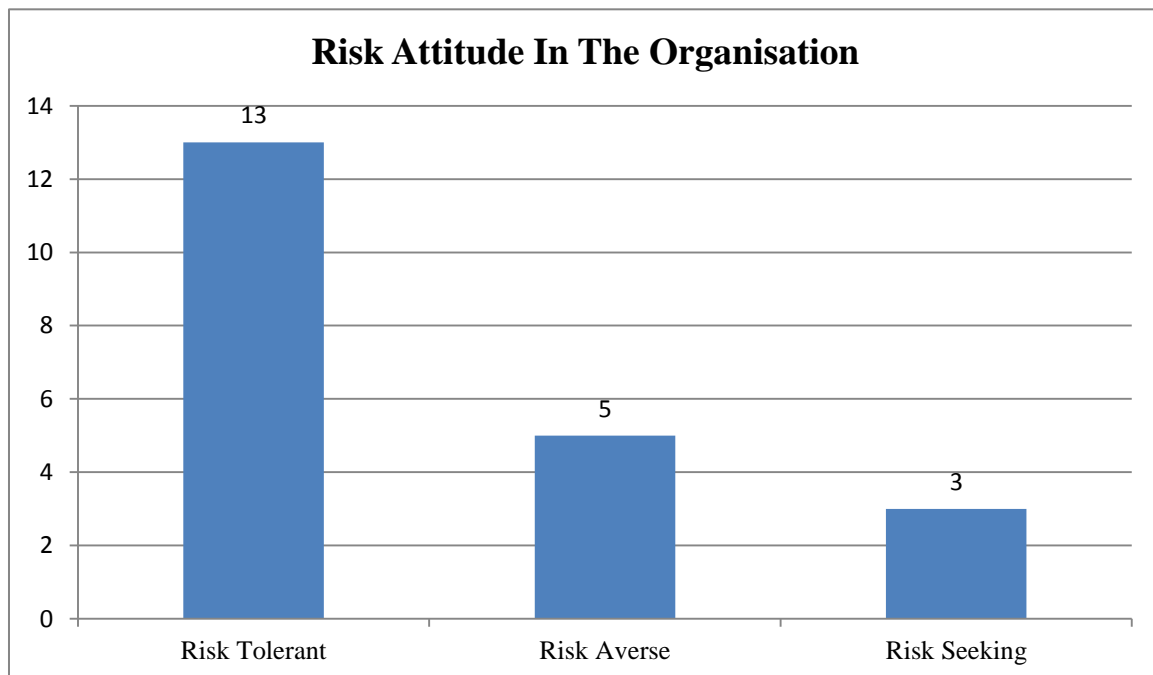
*Figure 4-3. The participants' attitude towards to the word risk*

Two definitions of the term risk were shown and the participants were asked whether they agreed with the definition. One of the definitions was from the organizations risk management guideline. Most of participants agreed on the definition found in the GDI, where the risks have negative impact but there were some disagreement of the definition that had a broader meaning. The results are shown in figure 4.4.



*Figure 4-4. The level of agreement of the definition of the term risk.*

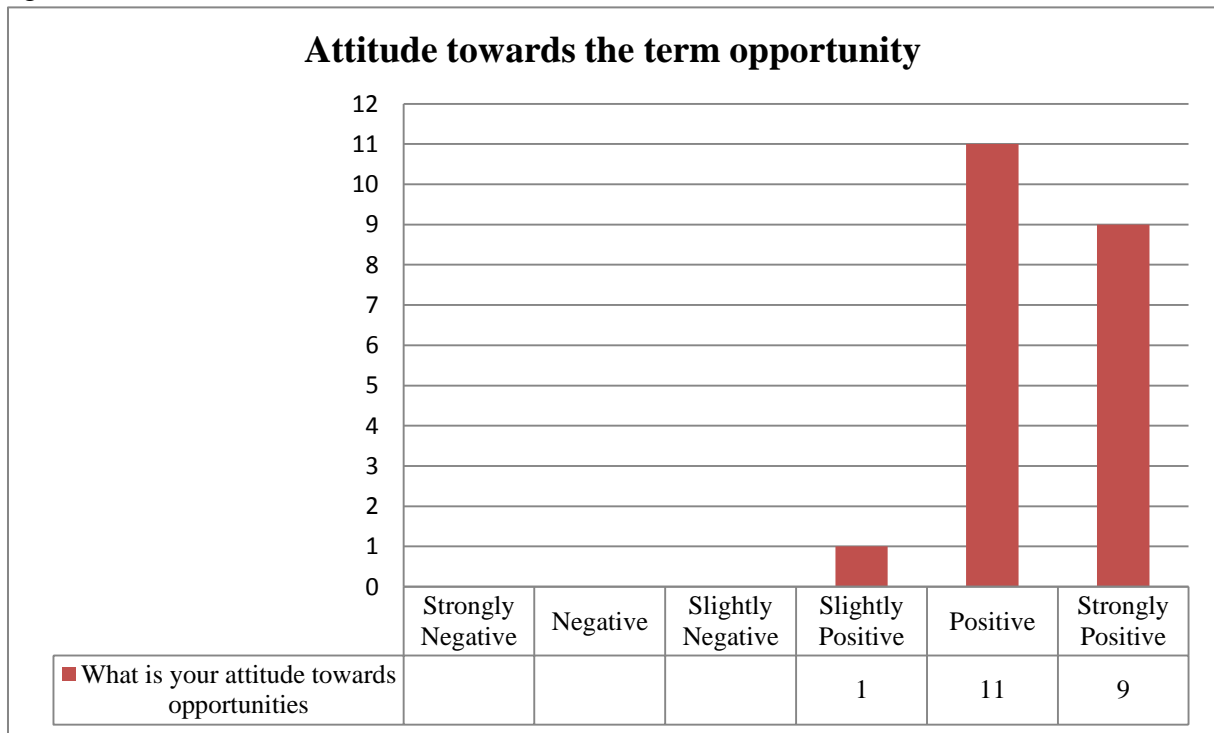
The participants were asked which behavior described the organizations risk attitude, here the result was indicating that the organization was risk tolerant. The result from this question is presented in figure 4.5.



*Figure 4-5. The risk attitude within the organization*

#### 4.2.2.2 Part II: Opportunity management

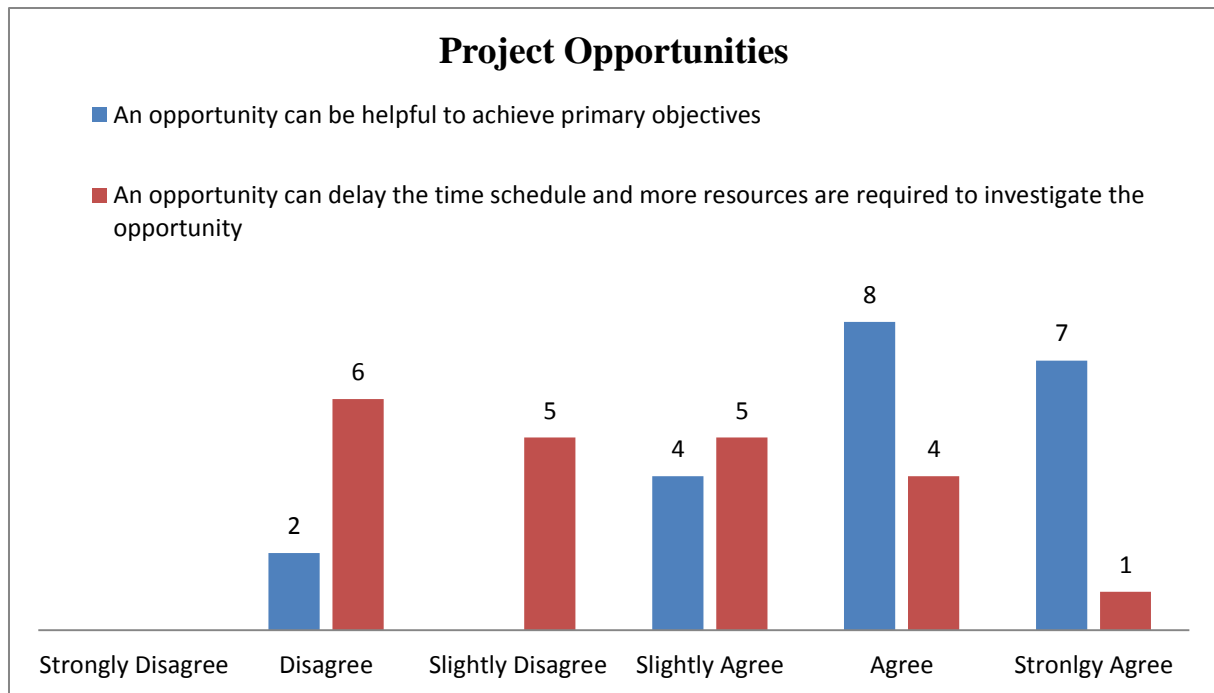
Most of the participants had a positive attitude towards opportunities, this is visualized in figure 4.6.



*Figure 4-6. The participants' attitude towards the term opportunity*

Two questions involving the finding of an opportunity were asked, and the participants answered their level of agreement. The result showed that opportunity is helpful for achieving primary objectives but there were discussion whether working with opportunity required more resources. The results can be shown in figure 4.7.

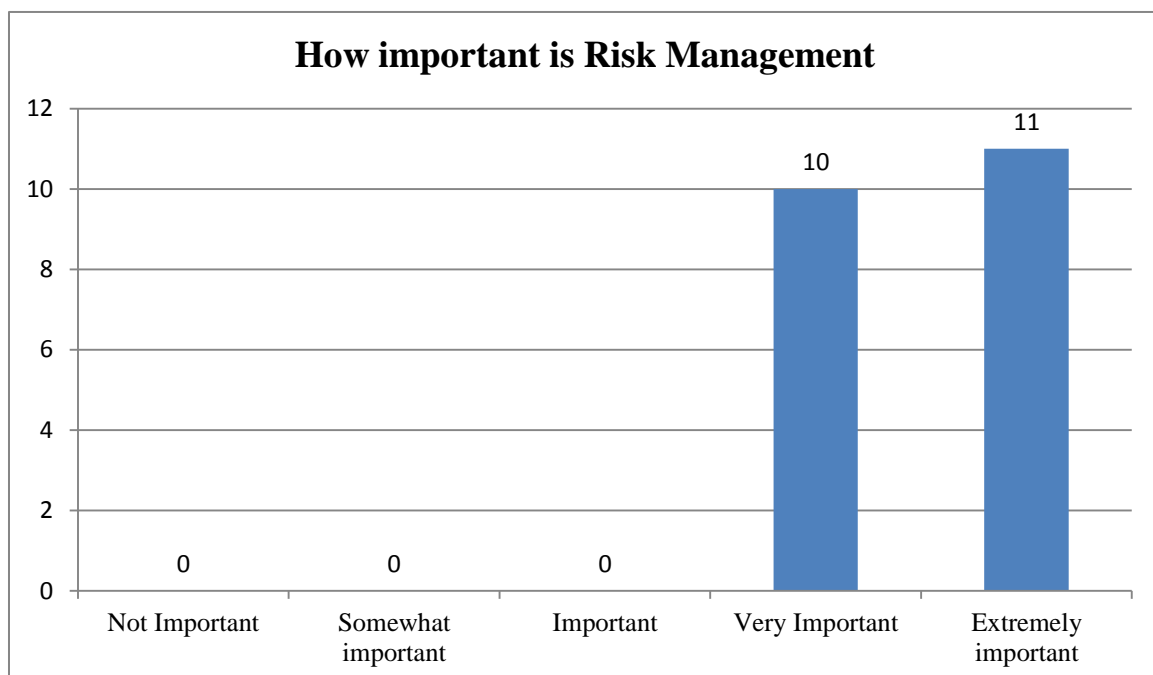




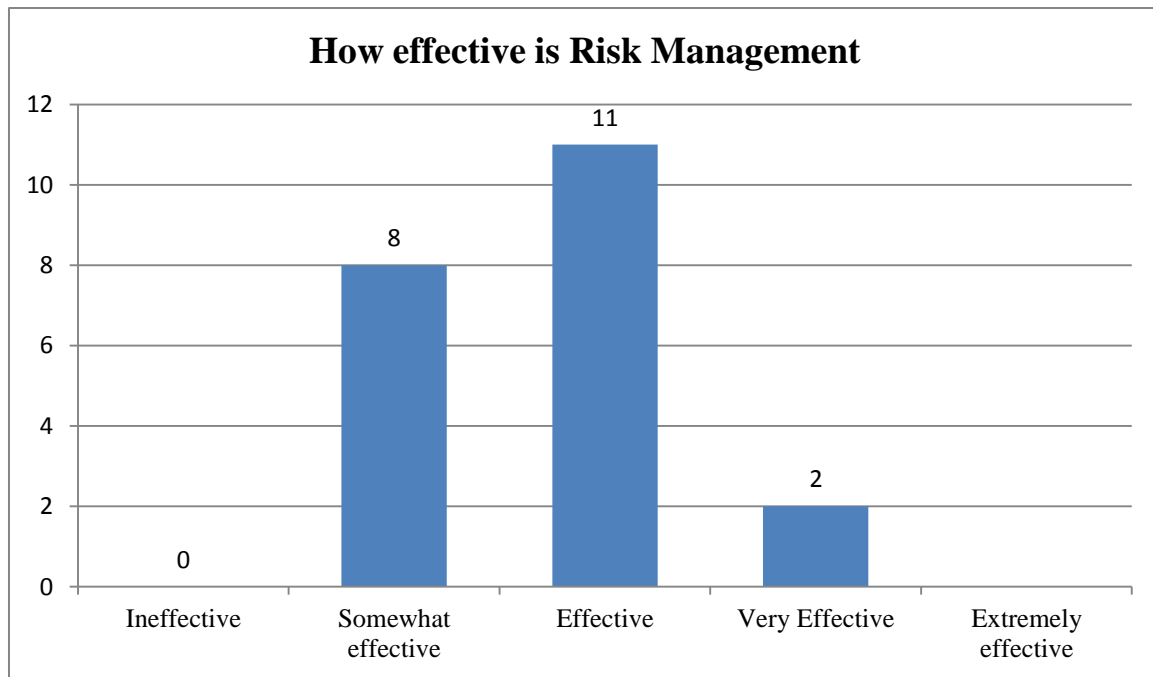
*Figure 4-7. The level of agreement of finding an opportunity*

#### 4.2.2.3 Part II: Project risk management

The two first questions covered the risk management within the organization, one of the question was how important risk management was to project success. The results from the two questions are shown in 4.8 and 4.9.

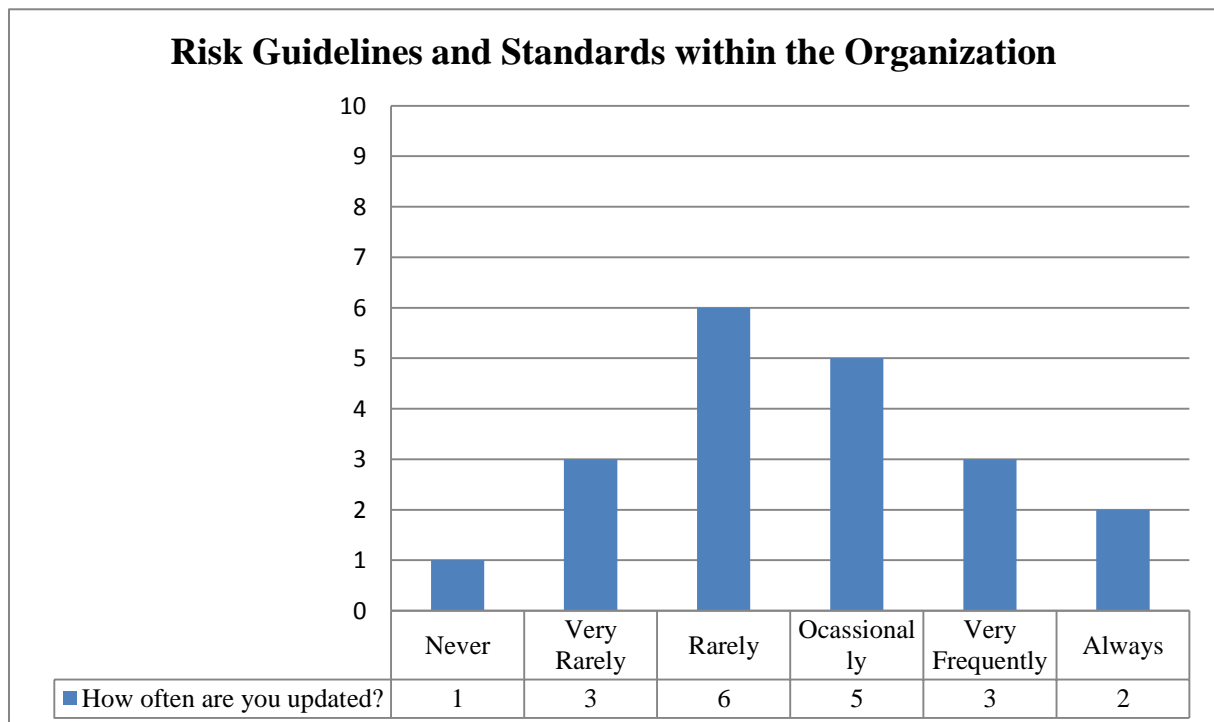


*Figure 4-8. The result from the question regarding how important is risk management*



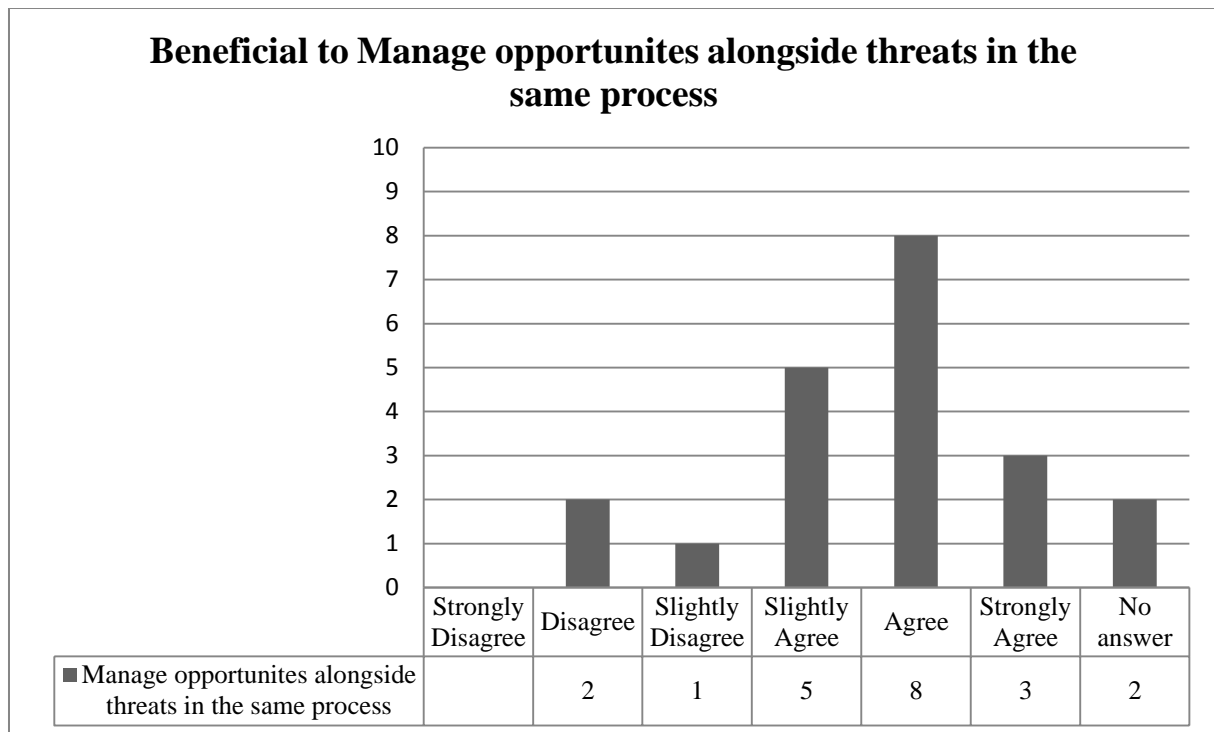
*Figure 4-9. The result from the question of how effective is risk management*

Further, one question was asked about how often the participants were up to date regarding the organization's risk management guidelines and standards. The result from this question is shown in 4.10.



*Figure 4-10. The result from the question about how often the participants were up to date regarding the organization's risk management guidelines and standards*

The last question was if it was beneficial if opportunities were managed alongside threats in the same process. The result is shown in figure 4.11.



*Figure 4-11. The level of agreement of whether it is beneficial to manage opportunities alongside threats in the same process*

### 4.2.3 Results from the interviews

To make it easier for the reader the chapter is divided into three parts; the first part will cover project risks; the second part will cover opportunity management; and the final part will cover project risk management.

#### **4.2.3.1 Part I: Project risks**

The majority of the participants defined risks as negative (see figure 4.3), but believed that identifying and handling risks was positive. One participant stated: *“For me finding and managing risks is positive, every time we are aware of a risk it is positive”*. Another stated that *“it is important that we manage risk, it is part of project management”*. When the interviewed was asked about preferred risk definition, it was clear that most people saw risk as negative. One participant stated: *“When we write and talk about risks, we see it as negative”*. Regarding the broader definition of the term risk, one participant stated: *“Would like to see a broader definition of the term risk, we focus a lot on technical risks. We should be better at, for example, highlighting communication problems”*. Further, when discussing the definition of the term risk, many participants mentioned the problem of separating issues from risks. One participant stated: *“I feel that sometimes we go astray, we have difficulty*

*distinguishing between issue and risks*". Most of the participants said that the organization was risk-tolerant (see figure 4.5), one participant stated: *"We are working in a very risk-tolerant environment, opening gates despite of high risks and move forward without any further investigation. Everyone is shaped by the environment and too many are risk-tolerant at all the time"*. Many of the participants specified the relationship between the project management team and the steering committee. One participant stated: *"Today I feel that we have a lot of negative reporting to the steering committee"*. Another participant stated: *"The steering committees are very risk tolerant, had wanted a more active steering committee that are concerned about the risks. Sometimes I feel that we talk about risks in the meaning of that it has not happened and will not happen. Further, we move on despite presenting high risks and the steering committee does not question the risks"*. Several participants stated that the project teams need to improve in order to present risks. One participant stated: *"The steering committee must be better at ask about risk but at the same time, the project needs to better at highlighting the risk and make effective presentations"*

#### 4.2.3.2 Part I: Analysis

As stated above, many participants had different opinions of the term risk (see figure 4.3 and 4.4). The finding is in accordance with Hillson (2004), which state that the common usage of the word "risk" sees only the downside. Further, according to Hillson (2004), one of the critical success factors is a clear definition of risk. For achieving an effective risk management, everyone in the project should know what risk means. The broader definition of the word risk presented caused discussion among the participants' (see figure 4.4). This finding is also accordance with Hillson (2004), which states that risk have two dimensions, therefore it is important that it is clear what type of effects might a risk have. According to Hillson (2004), the organization must aim to have an agreed definition and decided whether risk includes both opportunity and threat. Further, the first part of the interviews showed that the most of the participants saw that the organization as risk-tolerant (see figure 4.5). Being risk tolerant means that the individuals are unconcerned with risks, simply indicating that "we don't have risk in our project - we are engineers" (Hillson, 2004, ch.9) According to Hillson (2004), it is important to understand individual risk attitudes. This finding is in accordance with Hillson (2004), which emphasizes the relationship between attitude, behavior and environment. According to Hillson (2004), every organization should investigate the risk attitudes within the organization and aim to be risk mature. In summary, according to Hillson (2004), this finding indicates that a clear and unambiguous definition of terms is required and the organization should give more attention to risk management by understanding and adjusting individual risk attitudes and risk culture.

#### 4.2.3.3 Part II: Opportunity management

Most of the participants had a positive attitude towards opportunities (see figure 4.6), but the impression was that there was no clear process for handling opportunities. One participant stated: *"We do not handle opportunities on a structured way but we do communicate orally if we identify an opportunity"*. Further, there was discussion about what an opportunity is. One

participant stated: *“It is important that we define what an opportunity is, we must draw the line on what is deliverable and not to make the project bigger than what it is”*. The participants had also different on whether an opportunity found in a project would require more resources. One participant stated: *“An opportunity may make it easier to reach our objectives faster and cheaper due to the amplitude of the opportunity. Further, it is important to have resources to explore the opportunity”*. There was also discussion whether an opportunity is always beneficial. One participant stated: *“An opportunity doesn’t always mean a benefit, depends on in which stage the project is. One must always consider what kind of opportunity it is”*. When discussing if there was many opportunities in the projects, there were several answers. One participant stated: *“In terms of opportunities, it is also important to note that we have fixed prerequisites and the organization is top-down based. Therefore, we must consider the fact that resource allocation and payment plans are synchronized with what the project will deliver. Further, how should we then deal with opportunities?”* Another participant stated: *“It is important to link risks and opportunities to the “QDCF”, but is also important to understand that certain questions belong to the project and some are aligned to the line organization”*. The relationship between the project team and the line organization was by many the key in order to manage and handle opportunities. One participant stated: *“In terms of opportunities, there can be conflict between the line and the project due to different opinions. An opportunity can be great for the project team but can create problems for the line organization”*. Another stated: *“An opportunity will test the balance of power between the project and the line, it is the line that own resources and not the project”*. The participant had several suggestions where on the project lifecycle most opportunities would occur. In general, many stated the following suggestion as one participant stated: *“For me opportunities occurs most in the beginning, maybe until the concept gate”*. Another participant stated: *“Maybe the Product Planning People could be even better at working with opportunities, I believe that there are many opportunities in the beginning of the project”*. One question in the interview was about managing opportunities found in previous projects. First, many participants stated: *“Today we have not a document way of work to deal with opportunities”*. In general, most of the participants were positive of managing opportunities. One participant stated: *“For me it is positive if we start looking for opportunities. First, it is not good to only think negatively. Second, if we get good at it, we can generate income of terms of producing cheaper and faster – it can be a new mindset to meet the global competition”*.

#### **4.2.3.4 Part II: Analysis**

Most of the participants had a positive attitude towards opportunities (see figure 4.6) but there was discussion what the definition of an opportunity. This finding is in accordance with Chapman & Ward (2011, ch.1), which state that opportunity, uncertainty and risk are a "tricky trio". Focusing only on threats could mean that potential opportunity would be lost and identifying and managing project opportunities require creative thinking and a new way of thinking (Chapman & Ward, 2011). Further, both Chapman & Ward (2011) and Hillson (2004), underlines how important it is to defining risk appetite and risk thresholds. The results is in accordance with both Chapman & Ward (2011), which states that it is important to have

a clear understanding of the scope for approaching opportunities and define the objectives that should be pursued. Further, according to Hillson (2004), the organization should view opportunities (and risks) from a risk lifecycle perspective, mainly indicating that it is important to have risk response strategies and monitor and control the opportunity in order to make sure that the opportunity occurs and to fully benefit from it. Several participants mentioned the difficult documentation system in order to review historical opportunities, this finding is in accordance with PMI (2009), that states that historical review is important, especially in the risk identification phase. Further, the finding about the documentation system is in accordance with both Chapman & Ward (2011) and Hillson (2004), which state documentation as a key factor for risk management. In summary, the findings in this part is accordance with Chapman & Ward (2011) and Hillson (2004), which states that it is vital to understand the complexity of an opportunity, there it is a need for systematic searches for opportunities and it is important to search for them at all stages in the project life cycle. Further, it could be beneficial to have a management team working to respond to the opportunities (Chapman & Ward, 2011)

#### 4.2.3.5 Part III: Project risk management

In the questionnaire half of the participants' stated that risk management is extremely important to project success (see figure 4.8). As stated before, many participants said it was important to find and manage risks. However, many participants were not satisfied with the current risk management in their projects. Many of the participant thought it was room for improvement and gave several examples of how the risk work could improve. One participant stated: *"Today we have a structured risk management process, but for me the main problem is that we need to consider what we do with what comes out of the process. We should reflect on how we use our project management process, especially in the beginning of the projects"*. Another participant stated: *"We have several external circumstances that creates difficulties in order to close high risks. I feel that the risks are still there and we just float on. The risks are just there but we find it difficult to do anything about it"*. Several participants stated that they had problems on closing risk in their projects and continuously update the risk register. In general, several of the participant wanted that more attention to be given to risk work. One participant stated: *"Today we are very immature to see risks from a lifecycle perspective and manage secondary risks"*. Further, there was also discussion on the activities in the risk assessment stage. One participant stated: *"Most often, I feel that most risks are based on experience and we use gut instinct instead of quantifying the risks"*. Several participants mentioned that it would be better to quantify the risks, however there was discussion on whether if it would be beneficial using computer software for performing Monte Carlo analysis. One participant stated: *"Today I don't believe that we are in that level that is required for using Monte Carlo software because we lack input data and RiskBreakDownStrucutre(RBS) and WBS must be developed"*. In general, many of the participants wanted a more integrated risk management within the whole organization. Another participant stated: *"We must anchor our current response strategies in the project*

and in the steering committee, it is important that we create a red line for the entire risk work”. Another participant wanted to see more responsibility from every project member and stated: *“It should be every engineer’s responsibility to think in these courses and everyone should be concerned with this. The best way would be if we took both a top-down and bottom-up approach”*. Further, there was also discussion on the allocation of the risk work in the projects. One participant stated: *“In the projects, it has sometimes been confusion of who should do what, PAM or PMQ”* Another participant stated: *“Usually the CPM do not want to facilitate the risk work by itself, have sometimes experienced that it can be difficult to decide who should do what when it comes working with risks”*. There were also discussions of the relationship between the project team, the line organization and the steering committee. One participant stated: *“Sometimes it can also be helpful to solve the high risks from a top-down perspective, for example, with help of the steering committee”*. Another participant stated: *“Would have preferred more focus on risk management activities across the entire organization, today I feel that the line organization is somehow invisible in terms of risks. Working with risks is not number one on the agenda and it is difficult to get an active risk work”*. The last question discussed in the interviews was if it would be beneficial to manage opportunities in the current project risk management process. One participant stated: *“Working with opportunities involves looking at things with new perspective. We have to get out of our bubble “as we have always done”. The biggest challenge is to think outside the box”*. Another stated: *“Cannot see any advantage to blend in opportunities right now, it can create confusion and we need first start to effectiveness the current risk process”*. One participant thought it might be a good idea but it was important to not burden the employees with more work and stated: *“It might be a good idea to look for opportunities, but you have to look at how much resources it requires. Before we begin with opportunities, it is important that we have a very high closing rate on the risks we have identified”*. Several participants also mentioned that it would require less training and it would be more visible if opportunities were handled in the same process (see figure 4.11). One participant stated: *“In order to work with opportunities, I think we need a way or working that manages and facilitates opportunities in a natural way. It would be interesting to capture the opportunities available”*. In general, many participants were positive towards managing opportunities but there was discussion about resource allocation due the time pressure and it would require a change of mindset that is based on open communication and creativity

#### 4.2.3.6 Part III: Analysis

The results from the main investigation indicate the need of attention for higher level of support from the whole organization for achieving a more effective risk management. The finding is in accordance with Chapman & Ward (2011), which state that is important to understand the relationship between project, operation and corporate strategy. Further, according to Chapman & Ward (2011), it is important to separate the strategic planning for operation, project execution and corporate strategy purposes. The organization should consider both a top-down and bottom-up approach to risk management, but most importantly the organization must ask itself : *“Do all parties understand their responsibilities and the expectations of other parties in clearly defined terms which link objectives to planned*



activities”(Chapman & Ward, 2011, ch.5). As stated before, the finding is in accordance with Hillson (2004) and Chapman & Ward (2011), which state that risk management should be integrated within the whole organization and not as a tool to support project management. According to Hillson (2004), two critical success factors are; a simple scalable process; and appropriate infrastructure to support the risk process. Several participants mentioned weaknesses in three areas of the process; risk assessment; risk action planning; and risk monitoring and control. This finding is accordance with Hillson (2004), which state that is appropriate to first select the level of implementation and then provide required level of infrastructure to support the risk work. Further, according to Hillson (2004), risk response planning is one of the most important step in the risk management process. The finding is accordance with Hillson (2004), which emphasizes response strategies for both opportunities and threats that are anchored within the organization. Further, there was a discussion on communication and documentation within the organization. The finding is in accordance with both Chapman & Ward (2011) and Hillson (2004), which states documentation as a key factor in every formal management process, especially in risk monitoring and control. According to Chapman & Ward (2011), communication management needs to be jointed with risk management. The last question of this part was about whether it was beneficial to manage opportunities alongside threats in the same process. The finding is in accordance with Hillson (2004), which state that opportunity management will be accepted if only there are demonstrable benefits. Further, the participant’s named several benefits with managing opportunity management in the same risk management process that was also described by Hillson (2004), such as; no new process is required; familiarity to current techniques; and minimizing additional training. In summary, many participant were positive towards managing opportunities and the results was according to Chapman & Ward (2011), which states a change of mindset that is based on open communication and creativity.





## 5. CONCLUSIONS AND RECOMMENDATIONS

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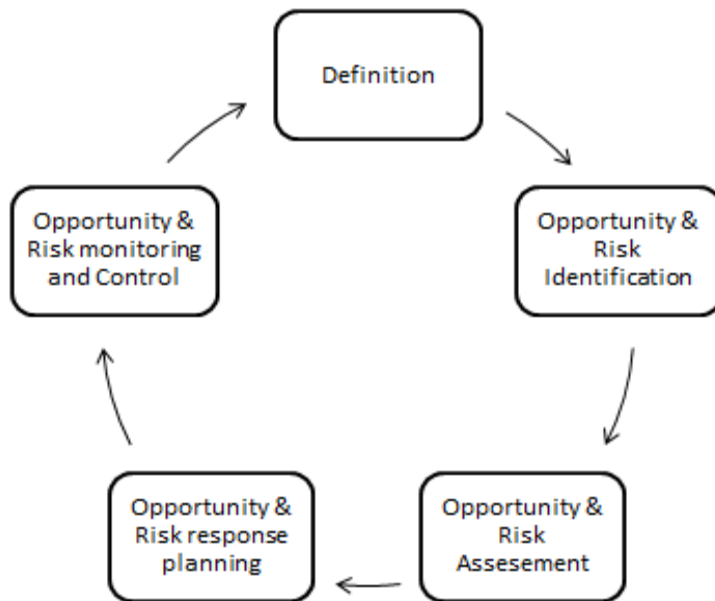
This chapter aims to present the conclusion from the two investigations. Further, the purpose of this chapter is to give recommendations how the organization should strive forward to implement opportunity management. Finally, the researcher will also present ideas for future research. To make it easier for the reader, the chapter has been divided into two main parts: conclusions and recommendation.

### 5.1 Conclusions

Project Risk Management is important because being successfully in order to identify and manage risks are vital to project success (PMI, 2004; Hillson, 2004). The first research question was regarding the organizations current risk management process. Both the background investigation and the main investigation tested the application of the current process. The background investigation showed that the organization saw risk management as one of the principles of project management. Further, the organization provided a risk guideline with a defined process and methods. However, many people within the organization stated that working with risk is not fun and often the risk work resulted in managing issues rather than risks. The result from the main investigation showed that there is a need to integrate risk management within the whole organization. Several participants stated, for example, that they wanted more commitment from the steering committee and the line organization. The main investigation also showed three main areas in the risk process that need improvement. One important result was that several participants request improvements in the risk action planning phase, stating that they wanted risk response strategies to be anchored within the organization. As stated above, risk management is important but it takes commitment and time. The conclusion is therefore that the organization needs to increase the attention given for risk management, in the present there is a need of integrating risk management within the whole organization and create a risk culture that is risk aware.

In recent risk management standards but also in the academic field, risk management nowadays includes opportunity management. The second research question was regarding the implementation of opportunity management within the current risk management process. Both the background investigation and the main investigation showed that the organization didn't have a structured process for managing project opportunities. Further, most of the participants stated that it would be beneficial to manage opportunities and gave several examples of possible opportunities in their projects. However, the main investigation showed that several participants didn't think it was the right time to blend in opportunities, mainly because they wanted first to see improvements in the current process. The main investigation showed that working with opportunities would require a new mindset based on open communication and creativity. Further, working with opportunities would require a supportive organization where risk and opportunity management is integrated within the organization. The conclusion from the investigation is that it exist a need for opportunity management in order to take advantage of the opportunities available, making sure that opportunities are not missed out. Figure 5.1 shows how the current process can easily be modified to include opportunities. Also note that

the process is emphasizing the term opportunity by calling it an opportunity and risk management process.



*Figure 5-1. The Opportunity and Risk management process (Mustafa, 2014). Source: (Hillson, 2004)*

As several participants stated, it would be beneficial managing opportunities alongside risks in the current process, mainly due there is no need for a new process and it would be transparent in a documented way for every project member.

## 5.2 Recommendations

The recommendations for the company are therefore:

- ✓ Integrate opportunity and risk management  
Start by defining a broader definition of the term risk that is accepted within the organization. It is important it is documented in the risk guideline but also in the risk management plan for every project. Further, it is recommended that the organization name the process to: Opportunity and Risk Management in order to emphasize identifying and managing opportunities.
- ✓ Clarify opportunity and risk thresholds  
In the definition phase it is important that thresholds are specific for every project and that the terms and labels used in the risk work are agreed-upon within the project team. The thresholds can allow the project team to identify opportunities that are realistic for the project.
- ✓ Improve the risk response planning phase  
By setting up well-defined response strategies for both opportunity and risks. A well-

based communication management can provide that the strategies are anchored within the organization.

- ✓ Continually educate employees in how to work with opportunities and risk  
By providing site-specific training the organization can increase the attention given to risk management making sure that every project member is risk aware. It will also add consistency for the tools and methods used in the process.
- ✓ Use simple statically methods for quantifying opportunities and risks in the risk assessment phase but also in order to set risk and opportunity thresholds. This can be coordinated with the project managers.
- ✓ Start evaluating and build an infrastructure for supporting computer software in order to perform quantitative opportunity and risk analysis in the future.

### 5.3 Future research

This thesis was made site-specific at the company's office in Gothenburg and didn't cover how risks or opportunities were treated and handled due to employee's position, gender, nationality or experience. Therefore, an investigation covering these aspect and map out individual risk attitude and behavior could be beneficial to provide specific training efforts. Further, it could also be beneficial to conduct a research regarding risk and opportunity management at other departments in other countries.



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## 7. APPENDIX

### APPENDIX 1 – The SWOT- Analysis

1) Identify both threats and opportunities that might affect achievement of the project objectives.	2) Assess the probability of the opportunity or the threat occurring. Set the following score system: 0 = not possible 1= unlikely 2= possible 3= probable
3) Determine now the impact for each opportunity or threat. Let the opportunities have positive score. Set the following score system: 0 = no impact +/- 1= minor impact +/- 2= significant impact +/- 3= major impact	4) Document all the result on a SWOT Worksheet. The team can now start to explore the strengths or weakness on the specific opportunities and threats. This gives the team four options to consider:  1. Strengths that make a specific opportunity easier to exploit 2. Strengths that counter exposure to a specific threat 3. Weaknesses that make it harder to exploit a specific opportunity 4. Weaknesses that increase exposure to a specific threat.  Strength adds 2 to an opportunity score and a weakness subtract 2. Record the new score system in the SWOT Worksheet

#### An example of the SWOT Worksheet

	O/T rating			Strengths	Weakness	Modified O/T score	Total O/T Score
	P	I	PxI Score	S1	W1		
<b>Opportunity 1</b>	1	2	2	2	-2	-2+2+2=2	Add all opportunities O/T Score
<b>Threat 1</b>	1	-1	-1	2	-2	-1	Add all threats O/T Score

## **Appendix 2 – The Questionnaire**

\* the questionnaire was created in Google Drive

### **Project Risk Management**

1. **What is your position?**

.....

2. **How many years have you been working at Volvo?**  
*Mark only one oval.*

- ☐ 0-4  
☐ 5-10  
☐ 11-14  
☐ 15-

### **Project Risks**

3. **What is your attitude towards the word "risk"?**  
*Mark only one oval.*

	1	2	3	4	5	6	
Strongly Negative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Positive

4. **Risk is an uncertain event or condition that, if it occurs, has a negative effect on a project's objectives.**  
*Mark only one oval.*

	1	2	3	4	5	6	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

5. **Risk is any uncertainty that, if it occurs, would affect one or more objectives**  
*Mark only one oval.*

	1	2	3	4	5	6	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

6. **Which of these behavior describes you best?**  
*Mark only one oval.*

7.

Which of these behavior describes your work environment best?

Mark only one oval.

- ☐ Risk Averse
- ☐ Risk Tolerant
- ☐ Risk Seeking

8.

Other comments?

## Opportunities

9.

What is your attitude towards opportunities?

Mark only one oval.

1 2 3 4 5 6

Strongly Negative Strongly Positive

10.

**An opportunity can also be referred to as a positive risk**

Mark only one oval.

[illegible]

11.

Do you agree with the following scenario: If an opportunity occurs in a project it can be helpful to achieve primary objectives?

Mark only one oval.

1 2 3 4 5 6

Strongly Disagree Strongly Agree

12.

**Do you agree with the following scenario: If an opportunity occurs in a project it will delay the time schedule and more resources are required in order to investigate the opportunity?**

*Mark only one oval.*

	1	2	3	4	5	6	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

13.

**Have you used the white books in order to evaluate risks and opportunities from previous projects?**

*Mark only one oval.*

☐ Yes

☐ No

14.

**Can you give an example of an opportunity in your current or previous projects?**

"Imagine that you are on a brainstorm session and the main objective is to find opportunities"

.....

.....

.....

.....

.....

15.

**Note the following statement: "Because we have <strength>, we might be able to create/exploit <opportunity>, which would lead to<benefit>". What is your reaction towards this statement?**

*\*David Hillson, 2003. Effective Opportunity Management for Projects: Exploiting Positive Risk*

*Mark only one oval.*

	1	2	3	4	5	6	
Strongly Negative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Positive

16.

**Have you used or have heard this kind of "metalanguage" to identify opportunities in previous projects?**

*Mark only one oval.*

☐ No

☐ Yes

17. Other comments?

[illegible]

## The Project Risk Management process

18. **How important is risk management to project success?**  
*Mark only one oval.*

- ☐ Not Important
- ☐ Somewhat important
- ☐ Important
- ☐ Very important
- ☐ Extremely important

19. **How effective is risk management on your projects?**  
*Mark only one oval.*

- ☐ Ineffective
- ☐ Somewhat effective
- ☐ Effective
- ☐ Very effective
- ☐ Extremely effective

20. How often are you up to date regarding the organization's risk management guidelines and standards  
Mark only one oval.

[illegible]

21.

**We only address threats in the starting point of the risk process***Mark only one oval.*

- ☐ Don't agree
- ☐ Agree

22.

**Are you aware if there are response strategies for opportunities in your department?***Mark only one oval.*

- ☐ Yes, please see the question below
- ☐ No, see the next question
- ☐ Other: .....

23.

Can you describe it briefly?

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24.

**Which of the following best describes your organization's approach to risk management\*?***\*David Hillson, 2003. Effective Opportunity Management for Projects: Exploiting Positive Risk**Mark only one oval.*

- ☐ The risk management process aims to manage potential negative impacts on objectives (i.e., threats only). There is no process for explicit handling of opportunities
- ☐ The risk management process aims to manage potential negative impacts on objectives (i.e., threats only). Opportunities are handled via a separate process that is not an integrated part of risk management.
- ☐ The risk management process aims to manage both threats and opportunities in a common (integrated) process.
- ☐ Other: .....

25.

**Do you have attended any risk workshop or brainstorm session in order to identify risks?***Mark only one oval.*

- ☐ Yes, please see the question below
- ☐ No, see the last question

24.

**Which of the following best describes your organization's approach to risk management\*?**

\*David Hillson, 2003. Effective Opportunity Management for Projects: Exploiting Positive Risk

*Mark only one oval.*

☐ The risk management process aims to manage potential negative impacts on objectives (i.e., threats only). There is no process for explicit handling of opportunities

☐ The risk management process aims to manage potential negative impacts on objectives (i.e., threats only). Opportunities are handled via a separate process that is not an integrated part of risk management.

☐ The risk management process aims to manage both threats and opportunities in a common (integrated) process.

☐ Other: .....

25.

**Do you have attended any risk workshop or brainstorm session in order to identify risks?***Mark only one oval.*

☐ Yes, please see the question below

☐ No, see the last question

26.

**Did you address both threats and opportunities in the risk workshop or the brainstorming session?***Mark only one oval.*

☐ No

☐ Yes

27.

**Is it beneficial if opportunities would be managed alongside threats in the project risk management process?**

What is your opinion? You can also write your opinion below the scale option.

*Mark only one oval.*

	1	2	3	4	5	6	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

28.

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