

**ADDIS ABABA UNIVERSITY**  
**COLLEGE OF BUSINESS AND**  
**ECONOMICS**  
**SCHOOL OF COMMERCE**  
**OFFICE OF GRADUATE STUDIES**



***Assessment of potential risks and risk management practices in construction projects in Ethiopia- multiple case study***

Research proposal submitted to Addis Ababa University School of commerce presented in partial fulfillment of Masters of Arts in Project Management (MA in PM)

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Addis Ababa Ethiopia


May 2020

## Statement of Declaration

### Declaration

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted at any university for a degree.

Signature:

  
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Date: June /24 /2020

**Addis Ababa University**  
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This is to Certify that the thesis prepared by *(Yejimmawerk Ayalew)*, entitled: *(Risk Management practices in construction projects in Ethiopia- Case Study)* submitted in partial fulfillment of the requirements for the degree of Degree of Master of Arts *(MA in Project Management)* complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by the Examining Committee:

Examiner: _____	Signature: _____	Date: _____
Examiner: _____	Signature: _____	Date: _____
Advisor: _____	Signature: _____	Date: _____
Advisor _____	Signature: _____	Date: _____

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Chair of Department or Graduate Program Coordinator

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## **Abbreviations/acronyms**

AAU-Addis Ababa University

ERA- Ethiopian Road Authority

FY- Fiscal Year

GDP- Gross Domestic Product

ISO- International Standard Organization

KII- key Informant Interview

PI- Probability and Impact

PIM- Probability Impact Matrix

PLC- Project Life Cycle

PMBOK- Project Management Body of Knowledge

RMP- Risk Management Project/Practice

RMS-Risk Management Systems

WB-World Bank

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## Abstract

*The construction industry is widening in its share in the service industry of the economy , construction is contributing around 3.5% to the growth of real GDP, and Ethiopian government have been increasingly investing in public social services, grand national projects and infrastructures that demand high capital and high project management skills and most of these projects are construction related projects. The construction projects are traditionally prone to different types of risks that are leading to delays, cost overruns and compromised quality, and this has become common observation in many projects. However little is known and documented on the prominent risks, perception of impact and likelihood of these risks and what the project risk management practice looks like by the project actors. Therefore this research or assessment intended to identify key risks in the construction sector, perception of these risks and common practice of risk management systems by project actors. The research methodology approach of this study was qualitative, multiple case study backed up literature review. The assessment has looked in to six construction projects as case study; four of the cases are building construction projects and two of them are road construction projects. The case study projects are undergoing and are located in four different regions of Ethiopia. The cases were thoroughly reviewed and analyzed based on the key informant in-depth interview, physical observation and relevant literatures. Accordingly the assessment found out that there are several prominent risks in the construction industry and the most common risks in both road and building construction were many but the top five of each projects were analyzed and found out to be ; cash flow, availability of raw materials, absence of skilled manpower, project management and technical skills, corruption, design completeness, inflation, right off, environmental and safety, limited contract administration skills from the client side, outdated building design codes, payment modality, political stability, safety and security (site location), and tender preparation. More over in order to understand the perception of risks and their impacts and likelihoods by the project actors, the likelihood impact assessment matrix was independently analyzed using 5 point Likert measurement. The result analysis showed that in building constructions risk of cash flow shortage is most certain to likely happen with high negative impact on the projects, and risk of price inflation was almost certain and with moderate negative impact, followed by availability of raw materials with likely to happen and to moderately affect the project objective negatively. In the road construction cases again cashflow was most certain to happen with high negative impact and availability of skilled manpower and raw materials are both likely to happen with moderate impact. It also found out that the risk management process and common practice of risk management to be mainly intuitive, based on individuals experience and subjective judgments. i.e. the risk management practice lacks structural (organizational) or systemic approach and it is reactive in most cases. (Keywords: risks, likelihood and impact of risks, Project management, project risk management, construction projects, project actors )*

# Chapter one-Introduction

## 1.1 Background

The construction industry consists of many different sectors and is growing by size and type over time. The construction has as well be come to be one of the key service sectors that are contributing to the growth of real GDP in Ethiopia . In 2017 World bank reported that construction sector has contributed 3.5 % growth rate to the real GDP of the country which has grown 10.9 % in total, the report also showed the change of the contribution of construction sector to the real GDP growth from 1.3% in 2011 to 3.5 % in 2017.

This can as well be explained by the intensive public investment observed in public infrastructures including roads, universities and energy production. The major construction projects in Ethiopia can be summarized as building (housing, Universities, stadiums etc), Road and transport (road sector rail way ), energy (hydropower projects including the renascence dam, geothermal etc.). However the growth of the construction industry is not standardized and its project projects are not managed by applying knowledge and skills, tools and techniques to meet project requirements.

Project management practices as whole and project risk management in particular has been observed to be poor in Ethiopia while the number and type of projects are increasing overtime and this typically prevalent in the construction industry. This is even worst when it comes to application of project risk management while construction industries are more overwhelmed by risks. i.e. the project management as a whole and risk management of projects in particular did not seem to grow parallely. This is manifested by common observation of failure of construction projects in meeting their expected performances. Most construction projects in Ethiopia are facing limitation in meeting the schedule, are suffering with cost overruns, or are not in good position in ensuring the desired level of quality. These challenges require proper incorporation and practice of project management and project risk management, This is even more critically important. since construction industries are more overwhelmed by risks i.e. unless the risks are dealt or managed properly there is maximum likelihood of cost overruns,

time delays and low quality. This in turn could result in dissatisfaction of clients, and public at large (Nadeem 2010). This even make it worst in developing countries where there is limited resources and most construction projects are public and basic social services and infrastructural developments and are largely financed by external grants and loans. This research entails a purpose of assessing the practices of risk management in the construction industry to see how performance of the sector can be better risk informed and is able to manage risks in project settings with proper understanding of the knowledge of project management. Risks can never be avoided; However, the risk could be managed, minimized, shared, transferred or accepted by understanding their livelihood and significance of their impact.

## **1.2 Problem statement**

The construction industry is widening in its share in the service industry of the economy , and the government is still increasingly investing in public social services and infrastructures projects over time and most of these projects are construction related projects. Ethiopia's annual rate of economic growth, which averaged 10.3 percent over 2005/06–2015/16 (compared with the regional average of 5.4 percent), slowed to 8 percent in FY2016 due to drought-related lower agricultural production (WB, Ethiopia Economic update 2018 ). Growth has been driven by the industrial sector with a 4.4 percent contribution to growth, followed by the services sector contributing 4 percent (out of which the 3.5 % contribution is from construction), and agriculture contributing 2.5 percent. i.e. Construction contributed 3.5 percent to the overall GDP growth in 2016/17 FY. The over all share of construction sector in the real GDP has as well be growing over time. The share of construction has increased from 0.5% share in 2011/12 to 3.5% Share in 2016/17. The growth has also been observed to continuously increasing. The share of increase of construction in the economy is in both in private and public and its significance in the demand as well as supply side of real GDP growth in the country. There fore construction has become one of the key main sectors that is contributing to the national growth that needs proper focus and understanding.

However it also noted the inefficiencies that the growing construction projects may have is some thing that needs careful attention. With growth of the construction as industry and economic opportunities, the growth of the project management skills and competencies does not seem to grow parallel. This is manifested by common observation of failure of construction projects in meeting their expected performances in the country. Project failures are also common phenomenon in the Ethiopian construction industry due different type and source of internal and external risks, however little is known and documented on the risks that are challenging the sector and how the project actors are responding to manage those risks, i.e. there is no much updated knowledge on the potential risks, how the construction sector and its stakeholder perceive or understands risks, and what are the common practices of project risk management. There fore this research or assessment intended to identify key risks in the construction sector, perception of theses risks by the project actors and asses the common practice of risk management systems by project actors and review it in line with standard project risk management to understand its status.

### **1.3 Research question**

Are project actors in construction industry risk proactive and what are the attitudes /perception of risk management in the industry

- What are the potential risks in construction industry in Ethiopia?
- How are the impacts and likelihood of risks perceived ? (Which risks are perceived the most significant in likelihoods and impacts by project actors?)
- What are the common risk management practices in construction industries?

### **1.4 Research objective**

This research entails a purpose of assessing the practices of risk management in the construction industry to see how performance of the sector can be better risk informed and is able to manage risks in project settings with proper understanding of potential risks, the knowledge, skills and tools of project management. Risks can never be avoided; however, risks could be managed, minimized, shared, transferred or accepted by understanding their livelihood and significance of their impact by trying to understand; how are risks and risk management perceived in construction industries?, how is the risk management process

perceived in practice?, and which type or category of risks are perceived the most significant (likelihoods and impacts )..

#### **1.4.1 General objective**

Asses potential risks and project risk management practices in construction projects in Ethiopia.

#### **1.4.2 Specific objective**

- To asses and identify the potential risks in construction industry in Ethiopia
- To asses the perception project actors on the likelihood and impact of risks identified
- To asses the project risk management practices in the sector.

### **1.5 Significance of the study**

Only little is known in risk management practices in the country and mainly in construction industry. There are knowledge gaps on how projects are undertaking risk managements based on recommended project management body of knowledge. Little has been documented in understanding , what the prominent risks in Ethiopia construction industries look like, and how theses risks are perceived by project actors and knowledge of practices in developing countries like Ethiopia in ongoing projects mainly construction industries. There are no updated and locally contextualized assessments on the area while the sector is widening its economic share. This paper will be adding values to bring current knowledge on perception and practice in risk management in construction industries and will try to come up in formulating better theoretical and practical recommendations and best practices how risk management practices could be institutionalized and better practiced.

### **1.6 Scope of the study**

The scope the study is limited to risk management practices, mainly in the construction industry as case study to understand the over all situation of risk management compared to the standardized and recommended management practices. It is qualitative and in-depth review of cases of projects in 6 construction companies. It reviews cumulative experience from the past focusing on current practice and prospects in the near future

- 1.6.1. Temporal scope:-this research tries to review the project management practices since the past 5-10 years and examines the prospects and possible changes in the near future
- 1.6.2. Methodological scope:-This research is qualitative case study facilitated by in-depth review and interview, observation and literature reviews. The assessment will be conducted from 5 construction companies who have active projects on building and roads and who have volunteered to participate.
- 1.6.3. Conceptual scope:- The study will mainly focus in Project risk management concepts, including identification and understanding of risks, differentiating ad-hock and knowledge based risk management practices in project in line with Project management body of knowledge

## **1.7 Limitation of the study**

The study is majorly qualitative and is case study of purposively selected projects in 5 construction companies in Ethiopia; based on their consent and readiness to participate and could be limited for wider generalization and representation

## **1.8 Definition of Terms**

### **1.8.1 Construction industries and project actors/members**

*Construction industry* consists of many different sectors and is growing by size and type over time. The construction industry sectors in Ethiopia includes building and residential development sector, civil engineering sector, electro mechanical engineering sectors, professional service sectors and self building sectors. (adopted from Building design enterprise ). As explained earlier construction industries are more overwhelmed by risks and most construction projects in Ethiopia are observed failing to meet their expected deliverables.

**Project actors-** Professionals involved in each project based on their involvement on RM. Commonly suggested professionals include construction project managers, construction managers, quantity surveyors, architects, contract managers, engineers, and their respective assistants

### 1.8.2. Risks, Project Management and Risk management Systems

**Risks-:** Risk is defined as an event that has a probability of occurring, with either a positive or negative impact to a project if it occurs and it may have one or more causes and all projects assume some elements of risk

**Project management -:** Project management is defined by PMBOK as the application of knowledge and skills, tools and techniques to meet project requirements. The process entails 5 key process initiation, planning, execution, monitoring and controlling and closing

**Project Risk management Systems:-** project risk management is one of the key areas of knowledge in project management. It is a proactive and institutionalized way of risk management in projects. A good risk management system (RMS) allows an organization to look forward to the future for each project, while maintaining a convenient capacity for looking backwards to the wisdom gathered from its previous project risk experiences

## 1.9. Organization of the Study

The research is organized in such a way that to include all relevant titles in body. In general chapter one deals about general background, problem statement, research objects and its approaches chapter two will deal about empirical and theoretical review of related literatures on construction projects and project risk management, chapter three will deal about methodological approaches, data collection and analysis, the fourth chapter will deal about the results and discussions, and chapter five will deal about summary of major findings, conclusion and recommendations.



# Chapter Two-Review of Related Literatures

## 2.1 Theoretical review

### Project Risk management process- Theories and Concepts

#### A. Project management and risk

Project management is defined by PMBOK as the application of knowledge and skills, tools and techniques to meet project requirements. The process entails 5 key process initiation, planning, execution, monitoring and controlling and closing. Managing a project typically includes identifying requirements, addressing the needs, concerns and expectation of the stakeholders as the project is planned carried out, balancing the competing project constraints including (scope, quality, schedule budget, resource, risk and others). There fore risk is one of the competing project constraints that requires proper management

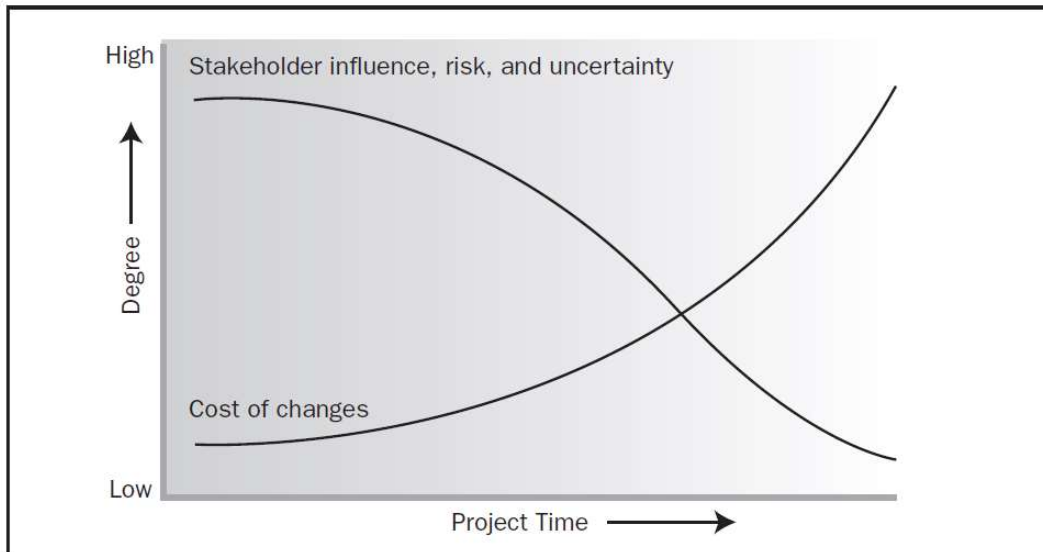
#### B. Project life cycle and risk

Projects differ in nature and their management could as well. i.e. projects vary in size and complexity. However no matter how theses differences exists all projects can be mapped in to a generic life cycle structure starting the project, organizing and preparing, carrying out the project work and closing the project. According to the PMBOK risks are greater at the start of the project and decreases later on over the life of the project.

The generic project life cycle has typical characteristics (PMBOK 2008)

- Cost and staffing are low at the start , peaks as the work is carried and drops later
- Stakeholders influences, risks and uncertainties are greatest at the start of the project and theses factors decreases over life of the project
- Ability to influence and the final characteristics of the project's product with out significant cost impact is at the start of the project and decreases over the project life cycle

Figure 2.1- Risks in Project Life Cycle (PMBOK 2008)



### C. Project Risks and Project Risk management

Risk is defined as an event that has a probability of occurring, with either a positive or negative impact to a project if it occurs and it may have one or more causes and all projects assume some elements of risk. Project risk has its own origins in the uncertainties present in all projects. Known risks are that has been identified and analyzed and making it possible for proper planning and response. On the other side the unknown risks can not be managed proactively and project team are advised to have some level of contingency. However all theses depends on the organizations or individuals attitudes to wards risk. Theses risk attitudes are driven by perceptions, tolerance and other biases unless consistent approach is developed , properly communicated and the risks are handled openly and honestly. Projects with out proactive focus on risk management increases the likelihood of higher negative impact of risks that can potentially lead to the project failure. There project require to institutionalize risk management as their key project management daily practice and culture. PMBOK 2008 Identifies eleven key project knowledge areas that project management need to consider and Project risk management is one of the key knowledge areas recognized. Project risk management is defined as a process of conducting risk management planning, identification, analysis, response planning, and monitoring and control.

### D. Systematic or institutionalized Project Risk management

It has been clearly noted that the complexity of projects is increasing, with growing demands and expectations, computation, rapid growth of technologies, the need for development and social and economical growth, accountability and many other reasons. This growth in complexity is as well accompanied by increased risks and we all tend to manage risks and mostly intuitively. i.e. exercising a deliberately cognitive approach is rarely unless formal procedures are required to deal with risk. A good risk management system (RMS) will allow an organization to look forward to the future for each project, while maintaining a convenient capacity for looking backwards to the wisdom gathered from its previous project risk experiences. PMBOK also recognizes the importance of project risk management as one of the key areas of knowledge in project management. Institutionalized Project risk management is a continuous process

A good RMS for a project should comprise processes to:

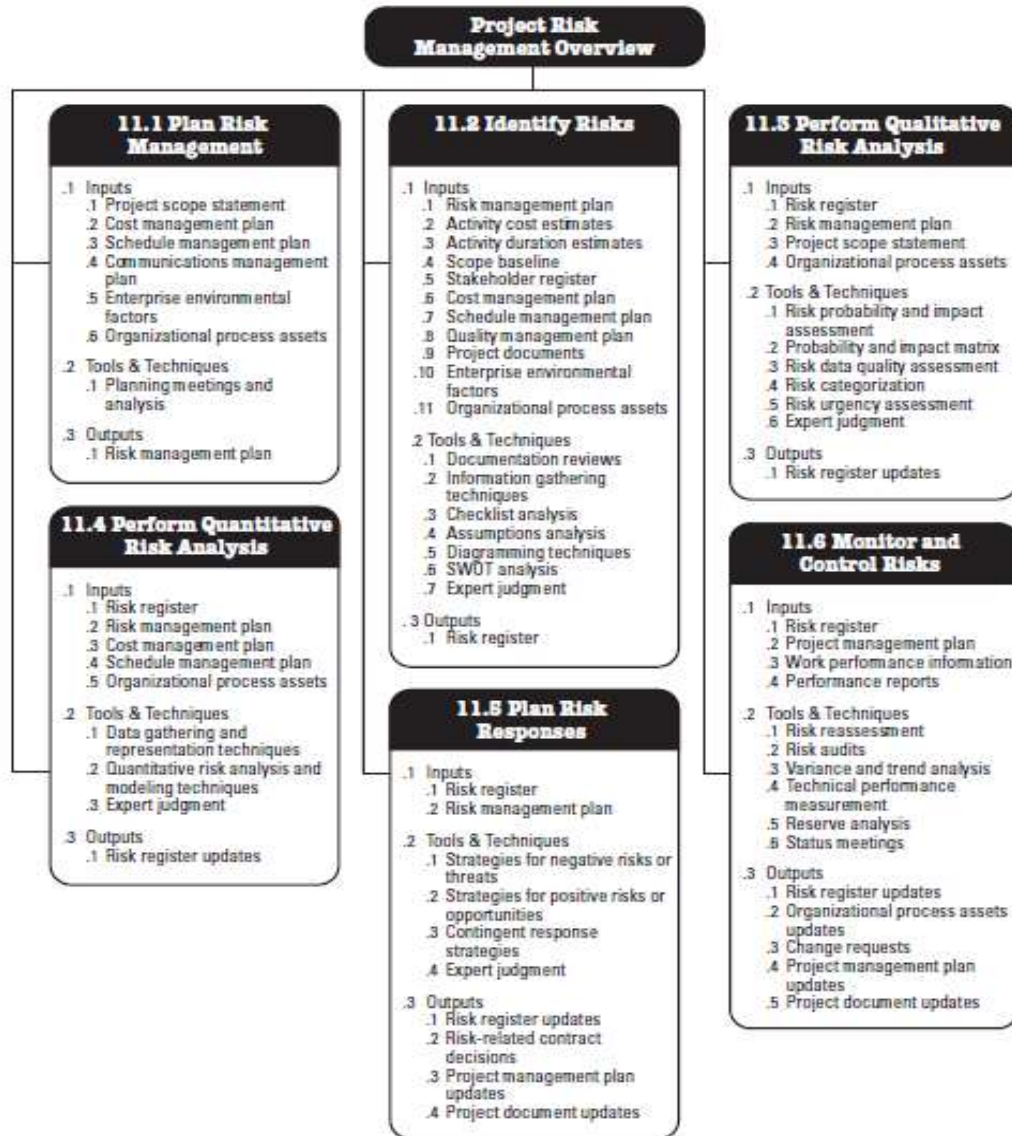
- ✓ establish the appropriate risk context(s),
- ✓ identify the project risks the stakeholder organization will face,
- ✓ analyze the identified risks,
- ✓ develop responses to those risks,
- ✓ monitor and control the risks during the project, and
- ✓ permit post-project capture of risk knowledge.

Similarly PMBOK establishes Key components of Project Risk Management and define them as follows

- ✓ **Plan risk management** (defining how to conduct risk management activities)
- ✓ **Risk identification** (defining which risk may affect the project and defining their characteristics )
- ✓ **Performing qualitative risk analysis** (prioritizing risks for further analysis or action by assessing and combining their probability of their occurrence and impact )
- ✓ **Performing quantitative risk analysis** (numerical analysis of effect of identified risks on over all project)
- ✓ **Planning risk response** (developing options and actions to enhance opportunities and reduce threats to project objectives)

- ✓ **Monitor and controlling risks** (implementing risk plans, tracking identified risks, monitoring residual risks, identifying new risks, evaluating risk process effectiveness through out the project )

Figure 2.2 Over view of Project risk management (Taken from PMBOK 2008)



In project risk management all of the components are very important, however for main purpose and scope of the study, this paper will of the study will focus on risk identification,

risk assessment/analysis and response plan to see the risk management process systems in the construction projects and over all perception by the project actors.

***Risk identification***

Risk identification purposes to establish risk register, that contain list of potential risks categorized in most sensible way that is easier for mapping. Different inputs and several techniques and tools are available to do it.

Risks and other threats can be hard to eliminate, but when they have been identified, it is easier to take actions and have control over them. If the causes of the risks have been identified and allocated before any problems occur, the risk management will be more effective (PMI, 2004)

Key inputs of risk identification include risk management plan, activity cost estimates, activity duration estimates, scope base line, stakeholder register, cost management plan, schedule management plan, quality management plan, project document, enterprise environmental factor, organizational process.

***Table 2.1 Tools techniques of risk identification***

<b>Techniques</b>	<b>Tools</b>
<b>Documentation Review</b>	Structured review of project documentation
<b>Information gathering techniques</b>	Brainstorming
	Delphi technique
	Interview
	Root cause analysis
<b>Check list Analysis</b>	
<b>Assumption Analysis</b>	
<b>Diagramming technique</b>	Cause and effect diagrams
	System or process flow chart
	Influence Diagrams
<b>SWOT Analysis</b>	
<b>Expert Judgment</b>	

A satisfactory process of risk identification is crucial to effective risk management, since unidentified risks cannot be systematically managed.

***Risk assessment /analysis***

Risk analysis is an evaluative process that serves the purpose of establishing some understanding of the magnitude of the risks faced by an organization in undertaking a project.

The identified risks can be assessed or analyzed qualitatively or quantitatively. PMBOK puts risk assessment/analysis as two key components project risk managements based on the methodologies used. I.e. Performing qualitative risk analysis and performing quantitative risk analysis. Performing qualitative methods are most applicable if risks can be placed somewhere on a descriptive scale from high to low level. The quantitative methods are used to determine the probability and impact of the risks identified and are based on numeric estimations (Winch, 2002). Companies tend to use a qualitative approach since it is more convenient to describe the risks than to quantify them (Lichtenstein, 1996).

***Table 2.2 Summary of Qualitative risk analysis tools and techniques***

<b>Tools and techniques</b>
Risk probability and Impact assessment
Probability and Impact Matrix
Risk Data quality Assessment
Risk Categorization
Risk Urgency assessment
Expert Judgment

***Table 2.3 Summary of Quantitative risk analysis***

<b>Techniques</b>	<b>Tools</b>
Data gathering and interpretation Techniques	✓ Interviewing
	✓ Probability distribution
Quantitative risk analysis and modeling method	✓ Sensitivity analysis
	✓ Expected monetary value analysis
Expert Judgment -	

**Performing qualitative risk analysis**

Performing qualitative risk analysis is usually rapid and cost effective means of establishing priorities for plan risk response and lays foundations for to perform quantitative risk analysis if required. The most commonly used Tools are Risk probability and Impact assessment and Probability and Impact Matrix

### **Risk probability and Impact assessment**

Risk probability assessment investigates the likelihood of each specific risk to occur . Risk impact assessment investigates the potential effect on a project objective such as time, cost, scope, or quality.. The level of probability for each risk and its impact on each objective is evaluated during an interview or meeting. Explanatory detail, including assumptions justifying the levels assigned, are also recorded. Risk probabilities and impacts are rated according to the definitions given in the risk management plan. Sometimes, risks with obviously low ratings of probability and impact will not be rated, but will be included on a watch-list for future monitoring (PMBOK 2008).

### **Probability and Impact Matrix**

Risks can be prioritized for further quantitative analysis and responses based on their risk ratings. Usually these risk ratings rules are specified and set in advance by the organization and included in the organizational process assets.

The range of priority score, the rating and color are assigned to indicate the importance of each risk. To set priorities, impact is multiplied by probability. The compiled results are shown in the matrix in Figure below (PMBOK 2008). are analyzed

Figure 2.3- Probability Impact Matrix (Taken PMBOK 2008)

Probability and Impact Matrix										
Probability	Threats					Opportunities				
0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05
0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04
0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
0.30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02
0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01
	0.05	0.10	0.20	0.40	0.80	0.80	0.40	0.20	0.10	0.05

Impact (numerical scale) on an objective (e.g., cost, time, scope or quality)

Each risk is rated on its probability of occurring and impact on an objective if it does occur. The organization's thresholds for low, moderate or high risks are shown in the matrix and determine whether the risk is scored as high, moderate or low for that objective.

### ***Risk Response***

Risk response is the next crucial step after analysis of the risk in risk management systems. Project managers or actor all other actor may take different strategies to respond to risks. There are several strategies to do it as well. The PMBOK suggests use of mixed strategies could be more effective. There are four risk response strategies to response to negative risks or treats this are avoidance; transfer; mitigate (reduce and retain residual), and accept or retain.

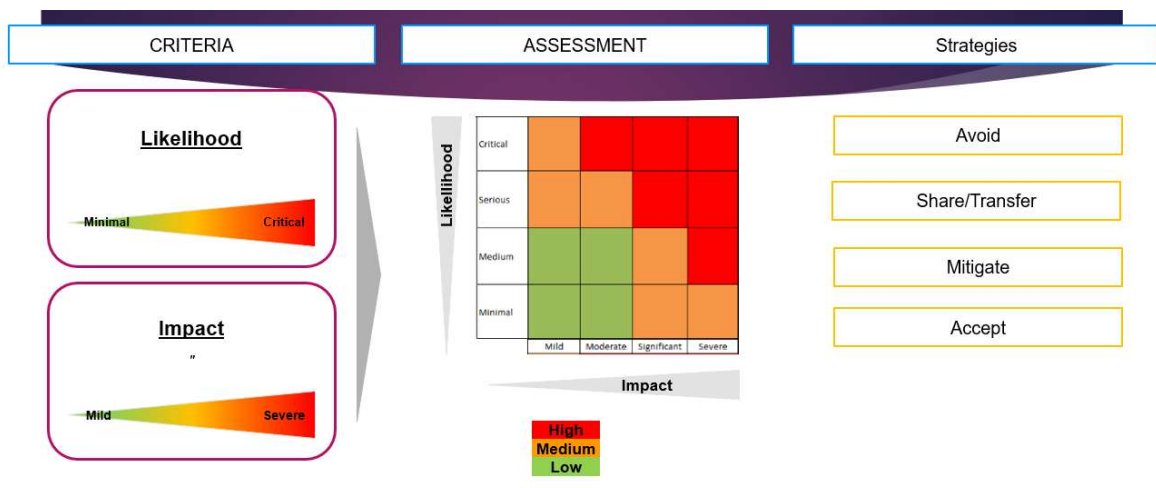
- ***Avoiding*** strategy option is exclusive, since if a risk is avoided it cannot be transferred, reduced or retained. However, this extreme is seldom adopted as a response to one project risk factor in isolation. Such a decision is usually arrived at after a number of issues have been considered and their overall influence on the project assessed.
- ***Risk Transfer-*** requires shifting some or all negative impact of threat along with ownership of the response. This is a common response in project situations where



stakeholder supply chains or networks are easily distinguished, as attempts will be made to transfer risks progressively along the supply chain or to the more distant extremities of the network. Typically, a project client will transfer risks to a contractor, who in turn will transfer them to subcontractors or suppliers. Insurance is a transfer mechanism for risks that are insurable: theft, injury, damage to property or equipment. This introduces a third party risk transferee to the situation, thereby involving another stakeholder in the project.

- **Mitigate-** requires the probability or/and impact of an adverse risk event be with acceptable threshold limit. No risk should be avoided, transferred or retained without first checking to see if it is possible to reduce it and then retain the residual risk. For anyone with a professional interest in risk management, reducing risk is probably the most absorbing area of involvement.
- **Accept-** this strategy is adopted because it is seldom possible to eliminate all treats from the project. Retaining risks without mitigating them presumes that the decision is an informed one and based upon analysis which indicates that any reduction treatment has a negative cost/benefit ratio. For example An excavation subcontractor tendering for a construction project might retain the risk of storm water flooding the excavations, but reward himself by increasing the unit price rate for the work.

Figure 2.4- Risk Assessment and Response Strategies Modified by the researcher



## **2.2 Empirical review**

### **Project management, risks and project risk management in Construction projects**

The construction industry is taking significant share in the economy and this a golden opportunity in a continuously growing economy. However, the over all management of construction projects need to grow parallelly as well and the in efficiencies observed in the sector need to be properly managed for sustained and optimal growth. This requires proper application of project management skills, knowledges and tools in all constriction projects since many construction projects are not performing well. Most construction projects in Ethiopia are facing limitation in meeting the schedule, are suffering with cost overruns, or are not in good position in ensuring the desired level of quality. Even though the area is not exhaustively explored and properly informed to back up the common observation and underlining causes with research and evidences, there are emerging literatures and empirical evidences that are trying to fill this gap. In one of recently conducted assessment by Ayalew and his co-researchers on performances of construction industry in Ethiopia, the result has revealed that the level of construction project management practice in terms of adapting general project management procedures, project management functions, tools & techniques to be unsatisfactory. Particularly, the level of practice in terms of safety, risk and time management was found to be very low. The amount of schedule slippage ranges between 61-80% and that of planed costs and other variables such as risk, quality, resources utilization and safety deviates in the range 21-40% from predetermined requirements or anticipated at the beginning of the project (AYALEW 2016). The study demonstrated that the level of construction project management practice in terms of adapting general project management procedures, project management functions, tools & techniques to be unsatisfactory. Particularly the level of practice in terms of safety, risk and time management was found to be very low. The study also identified that time, cost and risk management as the most challenging issues for professionals in managing their day to day's activities. All projects are undertaken under limited condition and constraint, project management success are usually measure if a project is able to fulfill in delivering the right product or quality of services with in the given time and resources. All quality, on time and on budget can be equally important and clients may also prioritize one over the other with out compromising the over all gain. However; Even though On time and

on budget completion of construction project is frequently taken as key criteria for success by clients, contractors, consultants and related stakeholders (Rwakarehe 2014) the overall performances of construction projects in Ethiopia does not seem to be in a best position to demonstrate this and key success criteria's are usually undermined. In another study that was looking into project management maturity in construction industry in developing countries taking Ethiopian contractors as a case study found out that Only 24% projects were able to manage their projects time management well (Abadir 2011). That three out of four projects were not able to manage their projects on time completion. If projects are not completed on schedule they can be followed up with many other risks that can compromise the value of the project as whole at least it can be accompanied by cost overrun. Similarly another study was conducted to understand the main reasons or factors of project delays in general. The study looked in to on construction projects delay and their antinodes taking Ethiopian construction sector as a case and it tried to explore why the construction projects are challenged to deliver their expected performance on time. In its conclusion the study indicated that factors that are causing delays can be many. However all delay causing factors can be generally related to limitation in project management application. This include limited use of proper application of project management knowledge areas and use of assisting software application. The study also undergone further and tried to identify risks and their prioritization in causing delay as perceived by the project actors. Accordingly it take come with identified five most common delay causing factors in the construction sector that are ranked priority by study participants (i.e. cash flow problem, mismanagement, improper planning, slow decision making and late delivery of material and equipment) (Zewdu 2016). As you can understand from some of the findings above the overall cases of challenges in the projects seem to coil in to non optimal Project management practices as whole and project risk management in particular. This is even worst when it comes to non optimal application of project risk management while construction industries are more overwhelmed by risks. We can't completely avoid or eliminate risks. Risks and uncertainties can appear in various shapes and, besides, no construction project is risk free (Kululanga 2010). And it could even be overwhelmed with risk than other sectors. Unless the risks are dealt or managed properly; there is maximum likelihood of cost overruns, time delays and low quality. This in turn could result in dissatisfaction of clients, and public at large (Nadeem 2010). In a study that assessed the Effect of Inadequate Design on Cost and Time Overrun of Road Construction Projects in seven road project in Tanzania found out that total cost and time overrun rates on average to be 44% and 26% respectively (Rwakarehe 2014). The case was the same in Ethiopia as well, during the review of the Implementation of the

Road Sector Development Program (RSDP), it was pointed out that the program was facing a number of challenges including time and cost overrun risks (Yilma, 2014). Similarly (D.K. Chimwaso 2000) investigated cost performance public construction projects in Botswana and found out that seven out of ten public projects had reported cost overruns. The study also looked into possible factors that influenced cost overruns and ranked them in order of their significance. Accordingly, key factors influencing or causing cost overrun in public construction projects were named in order and these were: variations, re-measurement of provisional works, contractual claims and fluctuations in the cost of labor and materials, with variations being the most significant. While this is the case, the construction sector in developing countries including Ethiopia does not seem to be risk proactive and risk management processes are not growing with the growth of the industry. This is supported by evidence; Apart from large-sized and more experienced construction contractors, all the small and medium-sized construction contractors – which constitute the largest proportion of the construction industry – were characterized by a low implementation of the various required steps for the project risk management process. The application of project risk management processes was significantly influenced by the various categories of size and experience of the surveyed construction contractors at  $p < 0.01$ . Furthermore, contingency planning within the series of steps of project risk management process featured highly among the surveyed construction contractors. Most of the variables under the series of steps of project risk management process were positively and significantly linked to progression in size and experience of construction contractors at  $p < 0.01$ . Besides many construction projects fail to achieve their time, budget and quality goals. Moreover, the consequences of risk in construction industries of developing countries, including sub-Saharan region are more severe than in established Western Construction industries (Kululanga 2010). Therefore, incorporation and application of risk management process is critically important in developing countries as the consequences of the prominent risks in construction industries could be fatal. The research and development team in Ethiopian Road Authorities assessed construction risk management practices through insurance and to address this gap and contribute to the knowledge base of construction risk management in Ethiopia. The study revealed that delay in payment to contractor for work done is ranked first important risk, injury to property is rated first as most important insurable risk and bid bond is ranked first as most used insurance policy in the Ethiopian road sector. The assessment also came up with key important findings in its conclusions (Yilma 2014). These are

1. The client (ERA) mainly uses the opinion of external consultants as the number one method of risk identification. The consultants and contractors, on the other hand, mainly use site visit as number one method of risk identification. By past experience or analysis of prior projects was ranked as second most used risk identification method by consultants and contractors.
2. Contractors mainly conduct risk analysis at the time of tendering. Most of the contract groups just add a percentage to budget/cost to cope up with uncertainties rather than implementing mathematical risk analysis tools to quantify risks.
3. Most of the respondents have encountered accidents in the road construction projects they were involved, however; the contracting parties mainly provide insurance coverage to road projects to meet the demand of the client rather than to avoid possible risks.
4. Majority of the respondents from consultants involved in the road projects have confirmed that they do not have effective professional indemnity insurance for the service they deliver and their firms. It is noted that the method of calculation for coverage of professional indemnity insurance is simple method of calculation based on the service contract amount and the period of service.
5. The main problems/concerns identified with the provision of insurance in the road construction projects are mainly lack of knowledge in insurance and complex policy language of insurance to apply for road construction industry.
6. The interaction among the contract groups in the identification and management of risks with insurance companies is insignificant. As a result, it is noted that the insurance premium is fixed mainly based on the location of the project and the contract amount of the road project.

In another research that objected to assess the impact of risk in construction projects in Ethiopia on time, cost and quality of project triangles has also identified risks that are perceived with high impact. Accordingly; It found out that out of identified risks factors those have very high risk level on project costs were found to be equipment/material failure, labor poor productivity and equipment scarcity. Lack of training, communication is high risk level in project cost. The quality of the project affected by labor poor productivity is very high. The others like equipment/ material failure, managerial inadequacy, and lack of training, lack of communication and departures of qualified staff are high risk level in term of quality. Generally very high risks are rating based on the analysis in project performance are equipment/material

failure, the labor poor productivity and equipment and material non-availability, their risk level was greater than 50%. The second specific objective was to identify whether water work construction project risks are managed with formal Risk management system. The assessment revealed that construction project has no routine practices employed to manage risks. The findings it concludes that the main risk factors that affect the project performance very high are equipment/material failure, labor poor productivity, the non-availability of equipment and material. The very low identified risk levels are injuries, earthquake & winds; and land slide & rock falls. Finally as from the respondents and impact levels of risk; the analysis revealed that the risk management is not practiced very well (Mitikie 2017) .

The prominent/potential risks of construction industry in Ethiopia are partially reflected in different literatures; however there is clear gap in documenting and proper mapping of comprehensive list of existing risks and newly evolving once. This project work paper sets objective assessing and consolidating potential risks in construction industry and would like to provide updated version of risk management perceptions and practices. Moreover even though the construction industry is widening its share in the economy and growing faster; projects are still at stake of many risks in some cases due lack of institutionalized risk management practices. The paper also will try to see if there are evolving or changing perception of risks and risk management by project actors in the growing industry. Literatures have reflected the non optimal knowledge skill and practice of project management as whole and risk management in particular is a common challenge and this starts with the perception of project actors. More over risk mitigation practices in the sector is widely researched and there is existing knowledge gap. Generally as the area is not well researched and there is no much updated knowledge on how the construction sector and its stakeholder perceive or understands risks, what type or category of risks are duly considered, how their risk management is oriented when compared to standardized practiced of project risk management in PMBOK in their daily activities and ongoing projects in practice. Therefore the study objects :to asses and identify the potential risks in construction industry in Ethiopia , to asses perception of risks and risk management practices by project actors in construction industries ,to asses means and practices of risk assessment (perception of likelihoods and impacts of risks by project actors and to see key and common measures and mitigation practices of risks to enable understand the key risk management practices and come up with concrete recommendations to contribute to the knowledge gap.

This study needs to understand the potential risks posed in the construction industry, the perception of risk and risk management of project actors, see how the risk management process is practiced or perceived by project actors. This is because it is people who are making decisions every day and the risks associated with projects are therefore more of the people (organizations) involved with those projects. Since risk is associated with project decision-making, it is the decision-makers within the stakeholder organization who will experience risk most directly, and who should be closely involved in managing it and their perception and analysis of skills matters. Research findings also tell us project members or actors concentrate on getting the job done and tend to avoid risk management procedures or practices.

# Chapter Three-Research Methodology

## 3.1 Introduction

The over all research methodology of this paper is summarize below. However the chapter will provide key explanations and justifications on the choice of the approach, design and methods including data collection

The research methodology is qualitative and deductive approach that will be backed up by case study. A two staged qualitative study approach will be used to enable explore better and get new insights on the subject matter and better analysis of understanding of risk management practices in the country mainly in the construction, more over the study will also try to asses the perception the stakeholders (project actors) have on risk, including identification of potential risks and their associated likelihoods and impacts. The first stage will be literature review and analysis of available evidences and this will be supplemented with multiple case study on purposively selected projects. The case study will be administered using structured explanatory type questioners to enable understand the complex nature of the PM and analyze and summarize the perception of construction stakeholders that will be deductive.

## 3.2 Research Paradigm, Approach and design

### 3.2.1 Research Approach

The research methodology approach of this study is qualitative, multiple case study . This because the main objective the study to gain more insights on the risk management practices in the construction industry, explore the challenges with in and asses the perspectives and perception of the project actors. Accordingly the approach is recommended to be qualitative. Qualitative strategy approaches can help the researcher gain new insights into the phenomenon, develop new theories about the phenomenon, and discover the challenges within the phenomenon under investigation (Leedy and Ormrod (2010: 136-137). Besides qualitative research represents the views and perspectives of people while offering an attractive and fruitful means of conducting research. Case studies are also effective as they helps us to get actual experiences and perspectives (Yin 2011 P 301).



### **3.2.2 Research Design**

Research designs are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis.[Cresswell,2009]. Different research design approaches can be used by a researcher based on different factors that may lead to decision. The most common design approaches can be categorized as **Exploration, Description , Explanation, Prediction and Evaluation and** have their own purpose and our choice of research design usually depend on the type of research question we want to answer and the state of knowledge of them problem and many other factors including resources, contexts etc. In this case Exploratory design approach is proposed and believed to be appropriate to gain proper understanding of the problems in risk management practices in the construction, as little known on the recent developments on construction risks, and risk management practices in the construction industry. The propose of this assessment is as well to serve as formative research for further in-depth studies. The exploratory research questions are responded through comprehensive literature review , and multiple case studies with structured questioners designed as deductive approach to enable draw conclusions.

### **3.3 Population and Sampling**

The study population are construction industries in Ethiopia engaged in road and building construction and who are grade one . Total registered grade one construction companies in Ethiopia are around 70 as per Ministry of Construction official reports 2011 EFY (2018/19).

#### **3.3 1 Sample Design**

The study is purposive case sampling- Active and relatively higher value and diversified type of projects will be selected for primary data collection. There fore it is non probability sampling since case study is deemed suitable .

#### **3.3.2 Sample size**

This is multiple case study of 8 project cases under 4 construction companies that are assessed in-depth as cases. The samples are selected based on their project type, convenience and willingness to participate

### 3.4 Data collection

The study approach involved literature review to set the context and explore available evidences in the areas and it has also use structured inductive questioners to asses the perception and review the over all risk management process in construction projects by taking 8 cases of construction projects in 4 construction companies. Relevant literatures , and documents were reviewed to better understand the construction industry, risk management practices, standard risk management procedures and recommendations. For the case study 4 construction campiness are planned to be assessed to see 8 construction projects whose their contract value is higher (at least 35 million ) are selected and professionals involved in the project were interviewed using structured questioner. However only 6 cases were studied. The professionals selections were be based on their involvement on risk management (Commonly suggested professionals are project manager, quality surveyor, architects, contract managers, engineers, and their respective assistances). The study used A 5 point Likert Measurement to rate perceptions of professional on likelihoods and impacts. (Structured questioner for KII and Likelihood and Impact assessment matrix will be developed)

### 3.5 Data Analysis

The qualitative data was transcribed and coded based on key themes of the research questions and objectives. These themes are formulated and synthesized based on the research objectives proposed to be answered by the qualitative methods. These themes are interwoven throughout participants' narratives, problems and gaps. Finally deductive thematic qualitative analysis approach is used.

For the data collected based on Likelihood and Impact assessment matrix using 5 point Likert Measurement, the collected data is analyzed using qualitative 5x5P-I risk analysis. [PMI 2008]

### 3.6 Scale Reliability and Validity

**Reliability-** The research is using standard probability Impact matrix from PMI and Likert scales 1 to 5 and proper definitions and explanations are provided. Inter-observer consistency is the degree to which there is consistency in the decisions of several 'observers' in their recording of observations or translation of data into categories, again people can perceive likelihoods and impacts of risks differently, how ever there is expected consistency of the major risks and reference of contextualized lists of risks is provided for easier references.so the study been designed to ensure inter-observer consistency is maintained to acceptable level

**Validity-** The study is not meant to establish causal relationships rather explore the risks in construction industry and how risk management process is being perceived and practiced, the study may see what are the key factors affecting influencing risk management process in construction projects. **External validity:** The extent to which findings can be generalized to populations or to other settings, this study is qualitative and case study it will provide proper insights but can limited to conclusive generalization to the larger population ,

### **3.7 Ethical considerations**

All participants will be informed about the purpose and advantage of the assessment and the right to refuse at any stage of the interview and procedure. All participants will be informed that the participation is voluntary. Confidentiality of the responses will be assured, and informed consent will be obtained prior to data collection. During data extraction, the name of the people and company will not be included so that information obtained will be kept confidential.

# CHAPTER FOUR-RESULTS AND DISCUSSION

## 4.1 Introduction

In this section key result findings will be discussed, the results are based on the findings of six cases of projects and coupled by literatures reviewed on risk management practices in construction projects and related issues.

## 4.2 Response rate and profiles of project cases

6 different projects run by four construction companies in four different part of the country were taken as a case to see and understand different project types. The projects were selected mainly based on their type or nature of the projects for representativeness, grade of the construction companies (Grade one) and willingness of participation of the company owners as case study. The original plan was to see 8 cases of on going projects from four different types of construction projects i.e. 4 from building, 4 from roads. There fore 4 building project cases were reviewed including one housing development project which has small scale water works and electromechanical project and two road projects were considered out of the four road projects planned since the two project managers of the projects considered for the study declined to be interviewed. There fore, the projects reviewed in this cases study are 1 university expansion building project in diredawa/harar, 1 housing development project, 1 real state development in Addis Ababa, 1 university buildings expansion in Mekele (Tigray), 1 road project around mekelle (Tigray) and 1 road project in Afar interviewed from Addis Ababa. Four general construction companies that are grade 1 were part of this assessment. A total of 12 key informants participated in the case study, the key informants interviewed in-depth are composed of company managers, deputy managers, building engineer, construction project manger and road engineer, civil engineers, material engineer. The experience of the construction actors engaged in in-depth interview ranges from 7 to 29 years of relevant experience. All except one had managerial roles or status in the construction companies that are contracted in the project. Names and details of the projects and construction companies were not deliberately specified for confidentiality and ethical consideration.

Table 4.1 -: Construction Projects ( Cases studies ) Profiles

<i>Project Description (Generic)</i>	<i>Project type</i>	<i>Location</i>	<i>Region</i>
University Expansion	Building	DireDawa	DireDawa city Admin
Housing development project (40/60)	Building	Addis Ababa	Addis Ababa City Admin
Real state development	Building multi function	Addis Ababa	Addis Ababa City Admin
University Expansion	Building	Mekelle	Tigray
Road Project	Bituminous Road	Tigray	Tigray
Road Project	Bituminous Road	Afar	Afar

## 4.3 Results

### 4.3.1 Potential and common risks of construction industry

#### *Most common risks identified negatively impacting the construction industry in Ethiopia*

In the initial review of litterateurs and synthesis of brain storming sessions; the most common risks in construction sector in Ethiopia were organized as per the table 4.3 below. Using this risk reference table further analysis and risk prioritization was conducted as part of the case study by the project actors in the case projects. Accordingly project actors in all building and road construction case study projects were asked to identify top five risks that are most frequent and with higher negative impacts in their projects as well as in the construction industry at large in Ethiopia. As a result the construction actors in the contractor side identified top five priority risk that are challenging their projects and the industry at large and they have been able to come with 15 risks as the most common risks in the industry. The risks identified include cash flow, availability of row materials, absence of skilled man power, gaps on project management and technical skills, corruption, design completeness, inflation, right off, environmental and safety, limited contract administration skills from the client side, outdated building design codes, payment modality, political stability, safety and security (site location), and tender preparation. Their frequency of appearance as top five in all six cases were analyzed and as a result cash flow appeared the most frequently mention top five risks i.e. 4 times out of the six cases as one of the top five risks in the construction industry , similarly absence of skilled manpower, limited skills in project management technical skills, availability of construction inputs appeared 3 times as top five risks, and then cost of materials, right offs mainly in road construction, environmental and safety, design completeness , corruption appeared two times as top five risks, more over political stability, payment modality and contractual issues, hard currency, outdated building design codes, limited skills in contract

administration from the client side, tender preparation problem, safety and security are mentioned once as one of the top five priorities from the six cases under the study.

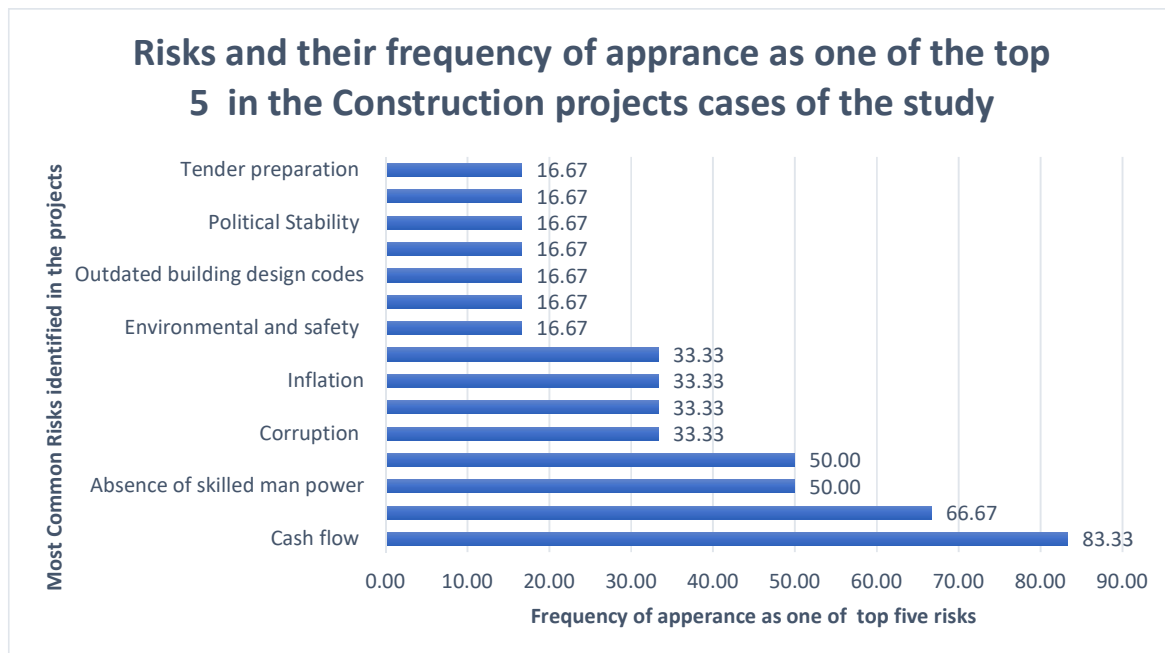
**Table 4.2 Risk Reference in construction industry in Ethiopia** (*Common Risks identified from literatures and brainstorming sessions and used as reference and reminder during interview* )

Possible Category	Common Risks identified from literatures and brainstorming sessions :	Possible Category	Common Risks identified from literatures and brainstorming sessions :
Monetary	Financial (Cash flows)	Political	Legal and Policy issues
	Economical		corruption
	Investment		Political economy
	Hard currency (High rates of foreign exchange)		Conflicts
	Inflation		land management and right offs
Materials	Resources	Environment	Environmental
	Logistics		Natural, Physical
	Price escalation		weather factors (flood, rain, humidity, harsh weather)
	equipment/material failure	Organizational	Institutional Capacity and organizational structure
Market	Market failure		Risk management process
	High cost of construction inputs due import related fees		Experience
Human	Labor poor productivity	Project	Contractual, client (Contractual type and modalities (Price adjustment))
	Limited Project Management Skills,		Project objectives
	Human factors		Project scoping
	Cultural		Planning, schedule,
Technical	Lack of trainings and competency in Risk management		Design
	Project costing and financial management		Quality
			Operational
		Safety	Safety
			Security, crime

Table 4.3 - List of Most common risks identified as Top five in the six project case studies

Most Common risks identified by the project actors as one of the Top five in their individual assessment and cases	Frequency (number of times) appearing as one the top five risks in six of the projects or cases	Probability appearing as one the top five risks in all six project cases%
Cash flow	5	83.33
Availability Raw material	4	66.67
Absence of skilled man power	3	50.00
Project management & technical skills	3	50.00
Corruption	2	33.33
Design completeness	2	33.33
Inflation	2	33.33
Right off	2	33.33
Environmental and safety	1	16.67
Limited contract administration skills from clients	1	16.67
Outdated building design codes	1	16.67
Payment modality	1	16.67
Political Stability	1	16.67
Safety and security (Site location)	1	16.67
Tender preparation	1	16.67

Figure 4.1 - Graphical presentation of frequency of appearance of as top risks in the construction case projects assessed.



The six project cases were separated in two categories as building related projects cases (4 cases ) and road related projects (2 cases) for better understanding of risks in each project types and to see if there is any possible differences . In building projects two risks (availability of construction materials and cash flow) appeared three times out of four cases as top five risks in the sector and own projects and In the road projects similarly two risks (Cash flow and right off) top up as top five risks in both cases. Four common risks appeared in both type of building and road construction projects Cash flow (appeared 5 times of six cases 3 in building and twice in the road ), Availability of raw materials (4 times out of six cases; 3 times in building and once in road), Absence of skilled man power (3 times out of six; twice in building projects and once in road) and project management and technical skills (3 times out of six; twice in the building and once in the road).

Table 4.5 List of risks identified in Building construction case projects of the assessment

Most Common risks identified by the project actors as one of the Top five in their individual assessment and cases	Frequency (number of times) appearing as one the top five risks in two of the Road projects or cases	Probability appearing as one the top five risks in all Road Project cases%
Availability of construction materials and hard curren	3	75.0
Cash flow	3	75.0
Absence of skilled man power (workforce)	2	50.0
Corruption	2	50.0
Design completeness	2	50.0
Inflation	2	50.0
Project management & technical skills	2	50.0
Limited contract administration skills from clients	1	25.0
Outdated building design codes	1	25.0
payment modality	1	25.0
Political Stability	1	25.0

Table 4.6 List of risks identified in Road construction case study projects

<i>Most Common risks identified by the project actors as one of the Top five in their individual assessment and cases</i>	<i>Frequency (number of times) appearing as one the top five risks in two of the Road projects or cases</i>	<i>Probability appearing as one the top five risks in all Road Project cases%</i>
Cash flow	2	100
Right off	2	100
Tender preparation	1	50
Project management & technical skills	1	50
Environmetal and saftey	1	50
Availablity Raw matrial	1	50
Absence of skilled man power	1	50
Saftey and security (Site location)	1	50



### 4.3.2 Perception of project actors probability and Impact (PI) assessed in risks identified in the Construction projects under case study

All identified top five risks under the case projects were analyzed in two types or categories. All risks identified in building projects ( four cases) and all risks identified as top five risks in both cases of road projects were separately analyzed for Probability (Likelihood ) and Impact. In both cases Likelihood impact assessment matrix was independently assessed based on risks identified in each category and 5 point Likert measurement was used to measure the likelihood analysis to get the understanding and perception of the project risks by the project actors.

Table 4.7- Probability/Likelihood and Impact Scale Definition

Probability/Likelihood		Impact	
Scale	Scale Definition	Scale	Scale Definition
	Likelihood/ Probability		
<b>100% (5)</b>	Very high / Almost certain (Highly likely to occur. Has occurred in past projects and conditions exist for it to occur on this project.)	<b>5</b>	Very high
<b>80% (4)</b>	High/Likely to occur (Likely to occur. Has occurred in past projects.)	<b>4</b>	High
<b>60% (3)</b>	Moderate/Possible to occur	<b>3</b>	Moderate
<b>40% (2)</b>	Low/Most likely will not occur (Infrequent occurrence in past projects.)	<b>2</b>	Low
<b>20% (1)</b>	Very low/highly unlikely (Highly unlikely to occur. May occur in exceptional situations.)	<b>1</b>	Very low

**Table 4.8 Probability Impact matrix of risks in building construction on three of key project activities scaled (Probability 0 to 1 (scales labeled according to the scales) and Impact 1 to 5 labeled**

**Table 4.8a Probability Impact matrix in building construction projects Probability vs Impact analysis of independent project objectives (Cost, Time and Quality) in numeric scales**

Risks	Probability	Impact on the project components		
		Cost	Time	Quality
Cash flow	1	4.3	5	3
Inflation	1	5	3.5	3
Availability of construction materials and hard currency	0.8	4	4.3	3
Project management & technical skills	0.8	3	4	4
Absence of skilled man power (workforce)	0.8	4	3.5	3
Outdated building design codes	0.8	3	3	4
Payment modality	0.8	5	2	2
Political Stability	0.6	5	5	2
Design completeness	0.6	4	4	3.5
Limited contract administration skills from clients	0.6	4	3	4
Corruption	0.6	3	2.5	3

**Table 4.8b Probability Impact matrix in building construction projects Probability vs Impact analysis of independent project objectives (Cost, Time and Quality) in numeric scales Labelled**

Risks	Probability	Impact on the project components		
		Cost	Time	Quality
Cash flow	Almost Certain	High	Very high	Moderate
Inflation	Almost Certain	Very high	Moderate	Moderate
Availability of construction materials and hard currency	Likely	High	High	Moderate
Project management & technical skills	Likely	Moderate	High	High
Absence of skilled man power (workforce)	Likely	High	Moderate	Moderate
Outdated building design codes	Likely	Moderate	Moderate	High
Payment modality	Likely	Very high	Low	Low
Political Stability	Possible	Very high	Very high	Low
Design completeness	Possible	High	High	Moderate
Limited contract administration skills from clients	Possible	High	3	High
Corruption	Possible	Moderate	Low	Moderate

Cash flow was almost certain to happen and with very high negative impact in timely finishing the projects and associated with high negative impact for additional incurred cost, Similarly Inflation of price of construction inputs is almost certain that happens all the time and leads to very high negative impact in incurring additional costs to the project. Again risks like limited availability of construction materials are likely to happen and with high negative impact in the cost and time of project objectives . Absence of the desired skill and experience in Project management and Technical skills is likely to happen and leads to high negative impact in quality and timely finishing and has moderate cost implication moreover absence of skilled

manpower is highly probably to happen and is perceived to lead highly affecting the timeline and quality of the project.

**Table 4.8c Probability Impact matrix in building construction projects Probability vs cumulative Impact analysis on over all project objective in numeric scales**

<b>Risks</b>	<b>Probability</b>	<b>Weighted Average of Cumulative impact of project objectives (Cost, Time and Quality) (scaled 0 to 5)</b>
Cash flow	1	4.10
Inflation	1	3.83
Availability of construction materials and hard currency	0.8	3.01
Project management & technical skills	0.8	2.93
Absence of skilled man power (workforce)	0.8	2.80
Outdated building design codes	0.8	2.67
Payment modality	0.8	2.40
Political Stability	0.6	2.40
Design completeness	0.6	2.30
Limited contract administration skills from clients	0.6	2.20
Corruption	0.6	1.70

**Table 4.8d Probability Impact matrix in building construction projects Probability vs cumulative Impact analysis on over all project objective in numeric scales labeled**

<b>Risks</b>	<b>Probability</b>	<b>Average Cumulative impact (Cost, Time and Quality) labeled cumulatives of the scales</b>
Cash flow	Almost Certain	High
Inflation	Almost Certain	Moderate
Availability of construction materials and hard currency	Likely	Moderate
Project management & technical skills	Likely	Low
Absence of skilled man power (workforce)	Likely	Low
Outdated building design codes	Likely	Low
Payment modality	Likely	Low
Political Stability	Possible	Low
Design completeness	Possible	Low
Limited contract administration skills from clients	Possible	Low
Corruption	Possible	Very Low

Cash flow was almost certain to happen and with high negative impact in the over all project and inflation (price scalation ) is certain and that leads significant negative impact on the over all project objective. Limited availability of construction of materials is highly probable and with significant. Project management skills, absence of skilled man power, outdated building codes and payment modalities and, are highly probable and with considerable negative impact respectively. Other risks like political stabilities, design completeness, Limitations in a contract administration and corruption have possibility to occur and all have considerable negative, moreover corruption which has possibility to occur and was perceived as its negative impact in the over all project objective was not that significant.

**Perception of project actors (PI) assessed in Road construction case projects (2 road project cases)**

**Tables 4. 9 Probability Impact matrix of risks in Road construction on three of key project activities scaled (Probability scaled 0 to 1 and Impact 1to 5 from lowest to largest)**

*Table 4.9a Probability Impact matrix in road construction projects Probability vs Impact analysis of independent project objectives (Cost, Time and Quality) in numeric scales*

<i>Risks</i>	<i>Probability</i>	<i>Impact</i>		
		<i>Cost</i>	<i>Time</i>	<i>Quality/Scope</i>
<i>Cash flow</i>	1	4	5	3
<i>Availability of raw material</i>	0.8	4	3	3
<i>Absence of skilled man power</i>	0.8	3	4	4
<i>Project management &amp; technical skills</i>	0.7	3	4	2
<i>Safety and security (Site location)</i>	0.6	4	4	3
<i>Tender preparation</i>	0.6	4	4	2
<i>Right off</i>	0.6	3.5	5	1.5
<i>Environmental and safety</i>	0.6	3	3	3

**Table 4.9b** *Probability Impact matrix in road construction projects Probability vs Impact analysis of independent project objectives (Cost, Time and Quality) in numeric scales Labelled*

<i>Risks</i>	<i>Probability</i>	<i>Impact</i>		
		<i>Cost</i>	<i>Time</i>	<i>Quality/Scope</i>
<i>Cash flow</i>	Almost Certain	High	Very high	Moderate
<i>Availability of raw material</i>	Likely	High	Moderate	Moderate
<i>Absence of skilled man power</i>	Likely	Moderate	High	High
<i>Project management &amp; technical skills</i>	Possible	Moderate	High	Low
<i>Safety and security (Site location)</i>	Possible	High	High	Moderate
<i>Tender preparation</i>	Possible	High	High	Low
<i>Right off</i>	Possible	Moderate	Very high	Very Low
<i>Environmental and safety</i>	Possible	Moderate	Moderate	Moderate

Cash flow was almost certain to happen and with very high negative impact in timely finishing the projects and associated with high negative impact for additional incurred cost and significant impact on the quality. Absence of Skilled man power is highly probable to happen and is perceived to lead to high negative impact in the schedule and quality of the project and significant impact on the cost. Unavailability of raw materials is highly probable and it has high negative impact on the cost and significantly affects the schedule and quality of the project. Risks in absence of the right project management and technical skills possible to happen and has high negative impact in project schedule and significant one in the cost and can moderately affect quality. Risks related to site safety and security and tender preparation are as well possible that has high negative impact in the schedule and cost of the project. Risks associated with right off are possible and have very high negative impact in the project schedule and significantly affect costing with no significant effect on quality. Environmental and safety related risk is possible and it can have significant negative impact in time, quality and cost of the project.

**Table 4.9c Probability Impact matrix in road construction projects Probability vs cumulative Impact on over all project objective in numeric scales**

	<i>Probability</i>	<i>Weighted Average of Cumulative Impact on project objectives(Cost, Time and Quality)</i>
<b>Risks</b>		
Cash flow	1	4.0
Absence of skilled man power	0.8	3.3
Availability of raw material	0.8	3.0
Project management & technical skills	0.7	3.0
Safety and security (Site location)	0.6	3.7
Right off	0.6	3.3
Tender preparation	0.6	3.3
Environmental and safety	0.6	3.0

**Table 4.9d Probability Impact matrix in road construction projects Probability vs cumulative Impact on over all project objective in numeric scales labeled**

	<i>Probability</i>	<i>Weighted Average of Cumulative Impact on project objectives(Cost, Time and Quality)</i>
<b>Risks</b>		
Cash flow	Almost Certain	High
Absence of skilled man power	Likely	Moderate
Availability of raw material	Likely	Moderate
Project management & technical skills	Possible	Moderate
Safety and security (Site location)	Possible	High
Right off	Possible	Moderate
Tender preparation	Possible	Moderate
Environmental and safety	Possible	Moderate

Cash flow was almost certain to happen and with high negative cumulative impact in the over all project objective , Absence of skilled man power and short falls in availability of raw materials are likely to happen and could impact the project significantly in the over all project objectives. Risks associated with site location safety and security are possible and have high negative impact in cumulative. Both Tender preparation and Environmental safety related risks are possible to occur and have significant negative impact.

### **4.3.3 Project risk management practices by project actors reviewed in line with Risk management systems**

#### **Risk Identification Processes**

**The Key informants were asked if there any risk mapping or identification exercise in their companies or in their projects.**

Only two out of four construction companies mentioned; they have some initiatives of exercising risk identification and mapping, one of the construction companies is considering this exercise because of plan of certification for ISO and there is requirements, the second company initiated the risk identification or risk management systems in general as part of requirements set to participate in housing development projects. One of the key informant or study participant whose company tried for ISO registration said “ There was ongoing effort for ISO registration and standardized approach to risks management process was initiated in our company, but we couldn’t go further to the standardized system. We are still aiming to do it and of course, we have some good practices that we still employ from our experience. For example, we usually employ external designers to get second thoughts of experts and identification and assessment of risks in new projects contracted; however it is limited to project inception and is mainly hanging at management levels.” Similarly in the second company who had the chance of participating in housing construction explained that; “ they have received generic training in project management and have tried to do periodic risk identification mainly risks that have been factoring delay. Other ways no systematic or institutionalized risk identification process is found in all cases.” One of the KII respondents also added, “some of the sub optimal or non systematic risk identification practices that you see here and there are; either done during bidding process or during project inception and contracting and no follow up or continued risk identification is done after wards”. Another respondent also added, “ you would see some level of reactive exercises in response to immediate and growing or emerging risks in a project.” He also added such risk identification or mapping exercises are done subjectively by individuals in the management or collectively and is mostly dominated from past experiences and intuitively. More over in one of the cases which is relatively trying to do suboptimal risk identification and management; the exercise is dependent on the proactivity and experience of individuals working in the project. In such cases the respondent in projects explained that “ we highlight our risks and try to seek for

managements attention and our cases are presented cases by case and are brainstormed among management members for possible action.” The over all process of risk identification is observed to be qualitative and subjective and there is no standardized approach to how and use of risk registration or capturing historic risk profiles for learning or experience sharing. One of the other key informant from the housing project participant said “The housing project provided us construction management training to all construction companies shortlisted for the project and it was like requirement to have a project or contract from them . The training included practical sessions like case studies and experience sharing, it familiarized with risk management and related concepts, how ever further application of the practice in other projects was limited. We were trying to do some of standard practice of assessing risks with project objectives, just because the client was periodically evaluating our performance accordingly. Other wise we go back to our traditional practices in the other projects”.

### **Risk Assessment Practices**

**The Key informants (project actors) were asked if there is any risk assessment practices they use and if the can mention any risk assessment method they usually use in their companies or in their projects.**

In all cases there was no standardized risk assessment procedure in place. The traditional risk assessment practices are found to be intuitive that depend on individual experiences, in some cases where they implied they used it is subjective and qualitative type. There was only one case mentioned that the company has employed specific risk analysis for price scalation to understand the impact of the risk and prepare for response. However this was done reactively as an ad-hock for some projects classified to be time sensitive.

The key informant said “ we do analysis of price scalation, due to sensitivity and urgency of some projects like stadium that were built to host national events on dates that were already pre-decided. We had to deliver on time and we needed to do what ever we could. We analyzed the possible price scalation of all construction martials input for that project and we procured most of the project inputs ahead and stocked. This was done mainly to avoid our company’s reputational risk and maintain or build our organizational profile. However we are not continuously assessing all risk factors except for some risks that are commonly or obviously happening like price scalation cost of materials and its associated risks.



The others informants also supplemented on the intuitive approach and practice of risk assessment and why it is lacking to have institutional arrangement , ‘‘he explained that this is mainly due limitation in proper understanding of its importance , our knowledge gaps and absence of motives to do it.

### **Risk response strategies**

#### **The Key informants (project actors) were asked**

- ✓ **If there any means of strategy to respond to risks/threats? And if this risks response strategy well structured and supported by any standardized working document ( policy /regulation or guideline)**
- ✓ **What are the common actions and strategies applied in response to risks/threats?**

There was no any document presented or available to show planned and strategized risk response strategies in all cases. i.e. there is no formal or standardized approach or guiding principles how to handle or respond to upcoming risks. They all use retroactive approach of risk response. The strategies they use are mixed; except that risk avoidance strategy is rarely used. Avoiding risk response strategy is used if and only if the risk was identified during bidding or before contractual agreement and contractors may decline ahead. One of the respondents said ‘‘avoiding has never been an option, as it comes with reputational risk’’ and all others basically agree on the principle. He also added , ‘‘once we are in a contract, we do our job and our part and request for consideration of possible changes while continuing to working.’’ Generally from the discussions the most common type of risk response strategy is risk mitigation and is followed by risk transfer. No signs of proactive risk monitoring was observed. Some of the common statements or actions mentioned in response to risks are like liaises with clients, consultation with stakeholders in response to risks like price escalations, designed related risks, contractual risks, weather and environmental factors etc. Subcontracting in response to technical or time line risks and partial insurances for machineries, vehicles & equipment’s, accident and human safety related risks are also mentioned mainly on road projects for. For risks related to cashflow, and availably construction material, one of the contractors have applied risk mitigation strategies like Project prioritization projects who can bring cash flow first and project which are sensitive to timelines, deadlines, minimizing stock periods in response to shortage of construction materials , stock and resource mobilization with in projects, bulk purchase of construction materials for which their inflation is predicted and

with hard currency related issues. Since most of construction inputs are imported ; their availability is highly dependent on hard currencies, and the fluctuation of exchange rate and price escalation and availability of the construction materials are highly related. Over all the most common strategy used is tailored to risk mitigation however all is done with out standardized criteria setting or approach and is mainly guided by individual experience and intuitional. In some cases joint consultation and periodic management meetings were reflected. In one of the cases there was generic guiding approach to response to any kind of risk and that is ‘ ‘ Improved efficiency (efficiency gain) or cost effectiveness approach which can be taken a good start to initiate standardized and analytical approach to respond to risks. One of examples mentioned on cost effectiveness and construction price escalations risk is application of global market search for potential suppliers and continues engagement and negotiations for best price offer.

### ***Risk management process and its barriers for standardized application in the case projects***

*In all cases the project actors agree that risk Project risk management is poorly applied. They all see it as its not yet practiced based on knowledge and proper organizational structure. It mostly depends on individual experiences and intuitive judgments. One of the respondents said ‘ ‘It is poorly applied, it is not knowledge based and organized , rather it has traditional tendency, the over all awareness of risk management is weak’ ’ and the other supplements by saying ‘ ‘risk management process that we operate here is Intuitively; it is mainly derived from peoples practical experiences, no standardized Risk Management Practices (RMP) is introduced in our case and in all most all of the contractors I know. ‘ ‘ and they all agree that current practice is reactive and they believe it should evolve to proactive and institutionalized risk management process. They have also identified main barriers or bottlenecks that are hindering application of standardized and proactive risk management process. In their response they underline that absence of any kind of well defined structure that takes risk management role in their organization’s organogram or organizational set up is a key indicator that there is minimal commitment and lower understanding or lower awareness on the significance of its importance. They also indicated that it could be due traditional way of set ups of the organizations and its over all organizational capacity and the capacity of its human resources project management skills , this is explained by limited culture and capacity in documenting (capturing) risks, cases, internal and external experiences, limitations in mainstreaming knowledge management practices, Limited skill and awareness of risk management process and risk analysis*

## ***4.4 Interpretation and Discussion***

### **Risk management process and over all challenges of the construction industry**

Construction projects are risk prone and risks occur from the very start of any of the construction projects and all others. There fore unless the negative risks are properly managed, they may come with bad consequences of failure in meeting project objectives. Risk management constitutes a strategy to avoid losses and use available chances or rather chances potentially arising from risks. The strategy demands from the person taking action a precise .consideration. an assessment. of the situation and the scenarios probably occurring in the future. On this basis, decisions are made in the hope of having eliminated all risks and used all chances. By adopting risk management, savings potentials can be realized in construction projects. For this reason, for project managers as well as real estate developers, a consideration of the risk management process is worthwhile. The risk management process comprises 6 process steps, starting from identification of risks, analysis of risks, assessing risks, controlling risks, risk monitoring and controlling of goals. The integration of a risk management system in construction projects must be oriented to the progress of the project and permeate all areas, functions and processes of the project (Martine, 2006). That is why it is necessary to spread awareness and create interest amongst people to use risk management techniques in construction industry. In the study of risk management in building construction in India; risk severity has very high rating in feasibility, design, and technology stage of project protective approach need to used than reactive, which possible only by understanding and implementing risk management principle It requires initial recognition, integrated with a systematic method of monitoring changes and impact over time for maximizing the process of project risk assessment and risk management (Mr.Shubham.A 2017).

From the findings of the case study; There are several prominent risks in the construction industry and are being managed differently every time. However the risk management process is mainly intuitive, based on individuals experience and their subjective judgment. The risk management process lacks structural or organization approach and its reactive in most cases. In similar case study on risk management conducted in construction industry in India by Suchith Reddy it pointed out that risk management is strongly linked with the production phase. Majority of the risk processes are executed during this phase and the most active group being

the contractors, have great influence on the risk management process. The owners and contractors pay little effort and time to assess and strategically plan for known, unknown or probable risks. If we don't have a proactive risk management process then problems that take place in a project could increase the delays and costs ( Reddy 2015). Similarly another study conducted by Dr. Nadeem Ehsan and his co-researchers in risk management in construction industry came out with finding that, the perception of risk by contractors and consultants is mostly based on their intuition and experience. The most utilized risk response measures are risk elimination and risk transfer. However, the respondents have revealed that these practices cause the problems of delays, low quality and low productivity in projects. The case is the same in Ethiopia the perception and over all risk management process is intuitive and based on individual experiences, similarly minimal commitment and lower understanding or lower awareness on the significance of its importance is hindering application of institutionalized and proactive risk management process.

The construction industry is taking significant share in the economy and this a golden opportunity in a continuously growing economy. However, the over all management of construction projects need to grow parallel. The construction have maintained its traditional way of doing business which One of the respondents said 'The construction industry just expanded laterally but did not maintain its optimal growth'' this is because it is not being led by professionals. In most cases Construction companies are not being managed by professionals rather by owners. In most cases the owners may not have expanded their professional competence in line with the growing industry and in other cases they also tend to grow emotional engagement and some critical decisions are made away from professional sense and with out objective assessment of risks And this again affects the over all effective risk management. In one study conducted on risk management in construction projects by Nerija Banaitiene and Audrius Banaitis explains how an effective risk management process encourages the construction company to identify and quantify risks and to consider risk containment and risk reduction policies. Construction companies that manage risk effectively and efficiently enjoy financial savings, and greater productivity, improved success rates of new projects and better decision making. The research results show that the Lithuanian construction company significantly differ from the construction companies in foreign countries in the adoption of risk management practices. To management the risk effectively and efficiently, the

contractor must understand risk responsibilities, risk event conditions, risk preference, and risk management capabilities.

The construction industry is also surrounded with many risks and some of them have several and interlinked structural causes. The most frequent and critical risks in the construction are cash flow, absence of skilled man power, limited skills in project management, availability of construction materials, price scalation of construction materials, right offs mainly in road construction, environmental and safety, design completeness , corruption over political stability, payment modality and contractual issues, hard currency, outdated building design codes, limited skills in contract administration from the client side, tender preparation problem, safety and security. Some of the risks are interlinked and are even linked to over all political economy of the country. Cash flow appeared the most frequently, It appeared 4 times out of the six cases as one of the top five risks in the construction industry , similarly absence of skilled manpower, limited skills in project management technical skills, availability of construction inputs appeared 3 times as top five risks, and then cost of materials, right offs mainly in road construction, environmental and safety, design completeness , corruption appeared two times as top five risks, more over political stability, payment modality and contractual issues, hard currency, outdated building design codes, limited skills in contract administration from the client side, tender preparation problem, safety and security are mentioned once as one of the top five priorities from the six cases under the study.

# **CHAPTER FIVE- SUMMARY, CONCLUSION, AND RECOMMENDATIONS**

## **5.1 Introduction**

The construction industry is taking significant share in the economy and this is a golden opportunity where there is expectation in a continuously growing economy and further new reforms are underway in the new transition to stimulate the economic growth though there is a pose danger of the global pandemic CoVID19 that is a growing threat that may negatively affect the economic growth and different economic activities including construction. Regardless of the continued economic growth in the past decades and increased share of the construction sector to the GDP and increased number of different construction projects, the over all growth of the knowledge, skill and practices of project managements of construction projects couldn't go parallel rather remind mainly traditional in most cases. The challenge is even more significant in project risk management while the construction industry is prone to many risks.

## **5.2 Summary**

The construction industry is surrounded with many risks and some of them have several and interlinked structural causes. The risks are different and can be classified in different ways with respect to their frequency or impact , with respect to their nature or type ,or if they are external or intrinsic so and so. In this assessment the classification was mainly based on their nature or type and then evaluated in their likelihood of occurring and the level or of the impacts that they pose. In addition to the generic review of risks from the literature review and presentation of key risks in the construction industry the case study has identified most frequent and critical risks in building and road construction projects and also evaluated their likelihood of their occurrence and impact. Accordingly the assessment identified to be the most common risks in the study cases, the risks include cash flow, availability of row materials, absence of skilled man power, project management and technical skills, corruption, design completeness, inflation, right off, environmental and safety, limited contract administration skills from the client side, outdated building design codes, payment modality, political stability, safety and security (site location), and tender preparation. Cash flow appeared the most frequently mention top five risks i.e. 4 times out of the six cases as one of the top five risks in

the construction industry , similarly absence of skilled manpower, limited skills in project management technical skills, availability of construction inputs appeared 3 times as top five risks, and then cost of materials, right offs mainly in road construction, environmental and safety, design completeness , corruption appeared two times as top five risks, more over political stability, payment modality and contractual issues, hard currency, outdated building design codes, limited skills in contract administration from the client side, tender preparation problem, safety and security are mentioned once as one of the top five priorities from the six cases under the study. The Likelihood impact assessment matrix was independently assessed based on risks identified in each category and 5 point Likert measurement was used to measure the likelihood analysis to get the understanding and perception of the project risks by the project actors. In building constructions cash flow has been identified as the most certain to likely happen with high negative impact on the projects, similarly inflation was almost certain and with moderate negative impact, followed by availability of raw materials with likely to happen and to moderately affect the project objective negatively. In the road constriction cases again cashflow was most certain to happen with high negative impact , and availability of skilled manpower and row materials are likely to happen with moderate impact.

With respect to risk management process only two out of four construction companies reviewed had started to introduce some elements of risk management process systems and only one of them is striving to meet standards as per ISO requirement and the other ne is trying to implement ad hock and reactive use up on subjection to critical risk. The risk management process lacks structural or organization approach and its reactive in most cases and it is mainly intuitive, based on individuals experience and their subjective judgment. The over all process was found ad hock that is mainly assessed qualitatively and is mostly subjective. There was no standardized approach to how and use of risk registration or capturing historic risk profiles for learning or experience sharing or continues process of risk assessment that is readily designed for proactive and evidence based responses. Accordingly it observed and confirmed from the key informants interview and discussion that they all use retroactive approach of risk response. In their response to risks. This is again reinforced by the absence of any kind of well defined structure that takes risk management role in their organization's organogram or organizational set up . This clearly indicates that there is minimal commitment or lower understanding/awareness on the significance of its importance.

### **5.3 Conclusion**

The construction industry in Ethiopia is prone to several risks which have high likelihood to occur in some cases are even most certain and their negative impact is mostly significant if not high or very high, however the risk management process lacks structural or organization approach and its reactive in most cases and it is mainly intuitive, based on individuals experience and their subjective judgment. In building constructions cash flow has been identified as the most certain to likely happen with high negative impact on the projects, followed by inflation that is perceived to happen almost certainly and with moderate negative impact, followed by availability of raw materials with likely to happen and to moderately affect the project objective negatively. In the road construction cases again cashflow was most certain to happen with high negative impact, and availability of skilled manpower and raw materials are likely to happen with moderate impact. In all cases risks are interlinked and highly associated with monetary(financial), human and technical capacity and their likelihood is so high and there is a need for depth analysis and strategic response plan that require proper organization setup with professional competency and leadership. Moreover intervention of regulatory and support system from the government institution who are leading the sector, financial institutions who can closely work with the sector and academia to better inform the sector with policies directions and human resources has been recognized to be significantly important.

### **5.4 Recommendation**

The construction companies need to reevaluate their project management process in general and risk management process in particular and reflect back on their missed opportunities for optimal growth. They can establishing Knowledge management and institutional memory capturing platforms to better understand this. They also need review their organization structure for more proactive risk management process and consider structural set up and introduction proactive risk management system with designated unit or department with clear roles and responsibility and associated authority. The sector leading the construction industry need to undergo periodic assessment or evaluation of evolving situation in the sector, production of policy documents, guidance, SOPs, periodic review or assessment of construction actors (contractors, consultant) for accreditation and assigning competency levels to stay in the sector performance and evaluation. The sector leading the construction industry could jointly work with academia to establish comprehensive management information systems, providing updated situations, profiles of risks in the sector, sector actors, the industry and related factors, registration and licensing of construction sectors. Construction minister should take the front seat to lead the sector with competence and foster regulating and need to



conduct Periodic review and analysis of market research , global and national updates on markets and availability construction materials, inputs, invest in evidence generation for policy directions, and recommended actions and policy advocacy. Building own capacity, facilitate and arrange capacity building strategies to construction actors, balancing the public interest, involvement of international and local contractors (capacity building of local contractors) are also some of the additional areas where the sector lead need to invest more to further positively influence the sector and the industry.

### **Recommendations for practice**

The construction companies could exercise project prioritization, introduction of other financing options (diversify investment to finance and have liquid money) like machinery rental, bundling rental , optimal use of financial insurances and insurance schemes to minimize the occurrence and impact of financial risks. They can also look in to the importance of establishment of project risk pool funding by sister companies or among projects with in an organization. Moreover, the construction sector need to invest in its workforce and the industry and can provide competency based training of project risk management to project actors, case studies be presented and publicly shared . (introduction of mandatory training to engage in the business with competency accreditation ), construction companies can be better benefited in investing their staff skill and experience and if can retain qualified and experienced staff for mentorship and can think of different modalities of introduction of senior and experienced staff retention mechanisms.

### **Recommendations for further study**

The assessment recommends further quantitative and large scale study to better understand the impact of key selected risks like the financial, human and market risks, as a follow up study in-depth understanding and to back up the evidences with studies that are methodologically plausible and a is representative enough for generalization.

## **5.4 Suggestion for further study**

This research was small scale case study and mainly qualitative, that has limitation for conclusive generalization and reveal the objective and quantified analysis of impacts on some of the risks. The research was able to identify the most common risks and the perception of the actors on the risk's frequency and their respective negative impact qualitatively, plus it has reviewed and highlighted the general practice and status of the risk management systems in the sector or industry based on the cases under the study . However further in-depth and larger scale mixed quantitative and qualitative randomized sample study with more cases that are statistically significance, and representative is recommended to enable proper generalization and estimate quantified negative impact of the risks in the in the sector as well as in the economy to understand the economic loss and its significance.

## Annexes

### Annex I -Structured KII Questionnaire to project actors in selected Construction case projects

#### I. Personal information

1. What is your current role in this project or in this organization?
2. How many years of experience do you have in this industry? And project management related works?
3. Do you have any kind of project management related training? If Yes, Specify the type of training

#### II. General Project information

4. Type of the project

Building

Water works

Road

Electromechanical

Project contract start Date		Initial monetary value of the project	
Project start date		Estimated cost at current stage	
Project contract end date		Project completion rate	
Expected Delivery or End date		Estimated cost at final stage	

III. Risk Management Practices and Perceptions in Construction projects

**Risk Identification**

5. What do you think are the most common risks/threats that are facing the construction industry currently as a whole?
6. What are the practices undergone to identify risks/threats?
  - a. an individual
  - b. as an organization
  - c. in this project
7. Is there any risk mapping exercise?
  - i. If yes, is it possible to see
  - ii. If no, why not
8. What were/are the top five risks /threats you think or assessed are have been a challenge in the project phases? How do you level the impacts of the identified risks on time, cost, and quality in the projects? (you can refer to the risk reference table below ) (Some of the common risks are listed for easier reference but are not complete list and respondents are free to come up with any type of risks not listed here)

<b>RISK Identified</b>	<b>Project objective</b>	<b>Very low (0.05) or 1</b>	<b>Low (0.1) 2</b>	<b>Moderate (0.20) or 3</b>	<b>High (0.40) or 4</b>	<b>Very high (0.80) or 5</b>
	Cost	Insignificant cost increase	< 10 % cost increase	10-20% cost increase	20-40% cost increase	>40 % cost increase
	Time	Insignificant time increase	< 5% increase	5-10 % time increase	10-20 % increase	> 20 % increase
	Quality	Quality degradation barely noticeable	Only very demanding	Quality reduction requires sponsor approval	Quality reduction unacceptable to sponsor	Project end item is effectively useless

			applicatio n affected			
RISK A	Cost					
	Time					
	Quality					
RISK B	Cost					
	Time					
	Quality					
RISK C	Cost					
	Time					
	Quality					
RISK D	Cost					
	Time					
	Quality					
RISK E	Cost					
	Time					
	Quality					

## Risk Reference Table

<i>Possible Category</i>	<i>Common Risks identified from literatures and brainstorming sessions :</i>
Monetary	Financial (Cash flows)
	Economical
	Investment
	Hard currency (High rates of foreign exchange)
	Inflation
Materials	Resources
	Logistics
	Price escalation
	equipment/material failure
Market	Market failure
	High cost of construction inputs due import related fees
Human	Labor poor productivity
	Limited Project Management Skills,
	Human factors
	Cultural
Technical	Lack of trainings and competency in Risk management
	Project costing and financial management
Political	Legal and Policy issues
	corruption
	Political economy
	Conflicts
	land management and right offs
Environment	Environmental
	Natural, Physical
	weather factors (flood, rain, humidity, harsh weather)
Organizational	Institutional Capacity and organizational structure
	Risk management process
	Experience
Project	Contractual, client (Contractual type and modalities (Price adjustment))
	Project objectives

	Project scoping
	Planning, schedule,
	Design
	Quality
	Operational
Safety	Safety
	Security, crime

9. How likely are these risks to happen and their perceived impact on the phases of the project (PLC)

<i>Project phase</i>		<i>Probability</i>						<i>Impact</i>					
		<i>Low.....High</i>						<i>Low.....High</i>					
		<i>Uncertain</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>		<i>5</i>	<i>Uncertain</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
		<i>20</i>	<i>40</i>	<i>60</i>	<i>80</i>	<i>100</i>							
		<i>%</i>	<i>%</i>	<i>%</i>	<i>%</i>	<i>(100</i>							
		<i>%)</i>											
Initiation	U						U						
Planning and designing	U						U						
Execution	U						U						
Close out	U						U						

**Assessment**

10. How do deal with risks in your project/organization?
11. What are the procedures in place to handle risks in projects ?
12. Is there means prioritizing risks , following any possible identification?
13. Have you heard or come across about ant risk analysis methods or means?
14. Do you use any methods to analyze risks?
  - i. If yes, which once are commonly used? And what do you think is the benefit gained or perceived.
  - ii. If no Why?

### ***Risk Response***

15. Is there any means of strategy to respond to risks/threats?
16. Is this risks response strategy well structured and supported by any standardized working document ( policy /regulation or guideline)
17. What are the common actions and strategies applied in response to risks/threats?

### ***Risk management process and organizational future***

18. Do you think Risk management process should be properly structured or institutionalized in your projects/organization
19. How do you think project risk management is being implemented in this project/organization?
20. What are the key barriers or issues you have with regard risk management practices
21. What are the areas of improvement you recommend regarding risk management process in your project/organization and the construction industry as a whole
22. What do you envision about project risk management process in your next projects/organization or the industry as whole.



## Annex II-References

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