ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

RISK MANAGEMENT IN BUILDING CONSTRUCTION PROJECTS IN ADDIS ABABA

BY

ALEM TEFERI

JANUARY 2020

ADDIS ABABA, ETHIOPIA

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ID. NO. SGS/0100/2010B

ADVISOR

DEJENE MAMO (Asst. Prof.)

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ST. MARY'S UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIRMENTS FOR THE DEGREE OF MASTERS OF ARTS IN PROJECT MANAGEMENT

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APPROVED BY BOARD OF EXAMINERS

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DECLARATION

I, the undersigned, declare that this Thesis is Author's original work and belongs to the Writer; it is prepared under the guidance of the Advisor Dejene Mamo (Asst. prof.). All sources of materials used for the Thesis acknowledged duly. It further confirmed that the Thesis has not submitted, either in part or in full to any other higher learning institution for earning any accreditation.

Alem Teferi ----------

Name Signature

St. Mary's University Addis Ababa January 2020

ENDORSEMENT

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

Dejene Mamo (Asst. Prof.) ----------

Advisor Signature

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LIST OF ACRONYMS AND ABBREVIATIONS

AEO	African Economic Outlook
APM	Association for Project Management
BC	Building Contractors
BSI	British Standards Institution
CAE	Consulting Architects and Engineers
CSA	Central Statistical Agency
EEA	Ethiopian Economic Association
GC	General Contractors
GDCF	Gross Domestic Capital Formation
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
HBC	Highway and Bridge Consultancy
IMF	International Monetary Fund
MoFEC	Ministry of Finance and Economic Cooperation
MoWUD	Ministry of Works Urban Development
MUDC	Ministry of Urban Development and Construction
NBE	National Bank of Ethiopia
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
RC	Road Contractors
RFI	Requests For Information
RII	Relative Importance Index
SC	Specialized Contractors
SD	Standard Deviation

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ABSTRACT

The construction industry exposed to more risk and uncertainty than many other businesses. Subsequently, effective risk management has turned out to be the main problematic area that challenges the building construction sector. Thus, the aim of the research is, to assess building *constructing project risk management in Addis Ababa towards consulting and constructing firms. Participants of the study, located in Addis Ababa, were grade-one contractors and consultants. To achieve its objective, in this study, mixed method research approach deployed. Descriptive Research Design also implemented for describing situations and facts to research questions. Survey questionnaire implemented for collecting data. Simple Random Sampling Technique used, which ensures representativeness of the sample to the population. The collected data analyzed with Descriptive Analysis using Statistical Package for Social Science /IBM SPSS 24/through statistical tools such as frequency, percentage, mean, and standard deviation, etc. and the results are presented using tables, graphs and charts, etc. The research findings indicated that five critical risk factors identified based on an assessment of their probability of occurrence in building construction projects. These were "high inflation rate", "delayed payment by clients", "poor resource management", "risk of corruption", and "economic instability" that have influence on project objectives. Financial risk is, as the most significant risk category recognized by participants. Due to unexpected nature and changes that occur during implementation of building construction projects, risk becomes a prevalent phenomenon. Hence, the two critical possible risks identified were time overrun and cost overrun. It also indicated that for effective risk alleviation, risk transfer and risk reduction measures were the major strategies recognized by participants. In this study, lack of knowledge and practice of risk management, which needs to be improved, revealed from further investigation of opinions of participants. Hence, managing risk in constructing projects recognized as a very important practice for realizing project objectives. The study concluded that a complete understanding and identifying of risk factors could enable the practitioners to execute early responses to possible risks. Therefore, consultants and contractors, including other stakeholders, should work together as a team on projects to systematically identify critical risk factors, analyze and respond to risks with appropriate strategy to achieve project objectives of time, cost, & quality.*

Key words: *risk; project; management; construction; risk management; risk factors; building;*

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

Construction projects have substantial impact to the economic growth of a nation. It involves several participants in the process of implementation throughout all phases of the project. Besides, operators in the sector were facing challenges and unreliable circumstances. This becomes a common phenomenon encountered by participants. It results, mainly in delay of project schedule, excessive increased on project cost, and sub-standard construction work, etc.

Correspondingly, Jayasudha & Vidivelli (2016) concluded that constructing projects led in multifaceted and vibrant environments bring about in situations of high improbability and risk, which compounded by challenging time overrun and excessive budget. It is an industry predominantly originated by private developers, Government, and other institutions and is susceptible to technical and business risks from initiation up to close out of projects.

"Due to the fact that each construction project is unique and dynamic, the construction operation involves numerous uncertainties, multiple intricacies, various techniques and divergent environments" (Jarkas & Haupt, 2015, p.166). Iqbal, Choudhry, Holschemacher, Ali & Tamošaitienė (2015) cited construction projects from PMI (2004) in general are apparent to have more inherent risks due to participation of many contracting parties, such as clients, consultants, contractors, subcontractors, suppliers, etc. Wiguna, & Scott (2005) also noted that risk plays a major portion in decision making to construction projects, and may affect the performance of a project. It may result in cost overruns, time overruns, and even poor quality of deliverables if they are not deal with properly.

Thus, detecting and handling the possible risk factors, which can considerably differ from project to project accountable on numerous circumstances, plays a decisive role in improving the performance and achieving the effective and efficient supply of the deliverables. Researchers in several publications sort out and identify major risk factors, which may possibly occur in building construction projects and classifying in diverse collections based on their sources and magnitude of influences, as vital contribution to the industry.

In their study, “Risk Management in Construction Projects” Serpella, Ferrada, Howard& Rubio (2014) addressed the problem with a knowledge-based approach and through a system perspective. The main purpose of their research is thus to develop a risk management system with knowledge to support risk management projects for enterprises and organizations in Chile. Both general and specific literature review was included in the research methodology to assess the situation in an organization for constructing projects that will help in structuring a framework of risk management as a benchmark.

In view of this, a model and tool developed for risk management and validated by two panels of experts. The study findings revealed that risk management in construction projects is still ineffective and its main cause is lack of knowledge and proposed a systemic and formal approach to risk management that will assist both owners and contractors.

Then, Banaitiene & Banaitis (2012) “Risk Management in Construction Projects” studied to identify contractors’ view on the significance of the construction projects risks and to discover the risk analysis and risk management practices in the Lithuanian construction companies. Survey questionnaire used to conduct the study. Totaling 98 samples distributed to the participants who are top and middle management members in construction companies at three different times.

Results of their research displayed that the Lithuanian constructing enterprises meaningfully vary from the constructing enterprises in overseas nations in the implementation of management of risk. Absence of knowledge, in Lithuanian contractors’, makes it challenging to transform attitude toward risk management. The study proposed contractors must understand risk responsibilities; risk event conditions, risk preference, and risk management capabilities to manage risk factors effectively and efficiently.

However, it was examined by Iqbal et al. (2015) “Risk Management in Construction Projects” to identify the attitude of construction practitioners toward types of risks and respective responsibility and the most effective methods in averting/alleviating various types of risks. Questionnaire survey with 150 samples disseminated to participants having knowledge of risk management techniques.

In their study, it discovered that financial issues for projects, accidents on site and defective design are the most significant risks affecting most of the construction projects and proposed close supervision and coordination with the contracting parties to be the most effective remedial technique.

These various studies used to recognize different categories of risks in constructing projects. However, evaluations of local studies show that there is inadequate research conducted on risk management in constructing projects in Addis Ababa. Certain remarkable studies comprise the following.

According to Yimam (2011), "Project Management Maturity in The Construction Industry of Developing Countries" studied to assess the practices of knowledge areas and project management maturity in the constructing sector of developing nation's particularly Ethiopian contractors. The researcher used three types of questionnaire samples survey and disseminated to eighteen practitioners, twelve academicians, and forty grade-one international and local contractors, to investigate the relative importance of the practices, opinion from the practitioners, and project management maturity of contractors.

From the study result described that projects function in extremely unstable, irregular, ill resourced and uncertain/risky situation resulting to unfinished, uncontrolled, and unfitted to the original plan or goal of projects and suggested methods of improving project management practices with particular reference to contractors for identified areas of problems.

Moreover, in his study, "construction contract risk management practices in Ethiopian building construction projects" Addis (2014) identified the level of use of construction contract and risk management techniques in building projects. It also stated that, the importance of identifying risks and deploying risk mitigation methods related with various types of contracts and assigning them to different stakeholders participated in the project to make the project successful. Totaling one hundred and five sample survey for both participants i.e. contractors and consultants of grade-one up to six was used.

In addition, risk factors classified in various groups; such as "contractual risk", "performance risk", "financial/economical risk", "political risk", "technical risk", "geographical risk", and "operator risk" and assessed the situation in Ethiopian building construction contracts. The study findings revealed that lack of sufficient knowledge in the main concepts of risk management practice among the participants and proposed ways of improving the circumstances.

It indicated that the probability of achieving project objective is insignificant: if risk not handled properly.

Tadesse and Dakhli (2016) noted that, the construction sector in Ethiopia is increasing enormously starting from 2001 and forwards. “The GDP contribution of the industry has been raised to 5.6% and approaches to the sub-Saharan average (6%). Meanwhile, the Gross Domestic Capital Formation (GDCF) about 60 percent in 1996/97 has reached nearly 75 percent in 2002/03” (Zewdu & Aregaw, 2015, p.108).

Therefore, from the above indications, the construction sector has its own contribution to the GDP of the country and plays an important role in the country’s economic development. Besides, systematic identification and analysis of risk throughout all phases of project activities need to deploy appropriately. Otherwise, it will be difficult to monitor, develop risk response strategies, and make decision for project managers and other stakeholders.

Consequently, this will have an effect to the project performance and the predetermined goals and objectives of the building construction projects. Therefore, the role of risk management in building construction project is an important element combined with all functioning and managerial process of the building construction projects.

“Risk management is a formal and orderly process of systematically identifying, analyzing, and responding to risks throughout the life-cycle of a project to obtain the optimum degree of risk elimination, mitigation and/or control” (Wang, Dulaimi, & Aguria, 2004, p.238). Therefore, this study attempted to identify the critical risk factors that contribute to the possible occurrence of risk in building construction projects in Addis Ababa.

1.2. Statement of the Problem

Santoso, Ogunlana, & Minato (2015, p.43) cited Flanagan and Norman (1993) “The construction industry is subject to more risk and uncertainty than many other industries.” The progressions of building construction go through many unexpected changes, featured by many unanticipated situations, during implementation.

Moreover, the nature of building construction projects is usually prone to risks. It resulted from poor planning and lack of knowledge on subsequent risk identification through to developing risk response strategies for critical risks. It brought about in cost and schedule overrun as the construction process progresses (Serpella et al, 2014). Consequently, effective risk management has turn out to be a main problematic area that challenges the building construction sector.

Thus, knowledge and understanding of risk management are significant to identify and manage critical risks effectively and analytically to attain the project goals of time, cost, and quality. Being unsuccessful to accomplish effective risk management can be reason for projects to go beyond financial plan, lag in schedule, failure in decisive performance goals, or unveil any incorporation of these difficulties (Santoso, et.al, 2015).

On the other hand, for an inordinate length of time, the method to risk management in construction projects was by means of a "reductionist" tactic that yields poor outcomes and restricts the value of project management. For instance, usually risk used to take care of with extra finances and time without a detailed and wide range of study. This able to affect a specific project, and that most of the time it is undoubtedly inadequate to protect the magnitudes of risks that come about in the course of project implementation. At that moment, in majority of the circumstances projects completed beyond budget and schedule (Serpella et al, 2014.)

Additionally, the lack of actual practice on project risk management has numerous undesirable outcomes for contributors in a project because of absence of precautionary measures counter to the risks and uncertainty that any project reveals. For instance, the absence of prevention, contrary to the risk of "scope definition" of a project, or "environmental hazards" or "communication risks", among others, that have consequence to interruptions, substantial escalations in prices and contractual disagreements, are some of them (Ibid).

In view of stakeholders who took part in Ethiopian building construction projects, according to (Addis, 2014), most projects are not finalized in accordance with the initial design and idea. They encountered several difficulties and variations that result to lag behind schedule, over budget or lesser value. The risks originated all the way through the period of a construction project might be reasons for deviations in project objectives if that is not handled properly.

From empirical evidence, Yimam (2011) found out that Ethiopian construction projects, risk management maturity level, are very low as he indicated below.

> *The very low level of reported maturity for risk management and the low importance given to it (risk management is ranked to be less important than all the other knowledge areas except safety management and communication management.) This may indicate the low level of awareness about the importance of risk management in the construction industry of the country. As developing countries characterized by very volatile and uncertain environment, management of risk should have been a logical priority (Yimam, 2011, p.148).*

The above-mentioned case proved that managing risk in the construction industry, in Ethiopia, is in a very early stages and it focuses only on few aspects of the project management process. For instance, Addis (2014) "construction contract risk management practices in Ethiopian building construction projects", Seleshi (2018) "Project Risk Management Practices of Selected Chinese Building Contractors in Ethiopia", Yimam (2011) "Project Management Maturity in The Construction Industry of Developing Countries (the Case of Ethiopian Contractors)" are amongst others.

To conclude, risk management practice in Ethiopian construction sector, not well known, given low level of attention due to lack of awareness about its significance and practice. Largely not used appropriately. Other studies also proved that, though the building construction sector has significant contribution to the economic development of the country, risks were unmanaged due to lack of knowledge; evidently, they become threats of building project objectives. This might be the main reason why most building construction projects completed with much deviation from the original plan particularly with respect to cost, time, and quality. Moreover, it undertaken on few characteristics of project risk management, like contract risk, involving single group of participant and conducted at a country level only.

Subsequently, the need for a comprehensive risk management arises towards identifying the critical risk factors, examining, and responding to risks for the success of building construction projects. It involved major operators in the building construction industry and conducted in the capital city of the country to minimize the effects on project objectives of time, cost, and quality. Therefore, this study seeks to assess risk management in building construction projects in Addis Ababa towards constructing and consulting firms.

1.3. Research Questions

- What are the critical risk factors that may generate possible risks?
- What are the major risks that may occur in building construction projects?
- What are the effective response strategies for the identified critical risks?
- What are the general recommendations on risk management related with building construction projects?

- What are the major challenges encountered in managing risk in building construction projects?

1.4. Objectives of the Study

1.4.1. General Objective

The general objective of the research is therefore: to assess building construction projects risk management in Addis Ababa towards constructing and consulting firms.

1.4.2. Specific Objectives

- To assess and rank the critical risk factors that may generate possible risks;
- To identify the major risks that may occur in building construction projects;
- To allocate risk response strategies for the identified critical risks;
- To examine recommendations for improved risk management associated with building construction projects;
- To assess the major challenges encountered in managing risk during implementation of building projects.

1.5. Definition of Terms

Monitor Risks: "The process of monitoring the implementation of agreed-upon risk response plans, tracking identified risks, identifying and analyzing new risks, and evaluating risk process effectiveness throughout the project" (PMBOK Guide, 2017, p.711).

Project: "A project is a temporary endeavor undertaken to create a unique product, service, or result" (Ibid, p.4).

Project management: "Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements" (Ibid, p.10).

Project Management Body of Knowledge: "A term that describes the knowledge within the profession of project management. The project management body of knowledge includes proven traditional practices that are widely applied as well as innovative practices that are emerging in the profession" (Ibid, p.716).

Project Risk: Project Risk includes all those risks that might affect the cost, schedule, or quality of the project (Cooper, Grey, Raymond, and Walker 2005, p.3).

Risk: The PMBOK Guide (2017, p.3) defines project risk as "an uncertain event or condition that, if it occurs, has a positive or negative effect on at least one project objective."

Risk Acceptance: "A risk response strategy whereby the project team decides to acknowledge the risk and not take any action unless the risk occurs" (Ibid, p.720).

Risk Avoidance: "A risk response strategy whereby the project team acts to eliminate the threat or protect the project from its impact" (Ibid).

Risk Category: "a group of potential causes of risk" (PMBOK Guide, 2013, p.557).

Risk Management: "Risk management in the construction project management context: is a comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives" (Banaitiene and Banaitis, 2012, p.431).

Risk Mitigation: "Risk response strategy whereby the project team acts to reduce the probability of occurrence of impact of a risk" (PMBOK Guide, 2013, p.557).

Residual Risk: "The risk that remains after risk responses have been implemented" (PMBOK Guide, 2017, p.719).

Risk Source: Any uncertain factor that can influence the outcome of a project is risk source or a risk hazard (Steyn and Nicholas, 2017, p.348).

1.6. Significance of the Study

The study outlined critical risk factors in building construction projects in Addis Ababa and recommended effective risk response measures to those identified risks. The study, therefore, will have significant contribution particularly to stakeholders who are involved in the construction sector. It might assist for the improvement of risk management practice through minimizing the negative effects of risk that may occur in building construction projects. The research will also be important to serve as an input for future studies on the topic. It might contribute in adding value to the prevailing body of knowledge particularly to management of risk in building construction projects in Addis Ababa.

1.7. Limitations and Scope of the Study

Regardless of its effort in undertaking rigorous empirical research methods based on the use of large questionnaire survey, the potential limitations of this research recognized. Firstly, the 50 potential risk factors grouped in to five major categories adapted from the review of related literature were not the only ones. Secondly, in this study, risk assessment was limited to the qualitative analysis only. However, the statistical outputs could be the foundation for further research.

Thirdly, response strategy was limited only to the overall perception and preference of participants from the possible risks that might occur. Fourthly, the probability of occurrence of risk factors associated with building construction projects used a five point Likert Scale in this study. Respondent requested to rate the likelihood of occurrence of these risk factors, possible risks and response strategies as (1) Very Infrequent, (2) Infrequent, (3) Neutral, (4) Frequent, and (5) Very Frequent respectively. However, Scale number (3) should have been termed and used as Moderate scale.

The study is also delimited to risk management in building construction projects in Addis Ababa. Survey questionnaire deployed for collecting data. The reason why the researcher selected survey research method is due to the benefits of survey designs, such as the low-cost of the design and the quick turnaround in data collection are among others. In this study, the variables are risk factors, possible risks, and response strategies that may occur in building construction projects.

Moreover, the participants involved in the study were delimited to grade-one contractors and consultants: who are playing a major role in the construction industry that includes Addis Ababa. These stakeholders are operating in construction and designing of building projects and are expected to have higher performance capacity, machineries, equipment and technical capability. As a result, the study findings would be applicable to those participants with lower grades of contractors and consultants.

1.8. Organization of the Paper

The study organized into five chapters, in the following manner:

Chapter One

Presents Background of the Study, on the research topic, which describes nature of building construction projects and how projects were functioning in challenging situations and their exposure to risk with their effect on project objectives. It also explains the practice of risk management both at international and local levels and at its significance for success of projects.

Statement of the Problem describes the industry's' liability to risk, its feature, and being a problem area in managing risk. It also explains lack of local studies in broad aspect, its need and awareness for the success of the project. Research Questions forwards questions to answer about the critical risk factors, possible risks, response strategies, participants' recommendation for improved risk management and challenges encountered in managing risk. General and specific objectives also stated to answer those research questions.

Operational definitions of some terms with particular reference to the topic of the study explained in this section. Significance of this study and its contribution to the prevailing body of knowledge also presented. The potential limitations of this particular study mentioned in this specific topic. The study's scope with particular reference to location, instruments of data collection, variables and participants involved also discussed in this topic.

Chapter Two

In this section, relevant related literature reviewed. It includes definitions and concepts of project and project management, general types of risk, project risk management, and risk management process. It also explains about risk response strategies, risk monitoring and control, risk management tools and techniques. In addition, from empirical review of literature, the general overview of risk management in building construction projects, construction industry and risk management in Ethiopia and the conceptual framework of the study also presented.

Chapter Three

This chapter presents the research design and approach implemented in this study, sources of data, population, and sample size and sampling technique, how data collection instruments developed

and employed. In addition, the procedures followed up for data collection, methods of data analysis and ethical considerations presented.

Chapter Four

In this section, results and discussions, describes the major findings of the study. It also explains whether the outcome of the study is in alignment or contrary to other scholars' studies reviewed from the literature. In addition, the possible cause for the outcome of a particular variable and the effect that created on project objective also addressed.

Chapter Five

It deals with Summary of Findings, Conclusion and Recommendations**.** The summary of findings emanates from the results of the study that focuses on critical risk factors, possible risks, response strategies, major recommendations and challenges encountered by participants. The conclusion originated from the findings of the variables of the study; presented the outcomes and decisions arrived to this particular study. The recommendations were also suggests drawn based on the conclusion on how the critical risk factors identified and challenges encountered could be addressed towards a complete risk management. Concepts that need further study, also addressed by this topic.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

2.1. Introduction

This chapter deals with Review of Related Literature of numerous scholars and authors: paying particular attention on project risk management with specific reference to building construction projects. Theoretical concepts associated to projects, project management, project risk management process (risk identification, risk assessment, risk response strategies, risk monitoring) and risk management tools and techniques were presented from the viewpoint of several researchers'. Moreover, the empirical review of literature from the perspective of findings of the research and methods used presented. Construction industry & risk management in Ethiopia and conceptual framework considered. The comprehensive review of related literature conducted with an aim to address the objectives of the research.

2.2. Review of Literature

2.2.1. Project and Project Management

In order to comprehend project management, one should begin with the definition of a project. In line with project management body of knowledge, the word project outlined in terms of its distinctive characteristics, as "a project is temporary endeavor undertaken to make a distinctive product, facility or outcome" (PMBOK Guide, 2017, p.4). Either a distinctive product, which will be a part of another unit, an improvement or rectification to a unit, or a first-hand finished a unit in itself. A distinctive facility is a capability to accomplish a facility. A distinctive outcome is like a product or a bit of record.

Projects carried out to attain goals by generating outputs. Constructing a building or facility can be a project among others. Momentary effort, the restricted period of projects shows that a project incorporates a definite begin and end. The limited period does not mean a project incorporates a small period.

On the opposite hand, (Hillson, 2009, p.11) illustrates what project means as "A project is launched so as to implement a facet of company strategy, to comprehend a business case, and to make a group of deliverables." Finishing the project itself does not essentially mean the project motivate direct benefit to the participants and establishments at completion. Nonetheless, it generally

produces ability that has to be functioned with the aim of creating the tangible profit that gained out of it. It associates the project with company strategy. Similarly, the British Standards Institution (BSI) also defined project as "A distinctive procedure, consisting of a group of coordinated and controlled activities with begin and end dates, undertaken to attain an objective orthodox to specific necessities, including constraints of time, cost and resources" (Ibid).

Furthermore, one among the foremost normally acknowledged definition of a project by Kerzner (2009) is that; a project often believed to be any sequence of actions and responsibilities that have a particular aim accomplished among definite qualifications: distinct starting and end periods, monetary margins, use folks and material means, and fulfilling through a variety of tasks.

Among many definitions by authors, Project Management outlined as "The art and science of coordinative folks, equipment, materials, money, and programs to complete a specific task on time and among approved costs" (Oberlender, 2000, p.8).

Nevertheless, Steyn and Nicholas (2017, p.366) argued that "managing project is managing risk" in this it enhances and is part of alternative project management practices like necessities and work definition, scheduling, budgeting, configuration management, modification management and performance pursuit management. With all of those, executives acknowledge and assess the threats in order that they will proactively scale back them or arrange for the consequences.

The preceding construct of Steyn and Nicholas (2017) complemented by different scholars that "all management of a project is management of risk"; the rationale behind this notion is that risk is inherent in all knowledge areas of managing project and it is the elemental task of managers. Moreover, the entire progress undertakings often shaped as risk management. However, risk management methodology is often a selected set of activities, and it consciously performed to spot and mange risks on the project (Verzuh, 2016, p.139).

According to Project Management Body of Knowledge Guide (PMBOK Guide, 2017, p.10); Project management, is that the application of information, skills, tools, and techniques to project activities to fulfill the project necessities and accomplished through the suitable application and integration of the project management processes well known for the project. (PMBOK Guide) mostly used as an inclusive outline of project management procedures and major sources, and it is the foundation for PMI certification.

It has nine Project Management Knowledge Areas: 1. Project Integration Management, 2. Project Scope Management, 3. Project Time Management, 4. Project Cost Management, 5. Project Quality Management, 6. Project Human Resource Management, 7. Project Communications Management, 8. Project Risk Management, and 9 Project Procurement Management. Hence, risk management is one among the knowledge areas of project management: is the focus of the analysis. It includes many sub processes that deals with accomplishing predetermined objectives of the project that has high influence on the outcome of a project.

2.2.2 Overview of Risk Management

Risks, which have not been recognized and accomplished, are certainly unchecked threats to development objectives; consequently, these might lead to substantial cost and time overruns. The failure of a single project might be seriously damaging to the financial status of a company: if the circumstances had been so extreme Chapman (2001). Hence, effectiveness of risk managing and its contribution is influenced by the degree to which the identification process to the overall task management of any particular project. Thus, a logical methodology needs to be engaged to manage threats all the way through the progress of a development.

2.2.2.1. General Types of Risk

In order to classify risk, a project risk needs to be well defined. Risk is associate uncertainty that matters; it will influence project objectives undesirably or satisfyingly. The uncertainty is also a couple of future events that will or might not happen and therefore the unknown magnitude of the impact on project objectives if it will happen. Thus, "risk" characterized by its probability of a happening and its unsure impact on project objectives (Risk management Task Group, 2012, p.4).

In a similar manner, Cooper, et al. (2005), defines risk as follows;

> *Risk is exposure to the consequences of uncertainty. In a project context, it is the chance of something happening that will have an impact upon objectives. It includes the possibility of loss or gain, or variation from a desired or planned outcome, as a consequence of the uncertainty associated with a particular course of action. Risk thus has two elements: the likelihood or probability of something happening, and the consequences and impacts if it does (Cooper et al. 2005, p. 3).*

Also, Chapman and Ward (2003, p.6) cited the definition of Risk from PMI as an uncertain event or circumstance that, if it occurs, has a constructive or destructive effect on a project objective.

They also cited from APM (Association for Project Management) as "an uncertain event or set of circumstances that, should it occur, will have an effect on the achievements of projects objective." Besides, to the diverse meanings of risk, there are several approaches for classifying risk for varied objectives as well. Some of the following listed below.

I) *In view of Cooper et al. (2005, p.3) risk is classified as business risks, project risks, operations and processing risks.*

a) Business risks include all those risks that might affect the viability of the enterprise, including market, industry, technology, economic and financial factors, Government and political influences.

b) Project risk includes all those risks that might influence the cost, schedule or quality of the project.

c) Operational and processing risks include all those risks that might influence the design, procurement, construction, commissioning, operations and maintenance activities, including major hazards and catastrophic events.

II*) According to Jayasudha & Vidivelli (2016, pp.6944-6945) risks are either acceptable or unacceptable.*

a) An acceptable risk is one that negatively affects a task on the non-critical path.

b) An unacceptable risk is one that negatively affects the critical path.

III*) Risks are either short or long term.*

a) A short-term risk has an immediate impact, such as changing the requirements for a deliverable.

b) A long-term risk has an impact sometime in the distant future, such as releasing a product without adequate testing.

IV*) Finally, risks are either internal or external.*

a) An internal risk is peculiar to a project, such as the inability to get the parts of a product to work (labor, materials, sub-contractor, design (consultant) contractual, construction, financial, management, and environmental, etc.).

b) An external risk originates from outside the scope of the project, such as economic, physical, political, and technological change, etc.

2.2.2.2. Project Risk Management

Managing risk is a central component of proper management, and vital to attaining appropriate business and project results and the effective procurement of goods and services Cooper et al. (2005, p.2). Risk management is the method of classifying, evaluating, ranking diverse categories of risks, planning risk alleviation, employing alleviation strategy, and monitoring the risks. It is a stage towards achieving of thinking analytically about the probable risks, complications, or

calamities earlier they occur and planning the method that will evade the risk, or decrease the influence, or deal with the effect (Rumane, 2018).

In their research Smith, Merna, & Jobling (2006, p.2) revealed that risk management as "one of the most creative tasks of project management" and consist of four steps; that is, to recognize the risk sources, to measure their effects (risk assessment and analysis), to expand managing responses to risk, and finally to provide for residual risk in the project estimates. "The language of project risk management explains this phenomenon: Known unknowns represent identified potential problems and unknown unknowns are the problems that arrive unexpectedly" (Verzuh, 2016, p.138).

Project management body of knowledge defined project risk management as:

> *Project Risk Management includes the processes of conducting risk management planning, identification, analysis, response planning, response implementation, and monitoring risk on a project. The objectives of project risk management are to increase the probability and/or impact of positive risks and to decrease the probability and/or impact of negative risks, in order to optimize the chances of project success (PMBOK Guide 2017, p.395).*

From the above definition, project risk management targets to risks that have the probability to cause the project to move away from the strategy and be unsuccessful to attain the definite project goals. As a result, the efficiency of Project Risk Management directly related to project achievement.

Therefore, to achieve the objective of a project starting from initiation, during the course of implementing a sequence of tasks and closure of the project Zavadskas, Turskis & Tamošaitiene (2010) described that; risk management plays vital part through classifying, assessing, producing responses plans continually taking into consideration of anticipated results. According to Cooper et al. (2005) risk, management facilitates better business and project results. It ensures by allowing understanding, awareness and assurance for creating improved judgment. Thus, it results in better confidence and a decrease in overall risk response.

Furthermore, risk management in a project according to Jayasudha & Vidivelli (2016) incorporates; categorizing impacting aspects that might possibly undesirably influence a project's budget, timetable or standard starting position; measuring the related likely influence of the recognized risk; and carrying out processes to handle and alleviate the possible effect. Hence,

knowledge and understanding of risk management are significant to help recognize and accomplish inherent risks effectively and systematically to realize the project objective of time, cost, and quality.

Therefore, Risk Management in the constructing project management context is a comprehensive and systematic way of recognizing, examining and reacting to risks to attain project purposes (Banaitiene & Banaitis, 2012, p.443).

Thus, with the knowledge of risk management, one can perform to increase the likelihood and influence of chances on the project (constructive happenings): although reducing the likelihood and influence to cause damage to the project (destructive happenings): and this is the central reason for accomplishing risk management. Moreover, risk management delivers a framework that prevents from happing unexpected events and validates careful risk minimizing and alleviation procedures (Cooper et al. 2005).

2.2.3. Project Risk Management Process

Risk management process intended to decrease or remove the risk of some categories of activities taking place or having an influence on the project (Rumane, 2018). Risk management procedures of construction project describe the work of all project life cycle. Project management body of knowledge described risk management processes, "plan risk management, perform qualitative risk analysis, perform quantitative risk analysis, plan risk responses, implement risk responses, and monitor risks" (PMBOK Guide 2017, p.395).

In view of Risk Management Task Group (2012), all methods to project risk management attempt to exhaust the possibilities of effectiveness and efficiency. Risk management has three essential parts: recognizing, examination, and action, even if the particulars of risk processes might vary contingent on the project. The Task Group further explained that risk need first recognized, defined, implied, and evaluated, earlier it could appropriately have controlled. Similarly, a thorough project risk management attempts contain these procedures: Risk Management Planning, Risk Identification, Qualitative Risk Analysis, Quantitative Risk Analysis, Risk Response, and Risk Monitoring as shown on Figure 2.1 below.

Risk management process emphases on the requirements and the main concern of the customer and comprises approaches, systems and instruments particularly established for this goal. A risk

chief or expert who is in charge for forming a system for digging out data from project main staffs by means of risk identification and assessment (Smith et al. 2006) frequently leads the procedure. The process is repetitive with rounds in return to preceding phases that acquires confirmation and project group control. One of the very significant aspects in the risk management procedure is the assembly of crucial staffs with single aim only: to talk over, evaluate, and if possible, measure the risks that might influence the project's goals.

According to Cooper et al. (2005) risk, management method encompasses the organized use of management policies, processes, and procedures: to the responsibilities of making the circumstance, recognizing, and examining, measuring, handling, observing, and interconnecting risk and applies across all phases of the project.

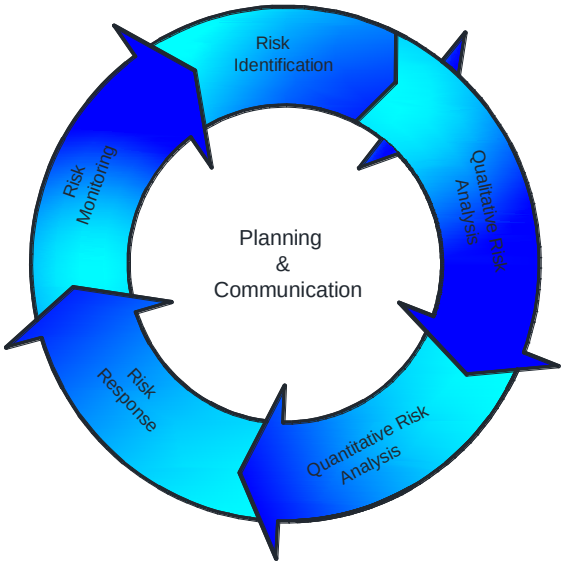


Figure 2.1: Project Risk Management Process
Source: Group R. M. (2012) *Project Risk Management Handbook: Scalable Approach*

However, with explicit reference in building construction sector; in sight of Wang, Dulaimi, & Aguria (2004) risk management may be a structured observes that contains of three central phases: a) recognizing risk; b) risk examination and assessment; and c) risk response. The risk management method instigates with the first identification of the many and prospective risks related with the building project. It is of in depth significance because the progression of risk investigation and response management might solely accomplish on recognized prospective risks.

2.2.3.1. Plan Risk Management

Kerzner (2009) describes risk management as the procedure of evolving and recording a prearranged, complete, and collaborative plan. It approaches for recognizing and examining risks, evolving risk, counteraction strategies, monitoring and controlling how risks have transformed. Moreover, PMBOK Guide (2017, p.401) defined plan risk management as the process of describing how to conduct risk managing activities for a development. The key benefit of this process is that it ensures that the degree, type, and visibility of risk management are proportionate to both threats and the importance of the project to the organization and other stakeholders. This activity done on one time or at predetermined instances in the project.

2.2.3.2. Risk Identification

Building construction project progression, from conception, viability investigation and principal design to finishing points of a project consume an extended period and includes various stages. It requires several individuals with diverse expertise and many interests, an appropriate material procurement scheme and the usage of equipment and machineries. All of these multifaceted circumstances need managed with proper harmonization to deliver a series of events without difficulties. It is essential to identify and distinguish risks that might come in to insight throughout this course (Santoso, Ogunlana, & Minato, 2003).

Efforts, in several researches have been made to manage the identification of risk areas and categorization in diverse clusters because of the magnitude of influence, root cause, etc. on the course of building construction projects. Banaitiene & Banaitis (2012) considered that risk identification is the principal and possibly the ultimate significant phase in the risk management process, as it tries to recognize the origin and kinds of risks. It comprises the recognition of prospective risk characteristic situations in building project and the interpretation of risk responsibilities. Risk identification builds the foundation for the subsequent phases: analysis and control of risk management.

Risk classification in the literature for effective constructing project management; have been proposed in several methods. Szymanski (2017, pp.176-177) classified risks in to five major categories in a building project: “Preliminary design, tender, detailed design, construction works, and financing the investment.” Moreover, the major categories of risk further classified in to associated sub-risks.

In their study, risks classified in to twelve major groups as suggested by Jayasudha & Vidivelli (2016): delivery/operation risk, technology risk, financial risk, procurement-contractual risk, political risk, environmental risk, social risk, economic risk, reserve risk, credit risk, engineering risk, material risks, weather risks, insurance risks, and people risks.

In addition, Santoso et al. (2003) classified risks in to nine groups: physical risk, personal risk, technical risk, safety-accident risk, construction and design cause risk, political and regulation risk, financial risk, contractual risk, environmental regulations cause risk. Each personal risk and technical risk divided into six sub-groups; i.e.; technical and labor, sub-contractor, staff/foreman, engineer, consultant, client; and material, equipment, technique, construction process, construction site, and ground condition respectively. The outcomes indicated very evidently that the managerial and design factor is the main and most important problem in high-rise construction projects both in terms of rate of incidence and magnitude of risk influence.

On the other hand, Zavadsks et al. (2010, pp.34-35) recommended three ways of categorizing the project risk: external, project, and internal risks. External risks are those risks that are outside the control of the project management group such as political, economic, social, weather risks. Project risks are time risk, cost risk, work quality, constructing risk, and technological risk. Internal risks can be categorized based on the participants who might be the source of risk events such as participants, consultant, contractor, etc. these are resource risk, project member risk, construction site risk, documentation and information risks. All the above-mentioned main categories sub-divided into associated sub-groups.

Furthermore, building project risk factors were classified in to 5 major classes as per Wiguna & Scott (2005, p.229). These are outside the project and site situation risks, financial and economic risks, written agreement and technical risks, and decision-making risks. Besides, every main class sub-divided into four sub-groups. Consequently, the topmost five decisive risk aspects influencing project schedule in hierarchy of significance were thus: high inflation/increased price, design change by owner, defective design, weather, and delayed payments on a contract.

After an intensive study of various scholars' insight, Chileshe (2012, pp.310-313) planned a mix of 10 risk causes: financial risks, resource risks, technical risks, economic risks, environmental risks, operational risks, Government and political risks, relationship risks, security and legal risk. The result of the analysis displayed that there was full agreement between the three samples

(clients, contractors and consultants) regarding the hierarchy of the financial risk issue of taking longer time for payment comparative to the amount of risk effect (Ibid, pp.323-324).

In view of their analysis Jarkas & Haupt (2015, pp.173, 187) conjointly bestowed the following four main classifications through recognizing the many construction risk problems that ought to be assigned as client-related factors; consultant-related factors; contractor-related factors; and exogenous-related factors.

As a result, from their study, they found out the noticeable construction risk factors, in a downward order. Slow decision-making process by client; delay in payment process by client; regular alteration instructions by owner; inaccuracies and oversights in project illustrations; absence or scarcity in listed resources; contractor's monetary problems; clearness of illustrations and technical descriptions; scarcity in technical workforce and skilled labor; late delivery of materials; and delay in consultant's response to requests for information (RFI) (Ibid).

From on top of analysis findings, it can be said that, risks connected with construction projects may be classified in many ways in which looking on the character of the project, the participants concerned, and also the circumstances within which the project operates. The premise for choosing an approach in distinguishing risk factors ought to facilitate the target of the study.

Risks in this study, therefore, classified with the actual focus of Szymanski's approach and tailored with the intention of reviewing risks from the perception of constructing projects. The data; screened out and customized to develop the applicable risk factors that usually found in building construction projects. These are vital to building contractors and design consultants in Addis Ababa. Overall, for the aim of investigation, there are 50 risk factors classified in to five categories: preliminary & detailed design, tender, construction works, financial & economic, and political and legal as indicated in Table 2.1: below.

Table 2.1: Identified Risk Factors and their Category in building Construction Projects

No	Category of Risk Factor Groups	Identified Risk Factors
1	Preliminary & Detailed design	• Poorly recognized preferences of the clients • Underestimating the costs of the project • Improper design team selection • Overestimating the costs of the project • Improper technology selection • Delays in material and shop drawing approval • Inadequate & ambiguous specification • Design change by clients

No	Category of Risk Factor Groups	Identified Risk Factors
		• Producing defective design • Unforeseen site ground condition
2	Tender	• Poorly recognized competition • Awarding design to unqualified design consultant • Risk of corruption • Risk of tender cancellation, • Quoting bad estimation for the project • Using predatory pricing by competitors • Incurring excessive or too low costs
3	Construction works	• Lack of competent & qualified professionals • Employees' absence at work place • Poor employees' work performance • High employee turnover • Poor resource management • Poor construction materials quality • Insufficient control of work • Extending scope of work • Poor organization of work • Poor communication & coordination among staff • Inappropriate change order by client • Lack of client's managerial capability • Defective construction work • Low labor and equipment productivity • Inadequate program • Lack of skilled/unskilled labor • Accidents and injuries on project sites • Burglary on site • Unrealistic construction schedule • High project complexity
4	Financial& Economic	• Economic instability • High inflation rate • High interest rate • Improper cost plan • Recession in the industry • Delayed payment by clients • Poor cost control • Financial failure of contractor • Delays in approval of payment certificate by the consultant
5	Political and legal	• Political instability • Weak law compliance & enforcement • Changes in legislative regulations contrarily • Difficulty in obtaining permits and ordinances • Delays in solving contractual issues

Source: Szymanski P. (2017), Risk Management in Construction Projects: *International Workshop on flexibility in sustainable construction (ORSDCE)*, (pp. 174-182). Poznan-Puszczykowo Poland.

2.2.3.3. Risk Assessment

A broad list of risks generated by risk identification that might influence the project and it is essential to isolate the significant issues from less significant ones. This procedure is termed as risk assessment (Cooper et al. 2006). Similarly, Banaitiene & Banaitis (2012) that commonly have two wide classes, that is, qualitative and quantitative analysis which are notable in literature on risk assessment support this notion.

Similarly, Wang et al. (2004) describes that risk assessment is a procedure in-between risk identification and risk response and controlling. It takes part improbability in a quantitative and qualitative way to assess the likely effect of risk. The assessment would usually focus on risks with high likelihoods, high economic effect or unions thereof which produce a considerable economic effect. Szymanski (2017) concludes that, it might explicitly mention that both qualitative and quantitative analyses rotate about the estimation of risk and its implications. Nevertheless, qualitative analysis frameworks the pillar for a process, and quantitative analysis displays concrete advantage of these examines - statistics, numeric data that are the foundation for additional investigation.

i) Qualitative Analysis

According to PMBOK Guide (2017, p.419) Qualitative Risk Analysis is the process of ranking individual project risks for further investigation or action by evaluating their likelihood of occurrence and effect as well as other characteristics. The main advantage of this process is that it concentrates actions on great-importance risks. As done to risk identification, the process of qualitative analysis accomplished during the course of the project. It evaluates the significance of identified individual project risks using their likelihood of happening, the parallel effect on project purposes if the risks happen, and additional aspects.

Subsequently it centers its observation of risk on the project group and other participants. This kind of assessment is subjective. Therefore, in this process, effective assessment needs categorical identification and management of the risk approaches of main participants. It detects a risk holder for each risk who will own accountability for developing a proper risk response and confirming that it fulfilled.

Taking into consideration Banaitiene & Banaitis (2012) qualitative risk analysis evaluates the effect and probability of the identified risks and advances ranked lists of the risks for additional

examination or immediate response actions. A number of principles applied in deciding whether the level of risk is high or low, such as the likelihood of an unwanted event, the level of importance, and the successive effect if it does happen.

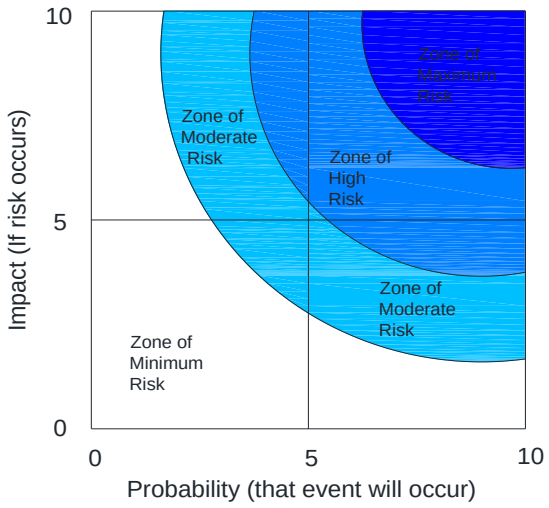


Figure 2.2: Graphical Representation of Risk Rating
Source: Jayasudha and Vidivelli (2016), Analysis of Major Risks in Construction Projects: *Journal of Engineering and Applied Sciences, 11*.

Similarly, Jayasudha & Vidivelli's (2016) in their perception of risk subdivided it into two main concepts: (a) the likelihood, which is the probability of an event and (b) the impact, which is the consequence of loss due to that event on other activities if the undesirable thing occurs. Mathematically described as follows:

$R=P\times I$

Where (R) is the degree of risk, within [0, 10], (P) is the probability of an event, within [0, 10], (I) is the consequence of loss due to that event per event, which is defined as being within [0, 10], (the greater the number, the more serious the impact is). Risk impact can be communicated as qualitative rating such as minimum, moderate, high, and maximum based up on a manager's/expert's judgment about the impact. Risk evaluations, can be made by plotting graph between probability and impact as indicated on Figure: 2. For the purpose of guiding response strategies and priority actions, the matrices are categorized in to four zones: Zone of minimum risk, Zone of moderate risk, Zone of high risk, and Zone of maximum risk.

i) Quantitative Analysis

Quantitative risk analysis is defined by PMBOK Guide (2017, p. 428) as the procedure of statistically examining the collective effect of known separate project risks and other causes of improbability on whole project purposes. The crucial advantage of this method is that it measures whole project risk coverage; also deliver further quantifiable risk data to help risk response design.

In consideration of Kerzner (2009), that includes developing an accurate model structure and incorporating accurate probability information, are the two keys for producing accurate quantitative risk investigation results. In project risk, management there is frequently unsatisfactory consideration given to each of these items, and the result can be incorrect outcomes. The model arrangement would be cautiously formulated and confirmed earlier to the first result is used for management objectives.

On the other hand, quantitative risk analysis is a method of statistically assessing the likelihood that a project will encounter its budget and schedule purposes. Quantitative analysis founded on a concurrent assessment of the effect of all known and computed risks (Risk management Task Group, 2012).

2.2.3.4. Risk Response Strategies

Once the risks of the project have been recognized and examined, appropriate risk response strategy adopted in order to take the necessary steps to minimize the negative effects of risk on project objectives. The nature and potential consequences of the risk will be bases for the mitigation measures to be established. The central goal is to avoid as much as possible the likely effect and to raise the degree of control of risk. The more effective the measure is on one risk, depends on the more control of one mitigation measure (Wang et al. 2004).

Additionally, Banaitiene & Banaitis (2012) suggested that there are four alternative approaches: risk avoidance, risk transfer, risk mitigation, and risk acceptance, for treating risks in a constructing project. The appropriate managing of risks need that it should be recognized and assigned in a distinct way. If agreed bodies understand their risk responsibilities, risk event conditions, and risk treatment abilities, can be real. After recognizing all risks that take place or may take place in the project, actions need to start to suggest explicit responses for each of the identified risk.

These actions can be dual. Firstly, they might target to finish removal of negative impacts on the project or emphasis on decreasing the negative effect. These responses grouped into four key parts: acceptance of risk, transfer of risk, reduction/mitigation, and avoiding risk. Nevertheless, the Risk Management Group (2012) discusses by dividing the risk response strategies in to two main categories, i.e. responses for treats (avoid, transfer, and mitigate) and responses for opportunities (exploit, share, and enhance); and acceptance being common for both categories.

Acceptance of risk: Nicolas and Steyn (2017) described that risk are an escapable, but only the prominent substantial ones that need consideration. If a risk and its effect are important, techniques needs establishment to remove or decrease the risk to a tolerable degree. What is taken in to account "acceptable" is to be determined by on the risk "tolerance" of project participants.

Retaining of the risk implies understanding the risk, its result, likelihood, and accommodating by choosing to do nothing about it. If the risk happens, the project group will respond. This is a usual plan when the results or likelihood that a risk will happen is negligible. Providing the results are more inexpensive than the cure, this strategy makes sense (Verzuh, 2009).

Moreover, Carstens, Richardson, & Smith (2013) also described that accepting a risk carried out when a project group recognizes a risk that might happen and chooses not to decrease the probability of the risk takes placing or the effect it would have if it does takes place.

Transfer of risk/Sharing: isrelate with the relocation of risk to another body indicating the capacity to resolve risk. One form of relocation is a direct relocation of losses results to another body. The main method of such an action is insurance, which permits lawful relocation of happening results. An example of risk relocation is to contract an 'uncertain task' to the service provider or transportation facilities to the freight firm Szymanski (2017). An approach to relocate the risk is to relocate the support scheme to a different group or another site such as another organization. The accountability of the support scheme exists in another institute, thus relocating the risk to a different group.

Partaking risks also is a form of relocation where a third group could be participated. To transfer the risks to another project is another form of sharing risks (Carstens et al. 2013). Being used a third party is the similarity between transferring threats and sharing opportunities. Those to whom opportunities allocated allowed sharing in the potential benefits and those to whom threats transferred take on the liability (Risk Management Group, 2012).

Reduction/Risk mitigation/: Mitigating a risk happens when a project group is responsive to risks and prepares a strategy of achievement to decrease the effect a risk will have on the project should the risk happen in the course of the project. Effecting primary deeds to decrease the possibility and/or effect of a risk, needs frequent operation than trying to restore the loss later the risk has happened.

Risk mitigation might need means or period and accordingly presents a balance between doing nothing against the cost of mitigating the risk (ibid). Activities that decrease the likelihood of takes placing and mitigate the effects of risk, for example, by the creation of properties accounts or matching one risk by another and hence decreasing the total risk. The value of risk reduction might need explanation at each phase of the project, from the preparation time and managerial actions (Szymanski, 2017).

Avoiding risk:

> *Where the level of overall project risk is significantly negative and outside the agreed-upon risk thresholds for the project, an avoid strategy may be adopted. This involves taking focused action to reduce the negative effect of uncertainty on the project as a whole and bring the project back within the thresholds. An example of avoidance at the overall project level would include removal of high-risk elements of scope from the project. Where it is not possible to bring the project, back within the thresholds, the project may be canceled. This represents the most extreme degree of risk avoidance, and it should be used only if the overall level of threat is, and will remain, unacceptable (PMBOK Guide, 2017, p. 445).*

2.2.3.5. Risk Monitoring and Control

As the project is maintaining regular control for development, already identified risks, observed attentively and fresh risks are recognized. Risks that do not happen removed from the risk plan; freshly introduced risks supplemented; and the procedure of risk forecasting is continual. Altogether these actions consequences, that informs to the description of work, financial preserve, development statement, work breakdown structure, and the several other project management outputs (Verzuh, 2005).

Kerzner (2009) also stated risk monitoring and control as the procedure that methodically trails and assesses the accomplishment of risk reaction activities compared to recognized metrics during the course of attainment procedure and delivers contributions to informing risk response strategies, as suitable.

Monitoring outcomes may also deliver a foundation for evolving extra risk response plans, or informing prevailing risk response plans, and reexamining recognized threats. In specific situations, monitoring outcomes might also use to classify fresh risks and review specific features of risk forecasting. The basics to the risk monitoring and control procedure are to create a budget, methodological performance, and schedule management indicator system over the program that the program manager and other important staffs use to assess the position of the program. The indicator structure would be planned to deliver timely cautionary of likely difficulties to let management measures (Ibid).

The Risk Management Group (2012) also stated that constant monitoring by the project risk manager and the project crew confirms that fresh and varying risks noticed and accomplished and that risk encounter activities are applied and operative. Therefore, risk monitoring lasts throughout the project lifecycle. Risk monitoring and control maintains a pathway of the known risks, remaining risks, and fresh risks. It also monitors the performance of prearranged plans for the known risks and assesses their efficiency.

Checking and regulating treats traces recognized risks, checking residual risks, and identifying fresh treats, accomplishing risk response plans, and evaluating their efficiency during the course of the project phase. The key results of this procedure suggested remedial and protective activities, demanded variations, bring up-to-date to the risk record, and reviewed project-managing strategy (Carstens, Richardson, & Smith, 2013, p.388).

Finally, Communication and discussion with project participants and supporters are critical aspects in commissioning proper risk management and in attaining project results that are generally recognized. These benefit everybody to comprehend the risks and balance that made in a project and helps the project manager's determinations. Consistent written assessment is a significant element of communication. Information on the recent position of risks and risk management confirm that entire participants are totally informed and comprehend the risks, consequently removing undesirable surprises (Ibid).

2.2.4. Risk Management Tools and Techniques

A risk management development acknowledges tools and techniques to help in reducing risk by recognizing, evaluating, and handling the risk intrinsic in projects. It presently accepted that recognized procedures associated to the current of the project would have an operative effect on

successive project actions. Consequently, a proof of those activities proves to be a part of the activities for the risk management subdivision within the project strategy and therefore the foundation to demonstrate how risk in a project setting is handled (Carstens et al. 2013).

i) Tools and Techniques for Plan Risk Management

The Project Management Body of Knowledge (PMBOK Guide, 2017) describes the tools and techniques for plan risk management as expert judgment; data analysis; Stakeholder analysis; meetings.

ii) Tools and Techniques for Risk Identification

For classifying risk related to projects, there are many tools and techniques according to Cooper et al. (2012, p. 38). It comprises, Brainstorming; Checklists; Interviews and Focus Group Discussions; Scenario analysis; Surveys and Questionnaires; Work Breakdown Structure Analysis; and, Examination of indigenous or overseas experience with similar activities and projects, together with analysis of Post-Project Completion Reports and Audits. Furthermore (N.N. Hlaing D. Singh R.L.K. Tiong M. Ehrlich, 2008) cited Chapman (1998) the strategies to spot potential risks, which gathered into three separate classifications utilized by construction experts:

1) Identification conducted exclusively by the risk analyst;
2) Identification by the expert, questioning a contributor of project group;
3) Identification by the analyst, leading a working team;

iii) Tools and Techniques for Qualitative Analysis

Qualitative investigation, in keeping with Szymanski (2017) practices various tools in valuation and categorization of risk. The foremost important of those contain indicative assessment of probability of risk issue prevalence and its impact; risk index assessment matrix; estimated assessment of risk significance to the project; study of project assumptions stability and project sensitivity to any changes of those assumptions; information ranking techniques in terms of usability for risk analysis.

iv) Tools and techniques for Quantitative Analysis

A number of approaches normally used in quantifiable risk analyses. The methods and procedures for computable investigation in keeping with the PMBOK Guide (2017, pp. 431-433) are expert judgment; data gathering; interpersonal and team skills; representations of uncertainty; and, data

analysis. According to Kerzner (2009, p.771) quantitative risk analysis tools and techniques comprised, but are not restricted to Payoff matrices; decision analysis (typically decision trees); expected value; and A Monte Carlo process.

v) Tools and techniques for Risk Response

According to project management body of Knowledge Guide (2017, p.437); tools and techniques for risk response are the following: Professional judgment; data gathering; interviews; interpersonal and the team skills; facilitation; strategies for threats; strategies for opportunities; contingent response strategies; strategies for overall project risk; data analysis; alternatives analysis; cost-benefit analysis; decision making; and multi-criteria decision analysis.

vi) Tools and techniques for Monitoring and Control

Data exploration, (technical performance investigation and reserve examination), Audits and Assemblies (Ibid).

2.3. Empirical Review of Literature

2.3.1. General Overview of Risk Management in Building Construction Projects

In their examination, "Major Construction Risk Factors Considered by General Contractors in Qatar" Jarkas & Haupt (2015) conducted a structured questionnaire survey of 95 samples out of the total population of 126 participants. The study classifies, discover, rank the relative importance and determine the dominant distribution response tendencies of the most important construction risk causes taken in to account by general-contractors functioning in the State of Qatar.

They further explained how critically significant that conducting a study to analytically identify, categorize and assess the possible risk elements which can undesirably influence the performance of projects although the sensibility to assess the possible positive risk factors to improve the effectiveness limits of construction deals.

The results obtained from the study pointed out that risks related to the "client" group are perceived as most critical, followed by the "consultant", "contractor" and "exogenous" group-related factors, respectively. The results additionally indicated that the "transfer" option was the contractors' predominant response to "client" and "consultant"-related risks, while the "retention" decision is the principal pattern linked to "a contractor" and "exogenous" group-related risk factors.

In addition, a research "Assessment of Risks in High Rise Building Construction in Jakarta" conducted to identify, classify, and rank high probable risks in high-rise building projects in Jakarta (Santoso et al. 2003). Questionnaire survey and interview employed in the study to engineers from contracting companies in the city.

The research outcomes displayed that risks associated to managerial and design factor are the most important in high-rise construction projects in terms of both occurrence and degree of impact. The study recommended project leaders shall give due attention for the known risk factors which enables them to coordinate all components of a project, minimized interference from client's side, and building the capacity of consultants are the very significant ones for the project to be successful.

Moreover, Wiguna & Scot (2005) in their research "Nature of The Critical Risk Factors Affecting Project Performance in Indonesian Building Contracts", studied to conclude the risk issues initiating schedule and cost overruns in Indonesian building projects. To assess risk levels in terms of time and cost the study mainly founded on interviews with project managers by means of a structured questionnaire. Twenty-two building projects surveyed.

The result found out the subsequent as most critical: high inflation of prices; defective design; design change by owner; delayed payments on a contract; inclement weather; unforeseen site ground condition; poor financial regulation; substandard building work; late delivery of workshop illustrations; and difficulties with accessibility of skilled and un skilled workers, material and tools. It also revealed the critical risks influencing both project schedule and budget apparent by the building contractors are related.

In order to manage various risks and effectively identify the vital ones, for overseas constructing projects, "Risk Management for overseas constructing projects" were studied (Zhi, 1995). This was a case study conducted in the northern China between a foreign company and a local Government based company agreed up on joint venture development. To identify the potential market and development risk, survey conducted.

The survey enclosed the project members, local Government officials, consulting firms, and the residents originally living at the location. Knowledgeable cluster elite from indigenous professionals and the foreign company assessed risk factors. The results of the study disclosed that high inflation, bureaucracy, low social security at the situation, and corruption, etc. were the

foremost important factors hierarchical from first up to fourth severally that have impact on project success (Ibid).

To rank risks in line with to their importance of effect on clear project purposes in relations to schedule, quality, safety and environmental sustainability and analyzed from twin perception of stakeholders and project life cycle (Zou, Zhang, & Wang, 2007) considered, in their research, "Understanding the key risks in construction projects in China." From the survey and comprehensive literature review deployed to gather information, the form disseminated to samples of 177 practitioners within the Chinese industry.

Their study result shows that owners, designers and Government bodies ought to take responsibility and work along from initiation up to project shut out section to manage their several pertinent risks. These risks compared with the findings of a parallel survey in Australia to establish the generic risks in each country and highlight the distinctive risks connected with Chinese constructing projects (Ibid).

Furthermore, Tadayon, Jaafar & Nasri (2012) in their analysis "An Assessment of Risk Identification in Large Construction Projects" investigated explicitly risk identification in the Asian nation. Questionnaire surveys conducted from participants in large construction projects. Within the study, Government, consultants and contractors were participated. The result of the study exposed that the foremost important classes of risk in constructing projects are financial risks, construction risks, demand or product risks, and political risks were hierarchical from one up to fourth hierarchically.

"Significant Risk Factors in Construction Projects" Nur Alkaf Abd Karim, Ismail Abd. Rahman Aftab Hameed Memmon, & Nurhidayah Jamil (2012) surveyed by exploitation structured questionnaires to explore risk components from contractors' perception in Malaysia. The findings of the study show that construction, political and contract provision, design, finance, and environment were the foremost important risk classes in hierarchy that were essential part to attain project objective.

Furthermore, Jayasudha & Vidivelli (2016) "Analysis of Major Risks in Construction Projects" examined the observed Indian construction industry survey of two hundred companies on the awareness of professionals (Project Managers, Engineers, Site Engineer, Architect, Contractors, and Subcontractors). These observed as the major participants in the construction sector, whether

they were using planning tools and techniques as a major tool for effective project implementation or not.

The study discloses that ranking of risk causes technical risk, time risk, constructing risk, design risk, and legal risks are the most significant factors, respectively. There was also low awareness on the application of practice of construction planning tools. It recommends that the use of the construction planning tools and techniques to be applied in all building projects. There should be regular adequate training of professionals on the effectiveness and improvement in Information Technology in the construction sector especially in project planning and execution.

To the implementation of construction, projects in North Aceh, Indonesia, "Identification and Assessment of Risk Factors Affecting Construction Projects" were analyzed Rauzana (2016). The empirical study was amid to identify risk elements that affect the constructing project and decide the most dominant risk factors that effect on performance of the project. Structured questionnaire survey used on forty-seven companies. The outcome of the investigation revealed that material resource management was the most influential risk factor preceding the equipment and financial factors respectively.

In addition, Odeyinka, Oladapo & Akindele (2006) examined "Assessing Risk Impacts on Construction Cost" and checklist of risk factors and questionnaire survey used to carry out investigation to determine their relative importance. Construction practitioners in contracting organizations, consultancy firms and Government organizations were among the participants. The survey result showed that the major risk factors inherent in constructing were financial, political, physical, and construction respectively that have impact on construction cost.

Also in the study "Identification and assessment of risk factors affecting construction projects" to identify and assess risk factors during the constructing phase of construction projects in the Gulf region focusing on two countries of the Gulf region – the State of Kuwait and Kingdom of Bahrain (Altoryman, 2014). In the study, interview and questionnaire survey deployed to contractors, consultants and clients. The study shows that the perception of the risk factors on the categories level, both countries agreed on the finance category as the main factor threatening project completion.

To examine the possibility of prevalence and degree of impact of the risk problems on constructing projects within the Ghanaian constructing sector Chileshe (2012) considered, "An Evaluation of

Risk Factors Impacting Construction Projects in Ghana." Survey of random sampling chosen respondents of thirty-four contractors, forty-six consultants, and twenty-three owners was participated.

Their (experts') study result shows that there is inequality of ranking of the degree of occurrence and impact in the midst of participants. However, the results indicate that there is whole agreement between the three participants concerning the ranking of the financial risk factor of "delay in payment" comparative to the degree of risk impact. The results also reveal that "inflation" and "financial failure" are the second and third most ranked factors having an impact on project objective.

2.3.2. Construction Industry and Risk Management in Ethiopia

Construction industry makes vital contributions to the socio-economic development route of a nation. Based on the Ministry of Urban Development and Construction (MUDC) construction industry policy (first draft) July (2012) the "National Construction Industry Policy" takes into thought of the very fact that the realization of the objectives and goals. The known significance components, like education, health, water, agriculture, manufacturing, tourism, mining, energy, construction, land and good Governance operates on the accessibility of consistent, robust and viable indigenous constructing sector. This, in turn, is proficient in providing services with excellence to its participants.

One of the principal purposes of the constructing sector strategy is to advance the ability and effectiveness of the indigenous constructing firms (contractors, consultants and informal sectors) (Ibid). In step with the report of The Construction Industry in Ethiopia (2018), an outsized range of micro-entrepreneurs characterizes the Ethiopian construction: the large percentage of which operates within the country's informal economy.

Ethiopia's formal construction sector contains endogenous and indigenized corporation, also as various foreign technology and construction firms. Public and personal expenditure on infrastructure and different construction works has served as a catalyst for Ethiopia's fast economic development. The country has systematically invested greater than 30% of GDP into Gross Fixed Capital Formation (GFCF) expenditure since 2010 (Ibid).

Based on the Ministry of Urban Development and Construction (MUDC) construction industry policy (first draft) July (2012) the proportion share of the development sector to GDP at constant value has augmented from 4.5% in 2000/01 to 5.8% by 2009/10. Similarly, the value of the development sector expected at more than US$7bn. According to African Economic Outlook (AEO, 2017) report, construction activities in Ethiopia accounted for 15.9% of GDP at current costs throughout the 2015/16 fiscal year.

Regardless of this economic impact, maturity of risk management practice on projects, of the construction sector apparently seems to be at its very early stage. A small number of studies that conducted displayed that risk management practices in Ethiopian construction projects are, in general, insufficient. For instance, in his study result, with a specific preference of Ethiopian contractors, Yimam (2011) indicated that generally the maturity of the development aspect of construction project management identified at casual development maturity stage.

It described that risk and safety management are the least matured among project management knowledge areas. Essentially, it reflected that these two knowledge areas are completely unfamiliar or experienced rarely in the construction sector. Based on the outcome of an empirical evidence of the study, about 2/3 of the contractors do not have risk management practice. Nearly, 24% of contractors practiced risk management poorly. Out of the 21 contractors in his study, merely two implemented risk management process entirely at a casual or proper stage. None of the respondents identified to implement risk management at a 'managed' stage. Again, simply 38% showed that they 'identified and documented' risks and 33% assumed they implemented some examination to the probability and effect.

Yet again: quantitative risk analysis, which is using rated by experts as a progressive performance, practiced by none of the respondents. Furthermore, the research result revealed 76% of the respondents determined that there is no recognized project risk management performance or principles implemented in their company. He adds the usage of risk management tools and techniques is largely unknown.

Thus, the researcher recommended facilitation of training and mentoring to the contractors and special attention to resource, risk and change management to improve their project management knowledge and practice are among others (Ibid).

From the above findings, it reached to an agreement that risk management seemingly got very low level of attention. This might show the level of attitude, perception, awareness and significance towards risk management by the practitioners in the building construction industry of the country.

The Ministry of Construction registered and issued licenses and certificates of competence to those involved in the country's construction industry. The Ministry classified the contractors in to four categories, namely: General Contractors (GC); Building Contractors (BC); Road Contractors (RC) and Specialized Contractors (SC); based on some requirements such as experience and qualification, fulfill staff requirement, record of past performance and audited statement of accounts, various equipment requirements depending on the categories to which a contractor is registered, and other resources.

Each category, then sub-divided into 10 grades, which categorized accordingly based on the construction cost of the project that the contractor is seeking to undertake. Likewise, the Ministry classified consultancy firms broadly as follows: Consulting Architects and Engineers (CAE); Consulting Architects (CA); Consulting Engineers (CE), Highway and Bridge Consultancy (HBC) and Specialized Consultancy (SC) based on their resources, experience and other standards.

2.4. Summary of Review of Literature

Projects carried out to achieve goals by generating outputs. Constructing a building or facility could be a project among others. All project activities shaped as risk management, but the risk management procedure is a specific set of activities that consciously performed to identify and manage threat on developments.

A comprehensive risk management effort, for projects, comprises these processes: Risk Management Planning, Risk Identification, Qualitative Risk Analysis, Quantitative Risk Analysis, Risk Response, and Risk Monitoring and Control. Therefore, managing risk is a fundamental component of appropriate management, and vital for achieving proper business and project results. In order to manage risk, it needs defined first.

The review of literature revealed varied meanings and wide range of risk types in construction projects for various objectives. Among others, risk is an uncertainty that matters; it can affect project objectives either negatively or positively. Consequently, a risk characterized by its

likelihood of an event and its uncertain effect on development purposes. Hence, risk should first be recognized and analyzed to manage it.

Risk identified in various approaches. Generally, two broad categories, namely, qualitative and quantitative analysis distinguished in literature on risk valuation. Qualitative risk examination valuates the influence and possibility of the identified risks and develops prioritized lists of the risks for further analysis. A qualitative investigation allows identifying the key risk elements through qualitative process such as interviews, brainstorming, and checklists, etc.

Quantitative analysis includes more sophisticated techniques and approaches to examine and analyze construction project risks, such as decision trees analysis, expected value, and a Monte Carlo process, etc. After the risk exhaustively assessed a strategy as to how to respond to the risk allocated. Hence, plan need put in place: to respond to each risk event with the goal being to increase opportunities and decrease threats. Mainly, there are four alternative strategies; Risk Avoidance, Risk Transfer, Risk Mitigation, and Risk Acceptance, for treating risks in a construction projects.

The last step is monitoring and controlling of risks throughout the course of the project. Even though risks known at the beginning of the project, new risks are recognizing throughout the life cycle of the project. Subsequently, it is essential, to continuously evaluate possible treats all the way through the development. In addition, construction projects accomplished through deploying various risk management tools and techniques to respond to the known risk, monitoring, and controlling them. From the empirical evidence, it learned that numerous risk factors that have impact on project objectives identified by various scholars from diverse studies. Accordingly, the researchers based on their findings in order to achieve construction project objectives forwarded several recommendations.

To the contrary, the very limited number of studies conducted locally revealed that risk management practice is at a very early stage. This would have huge impact to the building construction projects in particular and to the construction sector in general in the country.

Therefore, it requires extraordinary attention and effort by the practitioners and contracting companies in order to improve the existing situation of project management practice. It is evident that there is no well-organized and complete construction industry policy: that could facilitate the

improvement and development of the construction sector at a wider range in the country because the existing policy not finalized and it was at a draft level.

2.5. Conceptual Framework of the Study

The conceptual framework of the study begins by identifying risk factors. Then, followed by qualitative assessment and ranking of critical risk factors classified into five major categories. Ten risks were associated to preliminary and detailed design, six to tender, twenty to construction works, nine to financial and economic, and five associated to political and legal aspects. Examination of the possible risks and allocation of their response strategies continued as shown in Figure 2.3 below.

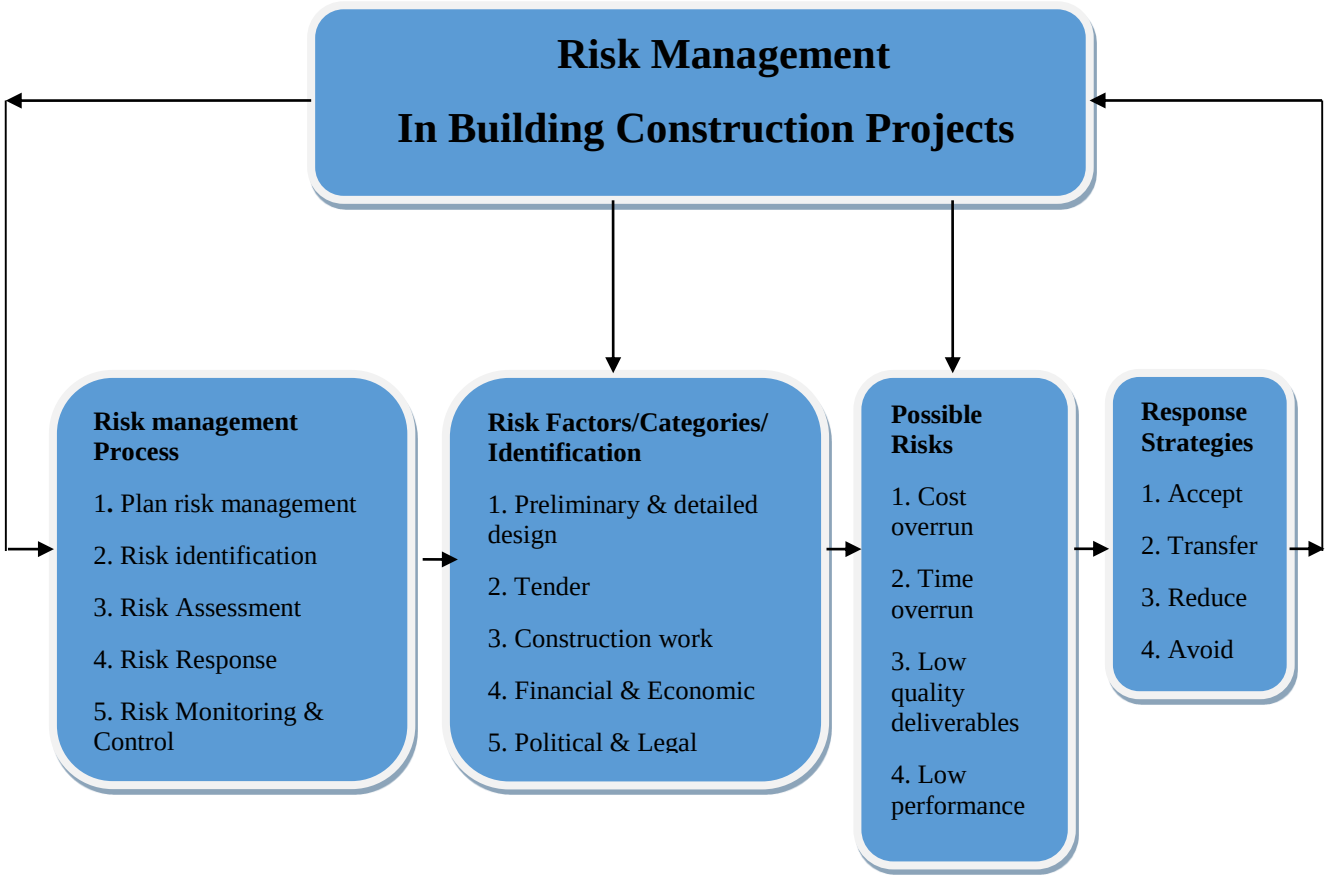


Figure 2.3: Conceptual Framework

CHAPTER THREE

3. RESEARCH DESIGN AND APPROACH

3.1. Introduction

The purpose of this research is to study risk management related with building construction projects in Addis Ababa. To achieve this objective, this chapter presents the approaches, methods, instruments, techniques, and procedures, etc. that used to collect and analyze data. It includes research design, sources of data, population, sample size, and sampling technique, instruments of data collection, procedures of data collection, methods of data analysis, and ethical considerations.

3.2. Research Design

The research design is the over-all blueprint of how the researcher will go about responding the research question (s). It will comprise clear objectives resulting from the research question(s), lay down the bases from which the researcher be going to gather data, plan how to gather and evaluate these, and talk over ethical subjects and the limitations that it will certainly come across (Saunders, et al. 2016). To achieve the objective mixed method research approach used in the study. It helped to capture the best of both quantitative (plays a dominant role) and qualitative (plays a supporting role) approaches which is a concurrent embedded research design that were used within a single phase of data collection and analysis (a single-phase research design).

This study; using mixed method approach, tried generally to identify, study, and explore the major variables (risk factors), and examine which risks possibly occur from the identified critical risk factors. It investigated those variables (factors) with a large sample of individuals and suggested risk response strategies to the identified critical risks towards a wide-ranging of risk management. It also leads to develop better conclusions from this particular study, explain and generalize the findings to a population of contractors and consultants.

The research implemented descriptive research design in order to describe the situations and facts to the research questions of this specific study. It allowed for the collecting of data, review, propose and comprehend it for achieving a precise profile of risk events.

3.3. Sources of Data

According to Zikmund, et al. (2013, p.186) the survey is outlined as a technique of gathering primary information supported to communication with a satisfied sample of individuals.

The study used each primary and secondary source of information. The first sources of information were survey questionnaire. The primary data, collected from samples of contractors and consultants. Moreover, published or unpublished particularly survey based secondary data/that are already been composed and analyzed by different scholars or Government institutions/building construction policies, and reports, etc., were employed in this study. This helped compliment on the first information to answer the study question and attain the study objective.

3.4. Population, Sample Size and Sampling Technique

i) Population

In this study, the population included two groups of participants. These were building contractors and design consultants who are the major operators in the construction industry located in the national capital. It enclosed grade-one contractors (BC-1) and consultants (CAE-1). The explanation why those participants were chosen were in thought of that, they possess better financial position, material, and human resources (professionals/expertise, knowledge, and practice) than others. They typically design and perform massive building construction projects compared to the opposite lower grades of contractors and consultants. This enables, successively to have a major contribution to generalize to the population of the study.

In addition, due to constraints of time and finance, the investigator formed and centered on solely to the on top of mentioned participants for manageable samples size. The particular designation of the participants was Project/Technical/Risk Managers for each consultant and contractors. This can be as a result of risk management method is often directed by Project/Technical/Risk Managers who are in charge for making a basis for disposing of information from project main staffs with a knowledge of risk identification and analysis.

ii) Sample Size

Before any information collected for getting a sample from a given population, a sample design should be determined with a definite plan (Kothari, 2004, p.14). Sample survey of contractors and

consultants employed within the study. This assisted to conclude the parallel value of the population, with less cost and time.

Therefore, the sampling frame of this study involved a list of all grade-one contracting enterprises (69) and consulting firms (59) located in Addis Ababa. These firms are registered by MoWUD (Ministry of Works Urban Development) and by Addis Ababa City Construction Bureau severally that functioned actively in license renewal of the year 2018/2019 (2011 E.C.). From the sampling frame sample magnitude were determined by using Yamane technique as follows.

Yamane $n = N / (1 + Ne2)$

Where,

n= sample size

N= known population size

e= error level (5%)

For contractors, total number= 69…….…. (1)

n Yamane = N / (1 + Ne2)

= 69/ (1+69*0.0025)

= 59

For consultants, total number = 59...……. …..…….. (2)

= 59/ (1+59*0.0025)

= 51

Therefore, from the above result, the sample size for contractors was; 59 and, consultants 51, which constituted to 110 samples.

iii) Sampling Technique

In this study, research questions and objectives required to assess the features of the target population statistically from a sample. Therefore, it necessitated deploying probability sampling. Simple random sampling technique used, since there was an accurate and easily accessible sampling frame that listed the target population of both contractors and consultants.

In addition, due to the homogeneous nature of both building contractors and consulting firm's samples nominated using simple random sampling technique. It deployed by choosing the sample at random from the sampling frame using lottery system. First, each of the participants numbered from the sampling frame with a unique number. Then each sample drawn one by one randomly

without bias and replacement until it reached the actual sample size. The research deployed 95% confidence level that is a 5% error tolerance. These ensured representativeness of the sample to the population as a whole.

3.5. Instruments and Procedures of Data Collection

"The purpose of survey analysis is to deduce from a sample to a population in order that inferences may be created regarding some characteristic, attitude or behavior of the population" (Creswell, 2002). In this study, survey questionnaire used, to gather information from the sample and justify or explain their data, attitudes and behavior on the main risk factors that contribute to the potential incidence of risks.

Survey, allows to the gathering of an outsized quantity of data from the target populations of contractors and consultants, in an exceedingly economical approach. Since probability sampling were deployed in this study, it had been potential to come up with findings that were statistically representative of the whole population at a lower cost and time than gathering the information for the entire population.

Due to the non-availability of organized data associated with the incidence of risk factors and risk management of building projects in Addis Ababa, the questionnaire designed primarily based upon literature. It facilitated to get primary information on the possibility of an event of risk factors better known to professionals among participants in building construction projects. It organized in such the simplest way that some queries within a questionnaire had a qualitative response. That is, it had both opened and closed ended queries to collect the specified information and to attain analysis objectives making certain that the constraints of one type of information balanced by the strengths of another.

Questionnaire survey was most popular; it provided a fast, cheap, efficient, and correct suggest that of assessing data a few population queries (Zikmund, et al. 2013). It is valuable methodology of gathering data. The questionnaire divided into three main parts having a complete of sixty-four questions. Part I solicited general information about respondents. Part II consists of fifty risk factors (attitude and opinion variables). Respondent requested to rate the likelihood of occurrence of these risk factors, possible risks and response strategies as Very Infrequent (VI), Infrequent (I), Neutral (N), Frequent (F), and Very Frequent (VF) respectively. Part III included two open-ended

questions that asked respondents to state their opinion and challenges encountered regarding risk management in brief.

Before distributing the final questionnaire to respondents to collect data, it checked by associates, project managers and the research advisor. Then Pilot survey of (10) conducted for testing to evaluate the validity and probable reliability of the questions. Hence, feedback was included on the questionnaire and survey techniques and improved.

The questionnaire introduced carefully to respondents to ensure a high response rate. It consists of several questions written in a definite order on a form, having a covering letter, and hand over to respondents. Respondents known companies having professionals to understand the questions and wrote down the reply in the space intended for the purpose in the questionnaire itself.

Questionnaires distributed to a 110 randomly chosen firms. This done by pre-contacting the randomly selected respondents through telephone asked their willingness to answer the questions and took their addresses. Then the researcher, after delivery, attentively followed up respondents through frequent direct contacts and reminded them by phone calls for its collection. As a result, 100 responses collected from respondents. Out of which one rejected due to uniformed answers throughout all the questions. This represents 99 responses with a valid response rate of 90%, which raised the sustainability of data for analyzing the study objectives statistically.

Table 3.1: Reliability Statistics of Respondents

Reliability Statistics	
Cronbach's Alpha	Number of Items
.933	58

Source: Own Survey (2019)

For all the valid samples to measure the internal consistency across the raters; reliability analysis, (Cronbach's alpha), was conducted by Statistical Package for the Social Science/IBM SPSS Statistics 24/software. The alpha coefficient ranges in value from zero to one, and used to describe reliability of factors extracted from ordinal rating scale questionnaires Jarkas & Haupt (2015).

Therefore, the internal consistency of50 risk factors, four possible risks, and four response strategies which constitute a total of 58 variables of Likert Scale questions, verified by calculating "Cronbach's alpha" from the valid responses. The produced scale is more consistent with greater alpha coefficient value. A value of 0.700 is an acceptable coefficient (Ibid). The result showed

alpha coefficient value of .933 very close to one that confirmed the questionnaire reliability by all respondents which measures the same construct.

3.6. Methods of Data Analysis

The questionnaire was pre-coded to minimize coding after data collection. However, before analysis, the collected data first coded for missing values, edited and entered. This aided ensuring accuracy, completion and consistency with the intent the question and their specifics in the survey to obtain maximum quality standard information. Descriptive analysis deployed in the study using Statistical Package for Social Science/IBM SPSS Statistics 24/software, which is the most efficient method to analyze data. It allows describing results using descriptive statistics tools; such as frequencies, percentages, mean, and standard deviation, etc. The outcomes displayed by means of tables, graphs, and charts.

In addition, "Relative Importance Index" (RII) method was applied to measure the response related to the rating and importance level of each variable based on the mean scores identified (Szymanski, 2017). This method used to generate scores of the variables to analyze and find the hierarchical risk factors and measures the level of importance of each factors based on a five-point Likert scale Akadiri (2011). The RII value ranges from zero (not inclusive) to one. Low ($0<RII\leq0.2$), medium-low ($0.2<RII\leq0.4$), medium ($0.4<RII\leq0.6$), high medium ($0.6<RII\leq 0.8$), and high level ($0.8< RII<1$). The RII computed by the formula shown in equation (3) below.

$$\mathbf{RII} = \frac{5(n5) +4(n4) +3(n3) +2(n2) +(n1)}{5(n1+n2+n3+n4+n5)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where n1, n2, n3, n4, and n5 are the number of respondents who selected1, for Very Infrequent (VI), 2, for Infrequent (I), 3, for Neutral (N) 4, for Frequent (F), & 5, for Very Frequent (VF) correspondingly.

Furthermore, content analysis implemented and this was the most common method of doing by code of written answers on an open-ended question (Dawson, 2009). First, the written answers thoroughly looked through and grouped into possible categories that have different themes. Then each theme given a code and assigned to each one of the responses. Common themes identified from the number of responses applied. Afterwards their corresponding frequency count and percentage of response were calculated. This presented in charts.

3.7. Ethical Considerations

Research is a collaborative practice between researchers and participants and it conducted with trust and fairness between the parties. Throughout the process of conducting this study, ethical considerations took into account. The researcher firmly followed to the ethical principles so that the work of others never be included as own work and provided appropriate tribute through citation.

Participants asked their voluntariness to answer questions that offered to them prior to data collection. All participants informed who the researcher of the study was, the purpose, objective, and procedure of the research, what the study was all about in general. The reason why participants selected in this study also explained. It was clarified that their response to the offered questions was only for the purpose of academic research and would never be disclosed to anyone at all times so that there was not any harm that might happened to them and to their organization.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

4.1. Introduction

This section presents the research results and discussion of the collected data using survey questionnaire. The critical risk factors, the possible risks and response strategies identified in the survey results. Moreover, based on the qualitative analysis on open-ended questions, the major recommendations for improved risk management and challenges encountered forwarded by participants.

i) Questionnaire

The questionnaire has three major parts. The first part contains the general profile of respondents. The second part presents about the findings of the question towards identifying the critical risk factors that may generate possible risks. It also presents to answer the questions of possible risks that might occur and their allocation of response strategies. The third part discusses about general recommendations of respondents and their challenges encountered in managing risk associated to building construction projects.

Table 4.1: Respondents Response Rate

Sector	Sample Size	No. of Respondents	Percentage (%)
Contractors	59	53	89.83
Consultant	51	46	90.19
Total	110	99	90

Source: Own Survey (2019)

Respondents divided in to two groups, i.e. contractors and consultants. Table 4.1 shows 110 questionnaires distributed to respondents. Out of which, 59 were contractors and 51were consultants. A valid response of 53 and 46 returned respectively and used in the analysis that constituted 99 respondents and this represented a 90% response rate, which considered as a good response. Over 80 per cent of all questions answered other than by a refusal or no answer, it considered as a complete response (Saunders et al. 2016).

4.2. Part I: General Profile of Respondents

This section of the questionnaire considered to obtain the general profile of respondents. It includes respondent's job position, educational status, field of specialization, and years of experience.

i) Respondents Job Position

Table 4.2: Respondents Job Position

	Job position	Frequency	Valid Percent	Cumulative Percent
Valid	General Manager	17	17.2	17.2
	Deputy General Manager	14	14.1	31.3
	Technical Manager	19	19.2	50.5
	Project Manager	26	26.3	76.8
	Other	23	23.2	100.0
	Total	99	100.0	

Source: Own Survey (2019)

Respondents selected from a wide range of professions that include General Manager to Office Engineers. The overall groupings of respondents presented according to their job positions; General Manager 17.2%; Deputy General Manager 14.1%; Technical Manager 19.2%; Project Manager 26.3%; and others 23.2%; such as project coordinators, Contract Engineers, Lead Architects, and Office Engineers, etc. (Table 4.2).

Therefore, from the above Table 4.2; 76.8 % of the background of respondents was from management position and this assists one of the ideas that risk identification can be done by the analyst leading a working group (Hlaing et al. 2008).

ii) Respondents Educational Status

Table 4.3: Respondents Educational Status

	Educational status	Frequency	Valid Percent	Cumulative Percent
Valid	Diploma	3	3.0	3.0
	B.Sc.	60	60.6	63.6
	M.Sc.	36	36.4	100.0
	Total	99	100.0	

Source: Own Survey (2019)

Table 4.3 displays the general groupings of participants according to their educational status. 60.6 % of respondent's educational status first-degree holders and 36.4 % were holding second degree. Both constituted to 97 % and it believed that respondents have knowledge of risk management and support in realizing to achieve objective of the study.

iii) Respondents Field of Specialization

Table 4.4: Respondents Field of Specialization

	Field of Specialization	Frequency	Valid Percent	Cumulative Percent
Valid	Engineering	58	58.6	58.6
	Architecture	13	13.1	71.7
	Project Management	5	5.1	76.8
	Construction Management	19	19.2	96.0
	Other	4	4.0	100.0
	Total	99	100.0	

Source: Own Survey (2019)

Table 4.4displays the total groupings of respondents according to their field of specialization. 58.6 % were from engineering, 9.2% construction management, and 13.1 % from architecture. However, the study revealed that only 5.1 % were from project management.

iv) Respondents Experience in Years

Table 4.5: Respondents Years of Experience

	Years of Experience	Frequency	Valid Percent	Cumulative Percent
Valid	1 up to 5 years	15	15.2	15.2
	6 up to 10 years	20	20.2	35.4
	11 up to 15 years	24	24.2	59.6
	16 up to 20 years	20	20.2	79.8
	more than 20 years	20	20.2	100.0
	Total	99	100.0	

Source: Own Survey (2019)

As indicated in Table 4.5 from all of respondents 24.2 % constituted 11 up to 15 years of experience, where as 20.2 % constituted from 6 up to 10 years, 16 up to 20 years, and more than 20 years of work experience in the industry. Generally, 64.6% of respondent's experience were above 10 years that also supports the idea that they were participated in implementing projects both at operational and design levels.

Consequently, it believed that respondents had some knowledge and understanding of the topic related to risk management in general and awareness of identifying risk factors and allocation of response strategies in building construction projects in particular. This makes them as dependable and credible sources of information, which is vital to realize the research objective.

4.3. Part II: Perception of Risk Factors, Possible Risks, & Response Strategies

4.3.1. Perception of Critical Risk Factors by Respondents

The perception of fifty risk factors considered by consultants and contractors were determined. The Relative Importance Indices (RII) ranks and importance level of the factors surveyed presented and discussed. Table 4.6 illustrates the overall insight of respondents Mean, RII, Rank, Importance Level, and Probability of Occurrences for each risk factor. Moreover, the combined and independent observation by consultants and contractors annexed (Appendix D).

Table 4.6: Evaluated Risk Factors Descriptive Statistics, RII, Rank, and Importance Level & Frequency

Risk ID	Risk Factors	Mean	SD	RII	Rank	Importance Level	Frequency of Occurrences
EF2	High inflation rate	4.25	.747	0.85	1	High	Frequent
EF6	Delayed payment by	4.18	.850	0.836	2	High	Frequent
C5	Poor resource	4.11	.978	0.822	3	High	Frequent
T3	Risk of corruption	4.01	.974	0.802	4	High	Frequent
EF1	Economic instability	4.00	.985	0.801	5	High	Frequent
EF4	Improper cost plan	3.98	.958	0.796	6	High-Medium	Frequent
D8	Design change by clients	3.95	.994	0.79	7	High-Medium	Frequent
EF8	Financial failure of contractor	3.89	1.039	0.778	8	High-Medium	Frequent
C14	Low labor and equipment productivity	3.88	.972	0.776	9	High-Medium	Frequent
C19	Unrealistic constructing schedule	3.87	1.140	0.774	10	High-Medium	Frequent
EF7	Poor cost control	3.85	.962	0.77	11	High-Medium	Frequent
C9	Poor organization of work	3.83	.904	0.766	12	High-Medium	Frequent
C6	Poor construction materials quality	3.78	.985	0.756	13	High-Medium	Frequent
C15	Inadequate program	3.76	.980	0.752	14	High-Medium	Frequent
C1	Lack of competent & qualified professionals	3.75	1.137	0.75	15	High-Medium	Frequent
T6	Using predatory pricing by competitors	3.72	1.134	0.744	16	High-Medium	Frequent
PL5	Delays in solving contractual issues	3.72	.980	0.744	16	High-Medium	Frequent
T5	Poor employees' work performance	3.68	1.008	0.736	17	High-Medium	Frequent
C3	Insufficient control of	3.68	.946	0.736	17	High-Medium	Frequent
C7	Quoting bad estimation for the project	3.68	1.141	0.736	17	High-Medium	Frequent
PL2	Weak law compliance & enforcement	3.67	1.020	0.734	18	High-Medium	Frequent
D6	Delays in material and shop drawing approval	3.66	1.108	0.732	19	High-Medium	Frequent

Risk ID	Risk Factors	Mean	SD	RII	Rank	Importance Level	Frequency of Occurrences
EF3	High interest rate	3.64	.952	0.728	20	High-Medium	Frequent
D2	Underestimating the costs of the project	3.63	1.225	0.726	21	High-Medium	Frequent
D7	Inadequate & ambiguous specification	3.59	1.138	0.718	22	High-Medium	Frequent
C12	Lack of clients managerial capability	3.59	1.125	0.718	22	High-Medium	Frequent
C16	Lack of skilled/unskilled	3.59	1.079	0.718	22	High-Medium	Frequent
C10	Poor communication & coordination among staff	3.57	1.032	0.714	23	High-Medium	Frequent
PL4	Difficulty in obtaining permits and ordinances	3.56	.992	0.712	24	High-Medium	Frequent
EF9	Delays in approval of payment certificate by the consultant	3.55	1.163	0.71	25	High-Medium	Frequent
PL1	Political instability	3.53	1.063	0.706	26	High-Medium	Frequent
C8	Extending scope of work	3.52	.962	0.704	27	High-Medium	Frequent
C4	High employee turnover	3.48	1.034	0.696	28	High-Medium	Neutral
C13	Defective construction work	3.46	1.013	0.692	29	High-Medium	Neutral
C11	Inappropriate change order by clients	3.34	1.179	0.668	30	High-Medium	Neutral
T4	Recession in the industry	3.33	.904	0.666	31	High-Medium	Neutral
EF5	Risk of tender	3.33	.969	0.666	31	High-Medium	Neutral
D10	Unforeseen site ground condition	3.31	1.075	0.662	32	High-Medium	Neutral
T1	Poorly recognized competition	3.29	1.163	0.658	33	High-Medium	Neutral
T2	Awarding design to unqualified design	3.28	1.196	0.656	34	High-Medium	Neutral
D9	Producing defective	3.27	1.185	0.654	35	High-Medium	Neutral
C2	Employees' absence at work place	3.19	1.104	0.638	36	High-Medium	Neutral
D3	Improper technology selection	3.18	1.143	0.636	37	High-Medium	Neutral
D5	Improper design team selection	3.18	1.190	0.636	37	High-Medium	Neutral
D1	Poorly recognized preferences of clients	3.15	1.312	0.63	38	High-Medium	Neutral
C17	Accidents and injuries on project sites	3.13	1.103	0.626	39	High-Medium	Neutral
C18	Burglary on site	3.04	1.045	0.608	40	High-Medium	Neutral
PL3	Changes in legislative regulations contrarily	3.03	.909	0.606	41	High-Medium	Neutral
D4	Overestimating the costs of the project	2.69	1.094	0.538	42	Medium	Neutral

Risk ID	Risk Factors	Mean	SD	RII	Rank	Importance Level	Frequency of Occurrences
C20	High project complexity	2.64	.994	0.528	43	Medium	Neutral

Note: low (0<RII≤0.2), medium-low (0.2<RII≤0.4), medium (0.4<RII ≤0.6), high-medium (0.6 <RII≤ 0.8), & high (0.8< RII<1)
Source: Own Survey (2019)

As indicated in Table 4.6 above, risk factors rated based on the assessment and probability of occurrence from the overall insight of respondents. It displayed that "high inflation rate", "delayed payment by client", "poor resource management", "risk of corruption", "economic instability", "improper cost plan", "design change by the client", "financial failure of contractors", "low labor and equipment productivity" and "unrealistic constructing schedule" were the 10 major risk factors identified according to their hierarchy. Nevertheless, in this study, those critical risk factors with high level of importance and frequent occurrence discussed. These were the first 5-risk factors associated to financial and economic, tender, and construction works categories.

"High inflation rate", with an RII of 0.850, perceived and ranked overall as the first building construction projects critical risk factor measured by both consultants and contractors who were active in Addis Ababa (Table 4.6). However, both rated it as the second critical risk factor independently (Annex D). The outcomes achieved from the study were in alignment with the findings of (Wiguna & Scot, 2005) & (Zhi, 1995) whose research studies have determined this factor among the most critical factors affecting both project time and cost in Indonesian building contracts and Chinese project developments respectively. However, with a little difference, (Chileshe, 2012) & (Banaitiene & Banaitis, 2012) in their study revealed that inflation was the second most ranked risk factor that have influence on constructing project objective in the Ghanaian and Lithuanian construction company respectively.

According to the Central Statistical Agency (CSA, 2019) report, inflation rate for the month of April 2019 was 12.9%. The annual inflation rate in Ethiopia has increased by 18.6% in September 2019, from 17.9% in the prior month. It was the highest inflation rate since September 2012. This showed there was a high inflation-increasing rate to the past few months.

Possible reasons could be high exchange rate, lack of foreign currency, high currency devaluation, increase in the money supply, collective demand rising more rapidly than collective supply, etc. These might lead to high cost of imported building construction materials, and increases local demand. For instance, according to the report of IMF (2018), the National Bank of Ethiopia (NBE)

devaluated the country's currency, the Birr by 15 percent on October 10, 2017; resulting an increase of interest rate from 5 percent to 7 percent as counter measure of inflation.

This action makes a fall in the value of the country's currency and makes imported materials and even local materials more expensive. For instance, though iron bars manufactured locally, due to its low quality, it does not fulfill acceptable international standards, and not preferred by most constructing companies. Hence, most construction companies used imported iron bars for constructing projects that requires foreign currencies. This factor, combined with others, aggravated the price of iron bars.

As a result, projects might take longer time through expecting the falling of constructing material prices. In the meantime, due to work interruptions, the progress of projects momentum becomes slow down and some qualified professionals might leave the site as well in search of active projects. In addition, lower quality of materials used for reducing the cost of projects. All of these might contribute in affecting building construction projects negatively.

Thus, if this factor is unmanaged, there might be a continued escalation in the price of building construction materials. This could have an adverse effect on several building construction projects; subsequently, it might not be possible to achieve project objectives. Hence, projects' high cost overrun, and time overrun might be inevitable.

"Delayed payment by clients" with an RII value of 0.836 observed by participants as the second critical risk, among the factors examined (Table 4.6). This factor, as per the view of contractors and consultants, was also ranked first and sixth respectively (Annex D). The result was also in agreement with the outcome of (Jarkas &Haupt, 2015) who studied on major construction risk factors considered by general-contractors in the State of Qatar. Nevertheless, according to the study of (Iqbal et al., 2015) this risk factor of payment delay to construction projects in Pakistan, was ranked first. Also, in their study, (Wiguna & Scot, 2005) ranked this risk factor as fourth.

The potential cause for the outcome could be exaggerated collateral requirement by banks (financial institutions) to issue guarantees: banks took an unprecedented long period to facilitate due diligence for project financing: and clients might not have secured adequate finance before commencing construction projects; etc. The other probable reason could be preparation of a certificate for payment by consultants might take longer periods than the agreed period. This is due to lack of taking well-organized measurement certificate for executed item of works by both

consultants and contractors coupled with a long process for payment approval, especially for building projects owned by government.

Hence, delayed payment by the client, could have a direct implication of time and would be source of dispute creating financial over burdens particularly to contractors' side generating difficulties to meet their responsibilities. If this risk factor would not have handled in time, the projects might have faced shortage of construction materials, equipment, and other necessary resources, that might lead to low productivity and performance. Therefore, building construction projects would not complete on time and project objective could not achieved as planned resulting to time overrun and cost overrun.

Large proportion of risk factors considered in the survey originated from the category of construction works (20 factors). Nevertheless, out of the five critical risk factors identified, only one factor, i.e. "poor resource management", was associated to construction work categories. It ranked as the third critical risk factor equally both by consultants and contractors; with an overall RII of 0.822 (Table 4.6).

However, the result displayed a difference with Rauzana (2016) who ranked resource management as the most important risk factor that have effect on project objectives. Since various resources (human, material, equipment, financial, etc.) were major components of building constructing projects, without proper management, it would be difficult to realize project objectives. This factor is mainly associated to contractor's capability in managing resources of a project and other stakeholders too.

The possible reason for the outcome of this factor might be lack of knowledge in resource management. These are, poor procurement plan for resources (not preparing a separate resource procurement and delivery schedule), inefficiency of suppliers in providing the service on the agreed period, and escalation of prices of materials are the major ones. Also, unavailability or shortage of construction materials: insufficient and an organized storage of materials on site: and not obtaining and assigning qualified personnel to the required position for appropriate management of resources among others.

Contractor's inefficiency in management of financial resources might be the other potential cause for the outcome of this critical risk factor. Quite frequently, contractors execute different projects at the same time. In the process, they might not have proper financial management plan for

individual projects: they might usually assign one's project finance to other projects. This might result in a cash flow problem and create constraints of the necessary resources on project sites. Hence, this might have a negative consequence on the progress of projects.

In general, if this risk factor is not given due attention by project implementers; it might lead to frequent interrupted supply of resources to projects causing disorder of work force activities and inefficient utilization of resources. These might influence projects to low performance, low quality of work, which might again lead to rework or complete demolition of work resulting high cost and longer time to achieve projects objectives.

The study also ranked "risk of corruption" as the fourth critical risk factor with similar perception of consultants and contractors with overall RII value of 0.802 in building constructing projects (Table 4.6). The result is in agreement with (Zhi, 1995) that studied risk management on overseas constructing projects in China and found out risk of corruption ranked in fourth. As risk of corruption was under the category of tender, problems of corruption might be associated to this category factor.

The potential causes might be being unethical in profession and morality in undertakings like, preparation of incomplete design and inadequate bill of quantity and specifications before contracting or tendering stage could be among others. This might again lead to excess in quantity and price escalation for the new item of works after the project started. As the result, quality of projects compromised. Then projects not completed on time and spent more cost and time than the planned.

The political and economic environment of a country, also, might be another reason for the possible cause of corruption with the purpose of gaining monetary or substantial advantage that is not lawfully correct for itself or for others. This, in turn, increases the cost of projects, compromised on the quality of work, and reduces the effectiveness of projects. Overall, unless all stakeholders give careful attention to this critical risk factor, it affects construction industry operations and hinders economic development of a country at large.

The fifth ranked risk variable in this study, perceived by the respondents, with overall value of 0.801 RII was "economic instability" (Table 4.6). This factor was ranked third by contractors, whereas, consultants contrarily ranked it eleventh (Annex D). The possible reason for the outcome of this factor might be unstable economic policy, unstable political situation, higher rate of

unemployment, Government debt crisis; volatile inflation rate, change in interest rates, global factors like price of oil, etc. could be some of them.

For instance, according to the report of Ministry of Finance and Economic Cooperation (2018), the Government total debt from overseas and indigenous financiers, exceeds $52.3 billion. The report further explained that Government borrowed a lot of money for giant public investment and infrastructure projects, however, failed to attain the anticipated outcome. Hence, the country has been suffering from enormous debt, incapable to reimburse on the given time.

The other potential cause for the economic instability of the country could be unemployment. Unemployment rates at country level and in Addis Ababa were 19.1 and 20.2 percent respectively, according to the survey findings of Central Statistical Agency (CSA, 2018). For the past 20 years, a number of universities in the country were established and thousands of youths graduated. However, quite large numbers are without a job. Youth unemployment rate in urban areas were 25.3 percent (CSA, 2018). This presents an obstacle to economic development of the country. Therefore, this could be a major peril to the operation and implementation of projects having a negative consequence to economic and political stability of the nation.

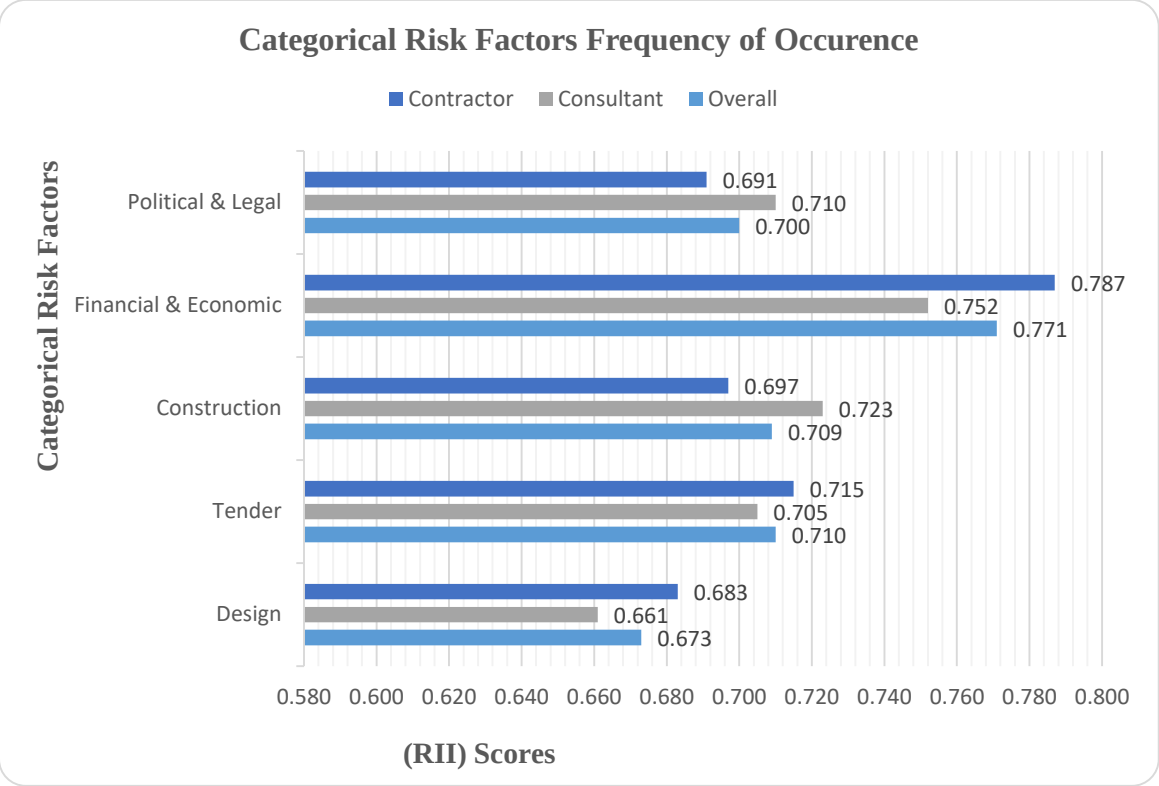
These problems might create difficulty to implement projects on time and budget. This could lead to undesirable project performance and decline the economic growth of the country. Hence, all corresponding stakeholders need to give enormous consideration in order to get out projects from crisis and pay their debts. Government should also promote and expand the construction sector in order to create employment opportunities. Formulation of Policies and programs by Government to regulate inflation rate, interest rate, towards stabilizing the overall economic environment, which facilitates the accomplishment of projects on time and budget is going to be the primary task.

4.3.2. Perception of Categorical Risk Factors by Participants

In order to observe the perception of category risk factors by participants; the RII value also derived on assessment of occurrence and importance level.

The study result indicated in Figure 4.1 below shows that there was a complete agreement up on their perception among the participants to the financial category risk factor. Both consultants and contractors ranked it first, with an overall RII value of 0.771. This factor occurred frequently with high-medium importance level. The outcome was in agreement with the findings of (Iqbal et al.,

2015); (Odeyinka, Oladapo & Akindele, 2006); & (Altoryman, 2014) which revealed that financial issues for projects was the most significant risk factor affecting most of the constructing projects in Pakistan, Nigeria, Kuwait and Bahrain respectively.



Note: low (0<RII≤0.2), medium-low (0.2<RII≤0.4), medium (0.4<RII ≤0.6), high-medium (0.6 <RII≤ 0.8), & high (0.8< RII<1)
Figure 4.1: Perception of Categorical Risk Factors by Participants

Furthermore, this category risk factor is also consistent with the results of (Hlaing, 2016) & (Tadayon, Jaafar & Nasri, 2012) that discovered the financial aspect of the project considered most important by building contractors in Singapore and Iran respectively. Due to the fact that, out of the five critical risk factors identified, i.e., "high inflation rate", "delayed payment by the client" and "economic instability" were under this risk category ranked first, second, and fifth respectively; obviously, that makes it, the most significant risk category in this study.

The potential source for this risk category might be financial instability of clients, insufficient financial sources of clients, poor financial management of contractors, price escalation of constructing materials, unstable economic and political situation are among other things. Furthermore, the potential cause for the outcome could be the accumulation effects of components of this category risk factor.

Therefore, all these factors have huge effect on the financial and economic characteristic of a project. As it is seen from the above-mentioned discussions of scholars, and being evident in this study, financial factors are one of the foremost important factors reflected for the achievement of building construction projects. Hence, all stakeholders need to give peculiar attention for projects to be successful.

The second ranked category risk factor, as indicated above in Figure 4.1 was tender with RII value of 0.710. The study exposed frequent probability of occurrence with high-medium level of importance to this factor. Contrary to perception of the financial and economic risk factor, tender observed differently by consultants and ranked fourth. The possible reason for the result of this risk category might be ethical issues and integrity related to institutions/clients/ in tender preparation, bidders, and other stakeholders participated in the process.

In addition, offering a very low price that might not be appropriate and sufficient to execute projects, just for the sake of securing and owning works only, could be one of the reasons. Likewise, inappropriate bidding criteria that might set by the client or consultant that could favor or accommodate certain groups of bidders only, might be another reason.

Quite frequently, tendering committee, particularly in Government institutions, might not have the knowledge and skill to perform the task and sometimes might not be familiar with the public procurement directives. They might consider it as an extra duty and do not give much attention and time. As a result, they could make mistakes and overlooked the expertise needed because of which the process delayed and controversies could arise that might take longer time to correct, to the extent of canceling the tender. Therefore, the overall effect of tendering process at the end might bring huge implication on project cost and schedule.

The third category risk factor with a slight difference to tender, with an overall RII value of 0.709, was construction works (Figure 4.1). However, consultants ranked it fourth. As perceived by respondents, the study uncovered to this factor, frequent probability of occurrence with high-medium level of importance. The study result was in alignment with (Jayasudha & Vidivelli, 2016) that ranked construction risk as the third most important factor. The result has shown a difference with (Tadayon, Jaafar, & Nasri, 2012) & (Odeyinka, Oladapo, & Akindele, 2006) findings: that construction risk was the second and fourth most critical risk category respectively.

The likely reason for the outcome of this risk category might be incomplete design, ill-defined scope, weak contract agreement, cost escalating unexpectedly, and inefficient project management could be some of the major ideas. Construction projects would involve many participants; clients, consultants, contractors, sub-contractors, Government institutions, and suppliers, etc. Construction projects by their nature would be unique and risks might have risen from a number of sources. If those risks were unmanaged properly throughout the life cycle of the project, it would have an impact on the projects performance, in terms of quality, time and budget.

Though consultants ranked it third, the fourth was political and legal factor with RII value of 0.700, as observed by participants (Figure 4.1). The study exposed neutral probability of occurrence with high-medium level of importance to this variable. This result is consistent with the findings of (Tadayon, Jaafar, & Nasri, 2012): that discovered the political and legal aspect of the project ranked the fourth important factor by participants in Iran. However, the result exposed dissimilarity with that of (Odeyinka, Oladapo & Akindele, 2006) & (Jayasudha & Vidivelli, 2016) that ranked it as the second and fifth most important risk category respectively.

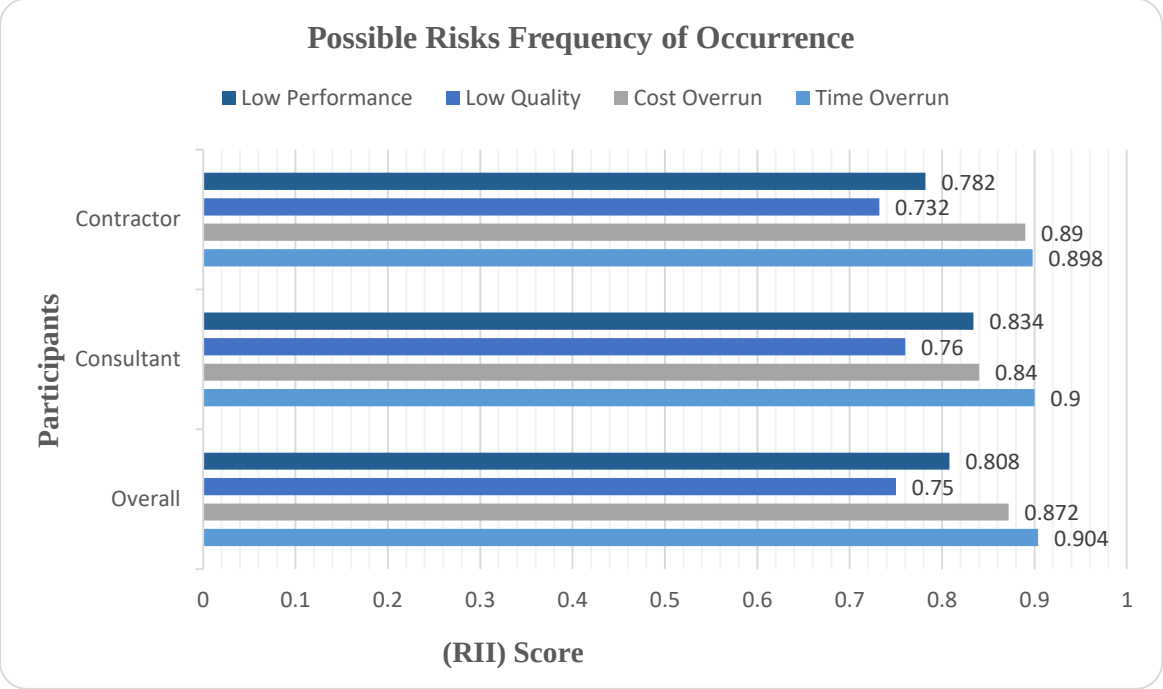
The expected cause for this factor might be political instability, weak law enforcement, conflict and violence, contract risk, dispute risk, and regulatory risks could be some of the components. In these situations, it might not be possible to get the necessary resources in order to implement projects. The inclusive effects of these possible causes of risk factors could create civil unrest and instability among the society. Business relationships and reputations might damage, and it could cost the constructing industry participants much time and valuable resources.

The fifth was preliminary & detail design, equally ranked by both consultants and contractors, with a 0.673 RII value (Figure 4.1). The study exposed neutral probability of occurrence with high-medium level of importance to this risk factor from observant. It showed a difference with the outcome of (Santoso et al., 2003), (Altoryman, 2014), (Karimet al., 2012), & (Jayasudha & Vidivelli, 2016). This displayed, risks associated to design factor were the first, second, third, and fourth most important factors respectively both in terms of occurrence and degree of impact. The inconsistency of perception on the risk factor among various studies of scholars might be depending on educational background and knowledge of risk management of participants involved: and the situations of the country in which projects implemented.

The probable origin for this factor might be inadequate or incomplete and misaligned designs. For instance, the misalignment among several design disciplines involved, i.e., architectural, structural, electrical and mechanical designs, etc., might take enormous time and finance in order to correct errors occurred in the process. The other potential causes could be improper technology/wrong selection of materials/, unforeseen site ground condition, design change by the client, inadequate and ambiguous specification, and delays in material and shop drawing approval are some of them.

In general, all of these factors could affect the performance of building construction projects in terms of time, cost, and quality. Overall perception of the participants in ranking risk category have shown a difference on three factors i.e., the second, third, and fourth categories and similar on two factors; the first and the fifth categories.

4.3.3. Perception of Possible Risks by Participants



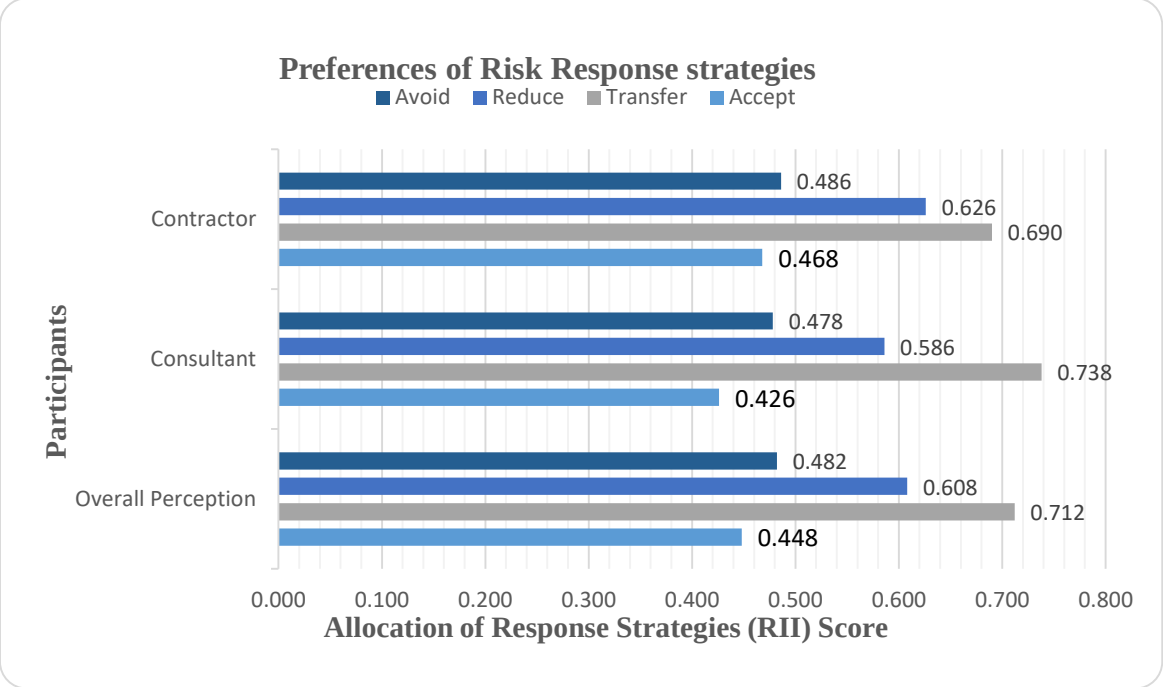
Note: low (0<RII<0.2), medium-low (0.2<RII<0.4), medium (0.4<RII <0.6), high-medium (0.6 <RII< 0.8), & high (0.8< RII<1)
Figure 4.2: Frequency of Occurrence of possible Risks by Participants

This study identified five critical risk factors (Table 4.6). Among the category risk factors, in descending order, the financial and economic, tender, construction works, and political and legal factors were the most significant factors identified with an overall RII value $\geq$ 0.700. All the categorical and sub-categorical risk factors contributed to the possible occurrence of risks that

could have effect on project objective in terms of time, budget, performance, and quality on constructing projects in Addis Ababa. In this study, as indicated in Figure 4.2 above, there is a complete agreement among the participant's perception for the occurrence of all possible risks.

The study discovered frequent probability of occurrence for all potential risks, high importance level for the first and second risks, and high-medium level of importance to the third and fourth risks respectively. Time overrun (RII, 0.904), cost overrun (RII, 0.872), low performance (RII, 0.808), and low quality (RII, 0.75) was ranked from first to fourth correspondingly. The high-level importance risk findings were in alignment with the results of (Serpella et al., 2014), (Hlaing, 2016), (Wiguna & Scott, 2005), (Chapman, 2001), & (Jayasudha & Vidivelli, 2016), etc. that revealed in majority of the situations projects completed beyond schedule and budget.

4.3.4. Preferences of Risk Response Strategies



Note: low (0<RII<0.2), medium-low (0.2<RII<0.4), medium (0.4<RII <0.6), high-medium (0.6 <RII< 0.8), & high (0.8< RII<1)
Figure 4.3: Preferences of Risk Response Strategies by Participants

After risks of a project identified, appropriate response strategy adopted in order to take the necessary actions to decrease the negative effects on project objectives. The allocation and preference of appropriate strategies by respondents to the overall risks to attain project success presented. Similar to occurrence of risks, the overall perception of risk response strategies by respondents were in a complete agreement as indicated on Figure 4.3 above.

It was preferred in the order of transfer (RII, 0.712), reduce (RII, 0.608), avoid (RII, 0.482), and accept (RII, 0.448). The first and second strategies were rated with high-medium importance level, whereas the third and forth with medium importance level. Their probability of occurrence found to be frequent, for the first response strategy, neutral, for the second and infrequent for third and fourth correspondingly.

Risk Transfer is shifting risk from one party to another through the form of insurance, sub-contracting, or involving other parties, sharing the risk and other methods could be the possible reason for this approach. The result, risk transfer, by both consultants and contactors being the most significant strategy might be due to their risk averse character of the respondents. This finding was in alignment with the result of (Jarkas &Haupt, 2015) which indicated that the "transfer" option is the contractors' predominant response to "client" and "consultant"-related risks. However, Hlaing (2016) in his study, ranked risk transfer as the second strategy.

The second strategy in this study was Risk Reduction. Conversely, Hlaing (2016) in his study also ranked it first. Whereas, his ranked risk avoidance and acceptance/retention study third and fourth that is in alignment with this study. The likely reason for this strategy could be reducing an unexpected event, saving time, cost, effort, greater productivity, improved success and guiding decision-making might be among others. To implement response plans and procedures risk management should be common knowledge to both consultants and contractors. Other stakeholders should also have the knowledge that played an important role in building construction projects in Addis Ababa. It includes, systematically identifying risks, analyzing and responding to risks to achieve project objectives. Consequently, participants might have got experience and practice for planning activities that reduce the probability of occurring risks and alleviate the impacts of risks that might occur throughout all phases of the project. This in return, could enable the project to be successful.

4.4. Part III: Recommendations and Challenges Encountered by Participants

4.4.1. General Recommendations by Participants on Risk Management

Questionnaire designed and encouraged to suggest or complement participants' opinion and challenges they might have faced in managing risk associated to building construction projects in Addis Ababa. From the total valid responses, 20 not responded at all to both open ended questions,

four responded to the first question only, whereas 75 respond to both open ended questions. However, three were not relevant and thus rejected.

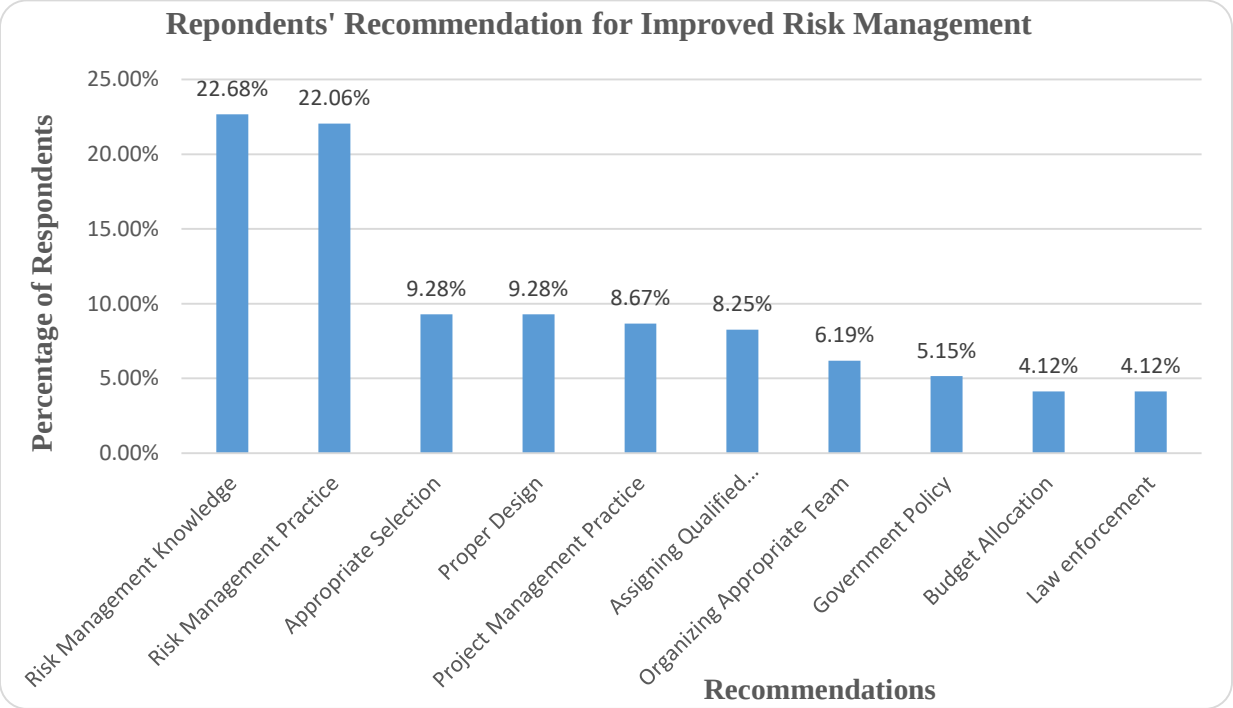


Figure 4.4: Recommendations of Participants in Managing Risk
Source: Own Survey (2019)

Hence, the total valuable open-ended questions were 72 (72.73%) which is considered to be a good response. After an in-depth study and understanding of each qualitative response forwarded by the respondents, it listed in short summary. Then, it grouped into 10 different themes accordingly as indicated in Figure 4.4 and Figure 4.5 above and below, respectively.

The first question asked was to suggest or compliment respondents opinion about risk management associated with building construction projects in Addis Ababa. From the total response 22.68% suggested that the major operators in the industry should have knowledge of risk management as indicated on Figure 4.4 above. Hence, from the participants' point of view creating awareness on risk management was the most significant component for the appropriate implementations of projects to achieve objectives.

The second almost equivalently ranked recommendation was practicing the knowledge (22.06%) of risk management accordingly. In view of respondents, this was a valuable suggestion given that acquiring of risk management knowledge is very important, however, without exercising; it does

not make projects successful alone. Because most of construction works performed in the traditional way with very less output that consume much time and cost. The result was in agreement with Banaitiene & Banaitis (2012) findings, which stated that lack of experience in risk management makes it very difficult to change contractors' attitude towards it.

The third most important recommendation given by participants was appropriate selection of implementers 9.28%. There should be a clear guideline or criteria for selecting implementers (contractors and consultants). It based up on their performance, competence, experience, capacity and organizational merits. The bidding process should be appropriate and transparent in order to select qualified contractors and consultants.

The other third important factor, equivalently ranked with appropriate selection was preparation of proper, complete and detailed design (9.28%). It includes working drawings and with its respective bill of quantity and specifications. Design should comply with the acceptable international standards accommodating clients' interest appropriately. Otherwise, this could mainly be the source of excessive increase of cost, delayed project time, reason for dispute and conflict among stakeholders, etc.

According to participants, project management knowledge and practice (8.67%) in terms of planning, organizing, executing, monitoring and evaluation was the fourth aspect that needs consideration. Assigning qualified professionals (8.25%), organizing appropriate team (6.19%) for identifying risk factors, analyzing and allocation of strategies was the fifth and six aspects of recommendation in managing risk respectively.

Government policy (5.15%) in reducing the price escalation/inflation/ of construction materials was one of the characteristics given attention by respondents. Respondents also suggested that clients should secure and allocate enough budgets (4.12%) before commencing their projects. Lastly, regulatory and law enforcement mechanism (4.12%) should be deployed by the respective implementing body.

4.4.2. Major Challenges Encountered by Participants in Managing Risk

The second question asked was respondents' opinion about the challenges they faced in managing risk associated with building construction projects in Addis Ababa. From the total valuable response, as indicated on Figure 4.5 below, the most significant challenge faced were lack of knowledge of risk management (22.58%) by consultants and contractors.

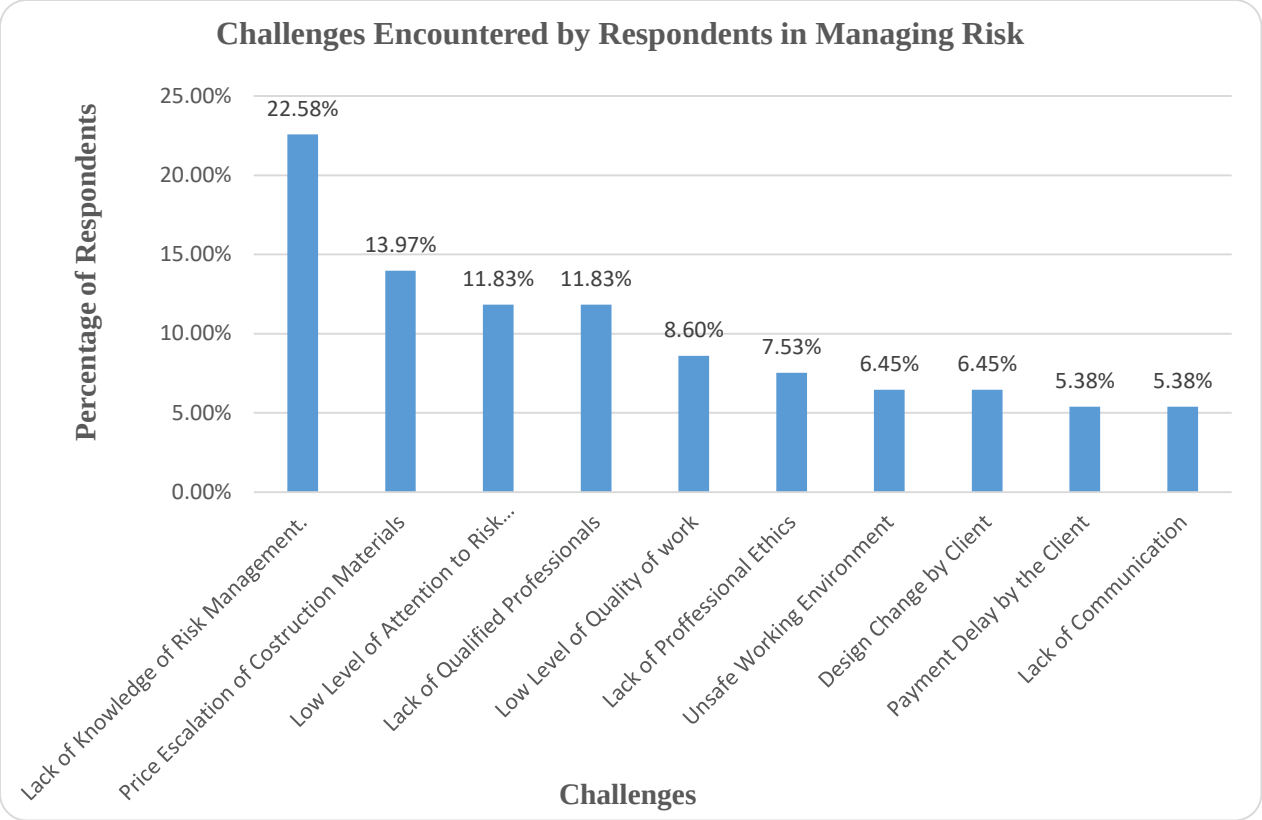


Figure 4.5: Challenges Encountered by Participants in Managing Risk
Source: Own Survey (2019)

This could be the reason why in the above discussion the most important recommendation given by the respondents were to create awareness and knowledge of risk management in the constructing projects. This challenge faced by participants was in agreement with the findings of (Yimam, 2011); (Addis, 2014); & (Seleshi, 2018) who stated that risk is the least matured among project management knowledge areas locally. Moreover, it is in alignment with (Serpella, 2014) & (Banaitiene & Banaitis, 2012) who stated lack/absence of knowledge is the main cause of risk management ineffectiveness for construction projects. Therefore, risk cannot be, identified, assessed, and allocated without the knowledge and understanding of managing it.

Participants agreed that the second most important challenge faced was price escalation (13.97%) of constructing materials on projects (Figure 4.5). This result was also in agreement with the findings of the most significant risk factor "high inflation rate" (Table 4.6) identified by participants. For instance, due to shortage of foreign currency, some construction materials (particularly imported ones) price extremely escalated. As a result, some construction projects

discontinued for a significant period. Therefore, projects got difficulty to achieve their objective on the planned schedule and cost.

The third most important challenges confronted as viewed by participants, with an equal percentage value of 11.83 (Figure 4.5), were low level of attention given to risk management and lack of qualified professionals in the sector. Had there been enough attention given to risk management by the major operators of the sector; there would have not been shortage of qualified professionals. Either training or educational development might be arranged or practitioners could be engaged with the knowledge and experience acquired.

In addition, from the general profile of respondents (Table 4.4) those who specialized in project management were only 5.1%, the rest were with other field of specialization engineering being the dominant that constituted almost 59%. This might prove the low level of attention given by the major operators. Hence, these two challenges were interrelated and this might be the reason why they got similar value by respondents.

Low level of quality of work (8.6%) and lack of professional ethics (7.53%) were the fourth and fifth important challenges that encountered by participants (Figure 4.5). As specified by respondents the possible reasons for low level of quality deliverables might be price escalation of materials and substitution by lesser cost, resulting a compromise on quality. This might be also true for skilled labor and qualified professionals manifested with poor planning, poor workmanship, and poor usage of constructing technologies, etc. Unethical and non-professional financial management, corruption, and intention of getting approval for poor quality of materials and work as equivalent to the quality stated in the contract, etc. could be the reason for lack of professional ethics.

Unsafe working environment and design change by the client were the sixth equally ranked important challenges faced by participants with a similar value of 6.45% (Figure 4.5). As stated by respondents, most construction works exposed to accidents, injuries, damages, and loss of human life. This was due to construction workers and owners' resistance to apply adequate safety measures in building construction projects. Besides, contractors not buying safety insurance for their employee's, equipment and machineries to transfer risks could be the other reasons. Most of building projects, as it was being for risk management, health and safety measures excluded from

project package and enough budgets were not secured due to wrong perceptions. However, the consequences were much costly and created delay and complications on projects.

Clients continuously change construction designs according to participants' reflection. This is due to the difficulty of clients in defining their needs at first stage and not undertaking feasibility study in the beginning. For instance, one of the building construction projects (its name intentionally kept in anonymity) was started construction with the function of the hotel have changed it later to an apartment after the building structure work was already completed. In the process, wastages occurred, and prices of construction materials escalated. This resulted in high cost overrun of the project and took much longer time than the planned in implementing the design change.

Finally, payment delay by the client and lack communication among stake holders were other challenge areas faced by participants with equivalent value of 5.38% (Figure 4.5). As stated from previous discussion one of the recommendation given by participants was clients obtaining adequate budget prior to commencing the project could be one reason. Respondents also pointed out that poor financial capacity and management of contractors could be the other reason.

Though there might be sufficient knowledge and qualified professionals on risk management; without proper communication among practitioners and stakeholders; projects might not achieve their objectives. As stated by participants, most disputes and conflicts among operators and other stakeholders, arises from lack of proper communications and team spirit. Appropriate communications could enable practitioners to get the right information and make informed decision that could be the basis of commitment amongst them. However, it ranked last. Communication is center of construction project and risk management and it might have massive effect for the overall implementation of projects in order to achieve objectives.

Therefore, based on their perception and experience, participants have recommended that: major operators in the construction industry should have knowledge and practice of risk management for the appropriate implementations of projects to achieve objectives. Because the most difficult challenge faced, as viewed by respondents, was lack of awareness of risk management. This might have done through workshops, trainings and continued development of professionals through formal education in order to build the capacity of major operators and other stakeholders in the sector.

CHAPTER FIVE

5. SUMMARY, CONCLUSION, AND RECOMMENDATIONS

This chapter has four subdivisions. The first subdivision presents summary of main findings: the second subdivision presents conclusion of the study resulting from findings. The third subdivision deals with recommendation based on findings. The last subdivision is concerned with concepts that might require further studies.

5.1. Summary of Findings

The purpose of the underlying research is to assess building construction projects risk management in Addis Ababa towards constructing and consulting firms. To achieve the intended objectives, mixed method research approach used in this study. The study also applied descriptive research design for describing situations and facts to the research questions.

From the review of related literature, 50 possible risk factors were identified that might occur in building construction projects in Addis Ababa. Based on an assessment of probability of occurrence of risk factors, the research findings indicated that five most critical risk factors identified. These were “high inflation rate” RII 0.85, “delayed payment by clients” RII 0.836, “poor resource management” RII 0.822, “risk of corruption” RII 0.802, and “economic instability” RII 0.801. Each of the factors, according to the result, has frequent probability of occurrence and high level of importance.

The financial factor was the most significant risk category recognized by participants with an RII value of 0.771. Moreover, among the category risk factors, following to the financial, tender, construction works, and political and legal factors were the most significant factors identified with an overall RII value $\geq$ 0.700.

The study revealed risks of time overrun RII, 0.904 and cost overrun RII, 0.872, with frequent probability of occurrence and high importance level as the first and second most possible risks. In this study, perception of risk response strategies by participants, allocated first and second were Risk Transfer (RII, 0.712) and Risk Reduction (RII, 0.608).

From the opinions recommended by participants about risk management, 22.68% acknowledged that the major operators in the industry should have knowledge of risk management related with building construction projects; whereas, 22.06% recommended practicing the knowledge of risk

management accordingly. Furthermore, the most significant challenges faced by practitioners of consultants and contractors, were lack of knowledge of risk management (22.58%) in building construction projects in Addis Ababa.

5.2. Conclusion

Due to unexpected nature and changes that occur during implementation of building construction projects, risk becomes one of the prevalent phenomena. Fifty risk factors identified from review of related literature and considered by consultants and contractors in Addis Ababa.

Based on the assessment conducted to identify and rank critical risk factors, addressed by the first specific objective, 5critical risk factors identified. High inflation rate is the most critical risk factor that has effect on constructing projects. For the achievement of development objectives, this factor should draw extraordinary consideration from government bodies and other institutions responsible for preparation of policies and its implementation.

Following inflation, participants observed delayed payment by a client as the second most dominant risk factor among the variables examined. This factor needs special attention by financial institutions that are in charge for fixing collateral requirement to issue guarantees for project financing. In addition, clients should secure adequate budget before commencing any project. As a result, projects could get sufficient finance on due time that can facilitate availability of resources on specified schedules. This also increases efficiency of project operation that enables to achieve objectives.

Poor resource management associated to construction work categories, rated as the third critical risk factor by participants that have effect on project objectives. This factor should get consideration by contractors who are responsible for executing projects on site. Executives should acquire the necessary knowledge of procurement and financial management. Also, assign qualified personnel to the appropriate positions. It assists for efficient utilization of resources resulting projects to accomplish objectives with high performance, high quality, less cost, and shorter time.

The fourth factor which needs consideration by all stakeholders, was risk of corruption, it is involved in and has significant role in the construction industry. It requires professional ethics in preparing design, specification, tendering and implementation of projects. Moreover, all responsible bodies should develop the necessary controlling mechanism to decrease possibilities

of corruption. Hence, projects would have to complete with less cost, better quality, on schedule and becomes successful.

As perceived by participants, the fifth dominant risk factor that has significant effect on project objectives is economic instability. This factor also requires due consideration particularly by Government which is responsible for formulating economic policies and creating a politically stable environment, etc.

The second specific objective that addressed by this study is identifying possible risks that may occur in building construction projects. All recognized critical risk factors contributed to the possible occurrence of risks that have effect on project objective in terms of schedule, budget, performance, and quality. The study revealed that time overrun and cost overruns are the two most critical possible risks identified in building constructions projects.

The third objective, also determined by participants, was allocating risk response strategies for the identified critical risks. The two most important allocations of strategies to attain project success were Risk Transfer and Risk Reduction. Hence, transferring risk to another body indicating the capacity to neutralize risk; such as activities that decrease the likelihood of occurrence to overcome the effects of risk; implemented. As a result, the negative effects of risk on overall project objectives minimized.

The fourth objective, addressed by participants was, to examine the general recommendations on risk management associated with building construction projects. The two most significant recommendations forwarded by participants were practitioners of both consultants and contractors should have the knowledge and practice of risk management for achieving a successful result on project objectives.

The fifth objective, addressed by participants was, to explain the major challenges encountered in managing risk during implementation of building projects. Thus, as perceived by participants, the major challenge that both contractors and consultants encountered, in the building construction industry was lack of knowledge of risk management. Therefore, risk management should be common knowledge to both consultants and contractors and other stakeholders who played an important role in building construction projects in Addis Ababa.

5.3. Recommendations

Based on the findings of the study, it recommended that consultants, contractors, Government and other stakeholders consider the following areas of improvement in managing risk in building construction projects in Addis Ababa.

- Practitioners of both consultants and contractors should have knowledge, skill, and practice of risk management to minimize building construction project risks early:
    - Through organizing training and workshop programs on risk management of building construction projects for their employees;
    - Facilitating continued development, education, and exchanging practices of managing risk for their employees;
- Both consultants and contractors should give attention to risk management so as to reduce/manage risk of time overrun and cost overrun to meet project objectives:
    - Through developing risk management plan during the early stage of projects and embrace risk as their essential part of project management;
    - Through developing and organizing separate teams who have knowledge and skill on risk management to identify, analyze risks and allocate response strategies correspondingly;
- Government should encourage local construction material manufacturers by formulating policies and strategies which facilitates to build their capacity and enables them to:
    - Be competent in the international market on the sector;
    - Produce materials with better-quality and less price to the required standard;
    - Satisfy the local demand and facilitate import substitution; overall facilitates in regulating the price escalation of constructing materials.
- Financial institutions need to require collateral with the reality of existing situations and with appropriate time in the process of financing projects.
- Contractors should devise a strategy that improve their resource management capability:
    - Through organizing continuous training and development on financial, procurement, and human resource management to their employees;

- Government, consultants, contractors, and other stakeholders in the industry should give the necessary attention and work together cooperatively in order to minimize risk of corruption:
    - Government institutions and enterprises in the sector should give value to professional ethics through creating awareness and developing organizational culture that adverse corruption and attend for its achievement;
    - Government should follow and took practical and strict anti-corruption measures;
- Government should formulate well-organized construction policy: to implement and improve the capacity and competitiveness of local building construction enterprises that assists to the economic stability of the country.
- Critical risk factors, as revealed in this study, should properly handle accordingly by their respective companies or institutions for the appropriate allocation of response strategies to achieve a successful result of construction projects.
- Identified risk factors can use as a checklist to contribute for risk management process in building construction projects in Addis Ababa.

5.4. Further Studies

Similar study could have conducted with inclusion of clients, suppliers, and sub-contractors in addition to consultants and contractors to evaluate the associated risk factors reflection. An inclusive risk analysis can be done on the bases of this qualitative analyses complemented by quantitative analysis. Further research might have done on risk factors identified in this study, to the allocation of their corresponding risk response strategy.

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APPENDICES

APPENDIX A

Questionnaire

Dear Sir/Madam,

My name is Alem Teferi, student at St. Mary's University School of Graduate Studies/SGS/ Department of Project Management. I am currently working on a research entitled "Risk Management in building Construction Projects in Addis Ababa". I believe your experience and educational background will greatly contribute to the success of my research. So it is with great respect that I ask you for a little of your time to fill this questionnaire. The questionnaire is prepared to gather information from selected Project/Technical/Risk Managers of grade-one Building Contractors (BC-1) and Consulting Architects & Engineers (CAE-1). The outcome of the research will serve as partial fulfillment of MBA in Project Management. The purpose of the research is to assess building construction projects risk management in Addis Ababa towards constructing and consulting firms. The questionnaire categorized into three major parts. Part I solicited general information about the respondents. Part II consisted of five categories with 50 risk factors. The respondent is requested to rate the probability of occurrence of these risk factors and 4 possible risks and 4 response strategies as Very Infrequent (VI), Infrequent (I), Neutral (N), Frequent (F), and Very Frequent (VF) respectively. Part III included two open-ended questions that asked the respondents to state their opinion about risk management briefly. Your response is highly valuable and contributory to the outcome of the research. All of your responses to any of the question kept strictly confidential and used for this academic research only. No report of the study will ever expose your identity. You kindly requested to answer & fill the questionnaire accurately & with truth.

Thank You!

Best Regards

Alem Teferi

Post graduate student, Project Management

St. Mary's University

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E-mail: alem_teferi@yahoo.com

Addis Ababa, Ethiopia

PART I **Code No.**

General Profile of the Respondent

1. Please, choose & circle to the multiple-choice questions.

1.1. What is your job position?

1) G/Manager 2) Deputy G/Manager 3) Technical Manager 4) Project Manager 5) Risk Manager

6) Other; please specify……...…….....

1.2. What is your educational level?

1) Diploma 2) B.Sc. 3) M.Sc. 4) PhD 5) Other; please specify……...

1.3. What is your field of specialization?

1) Engineering 2) Architecture 3) Project Management 4) Construction Management 5) Other; please specify…….....

1.4. How long have you worked in the Building Construction sector?

1) 1– 5 years 2) 6 – 10 years 3) 11 – 15 years 4) 16-20 years 5) More than 20 years

PART II

2. Use a five-point rating Likert Scale as 1. Very Infrequent (VI), 2. Infrequent (I), 3. Neutral (N) 4. Frequent (F), & 5. Very Frequent (VF) for the following questions.

2.1. Examine and rate the probability of occurrence of the following risk factors associated with building construction projects using on a five-point rating Likert Scale.

Table: 2.1.1. Preliminary& Detailed Design

ID	Risk Factors (Sources of Risk)	Likert Scale				
		1(VI)	2(I)	3(N)	4(F)	5(VF)
D1	Poorly recognized preferences of the clients					
D2	Underestimating the costs of the project					
D3	Improper design team selection					
D4	Overestimating the costs of the project					
D5	Improper technology selection					
D6	Delays in material and shop drawing approval					
D7	Inadequate & ambiguous specification					
D8	Design change by clients					
D9	Producing defective design					
D10	Unforeseen site ground condition					

Note: 1. Very Infrequent (VI), 2. Infrequent (I), 3. Neutral (N) 4. Frequent (F), & 5. Very Frequent (VF).

Table: 2.1.2. Tender

ID	Risk Factors (Sources of Risk)	Likert Scale				
		1(VI)	2(I)	3(N)	4(F)	5(VF)
T1	Poorly recognized competition					
T2	Awarding design to unqualified design consultant					
T3	Risk of corruption					
T4	Risk of tender cancellation,					
T5	Quoting bad estimation for the project					
T6	Using predatory pricing by competitors					

Table: 2.1.3. Construction Works

ID	Risk Factors (Sources of Risk)	Likert Scale				
		1(VI)	2(I)	3(N)	4(F)	5(VF)
C1	Lack of competent & qualified professionals					
C2	Employees' absence at work place					
C3	Poor employees' work performance					
C4	High employee turnover					
C5	Poor resource management					
C6	Poor construction materials quality					
C7	Insufficient control of work					
C8	Extending scope of work					
C9	Poor organization of work					
C10	Poor communication & coordination among staff					
C11	Inappropriate change order by client					
C12	Lack of clients managerial capability					
C13	Defective construction work					
C14	Low labor and equipment productivity					
C15	Inadequate program					
C16	Lack of skilled/unskilled labor					
C17	Accidents and injuries on project sites					
C18	Burglary on site					
C19	Unrealistic construction schedule					
C20	High project complexity					

Table: 2.1.4. Financial and Economic

ID	Risk Factors (Sources of Risk)	Likert Scale				
		1(VI)	2(I)	3(N)	4(F)	5(VF)
EF1	Economic instability					
EF2	High inflation rate					
EF3	High interest rate					
EF4	Improper cost plan					
EF5	Recession in the industry					
EF6	Delayed payment by clients					
EF7	Poor cost control					
EF8	Financial failure of contractor					
EF9	Delays in approval of payment certificate by the					

Note: 1. Very Infrequent (VI), 2. Infrequent (I), 3. Neutral (N) 4. Frequent (F), & 5. Very Frequent (VF).

Table: 2.1.5. Political and Legal

ID	Risk Factors (Sources of Risk)	Likert Scale				
		1(VI)	2(I)	3(N)	4(F)	5(VF)
PL1	Political instability					
PL2	Weak law compliance & enforcement					
PL3	Changes in legislative regulations contrarily					
PL4	Difficulty in obtaining permits and ordinances					
PL5	Delays in solving contractual issues					

Note: 1. Very Infrequent (VI), 2. Infrequent (I), 3. Neutral (N) 4. Frequent (F), & 5. Very Frequent (VF).

2.2. Examine and rate risks that might occur from the identified sources of risk associated with building construction projects using on a five-point rating Likert Scale.

Table: 2.2.1. Possible Risks that Might Occur

ID	Possible Risks	Likert Scale				
		1(VI)	2(I)	3(N)	4(F)	5(VF)
R1	Time overrun					
R2	Cost overrun					
R3	Low quality deliverables					
R4	Low performance					

Note: 1. Very Infrequent (VI), 2. Infrequent (I), 3. Neutral (N) 4. Frequent (F), & 5. Very Frequent (VF).

2.3. Examine and rate risk response strategies to be allocated for the identified sources of risks associated with building construction projects using on a five-point rating Likert Scale.

Table: 2.3.1. Risk Response Strategies

ID	Response Strategies	Likert Scale				
		1(VI)	2(I)	3(N)	4(F)	5(VF)
ST1	Accept					
ST2	Transfer					
ST3	Reduce					
ST4	Avoid					

Note: 1. Very Infrequent (VI), 2. Infrequent (I), 3. Neutral (N) 4. Frequent (F), & 5. Very Frequent (VF).

PART III

3. Please, state your opinions about the following risk management questions briefly.

3.1. From your experience and knowledge of risk management, what do you suggest or complement in managing risk associated with building construction projects?

……

……

……

……

……....

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3.2. What challenges did you encountered in managing risk related with building construction projects?

……

...……

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……....

THANK YOU!

APPENDIX B

List of Consultants

No.	Name of Consulting Firms	Regrd.	Grade	Phone No.
1	Acute Engineering	CAE	I	911518038
2	Addis Meberatu Beyene	CAE	I	911229341
3	Afri Consulting Architects & Engineers	CAE	I	115515109
4	Associated Engineering Consultants P.L.C	CAE	I	911505419
5	At.Con Engineering And Architures Consultancy	CAE	I	911525848
6	Azad Design Build Plc	CAE	I	911229295
7	Belete Birhanu Indris	CAE	I	911210725
8	Bereket Tesfaye Consulting Architects & Engineers	CAE	I	911242762
9	Bet Architects Plc	CAE	I	911242514
10	Bigar Builders And Developers Plc	CAE	I	911680573
11	Brave Consultants Plc	CAE	I	911258362
12	Breeze Consultancy Plc	CAE	I	911529708
13	Brhanu Mussa Architects & Engineers Consulting	CAE	I	911227377
14	Cheetah Consulting Architect Plc	CAE	I	911607449
15	Classic Consulting Engineers Plc	CAE	I	115518177
16	Dana Consulting Architects & Engineers	CAE	I	911249252
17	Defence Construction Design Ennterprize	CAE	I	911365324
18	Dynamic Planners Plc	CAE	I	912501607
19	E F Architect & Engineering Consulting P.L.C.	CAE	I	926789534
20	Edge Consult Enterprise	CAE	I	911209909
21	Ees Consulting Architects And Engineers P.L.C	CAE	I	911237077
22	Elugi General Trading Plc	CAE	I	911201493
23	Etg Designers And Consultants Share Company	CAE	I	911126312
24	Eyasu Siraj Consulting Architects Plc	CAE	I	911207989
25	Eyob Kinfe Consulting Architects & Engineers Plc	CAE	I	911343602
26	Gatmets International P.L.C	CAE	I	115533772
27	Gereta Consult Plc	CAE	I	116333220
28	Hh Consulting Architects & Engineers Plc	CAE	I	913592121
29	Hilltech Engineering Consulting P.L.C	CAE	I	911240366
30	Image Consultancy P.L.C.	CAE	I	930033554
31	Jcb Consult Plc	CAE	I	930337330
32	Jdaw Consulting Architects & Engineers	CAE	I	911215220
33	K2n Architecture & Engineering Consulting Plc	CAE	I	911247689
34	Lawe Berhanu Consulting Architects & Engineers	CAE	I	911240029
35	Ltf Architects & Engineers Consulting Plc	CAE	I	923292306
36	Mgm Consult Plc	CAE	I	911200177
37	Mh Engineering Plc	CAE	I	116633080
38	Misganaw Alem Terefe	CAE	I	911430182
39	Moges Desta Kassa	CAE	I	911216085
40	Mtt Archeticts Engineers Consultant Plc	CAE	I	912622839

41	Mulugeta Asfaw	CAE	I	911206220
42	Mvr Consulting Group Plc	CAE	I	911431820
43	Newfocus Design And Consultancy Plc	CAE	I	942192021
44	Noble International Business Plc	CAE	I	911202930
45	Nomy Engineering P.L.C	CAE	I	911516638
46	Obon Voyage Architects & Engineers Consultant	CAE	I	911801013
47	Ott Architects And Engineers Plc	CAE	I	911226272
48	Qtc Engineering Consultancy Plc	CAE	I	921030400
49	Shigez Consultancy Plc	CAE	I	911219170
50	Sileshi Consulting Plc	CAE	I	111229821
51	Skyline Consulting Architects & Engineering P.L.C	CAE	I	911217904
52	Towers Consult Plc	CAE	I	911235056
53	Universal Consultants Consulting Architect &	CAE	I	116392499
54	Virtual Consulting P.L.C	CAE	I	911528612
55	Wossen Architects Plc	CAE	I	911203100
56	Wossen Woldekidan	CAE	I	911241715
57	Yohannes Abbay Consulting Architects And	CAE	I	930003817
58	Zeleke Belay Architects Plc	CAE	I	911206651
59	Zias Design International Plc	CAE	I	911222957

APPENDIX C

List of Contractors

No.	Organization Name	Grade	Telephone
1	Genale Construction PLC	BC-1	0911 210806
2	Rediete Dagem Engineering & Construction PLC	BC-1	0911 202920/0911 231882
3	Bright Construction PLC	BC-1	0911 211161
4	Koracon Construction	BC-1	0911 214579
5	Trust Construction	BC-1	0911 414530/0911 230882
6	GAD Construction PLC	BC-1	0114 421692/0911 209875
7	Buelkon Construction PLC	BC-1	0930 469612
8	Dinova Engineering & Construction PLC	BC-1	0911 375097
9	Birhanu Ashebir Construction PLC	BC-1	0911 231102
10	Kassahun Million Construction	BC-1	0911 207757/0930 999999
11	Merid Dechasa Garedew	BC-1	0911 215097
12	Bershacon Construction PLC	BC-1	0917 552107
13	Elshine Trading PLC	BC-1	011 6623607/0930 100437
14	Birhanu Abebe Building Contractor	BC-1	0911 174850/0913 754647
15	Dawit Emiru Building Contractor	BC-1	0911 512552
16	Maven Construction	BC-1	0911 207691
17	Bamacon Engineering PLC	BC-1	0911 209024
18	Tiku Berhane Gebereyesus	BC-1	0911 407121
19	Justice Building Contractor PC	BC-1	0911 524805/0115580453
20	Aynalem Gashaw Argie	BC-1	0911 310851
21	United Construction PLC	BC-1	0920 427705
22	Alas Construction P.L.C.	BC-1	0911 517332
23	Roel Constsruction	BC-1	0911 202657
24	Yohannes Haile Building Contractor	BC-1	0930 003850
25	Megelta Construction P.L.C.	BC-1	0911 678211
26	Modocon Engineering PLC	BC-1	0911 231495
27	Dugda Construction PLC	BC-1	0930 098564
28	Bifacon Engineering PLC	BC-1	0930 034248
29	Wogen Building Construction	BC-1	0912 502288
30	YOT Construction PLC	BC-1	0911 206942
31	Felema Construction PLC	BC-1	0935 981681
32	Mohammed Abas Building Contractor	BC-1	0116 291025/0911 236120
33	Dawit Girmay Negash	BC-1	0911 633404/0911 600428
34	Bencon Construction	BC-1	0911 234504
35	Ashtho Engineering PLC	BC-1	0911 522912
36	Etete Construction	BC-1	0911 516970
37	LUCI ENGINEERING P.L.C.	BC-1	0929 907130
38	B.G.M. Construction	BC-1	0911 219538
39	Samuel S/Mariam Endale	BC-1	0911 211890
40	Seyfe Wondie Adenew	BC-1	0911 512921/0911 203887
41	Desalegn Asreda Building Contractor	BC-1	0916 581400
42	Kassa & Sons Construction P.L.C.	BC-1	0911 203874

No.	Organization Name	Grade	Telephone
43	Asmelash & Sons Construction PLC	BC-1	0935 409707
44	SA Construction PLC	BC-1	0911 410669
45	Yoada Construction	BC-1	0911 238258
46	Berhan Tobiaw Mareye	BC-1	0911 402558
47	Orbit Engineering & Construction P.L.C.	BC-1	0911 205031
48	Workneh Guday Teshale	BC-1	0911 517796
49	Unity Engineering PLC	BC-1	0911 517438
50	Dawit Wondimu Building Contractor	BC-1	0911 212888
51	Addis Gelaw Building Contractor	BC-1	0911 203110
52	Mescon Construction	BC-1	0930 105752
53	K.K.G Construction	BC-1	0912 114192
54	Getachew Atsbeha Kidanu	BC-1	0911 236549
55	Adam Construction PLC	BC-1	0911 202889
56	Gashaw Melese Building Contractor	BC-1	0911 207727
57	Nahiet Business PLC	BC-1	0911 525786
58	Getnet Tesfaye Building Contractor	BC-1	0911 529512
59	Universal Construction P.L.C.	BC-1	0911 120074
60	Demera Engineering & Construction	BC-1	0911 204771
61	Capstone Engineering	BC-1	0911 512423
62	Samson G/Yohanes Tedla	BC-1	0911 241030
63	ATS Engineering PLC	BC-1	0911 217048
64	Arsema Abebe Kasaye	BC-1	0911 238253
65	Ziquala Building Contractor	BC-1	0911 201985
66	Berehane Adane Construction	BC-1	0911 200382
67	Fufa Legissa Building Contractor	BC-1	0911 203654
68	Mohamed Yesuf Building Contractor	BC-1	0911 222208
69	Kasma Engineering PLC	BC-1	0930 034824

APPENDIX D