ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF PROJECT MANAGEMENT

AN ASSESSMENT OF PROJECT RISK MANAGEMENT PRACTICES: IN THE CASE OF KILINTO PHASE THREE PROJECT OF HEINEKEN BREWERIES S.C.

BY

YONATAN HABTAMU

A THESIS IS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ST. MARY'S UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PROJECT MANAGEMENT

JULY 2020

ADDIS ABABA, EHIOPIA

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

AN ASSESSMENT OF PROJECT RISK MANAGEMENT PRACTICES: IN THE CASE OF KILINTO PHASE THREE PROJECT OF HEINEKEN BREWERIES S.C.

BY

YONATAN HABTAMU

APPROVED BY BOARD OF EXAMINERS

_____	_____
Dean, Graduate Studies	**Signature**
_____	_____
Advisor	**Signature**
_____	_____
External Examiner	**Signature**
_____	_____
Internal Examiner	**Signature**

DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Maru Shete (PHD). All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

_____ _____

Name **Signature**

St. Mary's University, Addis Ababa July, 2020

ENDORSEMENT

This thesis has been submitted to St. Mary's University, School of Graduate Studies for examination with my approval as a University advisor.

_____ _____

Advisor **Signature**

St. Mary's University, Addis Ababa July, 2020

ACKNOWLEDGEMENTS

First and for most, I want to thank Allah. Secondly I would be glad to extend my deepest thankfulness and appreciations to my advisor Maru Shete (Phd) for his unreserved effort in providing me all the necessary guidance and supervision at all steps of the work. His critical comment and encouragement have contributed a lot to the successful completion of the study.

Finally, I would like thank to all my family, particularly my family for the moral and financial supports.

Table of Content

Contents **Page**

Acknowledgement ---------- i
Table of Content ---------- ii
List of Tables ---------- v
List of Figure ---------- vi
List of Graph ---------- vii
Acronyms ---------- viii
Abstract ---------- ix
CHAPTER ONE
INTRODUCTION
1.1. Background of the Study ---------- 1
1.2. Statement of the Problem ---------- 3
1.3. Basic Research Questions ---------- 4
1.4. Objectives of the Study ---------- 5
1.4. General Objective ---------- 5
1.4. Specific Objectives ---------- 5
1.6. Significance of the Study ---------- 5
1.8. Limitation of the Study ---------- 6
1.9. Organization of the Study ---------- 6
CHAPTER TWO
REVIEW OF THE RELATED LITERATURE
2.1. Theoretical Review ---------- 8
2.1.1. Uncertainty and Risk ---------- 8
2.1.1.1. Definition of Risk ---------- 8
2.1.1.2 Definition of Uncertainty ---------- 9
2.1.1.3 Opportunities ---------- 9
2.1.2 Project Risk Classification ---------- 9
2.1.3. Fundamentals of Risk Management ---------- 10
2.1.3.1 Risk Management Model and Process within the Construction Industry ---------- 11
2.1.4 Risk Identification ---------- 12
2.1.5. Risk Assessment ---------- 13

2.1.5.1Methods for Conducting Risk Assessment and Analysis ---------- 14
2.1.6. Qualitative and Quantitative Analysis ----------14
2.1.5.1. Qualitative Methods----------14
2.1.5.2. Quantitative Methods ----------15
2.1.7. Risk Register ----------15
2.1.8. Risk Response ----------16
2.1.8.1. Avoidance ----------16
2.1.8.2. Transfer ----------17
2.1.8.3. Mitigation and Reduction ----------18
2.1.8.4. Acceptance ---------- 18
2.1.9. Risk Monitoring----------19
2.1.10. Knowledge in relation to Risk Management ---------- 20
2.1.10.1. The Concept of Knowledge ----------20
2.1.10.2. Knowledge Management ----------19
2.1.10.3. Organizational Learning in the Construction Industry ----------21
2.1.10.4. Communities of Practice ----------21
2.1.10.4.1. SECI-model ----------21
2.1.10.5. The Interplay between Risk and Knowledge Management ----------22
2.1.11. The Attitudes toward Risk ----------22
2.1.11.1. Risk-averse ----------23
2.1.11.2. Risk-neutral ----------23
2.1.11.3. Risk-seeking ----------23
2.2. Empirical Review ----------24
2.3. Conceptual Framework----------27
CHAPTER THREE
RESEARCH METHODOLOGY
3.1. Research ----------29
3.2. Research Design ----------29
3.3 Data Type and Source of Data ----------30
3.4. Data Gathering Technique and Instruments---------- 31
3.5. Population, Sample Size and Sampling Technique ----------31
3.6. Method of Data Analysis ----------32
3.7. Validity and Reliability ---------- 32

3.7.1 Construct validity ---------- 32
3.7.2 Internal Validity ---------- 33
3.7.3 External validity ---------- 33
3.7.4 Reliability ---------- 33
3.8. Ethical Consideration ---------- 34
CHAPTER FOUR
RESULT AND DISCUSSION
4.1. Response rate ---------- 35
4.2. Reliability of the questions used to measure practice of project risk management ---------- 35
4.3. General characteristics of the respondents ---------- 36
4.4. Project risk management related knowledge ---------- 36
4.5. Project Risk Management Process ---------- 37
4.5.1. Planning risk management ---------- 37
4.5.2. Project Risk Identification ---------- 39
4.5.3. Major sources of risk for Kilinto Phase III Project ---------- 41
4.5.4. Risk analysis ---------- 43
4.5.5. Risk Response Planning ---------- 44
4.5.5.1. General Risk Response Planning Practice ---------- 44
4.5.5.2. Negative Risk Response Plans ---------- 46
4.5.6. Monitoring and Controlling of Risk ---------- 47
4.5.7. Project Risk Management Challenges and Documenting Lesson Learned for Kilinto Phase III Project ---------- 49
CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS
5.1. Conclusions ---------- 50
5.2. Recommendations ---------- 41
References ---------- 52
Appendices ---------- I

List of Tables

Table 4. 1 : Reliability Statistics ---------- 36
Table 4. 2 : General characteristics of sampled Kilinto Phase III Project---------- 36
Table 4. 3 : Pattern of responses to project risk management related knowledge questions by Kilinto Phase III Project---------- 37
Table 4. 4: Risk management plan related question by Kilinto Phase III Project ----------38
Table 4. 5 : Responses to risk identification related questions by Kilinto Phase III Project ----- 40
Table. 4.6: The Project team in terms of their involvement in risk identification process --------41
Table 4. 7 : Sources of risk for Kilinto Phase III Project ----------42
Table 4. 8 : Practice of project risk analysis by Kilinto Phase III Project ----------43
Table 4. 9 : Practice of planning risk response by Kilinto Phase III Project ---------- 45
Table 4. 10 : Practice of negative risk response plans in Kilinto Phase III Project ----------46
Table 4. 11 : Practice of monitoring and control of risk by Kilinto Phase III Project ----------48

ACRONYMS

FMOH:	Federal Ministry of Health
MSH:	Management Sciences for Health
PMBOK:	Project Management Body of Knowledge
PMI:	Project Management Institute
RHB:	Regional Health Bureau
SPSS:	Statistical Package for the Social Sciences
USAID:	The United States Agency for International Development

ABSTRACT

The general objective of the study was an assessment of the project risk management practices in the case of Heineken Kilinto Phase III Project. The respondents were selected by using non probability sample approach particularly judgmental sampling technique to include Heineken Kilinto Phase III Project project management, project technical support and project operation support teams who are believed to have knowledge in one or more of the steps of project risk management process. Structured questionnaire was distributed to 148 respondents and a total of 131 responses were collected. In-depth interview was conducted with the senior management of the project and the organization. The collected data was entered SPSS Statistics for analysis. Descriptive data analysis technique was used in which frequencies, mean, standard deviations and percentages were calculated. The transcribed qualitative data was categorized under each thematic area of the study and were narrated in detail. Lack of formal training of project staffs on project risk management, poor practice of risk management planning, lack of participation of stakeholders and beneficiaries on the process of risk identification, lack of effort by the management to maximize opportunities and poor practice of risk monitoring and control were the major finding of the study. The implementing partner and /or the project (Heineken Kilinto Phase III) should work on organizing detailed training to its staff on project risk management and proactive response strategy to manage security risks, should have risk management plan which outline the risk management tools and techniques to be used, outline risk ownership and required risk management budget. The company should also focus on increased participation of beneficiaries and stakeholders in the process of risk identification.

Key words: Project Risk Management; practice; Heineken Kilinto Phase III Project

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Risk is defined as the exposure to loss/gain, or the probability of occurrence of loss/gain multiplied by its respective magnitude. Events are said to be certain if the probability of their occurrence is 100% or totally uncertain if the probability of occurrence is 0%. In between these extremes the uncertainty varies quite widely (Jaafari, 2001). Risk also can be defined as a characteristic of a situation, action, or event in which a number of outcomes are possible, the particular one that will occur is uncertain, and at least one of the possibilities is undesirable (Yoe, 2000). Zayed and Chang (2002) defined risk as the presence of potential or actual constraints that could stand in the way of project performance, causing partial or complete failure either during construction or at time of use. Greene (2001) stated that there is no all encompassing definition of risk and provided his interpretation of what risk constituents: Risk defined hazard as the way in which an event can cause harm and exposure as the extent to which likely recipient of harm can be influenced by the hazard.

PMI defines project risk as an uncertain event or condition that if it occurs, has a positive or negative effect on a project objective. There is no risk free project! Having a well-designed project plan doesn't always guarantee success. Organizations should be well prepared in anticipating risks and deal with them proactively to avoid or minimize the impact. The level of risk management may vary from project to project depending on the type of the project, level of complexity, size, who the customers are and specific contractual requirements.

The traditional view of risk in project is negative and is often associated with threats that can have a negative consequence to the project objective. However project risk can be categorized as positive and negative risks. Where negative risk implies something unwanted that has a potential to irreparably damage a project, positive risks are opportunities that can affect the project in beneficial ways (Banaitene and Banaitis, 2012). Good example of positive risks completing the project early with a reduced budget, finding an easier way of doing things etc. Both risks should be accounted and planned for. The difference is only about the approach in addressing positive risk and negative risk. You manage and account for known negative risks to neuter their impact, but positive risks can also be managed to take full advantage of them (Potts, 2008).

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.

According to Rodrigues-da-Silva & Crispim, (2014) risk management process has five steps. (1) Planning for risk: - The risk management plan tells you how you're going to handle risk in your project. It documents how you'll assess risk, who is responsible for doing it, and how often you'll do risk planning and identification since it has to be a continuous process throughout the life of the project. (2) Risk identification: - involves using checklists of potential risks and evaluating the likelihood that those events might happen on the project and then categorizing the identified risk under each source. (3) Risk Analysis (qualitative and quantitative):- the process of probability- impact analysis of the identified risks by developing criteria to determine the magnitude. (4) Risk response planning: - After the risk has been identified and evaluated, risk mitigation plan should be developed. It is a plan to reduce the impact of an unexpected event either through avoidance, sharing, reduction and/or risk transfer. (5) Monitor and evaluate risks: - performing risk audit to see the effectiveness of the risk response plans and continuous assessment to identify new risks (Rodrigues-da-Silva & Crispim, 2014).

The objective of an efficient risk management procedure is to facilitate risk neutral decision making, which in turn will result in superior performance. Systematic methods for obtaining more information about uncertainty on the project is needed to achieve that objective (Winch, 2010). The implementation of various techniques and methods for risk management- and assessment will however not remove all risks but the aim is to ensure that the risks are assessed and managed in a manner allowing the overall objectives of the project to be achieved (Potts, 2008). Risk management involves the establishment of risk consciousness, integration of basic principles of risk policy and organizational integration. This allows, through proactive action, the project to be prepared for unavoidable problems and an increased transparency (Schieg, 2006).

It is an ongoing process throughout the entire the project life cycle as risks will continually change. Risk management is the process of identifying, assessing and responding to risk and it is important to work as an integrated project team from the earliest possible phases, in order to identify and efficiently deal with risks when they arise (Potts, 2008). The benefits of the process are clearer understanding of the specific risks associated with a project, supported decisions by detailed analysis and a buildup of historical data that can be used to assist future risk

management procedures. Unfortunately, many project managers have still not realized the importance of implementing project risk as an integral part of the delivery of a project (Smith et al., 2006).

The previous researchers have used the dimensions that are developed for factors that affect the project risk management the result to be on limited scope and under the influence of few variables and risks were not allocated to the party or parties which can manage it well. This study by taking this as a literature gap to evaluate the project risk management by using of the four major phases of project risk management process adapted from Simister, (2007): risk identification; risk quantification; risk response development and risk response control. These steps include initial risk detection, analysis and evaluation, creating a monitoring and response plans, operational risk management throughout the project and the determination of risk communications.

1.2. Statement of the Problem

Project risk management is a systematic approach to identify, evaluate and control events that are reasonably probable and how their effects impact the project objectives. For Heineken Kilinto Phase III Project, the objectives are to complete the project as early as possible in compliance with regulations, minimal capital expenditure and incidence. As the researcher discusses in the literature review chapter of this study, the most commonly practiced project risk management processes have been developed to manage risks in an environment, where the plan is defined at the outset of the project and everything else is compared to it for their relevance and importance. The dynamic environment of Heineken Kilinto Phase III Project is far from this and, as a result, project risk management processes are not effective, leaving major risk unmanaged.

Any risk that is not managed effectively can happen in the project, with the effect impacting the objectives. Dehghan (2011) translates these risks into the subsequent costs and Jergeas (2008) argues that is why so many projects reported significant cost and schedule overruns. The researcher could not find any peer-reviewed material on the topic of effective project risk management in Heineken Kilinto Phase III Project. Some material mentioned additional risks associated to the project and referred to Eastham (2002) for mitigations, but the researcher could not find any research that was performed specifically for the effectiveness of the project risk management process in the Heineken Kilinto Phase III Project condition.

Motivation processing of this work is to provide the reader with an overview in a field of risk management, their input and evaluation, as well as an overview of problematic parts of project management and design a structure of risk management for the company. The researcher is the staff of the Heineken brewery, the researcher had the opportunity to observe how the company (Heineken Kilinto Phase III Project) manages the procurement and makes strategic decisions regarding the project risk management. The company has set up working procedures and controls, which are used for contract management. Kilinto Phase III Project has no practices and has no manuals or guidelines for risk management. Employees should mandatorily follow manuals to minimize the risks which occur during the process of managing.

Project risk management is one of the core knowledge areas of project management. From the document review of Heineken Kilinto Phase III Project it was found out that it is only risk identification that the project assessed at the planning stage and arbitrary assignment of risk responses for the identified risks. This showed that there is a significant gap in the project's practice of risk management since the process is more than risk identification.

To fill this gap, the researcher initiated this research to study the project risk management practices in Heineken Kilinto Phase III Project and to identify the factors which make it more effective.

1.3. Basic Research Questions

The following sections explain how this task was accomplished.

1. How does the risk identification practice of the Heineken Kilinto Phase III Project discovering the possible risks of the project?
2. How does the risk analysis practice of the Heineken Kilinto Phase III Project transforming the identified risks into decision-making information?
3. How the risk planning practice of the Heineken Kilinto Phase III Project setting up a chain of actions regarding each of the risks and mitigation plans?
4. How does the risk response practice of the Heineken Kilinto Phase III Project monitoring the indicators and the mitigation?

5. How does the risk monitoring and control practice of the Heineken Kilinto Phase III Project making corrections if the current environment and risks are different than the planned?

1.4. Objectives of the Study

1.4. General Objective

The general objective of the study is an assessment of the project risk management practices in the case of Heineken Kilinto Phase III Project.

1.4. Specific Objectives

- To examine the risk identification practice of the Heineken Kilinto Phase III Project discovering the possible risks of the project.
- To find out the risk analysis practice of the Heineken Kilinto Phase III Project transforming the identified risks into decision-making information.
- To point out the risk planning practice of the Heineken Kilinto Phase III Project setting up a chain of actions regarding each of the risks and mitigation plans.
- To assess the risk response practice of the Heineken Kilinto Phase III Project monitoring the indicators and the mitigation.
- To examine the risk monitoring and control practice of the Heineken Kilinto Phase III Project enabling an appropriate information flow.

1.6. Significance of the Study

This study will be significance to the management of the Heineken Breweries Share Company Kilinto phase III project by giving sufficient information on the project risk management practice the company is currently providing and help it to know areas which need improvement and plan towards it so that its manage the risks. It will also allow the stake holders to have knowledge on where the risk allocating to the party or parties which can manage it well. It will initiate other interested researcher to undertake detailed study in this area.

1.7. Scope of the Study

This research was going to primary focus on was assessing the project risk management practice at Heineken Breweries Share Company Kilinto phase III project in Addis Ababa. The study was

measure by taking the project risk management process major phases: risk identification; risk quantification; risk response development; risk response control and communications.

This study was delimited to Heineken Breweries Share Company Kilinto phase III project in Addis Ababa. The respondent employees of the client, consultant and contractor were selected by using non probability sample approach particularly judgmental sampling technique.

1.8. Limitation of the Study

The focus of the research was assessment of the practices and challenges of project risk management within the Heineken Kilinto Phase III Project, thus including the perspective of contractors, clients and consultants, in terms of data collection from. However, the emphasis in the study is put on the perspective of Kilinto Phase III Project. Therefore, the study was limited in terms of gaining an in-depth perspective from contractors, clients and consultants in the construction industry. In addition, the research will be limited to Kilinto Phase III Project.

1.9. Organization of the Study

The study was divided into five chapters in order to provide clarity and coherence on the discussion of the study. The first part of the dissertation will be discussing the background, problem statement, questions and objectives and the significance and limitations.

The second chapter shall be discussing the relevance of the study in the existing literature. After the presentation of the existing related literature, the researcher shall provide a synthesis of the whole chapter in relation to the study.

The third part of the study was discussing the methods and procedures use in the study. The chapter shall comprise the presentation of the utilized techniques for data collection and research methodology. Similarly, it was also contain a discussion on the using techniques in data analysis as well as the tools used to acquire the said data.

The fourth chapter was discussion of the results of the study. Data to be presented will be statistically treated in order to uncover the relationship of the variable involved in the study. With the said data, the chapter seeks to address the statement of the problem noted in the first chapter.

The last chapter was comprised three sections: the summary of the major findings, conclusions of the study, and the recommendations. With the three portions, the chapter shall be able to address the problem stated in the initial chapters of the study.

Reference and annex also was provided in the final part of the paper.

CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

2.1. Theoretical Review

2.1.1 Uncertainty and Risk

The distinction and relationship between uncertainty and risk may be described as the risk being measurable uncertainty whereas uncertainty is immeasurable risk. It is the interaction of uncertainty on objectives that gives rise to risk, which means that only relevant uncertainties that have the potential to affect project objectives can become risks. In other words, a risk is an uncertainty that matters and the importance is defined in relation to the particular objectives in question. However, the term risk is used widely in variety of applications but the most common application of risk management is in projects, where project risks are defined as those uncertainties that could affect project objectives (Hillson, 2004).

2.1.1.1. Definition of Risk

Risk is always present when making decisions on the basis of assumptions, expectations and estimates of the future. It characterizes situations where the actual outcome for a specific event or activity is likely to deviate from the estimated value (Raftery, 1994). The definition of risk is diverse and can be assessed in terms of fatalities and injuries, sample of a population, in terms of probability and reliability or in terms of the likely effects on a project. One can distinguish uncertainty from risk by defining risk as being where the outcome of an event is possible to predict on the basis of statistical probability. This implies that there is knowledge about a risk as a combination of circumstances as opposed to the term uncertainty in which there is no knowledge (Smith et al., 2006). Risk is often explained in terms of probabilities and consequences, or impact on various objectives. In order for a potential event to be considered a risk it must have a probability of between 0 and 1, which reveals a spectrum in which the event is either impossible or is certain to happen (Loosemore et al., 2006). Hence, the occurrence of risk is present when a decision is described in terms of a series of possible outcomes and when known probabilities can be attached to set outcomes (Smith et al., 2006). Hillson and Murray Webster (2005) explain an interesting trend when examining various official published risk management standards. They state that the definition of risk had an exclusively negative

connotation before 1997, hence risk equals threat, with the term being synonymous with hazard, danger and so on. Although, from 2000 onwards, the definition of risk presented in various publications in relation to risk management has changed, a clear majority of the official standards have unequivocally treated risk as including both opportunities and threats. Risk – an uncertain event or condition that, if it occur has a positive or negative effect on a projects objectives (PMI, 2000) Risk – exposure to the possibility of financial loss or gain, physical damage or injury, or delay as consequence of the uncertainty associated with pursuing a course of action (Chapman C. , 1991) Risk – exist when a decision is expressed in terms of a range of possible outcomes and when known probabilities can be attached to the outcomes (Smith et al., 2006).

2.1.1.2 Definition of Uncertainty

Uncertainty can be deemed as the chance occurrence of some event where the probability distribution genuinely is unknown, meaning that uncertainty relates to the incidence of an event about which little is known except the fact that it might occur (Smith et al., 2006). Thus, it is the absence of information required for a decision to be made at a point in time (Winch, 2010). The occurrence of uncertainty is therefore present when an action leads to more than one possible outcome but the probability of each outcome is unknown (Smith et al., 2006).

2.1.1.3 Opportunities

It is essential to understand the relationship between opportunities and threats, especially in the context of project risk management (Hillson, 2004). The definition of risk does not necessarily refer to the chance of exclusively bad consequences. Instead it should also include the possibility of good outcomes (Smith et al., 2006). Both threats and opportunities are usually involved in any given decision situation, and both should therefore be managed. It is not advisable to concentrate on the reduction of potential threats without also considering associated opportunities. It is simultaneously not advisable to chase opportunities without regard for potential threats (Chapman & Ward, 2003). Opportunities and threats both involve uncertainty, which has the potential to affect objectives. An opportunity can be defined as a set of conditions or an uncertain event that, if it occurs, would benefit the project. A threat however might be defined as an uncertain event or condition that, if it occurs, would damage he project in some way. The only difference between them is the type of effect on objective. Given the similarity in description, it is reasonable to bring the two together under a common definition that combines the element of

uncertainty with the potential to affect objectives, which is how risk is defined (Hillson, 2004).

2.1.2 Project Risk Classification

Risks can be divided into different types or classifications or categories, the important aspects of these are as follows: Known risks: these risk events are frequently occurring in all construction projects and are inevitable, thus including minor fluctuations in material costs and productivity (Smith et al., 2006). It is the cognitive condition of risk, where the identification of the risk source has been made and the probability of occurrence regarding the risk event has been assigned (Winch, 2010). Known unknowns, these risk events are somewhat predictable meaning there is some knowledge regarding either the probability of occurrence or their effect (Smith et al., 2006). It is the cognitive condition of uncertainty, where at least the risk source has been identified. Unknown unknowns, it is the cognitive condition of uncertainty in which somebody might have knowledge about the risk source and probabilities but keeps the information private. The risk source is not identified and the risk event can therefore not be known (Winch, 2010). Thus, these risk events are incidents whose effect and probabilities of occurrence are unforeseeable, even by the most knowledgeable and experienced members of a project (Smith et al., 2006).

In project risk management, events or risks with a low impact can be divided into the elements of trivial and expected. The illustration compares the probability of occurrence of an event compared with its impact on the construction project. Hence, risks with both high impact and a high likelihood of occurring depend on risk management (Chapman & Ward, 2003).

Fig 2. Risk classification in relation to probability and impact (Smith , Merna, & Jobling, 2006)
Smith et al (2006) gives an example of a hazard event with low probability and high impact, they state that these might arise but aren't considered since they are too remote in reality. For instance, parts from a satellite might someday crash on a building project but few buildings are designed with that event in mind. However, even though the probability may be low the event should not be ignored if it is a high impact risk in project management. Thus, arrangement of response plans should be covered for risk events even if the financial impact is too large to be managed.

2.1.3. Fundamentals of Risk Management

Traditionally risk in construction was either ignored or dealt with in an arbitrary way (Potts, 2008) but today risk management is an integral part of project management (Serpella et al.,

2014). Thevendran et al (2004) described the concept of an effective risk management as a continuously monitored integrated formal process for defining objectives, identifying sources of uncertainties, analyzing them and formulating managerial responses in order to produce an acceptable balance between risk and opportunities. It includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of adverse events to project objectives (PMI, 2000). The adoption of risk management ultimately can serve as an instrument to help facilitate the decision making process in order to prevent, eliminate and reduce the risks.

2.1.3.1. Risk Management Model and Process of the Construction Industry

There are many methodologies or models in regards to managing the risks in various projects but the core process of risk management is comprised into four stages in the construction industry. Identification and classification of the risk sources, risk assessment analysis, development of management responses to risk and to control and monitor them (Smith et al., 2006). The method of risk management helps to observe and determine all the risks to which the project is exposed in hopes of making an aware decision that is pursued with the coordinated and economical application of resources, in order to control and reduce the effect and overall probability of events considered undesirable (Dehdasht et al., 2015) Thus transparency increases through risk management and the project can be prepared for unavoidable problems, also many problems can be averted from the outset through proactive measures (Schieg, 2006). Loosemore et al (2006) describes risk management as a proactive process of looking forward as opposed to indicating a reactive framework. They state that the distinction is often confused within the construction industry where managers might think they are practicing risk management, but in reality they often demonstrate a backward looking and reactive approach. Winch (2010) describes the model as being designed in a circular fashion to emphasize that risk management is a learning process through time, using the same four elements or stages as Smith et al (2006) and Hillson (2004). In literature, the core principle of risk management is the same but the process might differ somewhat depending on the industry and organization, but the components illustrated in fig 3 are usually present. A systematic implementation of the process throughout the lifecycle, from planning to completion, of any construction project is needed in order for the practice to be truly beneficial, thus the process needs to be iterative (Loosemore et al., 2006). PMBOK's model differs by incorporating risk assessment with qualitative and quantitative risk analysis. The

importance of feedback within each phase is emphasized in ISO 31000, in which monitoring and review ensures that the organization monitors risk performance and learns from experience.

Construction projects are from the start of their existence immediately exposed to risks (Schieg, 2006). Hence, the implementation of risk management from the early stages of a project is essential due to the fact that major decisions such as choice of alignment and selection of construction methods can be influenced during this stage (Eskesen et al. 2004). Other reasons for investigating risk events early in the project life is that useful information about the risks might emerge enabling the implementation of a strategic approach to be defined and adopted as early as possible. This will in turn help clarify internal project goals and priorities as well as enabling an improved estimation of safety, budget and schedule (Reilly & Brown, 2004). By incorporating risk management into the planning phase one can facilitate the identification and reduction of potential risks for the project success (Schieg, 2006).

2.1.4. Risk Identification

The identification of risk is arguably recognized as the most crucial step within the risk management process (Banaitene & Banaitis, 2012). The aim is not to obtain perfect predictions of future events, rather it is the recognition of potential risk sources with high impact on a particular project, should they occur. It is impossible to identify all potential risks and the purpose should not be to do so (Smith et al., 2006). Thus, the intention of identifying and assessing the risks is to ensure that potential risks are assessed and managed in a manner, which allows for the overall objectives to be achieved. Due to the constant changing nature of risks throughout a projects life cycle the management of risk must be an ongoing process (Potts, 2008). Before risks can be managed they must be identified, and knowledge from previous experiences might apply to the current project (Karimiazari et al., 2010). The descriptions of most risk management processes emphasize the need to identify the risks early in the process.

Chapman and Ward (2003) discusses the need to identify sources and associated possible responses as well as secondary sources that arise from these responses. The quality of the primary identification phase within the risk management process has a big impact on the success of later phases within the process (Chapman, 2001). The initial step at the early phase of the project should form the basis by which strategies, policies, uncertainties and risks are established when it comes to management and allocation (Potts, 2008). However, given that all risks are not completely recognizable before the start of a project and the fact that additional risks might arise

during the implementation of the project, the identification of risk must be implemented in a manner that is in line with the progress of the project as well as being forward-looking (Schieg, 2006).

The PMBOK describes the importance of an iterative approach to the process of risk identification, and the development and implementation of simple and effective responses as soon as risks are identified. However, they also mention that there is no significant sense of an overall iterative process to filter out risks in need of cautious scrutiny. The different methodologies regarding risk source identification usually consist of checklists, brainstorming, workshops, expert interviews and analysis of different scenarios as well as analysis of historical data and project plans. Furthermore, known unknowns and sources of risk and uncertainty should be documented (Klemetti, 2006). The usage of interviews with experienced project managers can be useful for solving and avoiding similar problems that might arise, all relevant participants in the project can be interviewed on factors affecting risk.

The method of using past experience or historical data from similar projects provides insights about common factors in a comparison between the projects. The usage of checklist is a simple yet useful tool which usually covers risks identified in previous projects and the associated responses to those risks (Mhetre et al., 2016). Winch (2002) describes risk source identification being done through brainstorming sessions and that this phase generally relies on experience. Furthermore, he emphasizes the benefits of producing some kind of risk register that covers all known risks and recognizes from an uncertainty and risk perspective, what has to be managed.

The authors Skitmore and Lyons (2004) described the former method as the most common and preferable risk identification technique. Smith et al (2006) further describes brainstorming as a method where team members within a particular project focus on the risks specific to the project, also stressing the importance of avoiding potential group or individual biases by carefully managing the process. In order to generate an enhanced and balanced project risk source assessment, and to avoid the fact that the group might have insufficient collective experience to identify key risks, a common practice is to use external consultants. The process of risk source identification as well as risk analysis may generally be viewed as the most essential phases of the risk management process given that these might have the strongest impact on the precision of risk assessment (Maytorena et al., 2005).

2.1.5. Risk Assessment

The identification of risk is only the first phase, some of the identified risks may be considered more significant and need to be further analyzed. The next step is to determine their significance quantitatively, before the response management stage. The objective in risk assessment and analysis is to describe the risk situations as completely as possible and to prioritize them (Schieg, 2006). In general, there are two major categories distinguished in the literature on risk assessment, specifically qualitative and quantitative analysis. The former is a process that consists of interviews, checklists and brainstorming while the latter is performed through a data driven methodology (Banaitene & Banaitis, 2012).

Risk assessment through quantitative analysis defines the impact of each risk in the spectrum of high and low and the probability of occurrence. Whereas qualitative risk assessment often involves the evaluation of impact and the development of lists in order to further analyze the highlighted risks (X.W Zou et al., 2007). The assessment of risks through both types of analysis should transpire on an individual level as well as include the interrelationship of their effects (Schieg, 2006). It is essential that the major predictable risk factors are quantified and effectively analyzed. The impact of potential risks might be a duration increase resulting in delays, productivity decrease, and a cost increase of an activity among many others. Given that resources might be shared among different projects it may be common that disturbance in one project can result delays in other projects. Subcontractors may also cause delays (Schatteman et al., 2008).

2.1.5.1. Methods for Conducting Risk Assessment and Analysis

Bahar et al (1991) describe the first step in risk analysis and evaluation process as the collection of relevant data to the risk exposure, which might be historical data collected through past project experience by the contractor. Furthermore, they describe the modeling of uncertainty of a risk exposure where the likelihood of occurrence is presented in terms of probability and potential consequences in financial monetary terms. Having formed the uncertainty of various risk events the next step according to them is to assess the overall impact of these risks, through techniques such as Monte Carlo simulation. The quantification of risks is the magnitude and frequency of each event, and every event can be a collection of incidents or a single incident. In order to quantify and evaluate the risks one can implement various analysis methods, everything from subjective estimation to probability analysis etc. (Williams, 1995). One of the most common used methods for assessing risk sources according to Winch (2010) is the probability

and impact matrix. The classification of the risks is made in terms of their probability of occurrence and the extend of their impact. It allows a prioritization of the risks on the project in terms of them being manageable or not. Qualitative high to low scales can be used for the assessment of known unknowns as well as the subjective assessment of known knowns as presented in fig x (Winch, 2010). PMI (project management institute) describes the probability and impact as dimensions of risk that are applied to specific events, as opposed to the overall project.

2.1.6. Qualitative and Quantitative Analysis

A compilation of the most commonly used methods when assessing the identified risks are listed below, including a description of each one.

2.1.6.1. Qualitative Methods

Probability & impact assessment can be applied in order to evaluate the likelihood of a specific risk to occur. The risk impact on project objectives is assessed in terms of opportunities and positive effects as well as threats and negative effects. It is important to adapt and define the probability and impact to the specific project. The risk matrix method can be used additionally by having probability and impact as a basis for further analysis. The priority score can be computed as the average of the probability and impact and the priority score range, rate and color are given to illustrate each risk's significance. The high priority score threats, meaning high impact and likelihood, are viewed as high-risk and could necessitate an urgent response while low scored threats could be further monitored and given attention only if needed. Risk categorization is applied as a way to systemize the threats according to their sources, in hopes of identifying areas with the highest exposure to those risks. The usage of this method breaks down activities into small units and creates hierarchical series of activities, additionally the method can include risk dependencies and a prioritization of them depending on how quick response they require.

2.1.6.2. Quantitative Methods

Sensitivity analysis is implemented in order to identify uncertain components in the project, which will have maximum impact on the outcome. The aim is to look at the sensitivity of various elements of the risk model on project outcome, by changing the values of one variable at a time and then showing the impact on the project.

Probabilistic analysis is a method used to show the potential impact of different level of uncertainties on project objectives. It quantifies the effect of risks on project schedule and budget and it uses three point estimates such as worst case scenario, most likely scenario and finally best case scenario for each task. Monte Carlo Simulation is most often used for this type of analysis. Decision trees is a useful method to frame the problem and evaluate various options. The usage of this method consists of decision tree diagrams used to represent the project and show the effects of each decision (Mhetre et al., 2016).

2.1.7. Risk Register

The risk database is a central tool in risk management for monitoring the risk management process (Cooper et al., 2005). The design of the register depends on the organization, the type of projects and the people involved. It is essential that the organization creates a customized version of the register that suits them in order for it to be fully used as intended, as opposed to being an additional burden in a demanding work schedule. In order to facilitate registration, storage, management and sorting of information the register should be incorporated in a database (Flanagan et al., 2007).

All the identified risks and results of their analysis, associated action plans and evaluation as well as the status of the particular risk are registered within this list. Throughout the entire project life cycle there should be updates and reviews of the risk register. The register is a central component because it facilitates monitoring and correcting progress on risk mitigation measures, it helps identify new risks and close down expired risks as well as adjusting the assessment of existing risk etc. (Potts, 2008).

Risks that are no longer relevant due to avoidance or if they already are managed can be removed from the register together with the associated action plans. The status of action plans and specific risks should be reviewed consistently (Cooper et al., 2005). According to (Schieg, 2006) new additional risks, risk status and the progress of the measures is required to be included. The risks that already have occurred must be documented including the amount of damage they have produced. Furthermore, he states that a big part of the monitoring of risk (which is the last phase) is the internal control system, where the responsibility of monitoring early indicators is allocated to specific people. In order for this process to work effectively there should be a reporting and meeting arrangement in place for the project and the organization as a whole (Flanagan et al., 2007).

2.1.8. Risk Response

The third step in the process of risk management signifies what actions should be taken towards the various risks and threats previously identified (Mhetre et al., 2016) The planning process of risk response is defined by PMBOK as the development of options and determining actions to enhance opportunities as well as reduce threats to the project objectives. This process involves the assignment of parties to take responsibility for each agreed risk response, and the efficiency of this phase will determine if the risks increase or decrease for the project. Literature suggests that there are mainly four risk mitigation strategies that can be implemented in order to reduce exposure to the risks associated with a project. Mills (2001) provides an example where incorporated risk control measures resulted in an added value, showing how risk and opportunity go hand in hand. The example he gave was an instance where a hoist was provided instead of ladders to reduce the risk of people falling. The additional benefit from the risk control measures taken increased in people's mobility and in turn their productivity. Hence demonstrate the example of potential opportunity arising from risk.

2.1.8.1. Avoidance

A response in form of avoidance can be justified if the risk is estimated to have serious consequence on such level that may warrant a reappraisal of the entire project (Potts, 2008). One can use avoidance to cope with risk by changing project plans in a way that makes the risk irrelevant (Klemetti, 2006), it might be necessary to reappraise the concept or maybe cancel the project. This method promotes changing project plans to facilitate the elimination of the risk or to protect the project objectives from the potential negative impact. An example might be avoiding an unfamiliar subcontractor (PMI, 2000). Other examples are extending the schedule or reducing the scope of the project (Karimiazari et al., 2010). The aim of risk avoidance might also be to reduce the risk via contractual countermeasures. Additional measures that can be taken into account is procedural changes, regular inspections, skill and training enhancement, more detailed planning, preventive maintenance and the selection of alternative approaches (Cooper et al., 2005).

2.1.8.2. Transfer

This response approach involves transferring the risks and consequences to third parties who are willing to accept responsibility for its management and the liability of the risk (Mhetre et al.,

2016). This method is most effective in regards to dealing with financial exposure to risk. It includes the use of both contracts and insurance to transfer liability to other parties, for instance by contractor to subcontractor and often involves payment of risk premium to the party that is taking on the risk and responsibility of the consequences (PMI, 2000). In order to avoid secondary risk in case the agent (third party) fails to meet obligations, the transfer should only be done when the agent is in a better position to manage the risk than the principal (Winch, 2010). The main purpose is to ensure that the risk is owned and managed by the party best able to handle the task successfully (Mhetre et al., 2016).

2.1.8.3. Mitigation and Reduction

This approach means to mitigate the risk by changing the scope of the project to minimize the likelihood of the damaging event occurring (Winch, 2010). Implementing risk management early in the project to reduce the probability of the risk event occurring is more effective than trying to repair the damage and consequences after the risk has passed. The mitigation of risk may be done by adopting less complex processes or changing conditions so that the probability of impact is reduced, other forms of action is adding resources and extra time to the schedule (PMI, 2000). Flanagan et al (2007) describes implementing an altered construction method and the use of other materials to reduce potential risks, or executing a new or more detailed planning. Additional reduction strategies include contingency planning, quality insurance, separation or relocation of activities and resources. In practice these categories might often overlap in some fashion as in this case where insurance also can be a mitigation strategy, sharing characteristics with risk transfer (Cooper et al., 2005). However, risk reduction can only be used a few times in a project before the project might become unmanageable (Flanagan et al., 2007).

2.1.8.4. Acceptance

It is impossible in reality to take advantage of all opportunities and eliminate all threats to the project, but it is possible to at least be aware of the threats and opportunities through the documentation and identification of them. The usage of this strategy is justified when it is not possible to respond to the risk by the other strategies, or when the grandness of the risk makes a response unreasonable (Mhetre et al., 2016). This risk response approach essentially means taking a conscious risk and to deal with the consequences as they occur. This indicates a decision not to change any project plans in order to deal with the risk or engaging in any other response strategies (Cooper et al., 2005). As described above the risk response stage involves planning

and execution and should be iterative. Having an effective control process adjacent can ensure the correct execution of this phase (Klemetti, 2006). When it comes to specifically high-impact risks but also with all types of risks, one of the most beneficial risk management strategies is to delay the decision until more information comes to light (Winch, 2010).

2.1.9. Risk Monitoring

Continuous monitoring and review of potential risks is an important in regards to the implementation of the risk management process. It guarantees new risks are detected and managed. The project manager should monitor a list of the major risks that have been identified for risk treatment action, which should be a primary tool used management meetings (Cooper et al., 2005). This is the final phase of the process and it is equally important as the others. Given that more information emerges one can reassess the probability and impact of the risks, and once the potential risk event has been passed they can be removed from the risk register (Winch, 2010)

2.1.10. Knowledge in relation to Risk Management

The construction industry is an industry where knowledge is the core competence, execution of construction activities requires expert knowledge and experience-based problem solving solutions. Most of the knowledge in the construction sector is obtained through the firms various projects, it is therefore desirable that lessons learned from previous projects is captured and used again in future projects (Maqsood, 2006). The management of knowledge is a discipline that is associated with risk management, the process of knowledge management both influences employees' know-how as well as enhancing the knowledge distribution among team members (Rodriguez & Edwards, 2008). The new knowledge that is generated within each of the previous projects is often lost as involved parties retire or move to a new assignment, resulting in a loss of both tacit knowledge and a potential source of competitive advantage. It is only possible to truly reflect on the real consequences of actions when they are evaluated in hindsight (Anumba et al., 2005). A lack of storing, distributing and sharing information and knowledge generated by each project will ultimately affect the decision making process negatively (Serpella et al, 2014).

The process of managing knowledge in the construction industry might not be the easiest undertaking given the inherent characteristics of the industry, in which phases are fragmented and temporary in nature (Tan et al., 2010). Construction projects are often inherently complex and filled with uncertainty. Risk- and knowledge management are increasingly becoming an

extensive component of the project management of construction projects, in a pursuit to efficiently deal with unexpected events and uncertainty (Banaitene & Banaitis, 2012).

2.1.10.1. The Concept of Knowledge

The most fundamental distinction, when describing the concept of knowledge, is between "tacit" and "explicit" knowledge. Tacit knowledge inhabits the minds of people and is difficult to articulate (King, 2009). It is the knowledge that you need in order to succeed in an endeavor, it is not formally taught and is can usually not be verbalized. The implicit or tacit knowledge, i.e. experience based knowledge has the potential to be transferred to a community at large or the whole organization at question (Sternberg, 1997). Explicit knowledge is knowledge that is easily conveyed and codified (Frappaolo, 2006). It exists in the form of documents, organized data, and computer programs. A fundamental issue that often is discussed when describing knowledge is the notion of explaining tacit knowledge and then be able to make it accessible for use by others (King, 2009).

2.1.10.2. Knowledge Management

In order to establish an efficient risk management, it is of course required to have a systematic methodology but also various knowledge and experience, the latter might be considered even more important in a lot of cases (Serpella et al., 2014). Given the potential economic and technical implication of loss of knowledge that is bestowed on organizations and individuals, it is considered crucial that strategies exist that deals with the issue of knowledge preservation. Although describing knowledge management might be a hard task given the lack of a singular definition, it can be stated that knowledge management is the leveraging of collective wisdom to increase responsiveness and innovation. Further, it also requires a culture that promotes faith in the notion of a collective thinking and sharing practice (Frappaolo, 2006). Knowledge management is often described as the retaining, using and sharing experiences and knowledge learned and the transfer of best practices, it is the management of experiences and tacit knowledge at a personal and organizational level. The sharing of knowledge and lessons learned is a critical area of knowledge management, hence why it is important to be able to capture experiences learned from other projects (Ly et al., 2005).

The contractual parties should adopt and maintain a continuous learning approach, from which they can gain further experience leading to a better future state for the parties when a new risk is

encountered. The management of information and knowledge of a construction projects is therefore essential in order to achieve a successful risk management (Perera et al., 2009).

Knowledge management is an organized and systematic approach in order to improve the firm's ability to mobilize knowledge resulting in an enhanced decision-making, enabling proactive action and delivering results in line with the business strategy (Hsu & Shen, 2005). The use of information in order to capture risk management experience enables project managers to share and learn from others by tapping into a centralized knowledge repository. Data should be stored and organized so that individuals as well as teams can be able to access, evaluate, and share it with colleagues and act upon the findings effortlessly (Tah & Carr, 2001).

2.1.10.3. Organizational Learning in the Construction Industry

Previous research from Serpell et al (2015) has observed unwillingness among companies to contribute to research in risk management within the construction industry, given their lack of knowledge. A way to conceptualize the relationship between knowledge management and organizational learning is by motivating the creation and application of knowledge. The initiatives pay of by facilitating the organization to embed knowledge into various organizational processes, such as risk management, in order to continuously improve its behaviors and practices. Therefore, organizational learning is intrinsically important in the pursuit to sustainably improve the organizations utilization of knowledge (King, 2009)

2.1.10.4. Communities of Practice

The challenge is to incorporate the right method in order to enable the process of uncovering tacit knowledge and knowledge sharing. The best possible solution to the issue might be the implementation of Communities of Practice (Khuzaimah & Hassan, 2012). These are social, interactive networks of individuals, with similar experience and problem solving skills, within a defined topic of knowledge and it is a tool to facilitate knowledge sharing in a learning environment (Wenger & William, 2000).

2.1.10.4.1. SECI-model

A specific knowledge conversion model for explaining the transfer of knowledge was presented by Nonaka and Takeuchi (1995), namely the SECI-model. The model consists of several methods, however only two of them are going to be mentioned given their relevance. Socialization (from tacit to tacit knowledge): This method is the process of sharing tacit

knowledge through practice, participation in various communities, imitation and observation (Yeh, Huang, & Yeh, 2011). The purpose of Communities of Practice is to promote the uncovering of tacit knowledge by encouraging socialization among employees with similar interests, i.e. socialization is bringing together like-minded individuals (Frappaolo, 2006). Hence, new knowledge can be converted through shared experiences when using this approach. This can be applied to the construction industry by implementing apprentice-based professions, where more experienced senior project managers have the opportunity to mentor junior project managers. Externalization (from tacit to explicit knowledge): This method refers to the transfer of knowledge from the minds of people to an external repository in a way that is most efficient, creating for example knowledge maps (Frappaolo, 2006).

2.1.10.5. The Interplay between Risk and Knowledge Management

The connection between risk and knowledge management by incorporating risk management as an essential part of the corporate culture within an organization one could facilitate its development and implementation in construction projects. A key component of this is to generate an effective management of knowledge so that lessons learned could be distributed and reused in upcoming project (Serpell et al., 2015).

2.1.11. The Attitudes toward Risk

The subject of various attitudes towards risk is important since it is key to understanding behaviors associated with activities related to risk management (Baranoff & Kahane, 2009). Therefore, in order to investigate the decision-making behaviors of decision makers within the domain of construction risk management, a good understanding about their risk attitudes needs to be established (Wang & Yuan, 2011). Especially since the lack of knowledge retention and communication has always been a serious problem for the construction industry (Liu et al. 2007). There are three types of attitudes towards risk according to literature, these are the following: Risk-averse, risk-neutral and risk-seeking. People have different attitudes towards risk and the individual's particular attitude will determine the way that they perceive risk and how they respond to risk (Raftery, 1994). Attitudes are valuable in enhancing the self-esteem of a person and serve to express an individual's self-identity and guiding values. They are therefore important to managers because they determine the direction of people's behavior in response to a particular stimulus and provide insights into motivating mechanisms. Individuals' attitude is based on their own positive or negative evaluation, beliefs and knowledge about the

consequences of a certain behavior (Teo & Loosemore, 2001). Thus, peoples risk attitudes is a reflection of their personal experience and characteristics as well as the management environment in which they belong to. This explains why different project managers make different, and sometimes even opposite judgments in the same decision situations (Wang & Yuan, 2011). Winch (2010) describes project managers' preferences in regards to risk as their propensity or appetite for the level of risk and uncertainty they are willing to accept. The model presented by Winch is based on the three different attitudes as previously stated and allows the identification of various decision making criteria in terms of risk profiles:

2.1.11.1. Risk-averse

People and groups are risk-averse when they are uncomfortable with uncertainty. The characteristics of this type of attitude are common sense and support of established methods of working. The presence of threat causes discomfort and leads to increased sensitivity leading to a preference for aggressive risk responses in order to minimize the risks. However, a risk-averse attitude might underrate the significance of potential opportunities (Hillson & Murray-Webster, 2005). They desire to have to have as much security as is reasonably affordable in hopes of lowering the level of distress (Baranoff & Kahane, 2009).

2.1.11.2. Risk-neutral

Individuals and groups with a risk-neutral attitude pursue strategies that have high future payoffs. Hence, they view present risk-taking as a price worth paying given the future benefits The characteristics of this type of attitude are fearlessness in face of change and the unknown, instead they visualize possibilities. The risk-neutral approach focuses on longevity when it comes to threats and potential opportunities. Thus only taking action that is expected to result in significant benefits (Hillson & Murray-Webster, 2005).

2.1.11.3. Risk-seeking

People and groups that embody a risk-seeking attitude tend to have a slightly casual approach towards the presence of threats. During the risk process the risk-seeking individual inclines to identify fewer threats due to their framework in regards to risk. Threats are likely to be underestimated when it comes to potential impact and probability of the event occurring. In regards to possible opportunities, risk-seeking attitudes might overestimate their importance and pursue them in an aggressive manner (Hillson & Murray-Webster, 2005). The definition of

attitude is twofold, the first relates to the inner working of the human mind where attitude is the mental view with regard to a fact. The second definition describes the direction of lean this may be seen as a metaphor for the internal approach adopted by a group or individual towards a particular situation. Some attitudes are deeply ingrained and some are more malleable but they nevertheless represent a choice, hence they are situational responses and may differ depending on influences. The possibility of changing the attitudes is introduced if the influences are identified and understood. Attitudes are therefore not fixed inherent attributes of individuals or groups, rather they can be modified which is essential to the case of understanding and managing risk attitudes (Hillson & Murray-Webster, 2005).

A survey presented by Akintoye and Macleod (1997) showed that the majority of contractors perceived risk as the likelihood of unforeseen factors occurring, which could adversely affect the successful completion of the project in terms of cost, time and quality. Only one contractor saw risk as an opportunity instead of an event that will always have adverse effects.

2.2. Empirical Reviews

Cruz et al. (2006) have conducted a research in Spain about downside risks in construction projects. The findings demonstrate lack of project management and project risk management maturity in Spain, and political issues have been marked as the main obstacles preventing a higher maturity level.

In a paper by Tang et al. (2007), they have compared criticality of the risks and have evaluated the methods and risk responses used by project parties in Chinese construction industry. They ranked the five most important risks as poor quality of work, premature failure of the facility, safety, inadequate or incorrect design", and „financial risk. They believe that the existing risk management systems are not sufficient for managing risks and the key barrier to proper risk management is lack of joint management mechanism. Their research suggested a need to introduce an information management scheme and the partnering principles to risk management process, encouraging the open communication among participants in order to manage the project risks jointly and collaboratively.

Wang and Yuan (2011) conducted a study presenting the critical factors affecting risk attitudes of contractors in the context of the Chinese construction industry. The factors considered most important where categorized into groupings such as knowledge and experience, contractor's character, personal perception and economic environment. By deepening the understanding of the various factors that affect contractors risk attitudes, further support in regards to decision making can be facilitated.

In a research carried out by Hassanein and Afify (2007), they aimed at investigating contractors" perceptions of construction risks and their attitude toward risk identification and management based on a case study of power station projects in Egypt. The results show a lack of consistency in contractors" risk identification behavior and also point out previous experience with the same owner as a factor having significant effect on the contractor's risk identification effort.

Liu et al. (2007) have studied key issues and challenges of risk management and insurance in Chinese construction industry. According to the results of their research, managers" knowledge and understanding about risk management is very little in Chinese construction projects. Great percentage of the respondents who had participated in this research believed that risk management skills are essential for project management activities but have not developed in China as much as project management. Unsupportive culture was identified as the biggest barrier in development of risk management in China's construction industry, followed by other factors such as attitude and perception of the contractors.

Perera et al. (2009) research on construction projects in Sri Lanka has ranked scope change and tentative drawings as the two most influential risks in construction projects. Authors have concluded that one best way for responding to risk does not exist and various risk handling strategies should be employed for dealing with the risks.

Zou et al. (2006) in their paper have identified and analyzed the risks associated with the development of construction projects from the perspectives of stakeholders and project life cycle in Australia. The results indicate that many risks occur at more than one phase and it was also concluded that construction phase is the most risky phase, followed by the feasibility phase.

Pourrostam and Ismail (2011) have conducted a research focusing on identification of the main causes and consequences of delay in construction projects of Iran. The result of research identified 10 predominant causes of delay as poor site management and supervision, delay in progress payment by clients, change orders by client during construction, ineffective planning

and scheduling of project by contractor, financial difficulties by contractor, slowness in decision making process by client, delays in producing design documents, delay in reviewing and approving design documents by clients, poor contract management by consultant and problems with subcontractors. The research also found 6 negative effects of delay as time and cost overrun, disputes, arbitration, total abandonment and litigation.

The study by Tsegaye, (2018) that identify factors influencing success of community development projects in Lideta sub-city of Addis Ababa. The major success factors identified include effective consultation with all stakeholders, proper needs assessment, clear understanding of the project context, competency of project team/manger, adequate resources and monitoring and evaluation. In addition, partnership with key stakeholders and beneficiaries, alignment with the government structure, relevance to country's priorities and sustainability factors are key elements in the overall project success. Based on the findings of the study, it is recommended that it is essential that the views of all key stakeholders are collected and analyzed at an early stage. This can help identify the real needs and possible constraints. The study also provides clear evidence that the involvement of all relevant parties during the early stages of a project and other phases is vital in identifying their differing requirements and needs, critical for project success.

Emran, (2017) conducted a research focusing on developing a conceptual risk management framework for the Addis Ababa City Roads Authority (AACRA) after studying the current risk management practice in Addis Ababa and Federal public road construction sector. The researcher concludes that the staffs of the major stakeholders in the Ethiopian construction industry are aware of risk management principles. However, the risk management practice in the industry is in its maturity stage. Currently, the Ethiopian public road construction sector is facing various hindrances and been adversely affected by various risk factors. The major challenges in the sector include: right-of-way obstacles, incomplete design and design problems, inadequate site or geotechnical investigations, scope and design changes, and unexpected weather conditions. The researcher also proves that there is poor practice of feasibility study in AACRA's projects.

The study by Eshetu, (2017)in the paper compare the road construction risk management practices of Local and International road contractors in Ethiopia and recommend possible ways of improving the practice of road construction risk management. The study investigated that there is limited understanding of road construction risk management practices among the local stakeholders. In addition, there is no formal method of risk mitigation strategies used by the stakeholders. Considering the assessment made through the checklist, the results showed that there is limited knowledge and understanding of road construction risk identification related concepts. Generally, it was also found that the lack of joint risk management practices by stakeholders and shortage of knowledge on road construction risk management practices were the most common barriers, and in the life cycle of road projects, critical risks at the planning and design stages are mostly allocated to the client or consultant while at the construction stage a high percentage of critical risk is allocated to contractors.

Ally, (2013) conducted a research focusing on assessing the management of risks in construction projects. Findings indicate that the types of risks found are classified into several categories which are financial risks, physical risk, construction risks, design risks, political risks, legal – contractual risks and environmental risks. The risks exist in both building and civil project. Vulnerable risks are financial risks, construction risks and physical risks. The level of risks is catastrophic in most of the financial risks while others are moderate. In construction and physical categories the level in most risks is high while others are moderate. Finally, measures for managing risks in construction projects were pointed out which are; Ensuring the adequacy of project funding, obtaining more geotechnical information, conducting constructability reviews, Set realistic contract performance times, work and rework cost information, introducing phased pricing, pre-plan for permits, Utilities and zoning, pre-define rates, use experienced project personnel.

2.3. Conceptual Framework

The general idea from past literature is that sound project risk management could be evaluated with the use of five constructs of project risk management processes conceptual model proven by (Rodrigues-da-Silva & Crispim, 2014) which are risk planning, risk identification, risk analysis (qualitative & quantitative), risk response and risk monitoring and control. Accordingly in this study to assess the project risk management practice of Kilinto phase three project used this

conceptual framework or model adopted from (Rodrigues-da-Silva & Crispim, 2014) with amendment to suit for this study by the researcher.

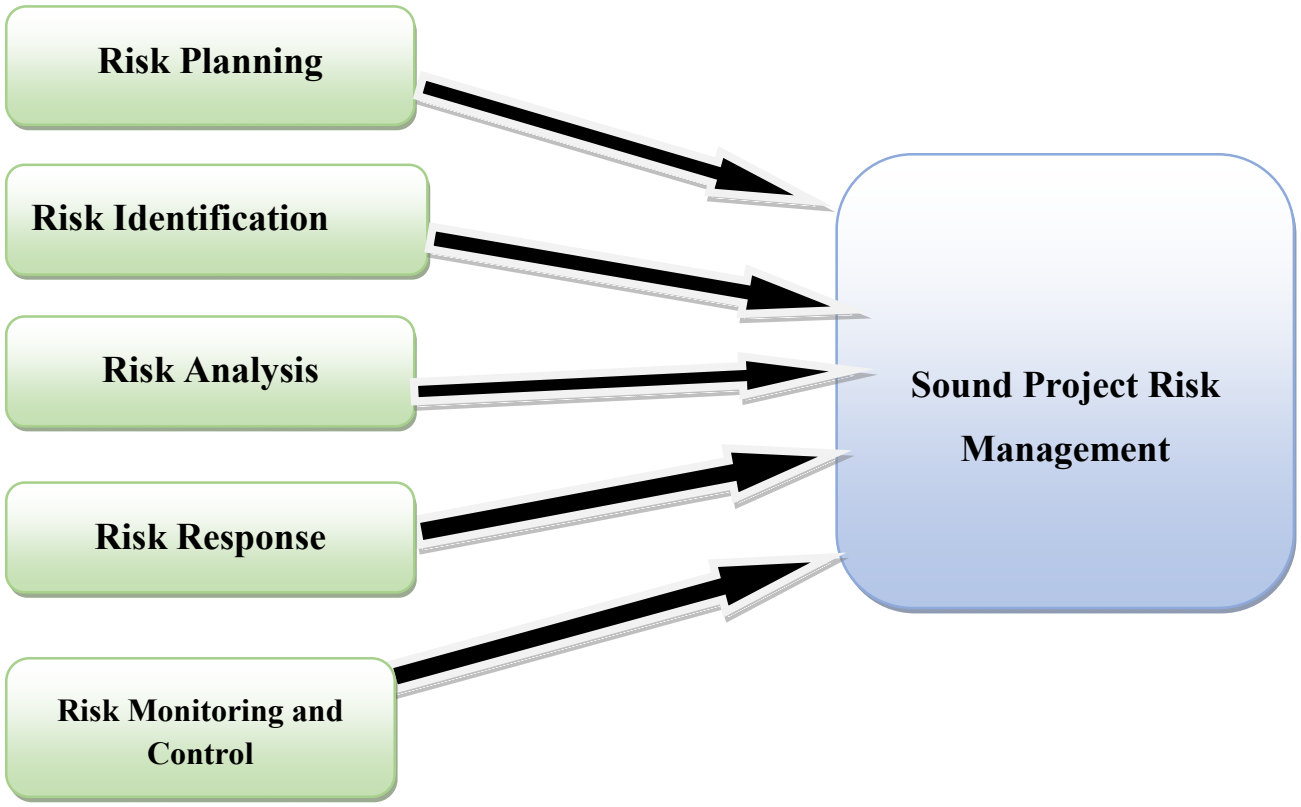

Figure.1:- Conceptual Framework Source: Rodrigues-da-Silva & Crispim, (2014)

CHAPTER THREE

RESEARCH METHODOLOGY

This part describes the methodologies that used in this study: the choice of particular research approach, research designs, data type and source of data, research approach, data gathering technique and instruments, sampling and sampling techniques and data analysis techniques along with an appropriate justification associated with each approach.

3.1. Research Approach

There are three different research approaches defined by Saunders et al. (2016), including deductive, inductive and abductive approaches. For this study deduction research approach was selected. In the deduction research approach the variable, or causal, relationship between two concepts tested. In addition, facts are measured through quantitative methods, where large and sufficient sample sizes are selected to allow for generalizations (Saunders, 2016). Accordingly the study was used the six steps involved in deduction research that is identified Blaikie (2009):

- The generation of a hypothesis (or more) and ideas with the aim of producing a theory.
- The deduction of measurable variables by using available literature or by identifying the circumstances, which contribute to the creation of the theory.
- An examination of the propositions and the logic of opinions that formed them compared with current theories to determine whether they can generate the further understanding of an issue.
- The collection of data to measure the variables or concepts and to analyze them.
- If the outcome from the analysis is not reliable, then the test fails. Therefore, the theory is rejected or must be modified.
- If the outcome from the analysis is reliable, then the theory is validated.

3.2. Research Design

This study used descriptive or size exploration (ex-post facto research) research design. In descriptive or size exploration research design fact finding enquiries, describing the state of affairs as it exists; the researcher has no control over variables, can only report what happened or what is happening by using Survey. It aims at answering the questions: Who? What? Where?

When? How? and How Many? This type of research was carried out to answer more clearly defined research questions. This study was applied quantitative data that was the numeric values that indicate how much or how many of something. Quantitative research was based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity. Quantitative research is a means for testing objective theories by examining the relationship among variables.

3.3 Data Type and Source of Data

The researcher used primary data for the entire analysis of this study. The information was gathered through questionnaire from the selected sample of respondents of employees of the client, consultant and contractor at Heineken Breweries Share Company Kilinto phase III project. The data that was collected from the respondents through questionnaires will be used as primary data. According to Biggam, (2008) primary data is the information that the researcher finds out by him/herself regarding a specific topic. The main advantage with this type of data is that it was collect with the research's purpose in mind. It implies that the information resulting from it is more consistent with the research questions and objectives.

3.4. Data Gathering Technique and Instruments

The primary data was gathered particularly using survey questionnaire. A questionnaire, whether it is called a schedule form or measuring instrument, is a formalized set of questions for obtaining information from respondents. Measurements of project risk management will be adopted and modified from the previous studies, and a five-point Likert scale ranging from 1=Strongly Disagree to 5=Strongly Agree was used. Further, the questionnaire was developed in English and it will be divided into two sections. The questionnaire was developed to measure the project risk management process major phases: risk identification; risk quantification; risk response development; risk response control and communications.

3.5. Population, Sample Size and Sampling Technique

According to Hair *et al.* (2010), target population is said to be a specified group of people or object for which questions can be asked or observed made to develop required data structures and information. Therefore, for this study, the target populations will be 236 employees of the client, consultant and contractor at Heineken Breweries Share Company Kilinto phase III project

in Addis Ababa. The sample size of this study was determined by using the formula developed by Yamane (1967).

$$n = \frac{N}{1 + N(e)^2}$$

Where, n is the sample size

N is the population size,

e is the level of precision or sampling error = (0.05)

$$n = \frac{236}{1 + 236(0.05)^2} = 148.43$$

Accordingly, 148 respondent employees of the client, consultant and contractor at Heineken Breweries Share Company Kilinto phase III project in Addis Ababa was taken as the representative sample size in order to have sufficient and reliable data. In order to select the sample size of the study was selected by using non probability sample approach particularly judgmental sampling technique. Accordingly 90, 50 and 8 respondents from the contractors, clients and consultants respectively were selected proportionally.

3.6. Method of Data Analysis

Descriptive statistics used to analyze and interpret the findings. The mean scores and standard deviation of the finding was interpreted using descriptive statistics used to find out the factors of the project risk management process major phases: risk identification; risk quantification; risk response development; risk response control and communications via SPSS Version 20.

3.7. Validity and Reliability

The ultimate goal of any research study is to obtain high-quality, trusted, valid and reliable results (Yilmaz, 2013). Therefore, researchers should ensure that the adopted research methodology meets the defined standards and criteria. Common criteria used to achieve these standards in research methodology are validity and reliability.

Yilmaz (2013) and Denscombe (2014) described the term ‘validity’ as the appropriateness and accuracy of collected data. Yilmaz (2013) defined reliability as ‘consistency or the degree to which a research instrument measures a given variable consistently every time it is used under

the same condition'. Accordingly, to maximize the quality of the research, Yin (2014) suggested four tests for validity and reliability that are commonly used in social research regardless of the data collection technique. The tests include:

- Construct validity
- Internal validity
- External validity
- Reliability

3.7.1 Construct validity

Construct validity is referred to as the establishment of the correct operational measures for the research topic under study (Yin, 2014). Yilmaz, (2013) stated that this type of validation is largely based on testing proper instruments during the data collection phase. This ensures that the most accurate and rich information is collected after a rigorous review of previous documents, an academic literature review; however, accuracy can be achieved through a focused use of different techniques/tactics, which include referring to multiple sources of evidence and establishing a chain of selections. The establishment of a rich chain can help immensely in producing a complete draft of evidence for further validity evaluations. For this research, construct validity will be achieved through the triangulation of research techniques using different sources of evidence.

3.7.2 Internal Validity

This criterion refers to the appropriateness of the data analysis techniques utilized to analyze the collected data. It is therefore important that the theoretical propositions are linked with the data accurately in addition to the appropriate application of the analytical strategies. For this research, to increase the internal validity, a careful and comprehensive review of the literature related to the topic of choosing a research design to enable the selection of an accurate data analysis technique will be conducted, and the analysis steps was followed precisely. In addition, by fulfilling all research objectives, internal validity was achieved.

3.7.3 External validity

External validity refers to the degree to which the research findings can be generalized or stratified in other research studies. For quantitative research, the generalization of results is

applicable, as generalization can only occur for theoretical propositions. The findings of this research will be generalized or transferred to a context similar to Ethiopia the context. Therefore, as this research involves the study of project risk management Heineken Breweries Share Company Kilinto phase III project, the findings of this study could be generalized to other construction projects within the same country which are prone to the same project risk management problem.

3.7.4 Reliability

Reliability means that the process (such as data collection procedures) of the study can be repeated to obtain the same results (Yin, 2014). For this research, reliability will be achieved by selecting and following an appropriate research methodology model to ensure that the aim and objectives will be fulfilled. In addition, to further ensure reliability, all participants were provided with an overview of the research background to ensure all questions will be understood in the same way.

In order to measure the consistency of the questionnaire and the overall reliability of constructs that it is measuring, the reliability test was carried out based on Cronbach‘s Alpha coefficient. Cronbach‘s Alpha can be interpreted like a correlation coefficient. Its coefficient range lay on the value from 0 to 1. A reliability coefficient (alpha) higher than or equal to 0.7 is considered as acceptable. That means the targeted questions raised in the questionnaires are capable to meet the objective of the study.

3.8. Ethical Consideration

The respondents were never mention about their ethnicity, political and religious view points and their private concerns. Because these whole things are their personal backgrounds that they were not want to explode. Confidentiality was the researcher’s concern and duty to keep the respondents safe under psychological discipline.

CHAPTER FOUR

RESULT AND DISCUSSION

4.1. Response rate

This chapter presents the findings of the survey on practice of project risk management among sampled staff of Kilinto Phase III Project under Heineken Breweries Share Company based on data collated using a self-administered semi structured questionnaire.

A total of 131 respondents managed to return a completed questionnaire out of a sample of 148 respondents which makes the response rate 88.51%. This rate concurs with Mugenda and Mugenda (2003) who explains that for hypothesis a response rate of half is palatable for examination and reporting, 60% is extraordinary and a response rate of 70% and over is awesome, thus 88.51% was surprising for an examination. This high response rate can be credited to the data gathering systems, where the researcher pre-told the potential individuals and associated the drop and pick technique where the surveys were picked at a later date to allow the respondents enough time to fill the reviews.

4.2. Reliability of the questions used to measure practice of project risk management

In order to measure internal consistency, Cronbach's alpha was run on the total sample of 131 sampled staff of Kilinto Phase III Project under Heineken Breweries Share Company. The method is used when we have multiple Likert questions in a questionnaire that form a scale and when we wish to determine if the scale is consistent or reliable (Tavakol & Dennick, 2011). Cronbach's alpha provides an overall reliability coefficient for a set of variables. This survey used a set of questions on a 5-point Likert item from "strongly disagree" to "strongly agree". The closer the coefficient is to 1.0, the greater is the internal consistency of the items in the scale. Alpha coefficients above 0.70 are considered acceptable

Therefore, the Cronbach's alpha was calculated for each dimension of the risk management, namely, Risk management planning (six items); project risk identification (eight items); risk analysis (four items); risk response planning (four items); and monitoring and controlling of risk (three items). The Cronbach's alpha values of 0.87, 0.62, 0.86, 0.61 and 0.78 were found which

indicates that the items in the survey questionnaire reliably measured the latent variables (Table 4.1).

Table 4. 1 : Reliability Statistics

	Cronbach's Alpha	Cronbach's Alpha based on standardized items
Risk management planning	0.87	0.88
Project risk identification	0.62	0.59
Risk analysis	0.86	0.86
Risk response planning	0.61	0.61
Monitoring and controlling of risk	0.78	0.77

Source; Own Survey, (2020)

4.3. General characteristics of the respondents

Majority of the respondents (61.3 %) obtained master's degree followed by bachelor's degree holders (25.8%). Significant proportion of respondents involved in project technical support area (38.7%) which is an important job category for the practice of project risk management in an organization. Years of service in project related work is important aspect of practice of project risk management. Hence, majority of the respondents (74.2%) had work experience from 6 to 15 years (Table 4.2).

Table 4. 2 : General characteristics of sampled Kilinto Phase III Project

Item	Alternatives	Frequency	Percentage
Highest level of education	Bachelor's degree	34	25.8
	Master's Degree	80	61.3
	Medical Degree	17	12.9
Job category	Program management	55	41.9
	Project technical Support	51	38.7
	Operations Support	25	19.4
Year/s of experience in program/project related work	0-5 years	25	19.4
	6-10 years	59	45.2
	11-15 years	38	29
	16+ years	8	6.5

Source; Own Survey, (2020)

4.4. Project risk management related knowledge

It was observed that all of the respondents were familiar with practice of risk management in the organization. It could be related to the selection of the respondents in which purposive sampling procedure was used by the investigator. When respondents were asked about how they familiarized themselves regarding project risk management, (58.1%) responded that they learned by themselves with no formal training or tailored courses while relatively few learned through formal education or trainings organized by the project (19.4). Majority of the respondents got involved in either one of the steps of project risk management process (71%) and (74.2%) of the respondents said that risk management is "very important" in meeting projective objectives as compared to time and cost management (**Table 4.3**).

Table 4. 3 : Pattern of responses to project risk management related knowledge questions by Kilinto Phase III Project

Item	Alternatives	Frequency	Percentage
Are you familiar with the practice of risk Management?	No		
	Yes	131	100
How did you familiarize yourself about risk management? (Multiple count is possible)	Self-learning	76	58.1
	Formal education/training	38	29
	Through training organized by the project	25	19.4
Ever been involved in the process of project risk management	Yes	93	71
	No	38	29
Importance of risk management in meeting project objective as compared to time and cost management	Very important	97	74.2
	Important	34	25.8

Source; Own Survey, (2020)

Based on the analysis of the in-depth interview conducted with senior management, it was understood that most of the staff of the Kilinto Phase III Project acquired knowledge on project risk management acquired through self-learning. The project has never taken any initiative to organize risk management training for its staff.

4.5. Project Risk Management Process

4.5.1. Planning risk management

Planning risk management is an essential first step in the process of project risk management. Respondents were asked whether or not Kilinto Phase III Project held the planning meetings to develop project risk management plan.

Table 4. 4: Risk management plan related question by Kilinto Phase III Project

Item	Alternatives	Frequency	Mean	Std. Dev.
Kilinto Phase III Project held planning meetings to develop project risk management plan	Strongly disagree	0	2.19	0.6
	Disagree	118		
	Neutral	0		
	Agree	13		
	Strongly agree	0		
As being a project team, staff are involved in the project risk management planning process	Strongly disagree	0	2.29	0.64
	Disagree	106		
	Neutral	13		
	Agree	13		
	Strongly agree	0		
Major stakeholders of the project are involved in the risk management planning process	Strongly disagree	0	2.32	0.7
	Disagree	106		
	Neutral	8		
	Agree	17		
	Strongly agree	0		
Kilinto Phase III Project has a well-developed risk management plan that shows the whole process of risk identification, analysis, response plan, monitor and control	Strongly disagree	0	2.26	0.58
	Disagree	106		
	Neutral	17		
	Agree	8		
	Strongly agree	0		
The plan assigns risk management responsible person for each risks	Strongly disagree	13	2.16	0.73
	Disagree	97		
	Neutral	8		
	Agree	13		
	Strongly agree	0		
Going through the planning process could be a learning opportunity about risk	Disagree	21	3.97	1.02
	Neutral	4		
	Agree	63		
	Strongly agree	42		

Source; Own Survey, (2020)

A mean value is calculated to see the level of agreement, disagreement or being neutral to such meetings to plan risk management and the value is 2.1 with a standard deviation of 0.6. Since the mean is below "3" (Mid-point of the rating scale) majority of the respondents disagree. Similar response were received for questions if staff were involved in the project risk management

planning process (mean value 2.2 and standard deviation 0.6), if major stakeholders of the project are involved in the risk planning (mean score 2.3 and standard deviation 0.7), if Kilinto Phase III Project has a well-developed risk management plan that shows the whole process that starts from risk identification to monitoring and control of risks (mean score 2.2 and standard deviation 0.5) and if the plan assigns a responsible person for each identified risk (mean score 2.1 and standard deviation 0.7)

A higher mean value (3.9) and standard deviation 1.0 is calculated for a response to the question if going through the process of planning risk could be a learning opportunity. The mean value is higher than the mid-point of the rating scale, significant number of respondents agree that possible participation in the process of risk planning will give them the opportunity to learn more about risk management.

The overall planning process for Kilinto Phase III Project is below average as the aggregate mean is 2.5. Based on senior management involved in the in-depth interview, it was expressed that project risk management plan is the primary activity in the process of risk management. It was stated that it is a blue print to guide project leaders on how to manage risks. Risk management plan for Kilinto Phase III Project was the least practiced step on risk management process as it is also observed on the document review. The findings from both analyses showed that none of the staff or any major stakeholders of the project has ever been involved in risk management planning meetings. It was noted from the in-depth interview that not having a well-developed risk management plan for the project would mean that the project arbitrarily deals with issues related to risk.

4.5.2. Project Risk Identification

Risk identification is essential to determine which risk may affect achievement of the project objectives (Lavanya & Malarvizhi, 2008). It is a process of identifying risks proactively so that the project team can have sufficient opportunity to act upon them.

To assess the practice of risk identification for Kilinto Phase III Project and the tools and techniques used by the project, eight questions were developed. The first question was about how iterative risk identification process in Kilinto Phase III Project done throughout the life of the project to identify new risks.

Table 4. 5 : Responses to risk identification related questions by Kilinto Phase III Project

Item	Alternatives	Frequency	Mean	Std. Dev.
Risk identification in Kilinto Phase III Project project is a repetitive process done throughout the life of the project to identify new risks that may evolve.	Strongly disagree	0	2.26	0.68
	Disagree	114		
	Neutral	0		
	Agree	17		
	Strongly disagree	0		
Document review is the frequently used technique in Kilinto Phase III Project to identify risks	Strongly disagree	0	3.77	0.43
	Disagree	0		
	Neutral	30		
	Agree	101		
	Strongly disagree	0		
Expert judgment is the frequently used technique in Kilinto Phase III Project to identify risks	Strongly disagree	0	4.1	0.7
	Disagree	0		
	Neutral	25		
	Agree	68		
	Strongly disagree	38		
Checklist analysis is the frequently used technique in Kilinto Phase III Project to identify risks	Strongly disagree	0	3.87	0.56
	Disagree	0		
	Neutral	30		
	Agree	89		
	Strongly disagree	13		
SWOT analysis is the frequently used technique in Kilinto Phase III Project to identify risks	Strongly disagree	0	4.1	0.54
	Disagree	0		
	Neutral	13		
	Agree	93		
	Strongly disagree	25		
Information Gathering is the frequently used technique in Kilinto Phase III Project to identify risks	Strongly disagree	0	3.77	0.67
	Disagree	8		
	Neutral	21		
	Agree	93		
	Strongly disagree	8		
Diagramming technique is the frequently used technique in Kilinto Phase III Project to identify risks	Strongly disagree	0	3.1	0.7
	Disagree	17		
	Neutral	93		
	Agree	13		
	Strongly agree	8		
Assumption analysis is the frequently used technique in Kilinto Phase III Project to identify risks	Strongly disagree	0	3.1	0.7
	Disagree	21		
	Neutral	76		
	Agree	34		
	Strongly agree	0		

Source; Own Survey, (2020)

The mean value is 2.26 with a standard deviation of 0.68. From the low mean value it is possible to say that most respondents disagree that the risk identification process is not a continuous process and done only at the beginning of the project during the planning phase.

It is known that various tools and techniques are used to identify risks in a project; hence, respondents were asked to rate as to which ones are used in Kilinto Phase III Project. Accordingly, the respondents agree that document review (mean score 3.7 and standard deviation 0.43) expert judgment (mean score 4.1 and standard deviation 0.7), checklist analysis (mean score 3.8 and standard deviation 0.5), SWOT analysis (mean score 4.1 and standard deviation 0.5) and information gathering (mean score 3.7 and standard deviation 0.6) are the frequently used techniques in Kilinto Phase III Project to identify risks. The respondents were neutral to the frequent use of diagramming and assumption analysis techniques with mean score of 3.1 and standard deviation 0.7 for each of the two techniques.

Based on document review and analysis of in-depth interview, it was understood that Kilinto Phase III Project has a practice of maximizing the use of different tools to identify project risk. Checklist analysis, Expert judgment and SWOT analysis are the most frequently used tools and techniques that the teams used which in line with the findings from the quantitative data analysis. However, diagram technique and assumption analysis techniques were not found in the document review as important tools of risk identification.

The senior management pointed out in the in-depth interview that diversifying the use of different tools and technique helps the project to better assess areas for risk identification. Moreover, the missing link which is the participation of beneficiaries and other stakeholders in the process of risk identification process was highlighted by the senior management. The lack of involvement of beneficiaries and other stakeholders was also supported by document review.

Respondents were asked to rank as to which project team are involved in risk identification process. Accordingly, project management (80.6%) and project technical support staff (61.3%) of Kilinto Phase III Project have “most frequent” involvement followed by operations support staff in risk identification process. The detailed result is presented in a bar graph (Table 4.6).

Table. 4.6: The Project team in terms of their involvement in risk identification process

Item	Alternatives	Frequency	Percent
Project management	Least Frequent	8	6.5
	Neutral	0	0
	Frequent	17	12.9
	Most frequent	106	80.6
Project technical supports	Least Frequent	4	3.2
	Neutral	13	9.7
	Frequent	34	25.8
	Most frequent	80	61.3
Operations support	Least Frequent	51	38.7
	Neutral	4	3.2
	Frequent	63	48.4
	Most frequent	13	9.7
Beneficiaries	Least frequent	131	100
	Neutral	0	
	Frequent	0	
	Most frequent	0	
Other stakeholders	Least Frequent	80	61.3
	Neutral	25	19.4
	Frequent	21	16.1
	Most frequent	4	3.2
	Total	131	100

Source; Own Survey, (2020)

4.5.3. Major sources of risk for Kilinto Phase III Project

Types of risks vary depending on the type of project under consideration. Sampled Kilinto Phase III Project staffs were asked to rank the major sources of risk as presented in a bar graph (Table 4.7). Consequently, the respondents ranked contextual risk (45.2%), human resource management (54.8%) and programmatic risk (41.9%) as "important" sources or risk, whereas, majority ranked institutional risk (71%) and security risk (64.5%) as "most important" sources of risk for the Kilinto Phase III Project. Equal proportion of respondents ranked company relationship management as "important" (45.2%) and "most important" (48.4%) source of risk.

Table 4. 7 : Sources of risk for Kilinto Phase III Project

Item	Alternatives	Frequency	Percent
Contextual risks (attitude towards TB, etc.)	Least important	46	35.5
	Neutral	17	12.9
	Important	59	45.2
	Most important	8	6.5
Human Resources Management	Least important	21	16.1
	Neutral	30	22.6
	Important	72	54.8
	Most important	8	6.5
Programmatic Risks	Least important	17	12.9
	Neutral	17	12.9
	Important	55	41.9
	Most important	42	
Relationship b/n Management	Least important	4	3.2
	Neutral	4	3.2
	Important	59	45.2
	Most important	63	48.4
Institutional risk (Securing buy-in from beneficiaries)	Least important	8	6.5
	Neutral	8	6.5
	Important	21	16.1
	Most important	93	71
Security risks	Neutral	17	12.9
	Important	30	22.6
	Most important	84	64.5
	Total	131	100

Source; Own Survey, (2020)

Next to Institutional risk characterized by security buy-in of a project by the beneficiaries, security risk is a major source of risk for Kilinto Phase III Project. Based on the analysis of the in-depth interview, the highly rated security risk may be due to the fact that many of the project's interventions areas are mostly in places where regional border conflicts are common. In addition, security risk had not been identified at the beginning of the project and some of the activities in such areas had to be suspended for quite some time. There were instances that the project had to request schedule extension for the submission of deliverables to the company.

4.5.4. Risk analysis

Risk analysis encompasses assessing the probability of occurrence and how a risk event impacts on project objectives and outcomes. It identifies the qualitative and quantitative impact of a risk event and prioritizes it with the aim of mitigating its impact (Lavanya & Malarvizhi, 2008).

Table 4. 8 : Practice of project risk analysis by Kilinto Phase III Project

Item	Alternatives	Frequency	Mean	Std. Dev.
The identified risks are well categorized based on the sources of risk.	Strongly disagree	0	3.45	0.72
	Disagree	17		
	Neutral	38		
	Agree	76		
	Strongly agree	0		
There is a system in place to determine risk probability and its impact	Strongly disagree	8	2.23	0.76
	Disagree	101		
	Neutral	4		
	Agree	17		
	Strongly agree	0		
Risk probability and impact are assessed for each identified risk with the participation of project team who are familiar with each risk category	Strongly disagree	0	2.32	0.75
	Disagree	110		
	Neutral	0		
	Agree	21		
	Strongly agree	0		
Probability-Impact Matrix is developed to rate the identified risks.	Strongly disagree	0	2.07	0.25
	Disagree	122		
	Neutral	8		
	Agree	0		
	Strongly agree	0		

Source; Own Survey, (2020)

Consequently, respondents were asked about the practice of risk analysis in the Kilinto Phase III Project. Majority of the respondents agree that the identified risks are well categorized based on their sources (mean value 3.5 and standard deviation 0.7).

This is directly related to a question in which respondents were asked to identify the major sources of risk and categorizing the already identified risks based on the source is a practice in Kilinto Phase III Project; while a great majority of the respondents with mean value 2.2 and standard deviation 0.76 disagree that there is a system in place to determine risk probability and its impact. Another significant number of respondents also disagree that risk probability and impact are assessed for each identified risk and Probability and Impact Matrix is developed to

rate the identified risks. The calculated mean score is 2.3 and 2.0; and standard deviation 0.75 and 0.25 respectively (Table 4.8).

A study done to asses use and benefits of risk management tools based on a data collected from 400 project managers concluded that risk probability assessment, risk impact assessment and risk time frame assessment are the most commonly utilized tools to analyze risks(Raz & Michael, 2001).

Through the in-depth interview made with the senior management, it was expressed that in the process of risk analysis Kilinto Phase III Project identified sources of risk and categorized them accordingly. The gap on the awareness of different methods and tools used to quantitatively analyze risk and calculate its impact is well recognized by the management. The project document review showed that the common practice of Kilinto Phase III Project in risk analysis is to randomly estimate the impact and the probability of occurrence for the already identified risk.

4.5.5. Risk Response Planning

4.5.5.1. General Risk Response Planning Practice

Risk response planning is a process of developing options to find solutions to mitigate or eliminate risks facing any given project. There may not be a quick fix to project risk rather solutions are given to it strategically over a period of time. Respondents were asked about practices of risk response planning in the Kilinto Phase III Project.

A significant number of respondents disagree that a fall back plan is always developed if the selected strategy is found to be not fully effective. It is with mean score of 2.1 and standard deviation 0.6. Respondents disagree that Kilinto Phase III Project has ever attempted to maximize opportunities through using available qualified personal in Kilinto Phase III Project to finish a project earlier or on budget. It is with mean score of 2.3 and standard deviation 0.6.

Regarding a question on Kilinto Phase III Project's attempt to avoid an anticipated risk through changing objectives of a project and/or reducing scope, respondents remain neutral. It is with mean score of 3.3 and standard deviation 0.9. Another great majority of the respondents disagree that a contingency reserve is always calculated as a risk response plan. It is with mean score of 2.0 and standard deviation 0.48 (Table 4.9).

Table 4. 9 : Practice of planning risk response by Kilinto Phase III Project

		Frequency	Mean	Std. Dev.
A fall back plan is always developed if the selected strategy found to be not fully effective	Strongly disagree	8	2.1	0.60
	Disagree	93		
	Neutral	25		
	Agree	4		
	Strongly agree	0		
In an attempt to avoid an anticipated risk, the team were forced to change the objective for example reducing scope	Strongly disagree	0	3.3	0.91
	Disagree	38		
	Neutral	8		
	Agree	84		
	Strongly agree	0		
Availability of qualified personal in Kilinto Phase III Project has been exploited to maximize opportunity to finish a project earlier than its completion time or on budget	Strongly disagree	0	2.3	0.61
	Disagree	93		
	Neutral	30		
	Agree	8		
	Strongly agree	0		
During budgeting, the team always calculate contingency reserve	Strongly disagree	13	2.0	0.48
	Disagree	101		
	Neutral	17		
	Agree	0		
	Strongly agree	0		

Source; Own Survey, (2020)

Kilinto Phase III Project identified risks only at the beginning of the project during the planning stage and developed risk response plan accordingly. Throughout the implementation of the project neither the senior management nor the project team did reassessment of the response plan to see if it still is an effective mitigation strategy. This activity will require continuous assessment and reassessment of the identified risks and could be done in the process of updating the risk register which Kilinto Phase III Project doesn't practice and doesn't have the register as it is confirmed through document review.

The senior management highlighted that there is little effort made to maximize positive risks which are considered as opportunities. It was also noted that shortage of funds, shift in company priority and security risk had forced the project to reduce the number of intervention areas with a minimized scope but not as risk response strategy. Through the in-depth interview with the senior management it was identified that setting contingency reserve aside as risk response plan is not allowed by the company of the project.

4.5.5.2. Negative Risk Response Plans

As risks are unintended events, project staff should identify them at the planning phase and throughout the life of the project and appropriate plan has to be developed to manage them. Sometimes risks could have a positive impact and are taken as opportunities. However, some risks could negatively affect the project objectives are considered as threats and actions should be taken to lessen the impact.

Table 4. 10 : Practice of negative risk response plans in Kilinto Phase III Project

		Frequency	Percent
Avoid (Change objective, discontinue the project)	Least practiced	34	25.8
	Neutral	25	19.4
	Sometimes practiced	68	51.6
	Mostly practiced	4	3.2
Transfer (Sub-contracting some of the project work, insurance)	Least practiced	42	32.3
	Neutral	30	22.6
	Sometimes practiced	51	38.7
	Mostly practiced	8	6.5
Mitigate (taking early action in choosing a reliable supplier, selecting reliable Implementing partner)	Least practiced	0	
	Neural	13	9.7
	Sometimes practiced	21	16.1
	Mostly practiced	97	74.2
Accept (accept the risk as it occurs by using contingency reserve to manage the impact)	Least practiced	4	3.2
	Neutral	25	19.4
	Sometimes practiced	21	16.1
	Mostly practiced	80	61.3

Source; Own Survey, (2020)

Hence, respondents were asked to rank the different strategies employed by Kilinto Phase III Project to manage negative risks. Nearly half of the respondents (51.6%) mostly practiced "avoid" strategy which is characterized by change of objective, discontinuing the project, changing the project scope or schedule.

Thirty nine percent of the respondents sometimes practiced "transfer" strategy which is chosen if a third party is better positioned or equipped to manage the risk and it is implemented in the form of sub-contracting some of the project work or through insurance. "Mitigation" is another risk response strategy in which project staffs make an effort to reduce the probability of occurrence of the risk or lesson its impact on the project objectives. While "accept" strategy is characterized

by acknowledging the risk and use contingency reserve to manage it when it occurs. Accordingly, 74.2% and 61.3% of the respondents mostly practiced mitigate or accept as a negative risk response strategy respectably (Table 4.10).

Based on the document review and in-depth interview with the senior project management, it was learned that mitigation and accepting are commonly practiced methods of negative risk response. The Kilinto Phase III Project used short term technical assistance from its head quarter or from other regional offices to lessen the impact of the negative risk on the project objective. While accept is also commonly practiced but it is mostly in form of charging overhead instead of setting contingency reserve aside which is not allowed by the company.

4.5.6. Monitoring and Controlling of Risk

Monitoring and control of risk is essential element of project risk management. It entails tracking of identified risks, monitoring the residual risk and ensures the execution of project risk plan. Resources allocation to the planned action is also monitored and the effectiveness of the planned risk response is evaluated.

Table 4. 11 : Practice of monitoring and control of risk by Kilinto Phase III Project

Item	Alternatives	Frequency	Mean	Std. Dev.
Identified risks are reassessed regularly to identify new risk and exclude those that are obsolete	Strongly disagree	0	2.3	0.65
	Disagree	101		
	Neutral	17		
	Agree	13		
	Strongly agree	0		
Regular risk audits are conducted to check the effectiveness of the risk response plans and risk management process.	Strongly disagree	0	2.3	0.70
	Disagree	106		
	Neutral	8		
	Agree	17		
	Strongly agree	0		
Project result deviations from the baseline project plan are monitored regularly	Strongly disagree	0	3.8	0.56
	Disagree	8		
	Neutral	4		
	Agree	114		
	Strongly agree	4		

Source; Own Survey, (2020)

Majority of the respondents disagree that identified risks are reassessed regularly to identify new risk and to exclude those that are obsolete. It is with mean score of 2.3 and standard deviation 0.65. With equal mean value and standard deviation, respondents also disagree that regular risk audits are conducted to check the effectiveness of the risk response plans. However a significant number of respondents agree that project result deviations from the baseline project plan are monitored regularly. It is with mean score 3.8 and standard deviation 0.56 (Table 4.11).

In the document review and in-depth interview with senior management, it was noted that risk monitoring and control has not be done properly. The literature shows that risk monitor and control is mostly neglected and one possible reason could be because Project managers might be willing to invest time and effort in the earlier phases of risk management, which are carried out in conjunction with other project planning activities. However, during the execution of the project they become busier and are subject to mounting resource and time pressures (Raz & Michael, 2001).

There were no risk status and risk audit reports found that are documented in the form of progress report and follow up report. Moreover, the project doesn't have risk register which could be updated continuously starting from risk identification through monitoring and control of risks. In a project, conditions change quickly. The risk register is where

the risks identified during risk assessment are recorded. As a result, the risk register normally is updated monthly. During the update, the assessments of previously identified risks are reviewed, new risks identified and assessed, the status and effectiveness of existing risk treatment plans assessed, and new risk treatment plans developed as required for both existing and new risks. The result is an updated risk register (Mike Fontaine, 2015).

The identified risk doesn't have an assigned responsible person who can follow up throughout the life of the project or until the risk is no more a threat or an opportunity. One specific practice mentioned by the senior management regarding risk monitoring and control was that deviation from the expected result or planned objectives are regularly assessed to make sure that company requirements are fully met instead of associating to impact of already identified risk.

4.5.7. Project Risk Management Challenges and Documenting Lesson Learned for Kilinto Phase III Project

The senior management, on the in-depth interview, mentioned that there are a number of challenges that the project is facing in regards to risk management. Primarily, the competition to win projects and diversify funding is set as a priority by the board of directors of the managing organization. To secure funded project extension or to win a new one, meeting or exceeding the set deliverables is one requirement. This has shifted the focus of the management and also the project team from giving due attention to project risk management. A second point highlighted by the management is that there is no clear understanding of the importance of project risk management both by the management itself and also by the staff. Finally lack of ownership of the already identified risk has created a gap in the assessment of the effectiveness of the response plan and in the monitoring and control of the risk.

It was also highlighted by the management that documenting best practices of project management in general is not a common practice in the organization. Each output lead document success stories that are only specific to the achievement of deliverables. This is also directly related to the objective of securing more funds and as part of fulfilling company requirement.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

In this section, conclusions are derived from the research findings and possible recommendations for the project team, the senior management and future researchers are forwarded.

5.1. Conclusions

This study has been carried out to evaluate the current practice of risk management in Kilinto Phase III Project. Based on the data collected through structured questionnaire, in-depth interview and document review, we concluded the following.

- Those project staff who are frequently involved in one or more of the steps of the project risk management process did not follow any formal training on project risk management and their knowledge on this issue was mostly through self-learning and from this it may be possible to conclude that though the technical staff participate in the process of project risk management they may not have enough knowledge on risk management.
- Even if it was acknowledged that project risk management is a blue print to guide project leaders on how to manage risks, planning for risk management in Kilinto Phase III Project was found to be a poorly practiced step. The senior management has ample experience in managing different projects under the organization; however, the focus has always been in complying with company requirements. The finding showed that though they have the experience in one or more of project risk management process none of the staff had participated in the planning process.
- Risk identification process in Kilinto Phase III Project is done only at the beginning of the project and possible risks that may surface at any phase of the project implementation are completely missed from being analyzed to develop response strategy. Among the different tools and techniques used for risk identification, Kilinto Phase III Project most frequently employs Checklist analysis, Expert judgment and SWOT analysis. However, lack of involvement of beneficiaries and other stakeholders in the process of risk identification was documented which limited the area of risk to be assessed and planned for mitigation.

- The various sources of risks were identified and categorized by the Kilinto Phase III Project and security risk was found to the major source of risk as a result of many of the interventions being in areas where there are regional border conflicts. It was observed that there was a huge knowledge gap on analyzing risk quantitatively and calculated its impact on the project objectives and outcomes. Based on the results of the analyses of the various sources used in this study, risk identification was not done in an iterative manner and there was lack of reassessment of the response plan to see if it was still an effective mitigation strategy.
- The project did not maximize positive risks or opportunities in the process of implementation and among the negative risk responses "mitigate" and "accept" were commonly practiced. The management supported that the focus of risk management process is more on the how to respond for possible risk that were lightly identified at the beginning of the project or act after the risk event happened. From this one can conclude that there was poor risk management planning practice.
- Analyses of data from the various sources indicated that risk monitoring and control was not carried out as per standard. This was confirmed by the lack of risk status report documented in the form of progress or follow up report. Moreover, the identified risk does not have an assigned responsible person who can follow up throughout the life of the project or until it is no more a threat or an opportunity. One specific practice mentioned by the senior management regarding risk monitoring and control was that deviation from the expected result or planned objectives are regularly monitored to make sure that company requirements are fully met instead of associating it to impact of already identified risk.

5.2. Recommendations

The following recommendations are forwarded to the Kilinto Phase III Project team and future researchers.

Kilinto Phase III Project:

- Tailored trainings should be organized by the organization in order to equip the staff of the project with the necessary knowledge and skill in the process of project risk management.

- Planning for risk should be developed at the start of the project. Having a well-developed plan will give a clear guidance to the management regarding how the team will manage the risk and what tools and techniques to be used, who will be responsible in managing risks and the required budget to manage risks. In addition the standard operating procedures should be developed to clearly guide the process of risk management for Kilinto Phase III Project or for other upcoming new projects.
- Various tools and techniques should be employed in the process of risk identification to maximize the benefits of other tools and techniques which have not been utilized. A risk register should be prepared and the responsible personnel should be assigned for each identified risk throughout the life of the project.
- Proactive training should be provided to project drivers and project technical staff in order to make them prepared on how to react on risky situations for projects hosted in potentially unstable regions. Moreover, the staff should be updated on security situation regularly before planning a trip and adequately resourced to respond to the security situation. South to south cooperation should be exploited in order to address the problem of lack of analytical skills related to project risk analysis.
- The project should shift its risk response plan more to "mitigate" and "transfer" instead of "avoid" strategy which might have an impact on limiting project deliverables. "Accept" strategy is also known to increase overhead cost since the project is not allowed to have a contingency reserve.
- Regular risk reassessment and risk audit should be performed in order to keep track of the effectiveness of the risk response plan and also to identify new risks and to exclude obsolete risks which are no longer a threat to the project. The practice of proper monitoring and control can also help the organization to document best practices that can be replicated in future new projects that the organization is anticipating to implement.

Future researchers

- Further research should be conducted on the practice of project risk management on various organizations operating in Ethiopia.

References

Akintoye, A., & Macleod, M. (1997). Risk analysis and Management in Construction. International Journal of Project Management , 15, 31-38.

Anumba , J., Egbu, C., & Carrillo, P. (2005). Knowledge Management in Construction (Vol. 1). Blackwell Publishing Ltd.

Bahar, J.F. Mustafa, M.A. (1991) Project risk assessment using the analytic hierarchy process. IEEE Technology Management Council, 46-52 Banaitene , N., & Banaitis, A. (2012). Risk Management in Construction Projects. InTech .

Baranoff, E., & Kahane, Y. (2009). Risk Management for Enterprises and Individuals . Saylor Foundation .

Bryman , A., Bell, E., Mills, A., & Yue, A. (2011). Business Research Methods (Canadian Edition uppl.). Wynford Drive, Don Mills, Ontario: Oxford University Press Canada.

Burke Johnson , R., & Onwuegbuzie, A. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. American Educational Research Association , 33 (No. 7), 14-26.

Chan, H., & Wang , X. (2013). Fuzzy Hierarchical Model for Risk Assessment: Principles, Concepts, and Practical Applications. London: Springer-Verlag.

Chapman, C. (1991). Risk, in Investment, Procurement and Performance in Construction. London: E & F.N. Spon (Chapman & Hall).

Chapman, C., & Ward, S. (2003). Project risk management (Second edition uppl.). John Wiley & Sons, Ltd.

Chapman, R. (2001). The controlling influences on effective risk identification and assessment for construction design management. International Journal of Project Management , 19.

Cooper, D., Grey, S., Raymond, G., & Walker, P. (2005). Project Risk Management Guidelines: Managing Risk in Large Projects and Complex Procurements . Southern Gate, Chichester: John Wiley & Sons Ltd.

Creswell, J. (2013). Research Desing: Qualitative, Quantitative and Mixed Methods Approaches (Vol. 4th Edition). Los Angeles, London, New Dehli, Singapore, Washington DC: SAGE Publications, Inc.

Dehdasht, G., Zin, R., & Keyvanfar, A. (2015). Risk classification and barrier of implementing risk management in oil and gas construction companies. Jurnal Teknologi .

Eskesen, S., Tengborg, P., Kampmann, J., & Veicherts, T. (2004). Guidelines for tunnelling risk management: International Tunnelling Association, Wroking Group No. 2. Tunnelling and Underground Space Technology , 19, 217-237.

Flanagan, R., Jewell, C., & Johansson, J. (2007). Riskhantering i praktiken. Byggnadsekonomi, Institutionen för bygg- och miljöteknik, Centrum för management i byggsektorn (CMB) . Göteborg: Chalmers Repro.

Frappaolo, C. (2006). Knowledge Managemenet . Southern Gate Chichester, England: Capstone publishing Ltd. (A Wiley company).

Hillson , D. (2004). Effective Opportunity Management for Projects: Exploiting Positive Risk. Petersfield, Hampshire, UK: CRC, Taylor & Francis Group.

Hillson , D., & Murray-Webster, R. (2005). Understanding and Managing Risk attitude . Gower Publishing Limited.

Hsu, S., & Shen, H. (2005). Knowledge Management and its relationship with TQM. Total Quality Management , 16, 351-361.

Karimiazari, A., Mousavi, N., Mousavi, F., & Hosseini, S. (2010). Risk assessment model selection in construction industry. Elsevier .

Khuzaimah, K., & Hassan, F. (2012). Uncovering Tacit Knowledge in Construction Industry: Communities of Practice Approach . Procedia - Social and Behavioral Sciences , 50, 343-349.

King, W. (2009). Knowledge Management and Orgaizational Learning. Annals of Information Systems , 4.

Klemetti, A. (2006). Risk Management in Construction Project Networks. Helsinki University of Technology .

Kothari, C. (2004). Research Methododology: Methods & Techniques (Vol. 2nd). Ansari Road, Daryaganj, New Delhi: New Age International (P) Ltd., Publishers.

Liu, J., Li, B., Lin, B., & Nguyen, V. (2007). Key issues and challenges of risk management and insurance in China's costruction industry. Industrial Management and Data Systems , 107 (3), 382-396.

Loosemore, M., Raftery, J., Reilly, C., & Higgon, D. (2006). Risk management in projects (2nd edition uppl.). Taylor and Francis.

Ly, E., Anumba, C., & Carrillo, P. (2005). Knowledge management practices of construction project managers . University of London. Association of Researchers in Construction Management , 1, 517-526.

Maqsood, T. (2006). The role of Knowledge Management in Supporting Innovation and Learning in Construction. D. Doctoral thesis, School of Bussiness Information Technology, RMIT University .

Maytorena, E., Winch, G., & Kiely, T. (u.d.) (2005). Construction Risk Identification. Manchester Business School, The University of Manchester, M15 6PB, UK .

Mhetre, K., Konnur, B., & Landage, A. (2016). Risk Management in Construction Industry. International Journal of Engineering Research , No. 5 (Issue Special 1), 153-155.

Mills, A. (2001). A systematic approach to risk management for construction. Structural Survey , 19 (lss 5pp), 245-252.

Nonaka, I., & Takeuchi, H. (1995). The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation. New York: Oxford University Press.

Perera, J., Dhanasinghe, I., & Rameezdeen, R. (2009). Risk Management in the Road Construction: The case of Sri Lanka. International Journal of Strategic Property Management, 13 .

Phillips, P. (2008). Data Collection: Planning for and Collecting All Types of Data. John Wiley & Sons .

PMI. (2000). A Guide to the Project Management Body of Knowledge (2000 Edition uppl.). Upper Darby, PA: Project Management Institute.

Potts, K. (2008). Construction Cost Management: Leaning from caste studies. London and New york: Taylor & Francis Group.

Raftery, J. (1994). Risk analysis: In Project Management . London & Newyork: E & FN SPON. An Imprint of Chapman & Hall.

Reilly , J., & Brown, J. (may 2004). Management and Control of Cost and Risk for Tunneling and Infrastructure Projects . Tunneling and underground space Technology , 2.

Rodriguez, E., & Edwards, J. (2008). Before and After Modeling: Risk Knowledge Management is Required . 6th Annual Premier Global Event on ERM, Chicago, IL .

Saunders, M., Lewis, P., & Thornhill, A. (2009). Research Methods for Business Students (Vol. 5th). Edinburgh Gate Harlow: Pearson Education Limited.

Schatteman, D. Herroelen, W. Van de Vonder, S. Boone, A. (2008). Methodology for Intedrated Risk Management and Proactive Scheduling of Construction Projects. Journal of Construction Engineering and Management ASCE, 885-893.

Schieg, M. (2006). Risk management in construction project management. Journal of Business Economics and Management , 7:2, 77-83.

Serpell, A., Ferrada, X., Rubio, L., & Arauzo, S. (2015). Evaluating risk management practices in construction organizations. Rotterdam, The Netherlands: Procedua Social & Behavioral Sciences .

Serpella, A., Ferrada, X., Howard, R., & Rubio, L. (2014). Risk management in construciton projects: a knowledge-based approach. Procedia - Social and Behavioral Sciences , 119, 653662.

Skitmore, M., & Lyons , T. (2004). Project risk management in Queensland engineering construction industry. International Journal of Project Management , 22.

Smith , N. J., Merna, T., & Jobling, P. (2006). Managing Risk in Construction Projects (Second Edition uppl.). Blackwell Publishing.

Sternberg, R. (1997). Tacit knowledge and Job Success. In N. Anderson, P. Herriot (Eds.) . (I. H. Assessment, Red.) Chichester: Wiley & Sons.

Tah, J., & Carr, V. (2001). Towards a framework for project risk knowledge management in the construction supply chain . Advances in Engineering Software , 835-846.

Tan, H., Anumba, C., Bouchlaghem, D., Carillo , P., Kamara, J., & Udeaja, C. (2010). Capture and Reuse of Project Knowledge in Construction . Wiley Blackwell.

Teo, M., & Loosemore, M. (2001). A theory of waste behaviour in the construction industry . Construction Management and Economics , 19:7, 741-751.

Thevendran , V., & Mawdesley, M. (2004). Perception of human risk factors in Construction Projects: An exploratory Study. . International Journal of Project Management , 22, 131-137.

Uher, T.E. & Toakley, A.R (1999). Risk Management in the Conceptual Phase of a Project. International Journal of Project Management, 17. 161-169.

Wang , J., & Yuan, H. (2011). Factors affecting contractors' risk attitudes in constructin projects: Case study from China. Science Direct: International Journal of Project Management , 29, 209-219.

Wenger, E., & William , M. (2000). Communities of practice: the new organisational frontier. Harvard Business Review , 139-145.

Winch, G. (2010). Managing Construction Projects (Second edition uppl.). Wiley Blackwell

Williams, P. (1995) A Regulation Evolution System: a decision support system for the Building Code of Australia. Construction Management and Economics, Vol. 13, 197-208.

X.W Zou, P., Zhang , G., & Wang , J. (2007). Understanding the key risks in construction projects in China . International Journal of Project Management , 601-614.

Yeh, Y., Huang, L., & Yeh, Y. (2011). Knowledge management in lended learning: Effects on proffesional development in creativity instruction. Computers and Education, 56 , 146-156.

APPENDICES

APPENDIX I

ST MARY'S UNIVERSITY

SCHOOL OF POSTGRADUATE

MBA PROGRAM

Questionnaire to be filled by Contractors, Clients and Consultants

Dear Respondents;

This questionnaire is developed for an academic effort planned for the collection of data to conduct a thesis paper on the title **"*Assessing the Project Risk Management Practice of Heineken Breweries Share Company Kilinto Phase III Project*"**, in order to fulfill the University's (St Mary's University) requirement set for awarding of a Master of Business Administration on Project Management. The information obtained from this questionnaire will be kept confidential and will not be used for any other purposes. Hence, I am kindly asking respondents to give your candid information.

NB:

- It is not necessary to write your name
- Try to address all the question given below
- For the closed ended questions use (√) mark for your choice in the given box
- If you have any query, please do not hesitate to contact me and I am available as per your convenience at (Mobile:)

Thank you for your cooperation!

QUESTIONS

1. How do you perceive risk within the construction project?

Positive ☐ Negative ☐ A combination of both ☐

2. What is your behavior in relation to risk?

Risk-seeker ☐ Risk-averse ☐ Risk-neutral ☐

3. Which stage/phase do you consider most important for Risk Management?

Conceptual Phase ☐ Planning Phase ☐ Production ☐

Completion and Closeout Phase ☐

4. Which Risk Management process is most important?

Risk identification ☐ Risk assessment ☐

Risk response ☐ Risk monitoring ☐

5. Have you read any courses in Risk Management and how knowledgeable are you in this area?

Very Knowledgeable ☐ Somewhat Knowledge ☐ No Knowledge ☐

Limited Knowledge ☐ Neither Knowledgeable nor Unknowledgeable ☐

6. Does your organization provide any training in Risk Management?

Yes ☐ No ☐

7. How do you draw lessons learned from previous project?

Communities of practice ☐ Workshops ☐

Knowledge repositories ☐ No methods for capturing knowledge ☐

8. What kind of obstacles exists for transferring knowledge and organizational learning within Construction project?

8.1 "Time and resources to handle the knowledge and database to easily identify and gather relevant knowledge and experience"

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

8.2. "We do "as we've always done".

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

8.3. More clear areas of responsibility are needed for those who face the risk"

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

8.4. "A fear or unwillingness of sharing both good but especially bad experiences from the project"

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

8.5. "A lack of systemized thinking with standardization of technical solutions and production methods"

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

8.6. "The construction project is very conservative at retrieving experience and knowledge"

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

8.7. The construction project is very bad at retrieving experience and knowledge"

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

8.8. "The human factor as well as time, one may rather start a new project without evaluating the previous one in sufficient way"

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

8.9. "We need more standardized solutions to reduce the scope of risk

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

9. How efficient are the communication regarding risks in your construction project?

9.1. We have good and effective communication concerning risks in our projects

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

10. Statement: "My organization has a clear risk identification process"

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

11. How do you personally identify risks?

Knowledge ☐ Analysis ☐

Experience ☐ Other ☐

12. Which method do you use for risk identification?

Brainstorming ☐ Interviews ☐ Checklists ☐

Experience from Previous project ☐ Source Identification ☐ Third Party ☐

No method ☐ Other ☐

13. "My organization has a clear risk assessment process"

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

14. Which Qualitative Risk Assessment method do you use?

Risk matrix ☐ Risk classification /register ☐ No method ☐

☐

Don't know Other ☐

15. Which Quantitative Risk Assessment method do you use?

Probability analysis ☐ Sensitivity analysis ☐ Decision Tree analysis ☐

No method ☐ Don't know ☐ Other ☐

16. Statement: "My organization has a clear risk response process"

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

17. How do you respond to risks?

17.1. Avoidance risk response method usually implement within your organization.

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

17.2. Transfer risk response method usually implement within your organization.

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

17.3. Mitigation risk response method usually implement within your organizations.

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

17.4. Acceptance risk response method usually implement within your organizations.

Completely agree ☐ Partly agree ☐ Partly disagree ☐

Completely disagree ☐ Don't know ☐

"THANK YOU"