



ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

**ASSESSMENT OF RISK MANAGEMENT PRACTICES IN
CONDOMINIUM CONSTRUCTION PROJECTS IN ADDIS
ABABA – THE CASE OF KOYE FETCHE PROJECT 11/18**

BY

BY: TIKEHER DEMENA MICHAELE

(SGS/O289/2012A)

DECEMBER, 2021

ADDIS ABABA, ETHIOPIA

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ADVISOR: MOHAMMED MOHAMMEDNUR (ASST. PROF.)

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DEGREE OF MASTERS OF ART IN PROJECT MANAGEMENT**

**DECEMBER, 2021
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DECLARATION

I, the undersigned declare that this thesis is my original work. All material used for this thesis has been duly acknowledged, as well, I confirm that this has not been submitted either in part or in full to other higher education institution for the purpose of earning any degree.

TIKEHER DEMENA MICHAELE

Signature

Date

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APPROVED BY BOARD OF EXAMINERS

Dean, School and Business

Signature and Date

Advisor

Signature and Date

External Examiner

Signature and Date

Internal Examiner

Signature and Date

**DECEMBER, 2021
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Abstract

This study explained the concept of risk management in condominium projects in Addis Ababa, specifically in Koye Fetche project 11/18. The overall objective of the research was to investigate the risk management practices applied in the project. Significance of the study is aimed to give an insight of the handicaps of implementing risk management practices through the project life. Diverse literatures were reviewed theoretically and empirically to discuss what was meant by risk in construction projects. The research area of the study was chosen at Addis Ababa Akaki Kaliti sub city woreda 09 where most of the target population was found. Descriptive model was taken to as a method of research. Primary and secondary data was used in the study. Data collected mainly by questionnaire, interview, and focus group discussion. The questionnaire is addressed to 122 participants and replied by 84 respondents. The same 122 participants are selected as target population of the interview 33 respondents participated in the interview. The data obtained questionnaire was analyzed qualitatively using SPSS version 24 in order to rank areas of risk and descriptive analysis was also applied to weigh the variables. Generally participants are involved in different levels of construction from inception to final acceptance stage and different areas of construction. Some participants of the study are not directly involved in the construction but the issue raised touched them. The major findings of the study showed that the level of understanding of risk was in a lower level and risk management practices are missing in the project. In addition, absence of risk management plan, poor recognition of risk and inadequacy of the emphasis given to supervision were found to be risks in the project. Based on the result, the study answers the research questions in the conclusion part of the paper and consequently put the corresponding recommendations for the conclusions reached.

Key words: Risk, risk management, construction

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Research

The dynamics of time leads us to the time where everything is changing in the speed of eye wink. This creates a huge uncertainty about what is happening a moment after now. This situation of being uncertain about whatever going to happen in the future creates risk. Every step of our life is composed of millions of choices, in which choosing the one means taking the risk of not choosing the other or taking the risk which following our choice. On the other hand risk appears between taking an action and being idle.

The construction industry is experiencing vast and rapid changes every second. These changes are bringing very essential features to the firm but also they come with many unpredictable elements to the firm. The number of stakeholders involving in the construction is also increasing day to day and this also brings another package of risks.

On the other hand construction is irreplaceable part of every country's economy, especially developing countries like Ethiopia. In order get the expected benefit from the firm and also enable it play its role in the country's development, construction risks must be managed properly and professionally.

Construction of condominium apartments started between 2003 and 2005 in Addis Ababa (Weldemariam, 2017).aiming to narrow the broad gap between number of houses and the respective high demand and also to supply low cost and faster to complete apartments to the middle income population of the city. When construction of the condominium apartments transferred from pilot project in specific areas of the city to formal routine construction many uncovered areas started to appear. One of those things is construction risk management. Due to the reason that most of the stakeholders of the apartment construction gave relatively less attention to risk management and most of their plans didn't contain risk management, quality, cost, time and scope deviations appeared repeatedly.

This research will try to assess the level of risk management practices and intended for guiding the project management team through all the whole process in the Construction of Condominium Housing Project in Addis Ababa 40/60 Condominium projects, the case of Koye Fetche project 11/18 which includes such major steps as Risk Identifying, Risk Analyzing, Risk Responding and Risk Controlling.

The research also aims providing the “3C” team (Client, Consultant, and Contractor) with a clear understanding of the necessary actions to be taken in order to protect the project from hidden and identified threats and to utilize existing opportunities for improving project performance. It also provides clear roles and responsibilities, a primary level description of the risk management process. It is designed to provide support to the project team and all the stakeholders.

1. 2 Statement of the Problem

As most of developing countries, Ethiopian construction sector is in a growing phase, but on the other hand it's a sector which contributes a significant portion of the country's GDP. During the past decade robust public and private expenditure on infrastructure and other construction works has served as a catalyst for Ethiopia's rapid economic development. The country has consistently invested more than 30% of gross domestic product into gross fixed capital formation expenditure since 2010 and as a result, Ethiopia has emerged as one of the fastest-growing economies in the world. The market value of the construction sector is currently estimated at more than US\$7bn. According to the 2017 edition of African Economic Outlook, construction activities in Ethiopia accounted for 15.9% of gross domestic product at current prices during the 2015/16 fiscal year.

Construction, in general have very close relation and direct impact on people's day to day life so that high quality and risk free construction has the of increasing their life and contribute to the societal development. However, the sector has been criticized for higher cost deviation, quality issues, delayed completion and critical risk management problems. Risk management it crucial and irreplaceable element of the entire project management portfolio. Many scholars studied the importance of risk management practice and what will happen in the project if the risk management is not properly addressed. Royer(2000) stated that unmanaged or unmitigated risks are one of the primary causes of project failure. Another scholar Borysowich (2008) said that. Most organizations are aware that risks do not appear on a linear basis and for this reason risk

cannot be identified and measured in this way. Assessing and understanding the interrelation of risk and their associated correlated impact is the real challenge. These complex relationships require a different set of tools. An efficient risk management is mandatory to project success. However, implementing such a management is complex because of the diversity and the dynamic nature of the risk. Moreover, each of the project stakeholders has his/her own risks; his/her own vision and his/her own action on the project and on risks (Taillandier, 2014.)

The above scholars tried to underline the importance of construction risk management and the truth that construction projects are facing a number of risks which have negative effects on project objects such as time, cost and quality (Iqbal,2015).but most of the condominium projects are facing repeated risks regarding quality, cost, scope and time problems.

This paper will try to investigate general conditions and level of risk management practices in the project and it will try to investigate the reason why it becomes unable to implement it and get better achievement in the project.

1.3 Research Questions

1. How is the risk management processes applied in practice at Koye Fetche project 11/18 site?
2. What are the challenges encountered in implementing risk management practices in Koye Fetche project 11/18 site?
3. Identification of the main risks causing quality, cost, scope and time problems in the project and what should be done to monitoring and control the problem
4. In what ways and to what extent are the main stakeholders influence the risk management process in various level of the project?

1.4 Research Objectives

1.4.1 General Objective

The overall objective of this research is to investigate the risk management practices applied in Addis Ababa 40/60 Condominium projects, typically in Koye Fetche project 11/18

1.4.2 Specific Objectives

1. Analyze the risk management process and how it's being practiced in Koye Fetche project 11/18.
2. Investigate what obstructs the project stakeholders from executing risk monitoring and controlling in the project.
3. Identifying causes for the main risks in the project and searching for the possible means of keeping those problems away from the project through the project lifecycle.
4. Assessing the role of the project stakeholders influence the risk management process in the project that impact the project constructively.

1.5 Scope and Limitation of the Study

1.5.1 Scope

The research performed in this paper mainly es on risk management practices and difficulties that the project is facing in implementation of the scientific and proved risk management practices in Addis Ababa 40/60 Condominium projects, specifically in Koye Fetche project 11/18. The student researcher has chosen the project that has the work exposure on the projects and also has got the chance to deal with the main stakeholders, the house owners, the contractor and the client. Condominium projects in Addis Ababa are so vast that it's difficult to cover risk management issues in all projects and if done, it was only the highlights. Furthermore, the project site is not completed yet so that it enables the student researcher to have clear understanding of risk management practices in almost all levels of the project phase and also the project stakeholders may use the result of this paper as input for uncompleted parts in this site and may apply it to other projects to get a better project achievements

1.5.2 Limitation

Due to the reason that the project site is vast and the stakeholders that involve are numerous so that the research is limited to specific sample population. Time and cost constraints are also another reason for the limited population consequently poor generalization may be observed through the research.

The research mainly es on risk management practice due to main stakeholders, namely the client, contractor, consultant and house owners which student researcher thinks have direct and long

term relation to the project and may be impacted by the project. Vicinity of other stakeholders like sub-contracting enterprises and other firms which will be influenced indirectly are not taken into consideration because of the research area is wide and all aspects cannot be covered and should stick to the scope as much as possible.

1.6 Significance of the Research

The city government of Addis Ababa is investing large sum of money and resource in order to achieve the expected result from condominium housing projects. Not only the government but also all other stakeholders highly expect the project to be risk free or in state of conditions that all risks are managed with limited deviation. The research will play its role in finding out the causes that hold the implementation of risk management practice back, highlighting the importance of risk management and showing the good practices being implemented by the project to the government and other stakeholders.

Finally, not only condominium housing but also building construction in Ethiopia is in almost in growing stage, consequently the level of construction risk management is also in an infant stage. Therefore the result of this research will used as input for other current and future condominium projects and also put a brick for further study of risk management in Ethiopian building construction.

1.7 Organization of the research

This paper is organized by five chapters. The first chapter is an introductory part of the paper which aims to give basic description to the research. The second chapter contains theoretical review, empirical review and conceptual framework. In the third chapter the methodology applied in the research is described. The fourth chapter describes the data presentation and interpretation and the fifth and last chapter centered on conclusion and recommendation.

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Theoretical Reviews

This is a discussion of relevant theories to be used in this study. In other words, this is a discussion of the theoretical literature regarding Risk management practices in Addis Ababa 40/60 Condominium projects, the case of Koye Fetche project 11/18.

Hereinafter the upcoming sections of the research will on overview important literatures which their innermost point is about definition of uncertainty and risk in building construction projects, their source and possible ways of minimizing the adverse effect of risks mitigating them. In addition, the negative effects of construction risks with respect to quality cost and time will be discussed. In doing this, the impact of those risks on the project stakeholders will be shown in parallel.

2.1.1 Definition of Uncertainty and Risk

2.1.1.1 Definition of Uncertainty

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

Uncertainty and risk are closely related as threats associated with the implementation of construction projects. Usually risk is viewed completely as uncertainty although all statements defining risk contains some element of uncertainty. Uncertainty is express in terms of an event's probability of occurrence. If the probability of occurrence of an event is 100%, then it is termed to be certain. On the other hand a probability occurrence recorded as 0%, means the event is uncertain. There exist a huge gap of uncertainty between the limit of 0% and 100% (Jaafari, 2001).

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

2.1.1.2 Definition of Risk

Risk is an uncertain event or condition that, if it occur has a positive or negative effect on a projects objectives (PMI, 2000).

Risk can also be explained in terms of probabilities and consequences, or impact on various objectives. In order for a potential event to be considered a risk it must have a probability of between 0 and 1, which reveals a spectrum in which the event is either impossible or is certain to happen (Loosemore, 2006). Hence, the occurrence of risk is present when a decision is described in terms of a series of possible outcomes and when known probabilities can be attached to set outcomes (Smith, 2006).

According to Wang, (2004) risk can be anything at which it multi-facet. Risk could be the likelihood of occurrence of an event or the combination of events at which it happened during the overall process in the context of construction project. Risk also may occur if in the decision making or planning situation, there are the lack of predictability about the structure outcome or the possible consequences that might happen. In that case, risk is actually needed to be managed. However, this management of risk is not only to secure the work but also in the context of making the profit in construction

Risk is always present when making decisions on the basis of assumptions, expectations and estimates of the future. It characterizes situations where the actual outcome for a specific event or activity is likely to deviate from the estimated value (Raftery, 1994). The definition of risk is diverse and can be assessed in terms of fatalities and injuries, sample of a population, in terms of probability and reliability or in terms of the likely effects on a project. One can distinguish

uncertainty from risk by defining risk as being where the outcome of an event is possible to predict on the basis of statistical probability. This implies that there is knowledge about a risk as a combination of circumstances as opposed to the term uncertainty in which there is no knowledge (Smith, 2006).

2.1.2 Project risk classification

Risks can be divided into different types or classifications or categories in several ways. Some of those ways are listed below.

2.1.2.1 Dynamic and Static Risks

- ▲ **Dynamic risk:** is concerned with making opportunities; for instance it might concern developing a new and innovative product. Dynamic risk means that there will be potential gains as well as losses. Dynamic risk is risking the loss of something certain for gain of something uncertain (Flanagan ,1993).
- ▲ **Static risk:** related only to potential losses where people are concerned with minimizing losses by risk aversion (Flanagan, 1993). The unsystematic and arbitrary management of risks can endanger the success of the project since most risks are very dynamic throughout the project lifetime (Baloi, 2003).

2.1.2.2 Pure and speculative risks

- ▲ **Pure risks:** are based on the notion that there would be loss or no loss at all. The underlying principle is that this depends purely on chance. Brealy (1985) have categorized pure risks in two broad classes i.e. unique and market risks. Unique risks stem from the fact that many of the perils that surround an individual company are peculiar to that company and perhaps its immediate competitor. The nature of products plays an important role in the success of the company. Unique risks may be eliminated by diversification. Market risks stem from the fact that there are other economy-wide perils, which threaten business. Government intervention could create economic perils. Government policy on taxes, protection etc., would affect business at macro-level. The impact of a government policy could be so great that diversification would not eliminate market risks. The characteristics of unique and market risks under speculative risks are similar to those of pure risks.

- ▲ **Speculative risks:** have the notion that there is a possibility of gain or the chance of a loss. Speculative risks recognise the fact that there is the possibility of an advantage and that all risks are not threats and therefore they do not have to be avoided. This notion serves as a catalyst to developers and gives them the impetus to invest. Positivity in this regard may be regarded as the nerve centre of an intending investor. Speculative risks may arise from three types of situations namely Management, Politics and Innovation.

2.1.3 Known and unknown risks

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

2.1.2.4 Classification based on responsibility

- ▲ **Employer risks:** These types of risk are related with actions, forbearances or negligence by the employer, his or her representatives or other persons/bodies ultimately attributable to the employer (client) (Zhang, 2006). If a certain event occurs and such event falls under the ambit of employer risks, then the responsibility is borne by the employer (Zhang, 2006). Employer risk is further classified into owner’s risk, engineers risk and consultants’ risks.
 - a) **Owner’s risk:** covers situations such as social and political risks including strike, lock-out, war, civil commotions and disorders (Zhang, 2006). Legal risks

are also borne by the owner (Zhang, 2006). Hence, any risk associated with changes or amendment in legislations after the project contract enters into force, will be the responsibility of the employer (The Civil Code of Ethiopia, Proclamation, 1960). Under the Civil Code of Ethiopia, the employer –as the owner of the property– has property risks if the project poses damages to neighboring property (The Civil Code of Ethiopia, Proclamation 1960). However the owner can seek contractual compensation from the contractor.

- b) **Engineer’s risk:** The second sub-category of employer risk is the engineer’s risk, which is closely associated with damages or risks as a result of the engineer’s action or inaction during the supervision of projects (The Civil Code of Ethiopia, Proclamation, 1960). It mostly emanates from losses or damages due to wider roles assigned to him or her by the standard conditions of contract. (The Civil Code of Ethiopia, Proclamation, 1960).
- ▲ **Contractor’s risks:** These types of risk result from actions, forbearances or negligence of contractors and their staff during the construction process and the contractor bears responsibility (The Civil Code of Ethiopia, Proclamation, 1960). One example is in the area of economic risks which is often related with the fluctuation of prices of materials, price adjustment, labour and equipment. (Civil Code, supra note 30, Art 2613(1)). Principally, in the construction industry, the contractor is duty bound to come up with necessary materials and staff for the completion of the project. (Civil Code, supra note 30, Art 2613(1)).
- ▲ **Sub-contractors risks:** This type of risk arises because sub-contractors might face risks they take over certain specific parts of the construction from the main contractor. The contractor is usually engaged in two or more projects and works; it will likely find itself working with new and unfamiliar subcontractors. There are various clauses employed and inserted to make sub-contractors responsible to take risks, For example, flow-down clauses illustrate this point (James, 1994).
- ▲ **Third party risks:** Such risks are associated with encumbrances’ created by persons other than the contracting parties. This includes unauthorized entry in the project sites by third parties (Dixonand, 2016).and interference by governmental authorities in the performance of the contract.

- ▲ **Common risks:** Risks shared by the contractor or the employer depending on the merits of the case are common risks. The best examples of common risk are behavioral risks. It encompasses risks sustained due to misconduct if the employer delays handover of the site to the contractor (Dixonand, 2016). Other examples include: undue delays in payments, issuance of design drawings or instructions, attendance to tests (Dixonand, 2016).and failure of the engineer to notify financial arrangements upon request by the contractor, notification of incorrect data to the contractor, and unreasonably withholding permissions or certificates (Dixonand, 2016).Common risks may also relate to the occurrence of natural catastrophes (natural disasters) since the very nature of such risks would potentially affect both parties irrespective of their actions. Such risks necessitate additional time for the completion of projects. Most international construction contracts adopted either the FIDIC or World Bank format which recognize almost all types of risks such as employer risks, contractor risks, common risks and third party risks.

2.1.3 Risk management

Project risk management, which has been practiced since the mid-1980s, is one of the nine main knowledge areas of the project management institute's project management body of knowledge (Tuysz, 2006). The major role of risk management is to reduce the negative effect of as many risks as possible but not to remove all the project risks since it not practical (Bunni, 2003). In the global sense, risk management is the process that, when carried out, ensures that all that can be done will be done to achieve the objective of the project, within the constraints of the project (Pledger, 1990). The basic goal of project management is to realize the project within the predicted time, planned costs and satisfactory quality. Contrary to this is project realization under conditions of uncertainty, and when the outcomes of all foreseen events cannot be predicted with certainty. This is what makes it necessary to turn uncertainty into risk, and to manage that risk. In this way, decisions based on insufficient information can be avoided, and this will lead to better overall performance.

Risk management is a formal and orderly process of systematically identifying, analyzing, and responding to risks throughout the life-cycle of a project to obtain the optimum degree of risk elimination, mitigation and/or control. The risk management process aims to identify and assess risks in order to enable the risks to be clearly understood and managed effectively (Hillson

2002). Significant improvement to construction project management performance may be achieved from adopting the process of risk management (Flanagan, 1993).

According to PMBOK (2008) risk management is the systematic process of identifying, analyzing, and responding to project risks. It includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of adverse events to project objectives and is divided into six steps: planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, and risk monitoring and control. Risk Management covers the process of identification, assessment, allocation, and management of all project risks. Douglas (2009) said managing risks is involved in identifying, assessing and prioritizing risks by monitoring, controlling, and applying managerial resources with a coordinated and economical effort so as to minimize the probability and/or impact of unfortunate events and so as to maximize the realization of project objectives.

According to Hayes (1985), the risk management process consists of three phases: risk identification, risk analysis, risk response. However, any activity undertaken as a risk response may produce new risks, which should be in their turn be identified, analyzed and responded to. Thus some authors view risk management as a cyclical process (Carter, 1994). The risk management process consists of 6 phases that cyclically repeat themselves

Risk identification and documentation; Risk quantification and classification; Risk modeling (often called risk analysis); Risk reporting and strategy development; Risk mitigation, reduction and/or optimization; and Risk monitoring and control

Ludin (1997) divided the risk management process into 4 phases, Risk identification; Risk analysis; Risk control; Risk reporting. Smith (2006) divided the risk management process into five phases: risk identification, risk estimation, risk evaluation, risk response and risk monitoring.

Despite the variety of risk management models risk identification, risk assessment, and risk monitoring and controlling and risk response form the core of project risk management. Therefore, a model consisting of these five stages is used in this study.

2.1.3.1 Risk Identification

Risk identification is the process of identifying the risks that can adversely affect the project cost, schedule and the opportunities that can reduce project costs or result in reduction of project duration (Touran, 2006). The process of identification and analysis of risk should be continuous process from concept to operation phase of the project to maximize the risk control mechanism of the project and ensure the completion of the project on time and budget. The result of this process will be recorded in the risk register for subsequent identification process (Asnake, 2010). The objectives of risk identification are to identify and categorize risks that could affect the project and to document these risks and the outcome of risk identification is a list of risks (National Cooperative Highway Research Program, 2009). The main objective is to see that the major risks that could affect the project most adversely are not left unidentified. Most commonly a relatively small percentage of key risks are likely to account for the majority of the time and cost implications of the entire risk (Mead, 2007). Regarding Risk identification objective (National Cooperative Highway Research Program, 2009, Mead, 2007) elaborates in different methods

Risk identification, just like the entire risk management process, should be carried out continuously (i.e. throughout the entire lifecycle of an investment project) and in various dimensions, in various sections, from various perspectives and in various areas as this ensures that the most comprehensive list of potential risks a given investment project is exposed to can be compiled. It should also address both internal and external risks (Turnbaughs 2005).

Project Management Institute, (2000) suggests that as many project stakeholders as possible should participate in the risk identification process. Risk identification is an iterative process that involves the project team, stakeholders and other managers affected by or who affect the project, and finally outside individuals who can comment on the completeness of the risk identification based on their similar experiences (Wysocki, 2004).

Risk identification sets out to identify an organization's exposure to uncertainty. This requires an intimate knowledge of the organization, the market in which it operates, the legal, social, political and cultural environment in which it exists, as well as the development of a sound understanding of its strategic and operational objectives, including factors critical to its success and the threats and opportunities related to the achievement of these objectives (Institute of Risk Management, 2002).

2.1.3.2 Risk assessment

The identification of risk is only the first phase, some of the identified risks may be considered more significant and need to be further analyzed. The next step is to determine their significance quantitatively, before the response management stage.

The objective in risk assessment and analysis is to describe the risk situations as completely as possible and to prioritize them (Schieg, 2006). In general, there are two major categories distinguished in the literature on risk assessment, specifically qualitative and quantitative analysis. The former is a process that consists of interviews, checklists and brainstorming while the latter is performed through a data driven methodology (Banaitis, 2012). Risk assessment through quantitative analysis defines the impact of each risk in the spectrum of high and low and the probability of occurrence. Whereas qualitative risk assessment often involves the evaluation of impact and the development of lists in order to further analyze the highlighted risks (Zou, 2007). The assessment of risks through both types of analysis should transpire on an individual level as well as include the interrelationship of their effects (Schieg, 2006).

2.1.3.3 Risk Analysis

The analysis of risks can be quantitative or qualitative in nature depending on the amount of information available (Association of Project Management, 2000). Qualitative analysis es on identification together with assessment of risk, and quantitative analysis es on the evaluation of risk (Chapman, 2001). Indeed there may be so little information about certain risks that no analysis is possible.

Qualitative Methods

- ▲ **Probability & impact assessment** can be applied in order to evaluate the likelihood of a specific risk to occur. The risk impact on project objectives is assessed in terms of opportunities and positive effects as well as threats and negative effects. It is important to adapt and define the probability and impact to the specific project.
- ▲ **The risk matrix method** can be used additionally by having probability and impact as a basis for further analysis. The priority score can be computed as the average of the probability and impact and the priority score range, rate and color are given to illustrate each risk's significance. The high priority score threats, meaning high impact and likelihood, are viewed

as high-risk and could necessitate an urgent response while low scored threats could be further monitored and given attention only if needed.

- ▲ **Risk categorization** is applied as a way to systemize the threats according to their sources, in hopes of identifying areas with the highest exposure to those risks. The usage of this method breaks down activities into small units and creates hierarchical series of activities, additionally the method can include risk dependencies and a prioritization of them depending on how quick response they require.

Uses of Qualitative Risk analysis Results

Qualitative risk analysis results are used to aid the project management team in three important ways (Kindinger , 2000).

- ✎ The qualitative risk analysis factor rankings for each project activity provide a first-order prioritization of project risks before the application of risk reduction actions.
- ✎ The more meaningful, result from conducting a qualitative risk analysis is the identification of possible risk-reduction actions responding to the identified risk factors. Risk reduction recommendations are often straightforward to make when the risk issue is identified.
- ✎ The final use of the qualitative risk analysis is the development of input distributions for qualitative and quantitative risk modeling.

Quantitative Methods

- ▲ **Sensitivity analysis** is implemented in order to identify uncertain components in the project, which will have maximum impact on the outcome. The aim is to look at the sensitivity of various elements of the risk model on project outcome, by changing the values of one variable at a time and then showing the impact on the project.
- ▲ **Probabilistic analysis** is a method used to show the potential impact of different level of uncertainties on project objectives. It quantifies the effect of risks on project schedule and budget and it uses three point estimates such as worst case scenario, most likely scenario and finally best case scenario for each task. Monte Carlo Simulation is most often used for this type of analysis. A decision tree is a useful method to frame the problem and evaluate

various options. The usage of this method consists of decision tree diagrams used to represent the project and show the effects of each decision (Mhetre, 2016).

- ▲ **Monte Carlo Simulation** is presented as the technique of primary interest because it is the tool that is used most often.
- ▲ **Breakeven Analysis** is an application of a sensitivity analysis. It can be used to measure the key variables which show a project to be attractive or unattractive.
- ▲ **Scenario Analysis** is a rather grand name for another derivative of sensitivity analysis technique which tests alternative scenarios; the aim is to consider various scenarios as options.

Basic Steps of quantitative risk analysis

As discussed previously, the aim of risk analysis is to determine how likely an adverse event is to occur and the consequences if it does occur. When quantitative risk analysis is to be done, it is attempted to describe risk in numerical terms. To do this, it should go through a number of steps (Kelly, 2003).

- i. Define the consequence; define the required numerical estimate of risk.
- ii. Construct a pathway; consider of all sequential events that must occur for the adverse event to occur.
- iii. Build a model - Collect data; consider each step on the pathway and the corresponding variables for those steps.
- iv. Estimate the risk; once the model has been constructed and the data collected the risk can be estimated. Included in this estimation will be an analysis of the effects of changing model variables to reflect potential risk management strategies.
- v. Undertake a sensitivity and scenario analysis; undertaking a risk analysis requires more information than for sensitivity analysis.

2.1.3.4 Risk response

The risk management most significant stage is risk response, but it's an area which has not been studied, where at this stage the decisions about the risks should be taken by the project managers. Even though much of the time and cost has not been sacrificed by the manager in responding to risks, planning of risk response is an ignored part of project risk management (Syedhosini, 2009).

Risk response is considered to be a very important stage in risk management because if it's finding the projects lead to create opportunities and decrease the threats that indicate how well are the managers (Motaleb, 2012).

Fairley (2005) states that risk handling include all the four types of risk response strategies: namely, avoidance, transference, mitigation and acceptance. Fairley (2005) suggests that selection of a particular response to risk should always be a strategic decision

Project Management BOOK 6th edition summarizes risk responding strategies that can be applied to overall projects as well as individual projects in the following way

2.1.3.4.1 Avoid.

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

2.1.3.4.2 Exploit.

Where the level of overall project risk is significantly positive and outside the agreed upon risk thresholds for the project, an exploit strategy may be adopted. This involves taking ed action to capture the positive effect of uncertainty on the project as a whole. An example of exploiting at the overall project level would include addition of high-benefit elements of scope to the project to add value or benefits to stakeholders. Alternatively the risk thresholds for the project may be modified with the agreement of key stakeholders in order to embrace the opportunity.

2.1.3.4.3 Transfer/share

If the level of overall project risk is high but the organization is unable to address it effectively, a third party may be involved to manage the risk on behalf of the organization. Where overall project risk is negative, a transfer strategy is required, which may involve payment of a risk premium. In the case of high positive overall project risk, ownership may be shared in order to reap the associated benefits. Examples of both transfer and share strategies for overall project risk include but are not limited to setting up a collaborative business structure in which the buyer and the seller share the overall project risk, launching a joint venture or special-purpose company, or subcontracting key elements of the project.

2.1.3.4.4 Mitigate/enhance

These strategies involve changing the level of overall project risk to optimize the chances of achieving the project's objectives. The mitigation strategy is used where overall project risk is negative, and enhancement applies when it is positive. Examples of mitigation or enhancement strategies include replanting the project, changing the scope and boundaries of the project, modifying project priority, changing resource allocations, adjusting delivery times, etc.

2.1.3.4.5 Accept

Where no proactive risk response strategy is possible to address overall project risk, the organization may choose to continue with the project as currently defined, even if overall project risk is outside the agreed-upon thresholds. Acceptance can be either active or passive. The most common active acceptance strategy is to establish an overall contingency reserve for the project, including amounts of time, money, or resources to be used if the project exceeds its thresholds. Passive acceptance involves no proactive action apart from periodic review of the level of overall project risk to ensure that it does not change significantly.

2.2 Empirical review

Due to the nature of the construction projects which consists of many related and none-related operations, many risk factors will contribute in a project. To have an effective risk management plan, at first step the key risk factors which have the most effect on project objectives should be identified and classified (Rezakhani, 2012). It was observed that, majority of decisions on

construction risk management are done based on intuition, previous experience, and the manager's professional judgment. As a result of ignorance and doubts on the sustainability, formal methods available are not been applied for the activities of the construction (Jarkas, 2015).

Construction risk is generally perceived as events that influence project objectives of cost, time and quality. Risk analysis and management in construction depend mainly on intuition, judgment and experience. Formal risk analysis and management techniques are rarely used due to a lack of knowledge and to doubts on the suitability of these techniques for construction industry activities. The role and contribution of the Construction Industry are pivotal and the primary conduits for infrastructure development and maintenance. In construction industries and the various project stages, one of the silent day to day realities are risks and uncertainties. And construction industry is inherently risky and uncertain and these arise from the nature of the industry itself (Okema, 1999). Risk in the construction industry is perceived to be a combination of activities that adversely affect the project objectives of time, cost, scope and quality (Ehsan, 2010).

Risk is a multi-facet concept. In the context of construction industry, it could be the likelihood of the occurrence of a definite event/factor or combination of events/factors which occur during the whole process of construction to the detriment of the project (Faber, 1979).

Project risks have significant impact on construction project's performance in terms of cost, time and quality. Thus, managing the risks has been recognized as a very important management process in order to achieve the project objectives. (Tsegaye, 2009).

There is little evidence of application of risks and uncertainties management in construction in developing countries and yet it is apparent how they influence the course of construction projects and poses immense challenges. This should be of particular concern in developing countries because they need every coin and accelerated progress to propel them to develop. In addition, most developing countries import quite a lot of construction materials, equipment and machinery for use in the construction industry, and balance of payment instability that can occur due to sharp fall in terms of trade can pose serious risks and uncertainties to projects (Okema, 1999).

Construction organizations in developing countries, approach risk management in construction projects by using practices that are typically inadequate, produce poor results frequently, and limit the realization of desirable project outcome (Serpel, 2015).

Construction risk in developing countries offers contractors a heightened degree of risk than can be expected from a developed nation. Consequently, many contractors chose not to participate in these markets. Contractors evaluating risks in developing markets are often charged with having to be more creative with their risk outlook. For example, if a contractor was looking to build in a politically hostile environment, the initial perception may be that the risk is too high despite the potential for higher profits (Taylor, 2004).

The consequences of risk in construction industries of developing countries, including sub-Saharan region are more severe than in established Western Construction industries(Wang, 2004). The construction industry in Ethiopia is challenged by several problems and thus making efforts in developing the construction industry is very difficult and complex (Mitikie, 2017).

The government of Ethiopia constructed high-rise condominium houses to achieve its purpose of easing infrastructure service provision for the densely settled people (Weldemariam, 2017).

Managing risks in construction projects has been recognized as a very important management process in order to achieve the project objectives in terms of time, cost, quality, safety and environmental sustainability. Majority of the parties involved in Ethiopian building construction projects believe that the effect of risk on project objectives can be greatly minimized if construction risk management techniques are used (Mihret, 2017).

Lack of risk management in Construction projects is one of the major setbacks for construction projects performance in Ethiopia. It includes identification, assessment, monitoring, and sharing. As observation and impacts of risk that show from literature show the current status of risk identification, assessment, monitoring and risk sharing in is not practiced and modeled. But the future risk management practice must be developed from the western risk management practice. This is timely identification of risk, assessments of risk, monitoring and controlling to minimize the impact of risks. Even construction project risk can- not be ignored, but it can be managed, minimized, shared, transferred or accepted. The identification of their causes might lead to their

reduction, possible elimination and subsequent improvement in overall project performance in civil work construction project. (Mitikie, 2017).

Yadeta, 2020, in his study shows that inadequate schedule is the first ranked most critical risk in the Ethiopian construction industry which contributes the most significant negative impacts on construction project performance in terms of time, cost and quality. He put late, nonpayment and minimum amount of interim payment and submittals and approvals of construction documents in the second and the third most critical risks in Ethiopian construction industry

Accordingly, these risks are among financial and management risks respectively and are likely to affect the project progress due to delay in payment and document approvals by the client and the consultant. This could be due to lack of timely decision of the managers. The fourth ranked critical risk in the industry is price inflation which is among the economic risks. Many construction projects progress are affected and some of them are terminated in the country due to price inflation occurred by increment in dollar value on imported construction materials. As he was found from the interview result inflation is among the risks they pointed.(Yadeta, 2020).

A study indicates that Assessment of Project Risk Management Practices in land Projects In Addis Ababa conducted in an exceedingly descriptive method found that there's a poor practice in terms of developing a policy or a tenet. Risk management isn't treated as a continual process in these projects. it's also found that there's no exclusively assigned responsible person to handle the chance management process therefore; the burden happens to get on the project manager. The project team members don't participate in any of the danger management processes. Risks don't seem to be identified and analyzed appropriately and no risk register is ready. Moreover, projects are missing out opportunities only that specialize in identifying and mitigating negative risks and planning just for threats and disasters. Overall the chance management is being practiced very poor and an enormous gap is noticed between what should be theoretically applied and what's actually being practiced (Kalkidan , 2017).

There are many different descriptions of the construction industry including that of the risks in Ethiopian building construction sector, drawn from different specialist disciplines. This vagueness is compounded by the fact that the construction involves such a wide range of activity

that the industry's external boundaries are also unclear (Murdoch and Hughes, 2000). Although risks in construction are so broad, Abrahamson, (1984) tried to summarize those wide range of risks in the following way.

- ✎ **Management, direction and supervision:** greed; incompetence; inefficiency; partiality; unreasonableness; poor communication; mistakes in documents; defective designs; inadequate briefing, consultation or identification of stakeholders; compliance with statutory requirements; unclear requirements; inappropriate choice of consultants or contractors; changes in requirements.
- ✎ **Physical works:** ground conditions; artificial obstructions; weather; defective materials or workmanship; tests and samples; site preparation; inadequacy of staff, labour, plant, materials, time or finance. Delay and disputes: possession of site; late supply of information; inefficient execution of work; delay outside both parties' control; layout disputes.
- ✎ **Damage and injury to persons and property:** negligence or breach of warranty; uninsurable matters; accidents; uninsurable risks; consequential losses; exclusions, gaps and time limits in insurance cover.
- ✎ **External factors:** environmental regulation; government policy on taxes, labour, safety or other laws; planning approvals; financial constraints; energy or pay restraints; cost of war or civil commotion; malicious damage; intimidation; industrial disputes.
- ✎ **Payment:** delay in settling claims and certifying; delay in payment; legal limits on recovery of interest; insolvency; funding constraints; shortcomings in the measure and value process; exchange rates; inflation.
- ✎ **Law and arbitration:** delay in resolving disputes; injustice; uncertainty due to poor records or ambiguous contract; cost of obtaining decision; enforcing decisions; changes in statutes; new interpretations of common law.

CHAPTER THREE RESEARCH METHODOLOGY

3.1 Introduction

3.1 Research area

The area where the research is conducted is in Addis Ababa Akaki Kality sub city woreda 09 in the vicinity of Koye Fetche project site and office. Some segment of participants are permanent employees of the project who are in the client side and others are residents who already settle there and others following up and waiting for the completion of the projects to settle. The remaining part in the research area is represented by consultants and contractors who are the subject of the research until the completion of the project on their hand or keep being the subject if the clients commence them another project.



Figure 1: Area map of the project site (Source: Google map)

3.2 Research design

Cruswell, (2009), explained research design as a procedure for collecting, analyzing, interpreting and responding data in research studies. The essence of research design is to trace research

problem into data for analysis so as to provide relevant answers to research questions at a minimum cost(Kerlinger, 1996) and research design determines the kinds of analysis that are to be done so as to get desired results and how it's going to be used (Jongbo, 2014).

There are three types of research approaches, namely: quantitative, qualitative, and mixed research. Quantitative study is a study where purely quantitative data and analysis techniques are adopted while qualitative approach makes use of purely qualitative data and analysis. The mixed approach on the contrary adopts the combination of both quantitative and qualitative approaches. The main criteria to decide which type of research to follow depends on the type of study and availability of the information which is required for the study (Naoum, 19980). Consequently, the researcher used descriptive Design and mixed research approach for this study.

3.3 Data type and source

3.3.1 Data type

There are different types of data that can be used in a research like primary and secondary data, cross sectional data, categorical data time series data and special data (Aryal, 2019).

In this research Primary and secondary data were used for the investigation of the risk management practices applied in Addis Ababa 40/60 Condominium projects, typically in Koye Fetche project 11/18

3.3.2 Data source

Primary data is more reliable than secondary data owing to the originality of the data that has been collected. It does not produce outdated information or secondary sources that may be subject to some 'errors or discrepancies (De Sordi , 2013).

Secondary data may be collected for various purposes. A systematic process with proper planning and organisation is followed when collecting primary data from its source of origin by the researcher himself or trained field workers. Secondary data is collected from both internal and external published sources (Shokane, 2018).

The primary data represents firsthand information obtained from respondents who works for the teams of client, contractors and consultants. The primary data were collected through

questionnaire and interview. This data helped to find out the source and causes of risk in the projects and the possible effects of the risk in the project. This study used the primary sources obtained from the client, contractor and consultant of Koye Fetche project 11/18.

Secondary data were collected from different sources that exist in the office documents. It includes reports, contractual agreements, published and unpublished documents related to the project. Secondary data was used to identify major areas of risk, assessing the identified risks, monitoring and controlling risks in the project and putting risk monitoring and controlling mechanisms together in construction.

3.4 Sample Size Determination

Sampling is the selection of subset of the population of interest in research study. In the vast majority of research endeavors, the participation of entire population of interest is not possible, so a smaller group is relied up on for data collection. Sampling from the population is often more practical and allows data to be collected faster and at a lower cost than attempting to reach every member of the population (Turner, 2020).

In order to generalize from a random sample and avoid sampling errors or biases, a random sample needs to be of adequate size. What is adequate depends on several issues like the absolute size of the sample selected relative to the complexity of the population, the aims of the researcher and the kinds of statistical manipulation that have been used in data analysis (Taherdoost, 2016).

The sample size was determined using statistical formula of McCuen, 2000. This was considering the population to estimate the number of questionnaires to be distributed to respondents to consider the response rate.

$$N = z^2 * (\hat{p})(1 - \hat{p}) / \epsilon^2$$

Where

z is the z score

ϵ is the margin of error

N is population size

\hat{p} is the population proportion

Using the above formula with 95% confidence level, 5% margin of error and 50% population proportion the representative sample size for the study is calculated as 122.

3.5 Sampling technique

Sampling is the act, process, or technique of selecting a suitable sample, or a representative part of a population for the purpose of determining parameters or characteristics of the whole population. Among the many types of sampling techniques, stratified sampling is used for the research.

The target extracted population is contractors, consultants and client who participated on Addis Ababa 40/60 Condominium projects, typically in Koye Fetche project 11/18

McCuen's formula has been used to determine the sample size of unlimited population (McCuen, 2000).

The design of respondents of the questionnaire is shown in the following table.

Table 1: Sample of respondents.

Participants of the questionnaire		Percentage	Number
	Contractor	44.9%	55
	Consultant	24.6%	30
	Client	17.2%	21
	Other	13.1%	16
	Total	100%	122

Source: Own survey, 2021

3.6 Data Collection Methods and Instruments

Firsthand information is collected via questioner and interview and focus group discussion, as sources of secondary data, the student researcher uses published & unpublished articles, online sources from different websites and digital library, office documents and reports. The qualitative data collected through questionnaires was then compiled to be interpreted as to draw conclusions

3.7. Methods of Data Analysis

Data was analyzed together with method of data collection. The results of the questionnaires were analyzed using quantitative data analysis software known as SPSS version 24. Frequency tables and descriptive statistics were constructed to display which independent variable is getting

more weight over the dependent variable. Ranking analysis was used to prioritize the level of those independent variables which contribute more to affect the dependent variable.

Mainly four methods were used by the student researcher; Questionnaire, interview, focus group and discussion. The questionnaires were open ended that can be answered by narration and choice type in which some part are addressed by printing the hard copy and presenting them in person and others via telegram based on their accessibility for addressing and collecting.

The other method used is structured and semi structured interview face to face approach, through telephoning and via telegram. Focus group discussion is used as another method by stimulating topics by the student researcher. The student researcher also facilitates the discussion and manages the overall activities including the opening and closing of the discussion.

3.8 Reliability and validity

The purpose of establishing reliability and validity in research is essentially to ensure that data are sound and replicable, and the results are accurate. The evidence of validity and reliability are prerequisites to assure the integrity and quality of a measurement instrument (Kimberlin & Winterstein, 2008).

3.8.1 Reliability

Reliability indicates the extent to which the measurements are without bias (error free), and hence insures consistent measurement cross time and across the various items in the instruments. Some qualitative researchers use the term ‘dependability’ instead of reliability. It is the degree to which an assessment tool produces stable (free from errors) and consistent results. It indicates that the observed score of a measure reflects the true score of that measure. It is a necessary, but not sufficient component of validity (Feldt & Brennan, 1989) In order to prove the data reliability the student researcher performed a calculation using SPSS current version 24. Here Cronbach’s Alpha test of reliability was performed. To approve the reliability of the tools or the questions Cronbach’s Alpha Coefficient result should be 0.7 or above (Nunnaly 1978). The student researcher had provided all responses of the common questions to all of the respondents to be tested through distributing 84 questionnaires which had 27 items as a pilot. Then based on the result of Cronbach’s Alpha which is 0.731, the tool is reliable. The following table shows the result obtained.

Table 2: Reliability statistics.

Cronbach's Alpha	N of Items
0.731	27

Source: Own survey, 2021

3.8.2 Validity

Validity is often defined as the extent to which an instrument measures what it asserts to measure (Blumberg, 2005). Validity of a research instrument assesses the extent to which the instrument measures what it is designed to measure (Robson, 2011). Validity explains how well the collected data covers the actual area of investigation (Ghauri and Gronhaug, 2005). High validity is the absence of systematic errors in the measuring instrument. When an instrument is valid; it truly reflects the concept it is supposed to measure (Wood and Haber, 1998).

The questionnaire was divided into two sections. In the first section questions general information of the respondents and the second part contains main areas of the study in four aspects; risk identification, risk assessment, risk monitoring and controlling and risk response.

Majority of the completed questionnaires were collected either personally and fewer numbers were sent and collected or via telegram. 122 questionnaires were sent, and a total of 84 were returned, resulting to a response rate of 68.8%.

On the other hand, the same population of 122 was used for the interview and from those, representative section of 45 respondents were introduced with the interview and 33 of them are willing to respond the questions and the response rate was 73.3%. Those 33 participants give response for both questionnaire and interview questions.

3.9 Ethical Consideration

Following ethical procedure is crucial contributes its part for the successful achievement of the research objective. Accordingly, participant were given a clear explanation about the nature of the study and to participate voluntarily emphasizing that the data were used only for the intended academic purpose and all data is analyzed without using respondent's personal information such as their name. In addition, they are informed about data collecting procedure and techniques. Moreover, all the data gathered from respondents is kept confidentially and all secondary sources of data are acknowledged by the researcher.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter covers interpretation of the data collected via different mechanisms as described in the previous chapter, questionnaire, and interview and focus group discussion. Three focus group discussions were organized throughout the study, two on the project site and one out of the site. The discussion that held on the project site participated contractors, consultants and employees of the client and was aimed to discuss the general as well as technical issues about risk management. Participants of the remaining one focus group discussion was composed of insurance workers, actual and potential residents of condominium buildings and other people who have an average understanding about condominium buildings. The following two tables show the participants in the questionnaire and interview.

Table 3: Respondents profile

Participants of the questionnaire		Percentage	Number
	Contractor	44.9%	55
	Consultant	24.6%	30
	Client	17.2%	21
	Other	13.1%	16
	Total	100%	122

Source: Own survey, 2021

Table 4: Participants of the interview

Participants of the interview		Percentage	Number
	Contractor	15.1%	5
	Consultant	9%	3
	Client	24.2%	8
	Other	51.5%	17
	Total	100%	33

Source: Own survey, 2021

The student researcher believes the interpretations that are derived from the result will reflect the risk management practice in Koye Fetche project 11/18.

Due to the nature of data collection followed by result and discussion, the interpretations are more inclined to show qualitative results about the subject matter.

4.2 Characteristics of respondents

The nature of the questionnaire is inclusive which covers the issue of all stakeholders so that some of the stakeholders may not have full or professional information about the topic raised. This cratered non uniform result through the research findings.

68.85% of the participants covered all questions in the questionnaire, participated actively in focus group discussions and give positive replies for the interviews. 23.7% of the participants didn't covered all parts of the questionnaire and didn't participate actively in focus group discussions interviews because they said they are not close enough with the topic or the question raised which enables them to be part of the research, even though the student researcher go forward to familiarize the topics.

The rest 7.3% of respondents have showed unwillingness to fill the questionnaire to participate a in focus group discussions or interviews because they have trust issue on the student researcher and they didn't believe the result of the research will be valuable and solve any problem so that they don't want to waste their time on it.

4.2.1 General information of the respondents

Table 5: General information of the respondents

Characteristics		Percentage
Sex	Male	58.3 %
	Female	41.66%
Stage of involvement in the project	Inception	11%
	Pre construction	19%.
	Post contract	42%
	Final acceptance	28%.
Representing sector in construction	Contractor	44.9%
	Consultant	24.6%
	Client	17.2%
	Other	13.1%

Respondents educational background	Certificate	10.6%
	Diploma/ level	13.9%
	Degree	37.7%
	Masters degree	16.3%
	Above Masters or below certificate	21.3%
Respondents experience in the project	Less than 3 years	15.5%
	3-5 years	31.96%
	6-10 years	36.8%
	11-15 years	11.4 %
	Above 15 years	4%
Number of condominium projects involved	One project/ Current	34%
	2 projects	26%
	3 projects	31%
	4 projects	12%

Source: Own survey, 2021

4.2.1.1 Sex

Based on table 5 above, due to the characteristic of the project, the respondents and non-respondents in the project are inclined to male sex that contributes 58.3 % and the female sex 41.66%

4.2.1.2 Stage of involvement in the project

Table 4 shows the largest percentages of involvements in the project are post contract, 42% and final acceptance stage which contributes 28%. The remaining two involvements, inception and pre construction are giving a percentage of 11% and 19% respectively. This is as observed by the student researcher because few professionals or members of the top management are involved from the inception stage and didn't even induced the big image to the mass stakeholders that even professionals of the sector starts the involvement "from the middle". Pre contract stage includes all the time between inception stage and contract awarding that there is a little more involvement is observed due to the reason the contract awarding, negotiations or terminations are seldom performed seldom in the project.

4.2.1.3 Representing sector in construction

As per the data inferred in table 4, from the total respondents, the majorities or 44.9% are contractors, 24.6% consultant, and 17.2% are client professionals and the rest 13.1 % includes client side professionals but not professionals of construction, current and future residents who own and win a house in the project site and other professionals who are indirectly linked with construction and construction risk management.

4.2.1.4 Respondents educational background

Among the respondents, 10.6% are certificate holders, 13.9% diploma or level holders. The highest percentage of educational background is bachelor's degree with 37.7% and master's degree with 16.3%. Respondent who have an educational background higher than master's degree or lower than certificate summed up and contributes 21.3%, according to table 5 above.

4.2.1.5 Respondents experience in the project

Similarly, table 5 also showed 36.8% of respondents spent 6-10 years and 31.96% of respondents 3-5 years in this project and other similar condominium housing projects in Addis Ababa. 15.5% respondents spent less than 3 years, 11.4 % spent 11-15 years and 4% respondents spent more than 15 years in this condominium housing and building construction sectors.

4.2.1.6 Number of condominium projects involved

As reported by Yeshitila (2019) more than 175,000 units of condominiums have been constructed in 13 project sites which show there is a probability of participants of the research to be involved in more than one project and there is also a chance of shifting to other similar projects when the construction in the previous site is completed, as per the data in table 5.

The data collected by the student researcher through the questionnaire shows the maximum number of involvement 4 with 12%. 31% of participants involved in 3 projects 26% of participants 2 projects and 34% are on their first project involvement.

4.3 Analysis of Collected Data

In statistics, descriptive analysis includes many techniques for modeling and analyzing several variables, when there is on the relationship between a dependent variable and one or more independent variables. More specifically, regression analysis helps one understand how the

typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed. Most commonly, regression analysis estimates the conditional expectation of the dependent variable given the independent variables that is, the average value of the dependent variable when the independent variables are fixed. Less commonly, there is on a quintile, or other location parameter of the conditional distribution of the dependent variable given the independent variables. In all cases, the estimation target is a function of the independent variables called the regression function. Regression analysis is widely used for prediction and forecasting, where its use has substantial overlap with the field of machine learning. Regression analysis is also used to understand which among the independent variables are related to the dependent variable, and to explore the forms of these relationships. In restricted circumstances, regression analysis can be used to infer causal relationships between the independent and dependent variables (Armstrong, 2012).

Based on the explanation made by Salman, (2014) if the value obtained from evaluating the mean of the data is below 3, it indicates the event is happening infrequently or it will never happen. On the other hand if the mean indicates a value of 3.3, it will signify the event is happening always or most of the time.

4.3.1 Risk identification

Table 6: Result of risk identification

Risk Factor	N	Mean
Poor or narrow understanding of risk	84	4.10
Clear detection of top project risks	84	2.40
Adequate risk reporting and communication system	84	2.21
Valid N	84	

Source: Own survey, 2021

Table 6 above which is summarized from results of the questionnaire shows the mean value of 4.10 which indicates the level of understanding risk generally is very limited and encompasses of very few possible scenarios and there is a tendency of externalizing the subject to other disciplines. Looking at the value given for detection of top project risks which is 2.40 shows the problem of finding out what risks may happen broadly in building construction as well as project

wise that the term risk related to construction projects is in a lower level but highly attached to professional safety and hazard, and the last point in risk identification, a mean value of 2.21 shows that there is no notable difficulty of risk reporting and communicating to the decision makers or to the stakeholders. In general, the narrower understanding of risk and risk related to the project creates a big gap in risk identification before the construction process starting or even in earlier stage of the project. This inability to clearly identify risks in pre construction and inception stage makes difficulty to prepare risk management plan or if it's prepared, it be unfit to the project or which doesn't cover most possible risks of the project.

4.3.2 Risk assessment

Table 7: Result of risk assessment

Risk Factor	N	Mean
Lack of risk management plan and its proper usage	84	3.90
Over costing is risk in this project	84	4.24
Under quality is risk in this project	84	4.05
Delay of payment is risk in this project	84	3.05
Delay of design variation approval is risk in this project	84	1.92
Professionals safety hazard is risk in this project	84	2.74
Price escalation is risk in this project	84	3.11
Ambiguous contract awarding is observed	84	1.74
Poor understanding of project scope is observed	84	2.90
Valid N	84	

Source: Own survey, 2021

From the risk assessment result discussed in table 7 it can be understood over costing of the projects and quality problems of the buildings as well as the entire project and risks due to price escalation scored 4.24 which is highest point that indicate the most common risks in the project. As per collected data the buildings in the project are not completed according to the schedule due to different pulling reasons behind like very high inflation of fabricated construction materials

and cement, inability to complete the project within the scheduled time and poor forecasting of the project cost in the pre construction phase.

The other variable measured is if the contract awarding is clear to all stakeholders putting in mind that vulnerability to risks starts from contract awarding and if the contract is awarded to the contractors or consultants who have adequate capability of executing the contract, the magnitude of risks will be minimized considerably. Delay of issuing payment is also observed as a risk with a value of 3.01 which indicate risk raised from delayed payment are occurring frequently and this risks are common throughout the entire project life that contractors and consultants point their finger to the client to own the quality and delay related risks and the client do nothing or give some valid reason for the complains. Delay to approve design and variations and risks in professional’s safety and hazard score below 3 indicating these risks are happening infrequently in the project. The reason behind is reported as the only bigger risk to deal with and to put an effort to manage is risks due to professionals safety and the risks are vivid when they happen to be aware of them.

4.3.3 Risk monitoring and controlling

Table 8: Result of risk monitoring and controlling

Risk Factor	N	Mean
Adequate risk monitoring and controlling mechanism in the project	84	4.05
Is there efficient dispute handling mechanism in the project	84	2.88
Tendency of taking measures in risky events in the project	84	3.13
Good material/cost/time management	84	1.85
Tight and supportive project supervision which can bring tangible result	84	3.25
Valid N	84	

Source: Own survey, 2021

Based on the outcomes obtained in table 8, the value obtained for the presence of adequate risk monitoring and controlling mechanism is 4.05 which show risk monitoring is in an appreciable level. The dispute handling mechanism have got a value of 2.88 which signifies the truth that

there is no standardized and written dispute handling mechanism to be followed by, whoever is on charge.

The next two results, tendency of taking measures to risky events in the project as contractor, client or consultants and presence of tight and supportive project supervision were found to be 1.85 and 3.25 respectively. From the results, the student researcher concluded there is considerably low tendency of taking measures towards the risk prone events so that the risk has higher probability of happening or aggravating.

The supervision which have undeniable role in risk minimization as well as monitoring and controlling which in turn plays its part in risk reduction even though the supervision is claimed to be oppressive than being supportive and bring result in achieving the ultimate goal of managing project risks.

4.3.4 Risk responding

Table 9: Result of risk responding

Risk Factor	N	Mean
Most of the risks in the project can be avoided	84	2.89
There is effective risk responding mechanism	84	3.64
Ample understanding and application of all kinds of construction insurance in the project	84	1.77
Retention payment is meeting its goal in the project	84	3.12
Valid N	84	

Source: Own survey, 2021

Most of the respondents answered that there is a doubt potential of avoiding most of the project risks as the value is indicating a figure of 2.89 even there is a potential that if most of the risks in the project are not properly identified. The next result due to risk responding which has got comparatively higher value of 3.64 was the availability of risk responding mechanisms. The risk factor may have a chance of getting a value higher than given had it been allied with other risk minimization mechanisms but still very inefficient to absorb the quality problems happening after the contractor commenced the project and any risk due to the contractor (and the consultant) in the defect liability period.

Since insurance is tightly linked with risk responding ways in a construction project, there should be unambiguous understanding about insurance policy and application. What is happening in the project is the only understanding and the application of insurance in the project is the insurance asked by client for advance payment and performance, as the value 1.77 revealed. Some few percent of main project stakeholders are aware of insurance of professional safety and hazard but with a limited application. Most of the contractors and consultants prefer compensating the risks happened on the professionals even they have bought insurance for them.

The score for if the retention payments met the expected goals was not found to be in appreciable level. Some of the contract administration professionals put the issue of retention payment in the contract document only to follow the procedure. Mainly it's aimed to minimize quality and scope risks even the risks are exposed after completion of the work. Some professionals who are aware of the contract law well were using the money to force the contractor to correct the exposed quality and scope risks.

CHAPTER FIVE SUMMARY OF MAJOR FINDINGS, CONCLUSION AND RECOMENDATION

5.1 Major findings

Findings of the study are aimed to answer the basic research questions which were found in chapter one. Each major finding responds across to each of the aforementioned questions

Since the first basic research question of my thesis was about how the risk management processes risk planning, risk identification, risk analysis, risk response and risk monitoring and control applied in practice at Koye Fetche project 11/18 site. The statistical as well as the interviewed result in chapter 4 indicated that risk management practices are missing in the project and traditional and passive risk management is being practiced in limited parts of the project.

The next question that was asked in the research assesses the challenges encountered in implementing risk identification, risk analysis, risk response and risk monitoring and control practices in Koye Fetche project 11/18 site. Majorities of the project stakeholders are found in a lower level of risk understanding, knowledge and skill of risk management.

The third one was about finding out the main risks causing quality, cost, scope and time problems in the project and what should be done to monitoring and control the problem consequently lack of risk management plan and poor risk recognition is found to be the main risk in the project and it's responsible for cost risk and cost risk has a quality and time roots.

The fourth and final question which aimed to answer the extent that the main stakeholders influence the risk identification, risk analysis, risk response and risk monitoring and control process in various levels of the project shown that supervision has irreplaceable value in the project to achieve project objectives but found to be light and lacks to have visualize the big goal of risk reduction in a project level.

5.2 Conclusion

Risk management plan which is the core point of risk management is found to missing in organized and satisfactory way that have a capability of managing the actual and potential risks of the project. The understanding and method of managing risks in the project is too traditional and based on past experience rather than scientific and proven methods.

On the other hand a huge skill, knowledge and understanding gap of risk identification, assessment and responding mechanisms to the identified risks. It's vivid that risk management is not being practiced from the initiation phase and the stakeholders start to think about risk or the management methods after once an immense risk happened in the project.

The student researcher observed startups risk management practices in the project but most of them are in paper level and the stake holders have lower willingness and commitment to apply it in to the ground.

The only risk that have got a better attention is the risk due to professional safety and hazard and other risks of cost delay and quality risks are under estimated even though the impact is very explicit.

Risk of delay is found to be the most prevalent risk in the project which plays its role in aggravating quality and cost risks. There is obviously a quality risk in the project but relatively it's managed by applying a bigger safety in structural works but there is still manifested quality problem in nonstructural works, roofing, finishing, sanitary and electrical works

Finally, it's found that no sufficient work is done by all stake holders to create awareness and induce the concept of risk in the project, methods of managing risks and the additional advantage from project risk management in terms of fundamental project deliverables.

5.3 Recommendations

The first finding in the previous section implies risk management practices are missing in the project and traditional and passive risk management is being practiced in limited parts of the project. Accordingly, managing risks is very essential element of any project especially condominium projects which prone to many innate risks so that the risks in all phases of the project, from inception to handing over to the end client should be managed well. The executing management should give the appropriate consideration to risk management practice throughout the project and it should be mandatory to have risk management team with a clear goal and responsibility. Since our country is developing and resources are scarce the trend of most of condominium projects showing a huge deviations from the milestones of the project should be avoided.

Based on the second finding majorities of the project stakeholders are found in a lower level of risk understanding, knowledge and skill of risk management. In order to eliminate the observed huge risk and risk management gap, the consultant of the project should prepare a well-organized document which is specific to the project that refreshes what is risk in that project context and list the main risk areas and expected risk management deliverables should be alerted between stakeholders of the project prior to implementing the project. Besides in the client- consultant-contractor meetings throughout the project, the level of understanding the current project risks should be an issue and should be evaluated and responsible personnel for risk management should be assigned.

The student researcher finally recommends a better and thorough construction risk management / research which will put a brick in the country's growing construction industry.

The third finding inferred lack of risk management plan and poor risk recognition is found to be the main risk in the project and it's responsible for cost risk and cost risk has a quality and time roots. Due to that, risk management plan should be mandatory so as to minimize risks as much as possible and the waste of country's resource, especially attention should be given in the material utilization where the aggregate result have huge cost impact. The plan must be included in the project document with a clear designation of managing cost risk in the project.

Supervision has irreplaceable value in the project to achieve project objectives but found to be light and lacks to visualize the big goal of risk reduction in a project level as per the fourth finding of the study. Hence, tight supervision should be implemented that enable to avoid the

risks in either way or to minimize the effects of the risks in the project to enable a better completion with respect to time, cost and quality. Risks of delay and over costing are the main risks to be managed in the project which have many negative implications in the entire project life so that the due level of proper attention should be given by the supervising team. The supervision must have a pre planned goal and should be structured in a way that meets the target of modern supervision. The management must align the adequate skill and knowledge with deciding power to give accurate direction to the supervision team.

The student researcher finally recommends a better and though construction risk management / research which will put a brick in the country's growing construction industry.

5.4 Suggestions for further research

This research concentrated on assessment of risk management practices in condominium construction projects in Koye Fetche project 11/18.

Further study is recommended for investigation of the impacts of risk management in the construction of condominium projects as well as construction projects in general to make increase the capacity of controlling risks in the industry.

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Annexes

Questioners

**ST. MARY’S UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

Dear Participants!

I am Tikeher Demena; a MA student in Project Management at St. Mary’s University. As part of my MA thesis work, I am undertaking Assessment of Project Risk management Practice at Addis Ababa Housing & development agency, specifically in your project area. I kindly request you to participate in this research study by completing the attached questionnaire. In order to ensure that all information will remain confidential please do not include your name anywhere in the questionnaire. I also sincerely request you to respond to the questions as honestly as possible and return the completed questionnaires. Knowing that your time is precious please, take few minutes of your time to complete the questionnaire.

In case if you need any explanation here is my number 0911 500 326

Email tikeherd@gmail.com.

Thank you in advance for your kind collaboration.

PART 1: General information

Gender Male Female

1. At what stage of the project were you involved in the project?

Inception Pre-Contract Post-contract Final Acceptance

2. In which side of the project are you participating

Client Contractor Consultant Other

3. What is the highest level of education that you have attained? Tick the correct answer

Certificate	<input type="checkbox"/>
Diploma	<input type="checkbox"/>
Advanced diploma	<input type="checkbox"/>
Bachelor's degree	<input type="checkbox"/>
Post-graduate Degree	<input type="checkbox"/>
Other, please specify	<input type="text"/>

4. How long have you worked in this project? Tick the correct answer

Less than 3 years	<input type="checkbox"/>
Between 3-5 years	<input type="checkbox"/>
Between 6-10 years	<input type="checkbox"/>
Between 11-15 years	<input type="checkbox"/>
More than 15 years	<input type="checkbox"/>

5. In how many projects are you involved in Addis Ababa condominium Housing projects ?

Part 2: Questions Related to Risk identification

1. What is project risk project risk by your understanding?

2. Based on the role you have on the project, what do you think is the main risk in the project?

3. In which stage risk is identified in the project? How and to whom the identified risks are reported?

4. Do you think risk identification got the due attention by the project stakeholders? How/why

Risk factor	Strongly agree	agree	No clue to decide	Disagree	Strongly disagree
Poor or narrow understanding of risk					
Clear detection of top project risks					
Adequate risk reporting and communication system					

PART 3: Questions Related to Risk Assessment

5. Is there risk management plan in the project? If yes how is it being used?

6. What is the main reason of quality problem in the project?

7. What is the main reason of over costing in the project?

8. What is the status of the project with respect to payment request and approval?

9. What is the status of the project with respect to design / change request and approval?

10. Have you faced/ played a part in redesign /demolishing of full or part of the building because of quality problem? What was the consequence?

11. How do you understand the effect of price escalation in the project

12. How convenient is there project with respect to safety and hazard?

13. What is the type of contract awarding system is practiced in the project and how efficient is it?

14. How far do you think the project scope is understood between project stakeholders?

Risk factor	Strongly agree	agree	No clue to decide	Disagree	Strongly disagree
Existence of risk management plan and its proper usage					
Over costing is risk in this project					
Under quality is risk in this project					
Delay of payment is risk in this project					
Delay of design variation approval is risk in this project					
Professionals safety hazard is risk in this project					
Price escalation is risk in this project					
Ambiguous contract awarding is observed					
Poor understanding of project scope is observed					

PART 4: Questions Related to Risk Monitoring and Controlling

15. Do you think risks can be managed? How?

16. Is there risk controlling and monitoring mechanism in the project? If Yes how efficient is the process?

17. How do you handle disputes and how disputes are being handled in the project?

18. Have you noticed terminated project/ consultant/ contractor in the last 3 years in the project?
If yes what was the reason and the consequence?

19. How material/manpower/ machinery schedule managed in the project?

20. How cost/ budget/ time schedule managed in the project?

21. How often the project is supervised and how the result is managed?

Risk factor	Strongly agree	agree	No clue to decide	Disagree	Strongly disagree
Adequate risk monitoring and controlling mechanism in the project					
Is there efficient dispute handling mechanism in the project					
Tendency of taking measures in risky events in the project					
Good material/cost/time management					
Tight and supportive project supervision which can bring tangible result					

22. Do you think risk can be avoided? If yes how?

23. Is there risk responding mechanism in the project? Explain

24. How often do you work with insurance companies?

25. Have you claimed for construction risk to insurance companies in the last 3 years? If yes what was the result?

26. How do you understand retention payment in the project?

Risk factor	Strongly agree	Agree	No clue to decide	Disagree	Strongly disagree
Most of the risks in the project can be avoided					
There is effective risk responding mechanism					
Ample understanding and application of all kinds of construction insurance in the project					
Retention payment is meeting its goal in the project					

Interview questions

1. What does the term risk mean to you?
2. What does the term risk management mean to you?
3. How do you think risk management contributes to the organization? What's its purpose?
4. What does the term risk identification mean to you?
5. What does the term risk assessment mean to you?
6. What does the term risk monitoring and controlling mean to you?
7. What does the term risk responding mean to you?
8. What do you suggest to manage risks in building construction, especially in condominium construction?
9. What is your experience preparing and presenting risk assessments and reports?

Pictures of the project



Figure 2: Data collection from the project, April 2021 (Source: own survey)



Figure 3: Data collection from the project, April 2021 (Source: own survey)



Figure 4: Data collection from the project, April 2021 (Source: own survey)



Figure 5: Data collection from the project, May 2021 (Source: own survey)



Figure 6: Data collection from the project, May 2021 (Source: own survey)



Figure 7: Data collection from the project, May 2021 (Source: own survey)



Figure 8: Data collection from the project, May 2021 (Source: own survey)



Figure 9: Data collection from the project, May 2021 (Source: own survey)



Figure 10: Data collection from the project, May 2021 (Source: own survey)



Figure 11: Focus group discussion on the project, May 2021



Figure 12: Focus group discussion on the project, April 2021