



ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE

POSTGRADUATE STUDIES PROGRAM

DEPARTMENT OF PROJECT MANAGEMENT

**Project Risk Management Practice: The Case of Walia Luxury
Hotel Apartments**

BY

Tsinukal Aweke

Advisor: Wubshet Bekalu (PHD)

**A Final Project Work Submitted to Addis Ababa University in
Partial fulfillment of the Requirements for an MA Degree in Project
Management**

JUNE 2024

ADDIS ABABA, ETHIOPIA

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External Examiner _____ Signature _____ Date _____

DECLARATION STATEMENT

I, Tsinukal Aweke, declare that the project work entitled " Project Risk Management Practice: The Case of Walia Luxury Hotel Apartments" is being submitted for the award of a Master of Arts Degree in Project Management from Addis Ababa University, School of Commerce, Department of Project Management. This work is original and has not been presented for a degree in any other university. All sources of materials used for this project work have been duly acknowledged.

Tsinukal Aweke

Signature_____

Date_____

CERTIFICATION STATEMENT

This is to confirm that Tsinukal Aweke has completed the project work titled " Project Risk Management Practice: The Case of Walia Luxury Hotel Apartments" with my supervision. This work is original and meets the requirements for the award of a Master's degree in Project Management.

Wubshet Bekalu (PHD)

Signature _____

Date _____

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ACRONYMS AND ABBREVIATIONS

PMI Project Management Institute

RM Risk Management

SIG Sisay Investment Group

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ABSTRACT

The primary focus of this study is to assess the risk management practices of the Walia Luxury Hotel Apartments building project. The study aims to understand the project risk management process, identify risk factors and develop response strategies. A closed-ended questionnaire was distributed to 31 participants, including personnel from the client, contractor, and consultant, to identify which steps of the project risk management procedures were given attention and to compare and rank 34 risk factors in terms of probability of occurrence, impact on time and budget. Using descriptive approaches, the quantitative data were statistically analyzed in SPSS version 27 software. The research revealed that project risk analysis and project risk monitoring and control received little to no attention throughout the project lifecycle. It was observed that, among project risk management procedures, risk response was comparatively well-executed. The results also revealed that the majority of the risks are linked to finances with regard to the probability of occurrence. The top-rated risk factors, in terms of their biggest impact on project schedule and budget, were financial, design, and construction risks. Finally, risk response plans were developed in relation to the recognized risk factors. The research concludes that it is critical to address the flaws found in the project's risk management procedures by implementing necessary changes. Those changes could aid the project to effectively handle and mitigate the identified risk factors, particularly those of financial and technical aspects. The research also recommended that every project stage implement project management processes. Although it's very hard to control financial risks such as price fluctuation, inflation, and exchange rates, there should be a flexible contingency plan in place to account for these risks without negatively affecting the project's budget or schedule.

Key words: Risk, Risk factors, Project risk management

CHAPTER ONE

INTRODUCTION

1.1 Background of The Study

Project risk is defined by the Project Management Institute as an unpredictable occurrence or circumstance that, if it materializes, might have a favorable or unfavorable impact on project objectives including scope, schedule, cost, and quality (PMI, 2013).

The goal of risk management is to find, deal with, and remove risk factors before they become a significant source of costly rework or a danger to the smooth functioning of the business. (Boehm & Ross, 1989). Risk assessment and risk control are the two interconnected stages of the risk management process. These stages are decomposed even more. Identification, analysis, and prioritization of risks are all part of risk assessment. Planning, mitigating, and monitoring risks are all part of risk control (Boehm & Ross, 1989). It is imperative that the team's project management practice include iterative risk management throughout the project.

To prevent or reduce the effects of threats and to maximize the effects of opportunities, project team members should proactively identify risks at every stage of the project. If a risk materializes, both opportunities and threats have a variety of possible countermeasures that may be planned and implemented. The project team must understand what degree of risk exposure is reasonable in order to achieve the project's goals in order to manage risk successfully. is defined by measurable risk thresholds reflecting the attitudes and appetite for risk of the project's stakeholders as well as the organization. Risk thresholds express the acceptable departure from a target and represent the risk tolerance of the organization and its stakeholders. Typically, while setting the project's risk impact levels, thresholds are established, communicated to the project team, and taken into consideration (Project Management Institute, 2021).

Because of this, businesses are unable to afford to devote a large amount of resources to a project that is extremely risky. Since projects have endings, a lot of work must be done to ensure that the objectives are accomplished on time. However, the greatest dreaded roadblock to project success is risk. As a result, it is critical that project personnel understand risk and how to properly manage it within a project.

It would be impossible to discuss risk in the age of raging globalization without doing so, since it has become an essential aspect of daily existence. Everywhere and in every aspect of life, there is a risk. One such sector is the construction business, where risk is a constant component of a complex jigsaw. The lowest choice activity, risk resignation, appears to be exempt from effective risk management (Szymański, 2017).

Every project has some level of risk, and building construction projects are no exception. Project financing, resource availability, client interest, construction parties' performance, environmental issues, and so forth are all unpredictable. These circumstances have the power to significantly reduce the likelihood that building projects will succeed.

In modern construction project management, risk management play a significant role. These practices assist various key stakeholders in carrying out their obligations and reducing any detrimental effects on the cost, schedule, and quality of construction projects, including the client, contractor, consultant, and supplier. Traditionally, successful construction projects have been closely linked to achieving objectives in these three areas. Since it is widely accepted that risks can be controlled to minimize their detrimental effects on project objectives, they are considered a common feature in all project endeavors.

Projects that effectively handle risks are those that priorities early and effective risk identification and assessment, even in cases when total risk removal is not feasible. Ethiopia's economy is growing rapidly, requiring large infrastructural and asset investments. While this offers project stakeholders opportunities, so as to execute projects that satisfy the project's goals, such as those related to quality, safety, time, money, and the environment, it is imperative to use an effective risk management strategy to handle the risks created by variable construction operations (Yadeta, 2020).

As stated above, the construction industry is highly susceptible to a wide range of risk factors from various angles, so in order to meet project objectives, it is imperative that all parties involved put in place suitable risk management measures to recognize and appropriately address any risks that could compromise the efficiency of the project as a whole.

1.2 Background of the Organization

Sisay Investment Group (SIG) is a large family of top-performing, independently owned businesses that are constantly expanding. SIG is a multifunctional, highly diversified company that leads the steel production sector. SIG's position in the highly competitive market of today has been won by a combination of its fundamental values and its steady provision of excellent services and high-caliber final goods.

Over the years, SIG have contributed greatly to the growth of industries and the production of comfortable living spaces by offering the market with diverse steel, plastic and paint goods that match the changing demands of the times. Moreover, it is also assisting the macro economy of the nation by immersing itself in hard currency generating export activity. In the course of these many years in the manufacturing sector, SIG had steadily progressed its capabilities towards a complete scope of diverse and specialized goods with a strong dedication of employee's empowerment that helped produce knowledgeable and experienced experts

Sisay Investment Group (SIG) is a leading and large business conglomerate in the country, involved in various sectors to contribute to the country's economic growth. It offers high-quality products and services that meet international standards for both local and international communities.

SIG have established major industries, real estates and Shopping mall which is under building phase. SIG is also interested in global trades mainly focused on coffee export in Europe and United States of America and company growth in African continent. For instance, SIG has invested in Rwanda towards the manufacturing sector and also having a mission to spread its investment and experience around the world.

SIG is established as Investment Group comprised of subsidiary units operating in a varieties of economic sectors. This decentralized approach is a design for efficiency and growth in the group. Group companies under SIG are described in the table below.

Company Name	Status	Investment Capital (USD)
Walia Steel Industry	Operational	100,000,000
Best Plastic Industry	Operational	20,000,000
Best Paint Industry	Operational	20,000,000
Excel Export Enterprise	Operational	4,000,000
S and H Industries LTD (Rwanda)	Operational	2,000,000
Walia Luxury Hotel Apartments	Under Construction	20,000,000

Table 1- 1 SIG companies

SIG is one of the largest business conglomerates in Ethiopia and is engaged in various sectors such as:

- Steel Industries
- Plastic and Paint Factories
- Real Estates
- Luxury Building and Apartments
- Export Businesses
- Construction Materials and Machinery Rentals

Walia Luxury Hotel Apartments

Walia Luxury Hotel Apartments is one of the companies that is owned and controlled by Sisay Invest Group (SIG). This project marks the beginning of the group’s intention to embark on the hospitality business. Sisay Investment Group is also building another luxury hotel apartment around kazanchis called La Meridian. Walia Luxury Apartments is a 23 floor high rising building (2B+1S+G+19) and is sitting on 800-meter square of land. This project is being constructed in the center of the city around “Lanchia - Beklo Bet”. This site has also acquired an additional adjacent plot of 1000 square meters of land for expansion.

The Luxury Apartment Hotel once finished will have 19 floors with each floor having four units with a state of the art three bad rooms. The project has created a job opportunity for 400 periodic and 20 permanent employees.

The project was started on 15th of October 2018 and was planned to be finished in 2020 but construction was halted for 2 years after the structural work is done. The project resumed on march 2023 and is now on finishing phase.

General Project Information

- **Project Name:** Walia Luxury Hotel Apartments
- **Site:** Lanchia-Beklo Bet, Addis Ababa Ethiopia
- **Employer:** Sisay Investment Group (SIG)
- **Contractor:** Kiberu Fiterete Building Contactors
- **Consultant:** Jedaw Consulting Architects and Engineers
- **Contract Signing Date:** 14/02/2017
- **Initial Planned Completion Date:** 15/07/2020

1.3 Statement of the Problem

An important part of emerging nations' economies is the building sector. For example, large-scale building activities comprise over 80% of all capital assets, 10% of their GDP, and more than 50% of capital expenditures on fixed assets in a number of developing countries. In addition, the sector generates a great deal of employment and makes a substantial economic contribution to developing countries, second only to agriculture (Yimam, 2011).

Although risk is inherent in all project endeavors, it is often recognized that risk may be effectively managed to reduce its adverse effects on the goals of construction projects. Risk assessment and handling are vital in today's construction project management because they help deal with uncertainty and unforeseen occurrences and guarantee project success. The main project stakeholders—the client, the contractor or developer, the consultant, and the supplier—can keep their end of the bargain and reduce negative consequences on the building project's success in terms of budget, schedule, and quality goals by managing risks well. Even while risks can never be completely eliminated, successful projects are defined by their ability to manage risks effectively, which requires early and careful risk identification and evaluation (Yadeta, 2020).

Lack of consensus on the best methods and approaches for risk management planning, identification, assessment, and mitigation is one of the biggest barriers to understanding how important risk management is to success. Different firms and organizations employ different strategies, and these strategies may or may not be very effective. Therefore, it is essential to look at how various risk management techniques affect the success of projects in a variety of fields. Moreover, the need for a risk management strategy for project success may depend on a number of factors, including project complexity, organizational culture, stakeholder participation, and the expertise and experience of the project team. For the purpose of developing thorough frameworks that may assist project managers in putting successful risk management strategies into practice, it is essential to comprehend the connection between these components and the effectiveness of risk management techniques.

The swift expansion of the Ethiopian economy necessitates substantial infrastructure and asset development. Although this presents advantageous prospects for project stakeholders, it is crucial to utilize robust risk management strategies to address the diverse risks linked to construction activities. This is vital for ensuring that projects are executed in accordance with their objectives, encompassing factors such as time, cost, quality, safety, and environmental sustainability (Yadeta, 2020).

Building construction projects are subject to a wide range of risks. It is best to identify the most important risk factors specific to these projects as early in the preconstruction phase as possible. If this isn't done, stakeholders are effectively accepting the risk should it arise during the project. Determining and identifying each project risk factor that could arise is crucial for the proper management of project risks.

Finding the root reasons of construction projects' poor performance and project risk management practices served as another driving force behind this study. Due to a lack of knowledge on its importance and use, risk management is not generally recognized and gets little attention in Ethiopia's construction industry. As was previously noted, the building construction industry makes a substantial contribution to the economic growth of the nation. However, due to a lack of understanding, risks were not controlled, posing an obvious danger to the objectives of building projects. This may be the main cause of the majority of building construction projects' notable deviations from the original schedule, particularly with regard to cost and schedule, as the Waliya Luxury Hotel Apartment construction project demonstrates.

This research might focus only on this particular project but may give us insight on major building construction project risk management practices in the country. As a result, the focus of this research will be on the present risk management practices by the Waliya Luxury Hotel Apartment construction project. The primary goal of this research is to identify the significant risk factors connected with this project that are predicted to have an impact and challenged the performance of the project throughout the project lifecycle and which step of the project risk management process did the project give emphasis to. Furthermore, it investigates challenges of putting project risk management into practice and recommend the sort of responses to employ for risk factors that have a high likelihood of affecting the performance the project.

1.4 Research Questions

The following research topics will be the focus of this study in light of the gaps found in the previously mentioned information.

1. How are risk management processes practiced in Walia Luxury Hotel Apartments development projects?
2. What are the critical project risks factors influencing the construction of Walia Luxury Hotel Apartments in terms of time and budget?
3. How can we respond to the risks affecting the project completion time and expected budget?

1.5 Research Objectives

1.5.1 General research objectives

The purpose of this study is to assess how well risk management procedures such as risk planning, risk identification, analysis, and response techniques were used to manage risks during the Construction of the Walia Luxury Hotel Apartments.

1.5.2 Specific research objectives

- To determine in which steps of the project risk management process was PRM highly implemented.
- To identify major risks factors, their risk rating and probability of occurrences for the Walia Luxury Hotel Apartments construction project.
- To determine the risk response strategy for each risk factor.

1.6 Significance of the Study

This study investigates how effective risk management may improve project execution. The study identified important risk factors taking one of Addis Ababa's high rising building construction as a case and advised appropriate risk response measures.

As a result, the study will be very beneficial, especially to those stakeholders like consultants and contractors that work in the building construction industry. The professional and academic communities would also get a thorough grasp of the components of risk management and its practice. This study aims to improve risk management practices by reducing negative consequences of project risk in building construction projects. This research will provide valuable insights for future studies on the issue.

1.7 Scope of the Study

In Ethiopia, there are several high-rise building projects underway. The structures are largely for residential and commercial use. This study focuses primarily on a high-rise building project in the hospitality industry and is classified as commercial structures. Researching and attempting to implement project risk management among contractors and consultants in building projects is challenging, and it takes time to finish the study in a clear and comprehensive manner. This study will only identify and highlight risks that are extremely important to building construction projects, out of all the numerous sorts of risks. This study aims to evaluate the project risk management procedures now used in building construction projects. Among the various stakeholders in the construction sector, consultants, contractors, and clients currently involved in this specific project will be the focus of this study. Additionally, the study's focus is restricted to just project risk management, one of the 10 project knowledge domains, out of the total ten.

1.8 Limitation of the Study

This research is limited to the construction project of the Walia Luxury Hotel Apartments. The use of questionnaires as the main source of primary data in research has a common restriction. Information may come from respondents who, in answering the questions posed to them, primarily convey their opinions, convictions, and values. There's a chance that respondents will give false information, which might skew the study's findings.

As important influences in the construction industry among many stakeholders engaging in the building construction sector, this research will rely solely on Consultants, Contractors, and the client as major inputs. These stakeholders are involved in the construction and design of building projects and are required to have increased performance capacity, machinery, equipment, and technical expertise.

1.9 Organization of the Study

There are five chapters in this research. An introduction including background, problem statement, study aims, research questions, importance, scope, and limitations is included in the first chapter. The literature on project management, risk management, and risk management systems is reviewed in the second chapter. Research design and methodology, study design, sample technique, data collection, analysis, and findings communication are all covered in Chapter 3. The outcomes and conclusions of the study are covered in the fourth chapter. The study's conclusions are outlined in Chapter 5 along with suggestions. Surveys and references are included in the miscellaneous section.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The following chapter presents a review of the theoretical and empirical literature on project risk management and its success and challenges. It takes a serious look at previous studies connected to this subject that are done by other researchers on the field.

2.2 Theoretical Literature Review

2.2.1 Project risk management

Project risk is defined as an unforeseen circumstance or occurrence that, if it materializes, might have a favorable or unfavorable impact on one or more project goals, including scope, schedule, cost, and quality (PMI, 2013). A risk might have one or more sources as well as one or more effects if it materializes. A need, assumption, restriction, or other circumstance that raises the likelihood of either positive or bad results might be considered a cause. Risk management is a project management strategy that entails recognizing project risks, calculating their implications, and defining the steps that may be done after the appropriate arrangements have been made, while accounting for uncertainties (Bayraktar, 2020)

The conditions that pose a risk may involve elements of the project or organization's surroundings that increase the likelihood of project risk. These could include underdeveloped project management methods, absence of unified management systems, simultaneous management of multiple projects, or reliance on external contributors beyond the project's immediate influence (PMI, 2013).

One of the main responsibilities of the project management system is risk management. This work necessitates a holistic approach and is not defined in isolation; rather, it is examined in connection with other project management activities. Protecting the project and all of its participants from the effects of various risks through timely identification is necessary when preparing the project budget, planning the scope of financial assets required for its implementation, signing contracts, and carrying out the project realization process.

Since risks might appear at any point throughout a project's development, it is essential to manage them well until the project is finished. During project implementation, the risk manager is responsible for coordinating and managing risks in accordance with an established methodology, since failure to do so might have severe effects in project activities.

In a broad sense, "risk management" refers to a certain type of activity of top management and associated services that aims to eliminate or minimize the influence of risk factors on project execution procedures (Fedyk & Fedyk, 2024).

2.2.2 Risk management process

Construction projects are highly intricate and unpredictable. Uncertainty and risk might be detrimental to construction projects. As a result, risk management and analysis are now essential parts of building project management. Construction projects are distinctive, complicated, and dynamic, with risks coming from a variety of sources. The interests of individuals and organizations that are actively involved in a construction project may be positively or negatively influenced depending on the path that a project follows from inception to completion (Srinivas, 2018)

The risk management process consists of the following six steps: planning, risk identification, qualitative and quantitative risk analysis, planned risk response, and risk monitoring and control. Lastly, based on (PMI, 2013) The term "project risk management" describes the group of steps that go into organizing, recognizing, assessing, organizing reactions to, and managing risk within a project.

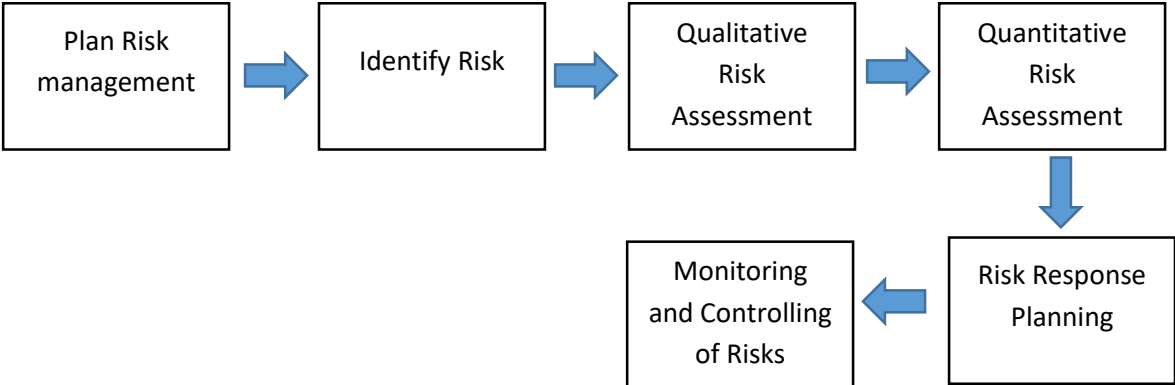


Figure 2- 1 Risk management process

2.2.2.1 Plan risk management

The chances of the other five risk management stages succeeding are increased by meticulous and thorough preparation. The process of choosing a project's approach and course of action for risk management is known as risk management planning. The planning of risk management processes is necessary to guarantee that the scope, nature, and visibility of risk management align with the project's risk and organizational importance, that sufficient resources and time are allocated to risk management endeavors, and that a mutually agreed-upon framework for risk assessment is established (PMI, 2004). This method ensures that risk management is commensurate to the project's relevance to the organization and stakeholders.

2.2.2.2 Risk identification

Risk identification is primarily based on previous experience and research into comparable projects that have been completed. As this is the earliest stage, a variety of methods and strategies may be employed to detect risks in any project. There are several ways available that are appropriate for various sorts of issues and projects, particularly during the identification stage. Risks and dangers may be difficult to remove, but once detected, they are straightforward to address and control (Srinivas, 2018).

Determining which risks might affect the project and documenting their characteristics are the first steps in the risk identification process. The primary benefits of this approach are the documentation of existing dangers and the knowledge and abilities it provides the project team to anticipate events (PMI, 2013).

The goal of risk identification is to compile a list of risks that might have a potential impact on project's development. Various strategies are used to identify all potential risks that might have an influence on a particular project. To ensure that the exercise is successful, the project team should employ a technique that they are comfortable with. The first stage in a good risk management strategy is effective risk identification.

According to (George, 2020), Effective project communications result from a careful risk identification approach, which often directs project choices. The following tendencies were found in this article and should be taken into account when determining project risks:

- It's important to diversify your sources of information to identify all potential risks to the project.
- Being well-informed about risk identification will guide you in pinpointing the areas to focus on.
- Utilize all applicable risk identification tools, and be open to finding new techniques if needed.
- Make sure the risk identification process is both effective and efficient.
- Remember to document all identified risks systematically, rather than relying on memory for recall.

(Mhetre, et al., 2016) identified these six the methods that can be used for identifying risks.

- **Brainstorming:** This is among the most widely used tactics. Though its primary application is idea generation, it may also be highly helpful in risk identification. Every significant project participant gathers at one place. A single facilitator informs the group on a range of subjects before noting any considerations. The facilitator goes over each part and removes those that are superfluous before closing it.
- **Delphi Technique:** This approach is similar to brainstorming, except the participants don't know each other and are not in the same location. They will determine the variables without consulting the other participants. Similar to brainstorming, the facilitator summarizes the highlighted elements.
- **Interview/Expert Opinion:** Experts or staff with extensive project experience may be extremely beneficial in avoiding/resolving identical difficulties again and over. Interviews with all project participants or relevant individuals might be conducted to identify risk-related elements.
- **Past Experience:** An analogy may be made based on previous experience with the same type of project to help identify the causes. When project characteristics are compared, it becomes clear what common elements exist.

- **Checklists:** These are basic, yet extremely helpful, preset lists of project-relevant parameters. The check list, which includes a list of risks discovered in previous projects as well as answers to those risks, offers a head start on risk detection.
- **SWOT Analysis:** This approach assesses the project's strengths, weaknesses, opportunities, and dangers from several angles. The method starts with identifying the project's strengths and limitations. It then highlights any project possibilities that stem from its strengths, as well as any dangers that stem from its limitations. The study also looks at how much project strengths outweigh dangers and identifies possibilities that might help overcome deficiencies.

2.2.2.3 Risk assessment and analysis

Risk assessment is the second stage of the risk management process, in which collected data is analyzed for possible risks. Risk assessment is defined as a brief list of risks, beginning with the lowest impact and progressing to the biggest impact on the project, from all threats identified during the identification phase. Risk assessment includes qualitative risk assessment and qualitative risk assessment (Srinivas, 2018).

The process of risk analysis and evaluation starts with data collection on risk exposure. This information may have been obtained from previous projects that the contractor has worked on. Furthermore, the modelling of risk exposure uncertainty, in which the possibility of an event is expressed, is explained in terms of probability and possible financial repercussions. The next step is to evaluate the risks' impact using various techniques, such as Monte Carlo simulation. Risks are measured by the amount and frequency of each event, which may be a series of occurrences. Risks are classified according to how often they are to occur and how much of an impact they might have.

Two main categories of risk assessment exist. While the quantitative analysis is carried out using a data-driven approach, the qualitative analysis is a process that includes checklists, brainstorming, and interviews (Banaitis & Banaitiene, 2021).

Qualitative Risk Assessment

Detailed investigation aids in identifying the primary risk factors. These elements can be found using qualitative techniques like checklists, brainstorming sessions, and interviews, or through data-driven (quantitative) approaches (Banaitis & Banaitiene, 2021). It is thought of as an assessment process that includes a description of every risk and its effects, or the subjective classification of risk (high, medium, or low) based on the likelihood that the risk would materialize and its impact.

Quantitative Risk Assessment

Quantitative risk analysis uses a variety of methodologies, including decision tree analysis, cost risk analysis, and Monte Carlo simulation, to evaluate the frequency and size of risks. The use of quantitative risk analysis allows for the modelling of construction project exposure, as well as the quantification of the probability of occurrence and possible effect of the detected risks (Banaitis & Banaitiene, 2021)

2.2.2.4 Risk response

There is no use in having a risk management strategy document that does not include risk response techniques. As a result, risk response plays an important role in the risk management process. Risk response refers to the procedures used by the project team to give alternatives and judgements for improving opportunities and significantly reducing risks to the project. The risk owner is in charge of the responses planned for a given risk (George, 2020) There are several risk response strategies used in project management including:

Risk Avoidance

To entirely eliminate the risk, the project management strategy must be modified as part of risk avoidance. The project manager might separate the goals of the project that are in jeopardy. This can be achieved, for instance, by extending an activity's timeline, altering the plan of action or reducing the scope of work, modifying the contract's provisions to handle unusual material price rises, or handling excess labor (Srinivas, 2018).

Risk Transfer

Transferring risk involves transferring the potential negative effects of a threat, as well as the responsibility for managing it, to a third party. However, it's important to note that transferring risk doesn't get rid of it; it simply assigns someone else the task of handling it (PMI, 2004). You can achieve this by either getting insurance (which makes the insurance company responsible) or by having the work completed through a fixed-price contract (which makes the contractor responsible) (George, 2020).

Risk Reduction (Mitigation)

Risk mitigation is a risk response technique in which the project team works to lessen the likelihood or impact of a risk. It denotes a reduction in the likelihood and/or severity of an unfavorable risk to within acceptable threshold levels. Taking early action to limit the likelihood and/or impact of a risk on the project is frequently more beneficial than attempting to restore the harm after it has occurred (PMI, 2013). (Srinivas, 2018) indicates that risk reduction is employed when the associated cost increase is less than the possible loss produced by the risk being minimized. Examples are:

- Being ready to handle any natural disaster
- Conducting thorough site investigations in areas with known challenging ground conditions
- Planning for unexpected scenarios
- Eliminating engineering barriers
- Improving quality assurance processes
- Paying more for land acquisition than the government recommends
- Designing structures according to established standards.

Risk Acceptance

Recognizing that residual risks (i.e., risks that remain after a risk response has been implemented) will persist and responding either actively by assigning adequate contingencies or passively by doing nothing but monitoring the status of the risk is referred to as risk acceptance (Bhoola, et al., 2014)

Accepting risk would also imply that deciding not to take action on risk was a well-considered choice. Therefore, a choice to accept the risk as it is and not take any action in response to it can be referred to as a risk acceptance strategy. This strategy is adopted when it is not possible to eliminate all risks from a project. This technique suggested that the project team had opted not to adjust the project management plan or was unable to find another appropriate reaction strategy. This needs no action other than to outline the plan, letting the project team to deal with risks as they arise (Srinivas, 2018).

2.2.2.5 Risk monitoring and control

The process of risk monitoring and control involves identifying, analyzing, and preparing for newly emerging risks, keeping an eye on identified risks and those on the watch list, reanalyzing existing risks, monitoring trigger conditions for contingency plans, overseeing residual risks, and assessing the execution of risk responses while gauging their effectiveness. (PMI, 2004).

(MANDRU, 2016) states that, in project risk monitoring and control, monitoring focuses on the status of risks and analyses the steps taken to reduce them, whereas control focuses on rectifying deviations from planned risk response activities and improving risk management systems.

Risk monitoring and control, like the other risk management activities, are ongoing throughout the project's life cycle. Other uses of risk monitoring and control include determining if:

- Risk responses have been carried out according to plan
- The success of the response measures is as anticipated, or new risk-reduction strategies must be developed
- Compared to the past, the organization's risk exposure has altered
- A warning indication for a risky event exists
- The risk that were first identified have materialized, or the risks that were not foreseen have already happened.

2.2.3 Risk in construction projects

Infrastructure development is one of the most essential activities that may enhance business in numerous industries, raising the country's gross domestic product (GDP). Construction projects are usually unique, and risks can arise from a variety of sources. (Mhetre, et al., 2016)

Construction projects may be exceedingly complicated and riddled with uncertainty. Risk and uncertainty may have negative effects for building projects.

As a result, risk analysis and management continue to be a fundamental aspect of construction project management in order to cope effectively with uncertainty and unexpected occurrences and achieve project success. (Banaitiene & Banaitis, 2012).

In the construction industry, depending on the size of the project, its complexity, the strategies used, and the environment in which it is completed, it is possible to limit the monetary losses and disputes that may arise between the parties by effectively assessing the risks that may be available at various rates in each project. However, the procedures used in the project evaluation plan usually do not allow for a meaningful review of the risks. (Bayraktar, 2020).

Construction projects involve a wide range of risks, including natural risks associated with climate systems (hurricane, typhoon, flood, etc.), geological methods (earthquake, volcanic eruption, geotechnical issues), and human risks associated with political, economic, financial, legal, well-being, managerial, complex, cultural, and social dynamics. (Ling & Hoi, 2005).

In the context of construction project management, risk management consists of identifying, assessing, and prioritizing risks by monitoring, controlling, and applying managerial resources in a coordinated and cost-effective effort to minimize the likelihood and/or impact of unfavorable events and maximize the achievement of project objectives (Yadeta, 2020).

2.2.4 Project risk factors in building construction projects

Risk management has become an integral component of building projects. The risk management process involves risk identification, risk assessment, and risk control. Risk is assessed using both qualitative and quantitative methods.

Risk management is the systematic process of recognizing, analyzing, and responding to project risk, which involves maximizing the chance and consequences of positive qualities while minimizing the probability and consequences of attributes detrimental to project objectives. (El-Karim, et al., 2017)

Several construction projects in poor nations are suffering from insufficiency, which includes quality issues, cost overruns, and failure to complete the project within the specified time frame. These challenges are primarily responsible for the initiatives turning out to be unprofitable. (Odimabo Otodo, 2016). To minimize the consequences of project risks and uncertainties in cost and time, a systematic approach may be used at the estimation stage. This strategy entails identifying risk sources, analyzing their consequences on a project, and deciding how to control them. (Birnie & Yates, 1991)

Risk management may help identify and reduce potential risks to the project's ability to fulfil its goals by integrating it into the planning process. Construction is unpredictable due to its distinct features and the particular players that collaborate on it. Each construction project is unique in some manner from the others. It is important to be completely prepared for anything that might go wrong with the plan in order to reduce risk in building projects. Several authors have attempted to identify various risk variables and classify them into internal and external risks that are likely to arise in building projects in their earlier works. We may infer from their analysis that risks that are not under the project team's control are known as external risks. These risks include those associated with politics, the economy, the law, society, and the environment. However, internal risks are those that the project encounters as a result of its special qualities. These risks may include those related to maintenance, design, construction, finance, management, and design.

According to (Maseko, 2017) risk associated with construction industry can be broadly categorized into:

1. **Technical Risks:** This group's risk factors include new technologies, scope changes, unfinished designs, and insufficient site assessment. The least dangerous elements in this group include improper execution, lack technical expertise, and building methods.

2. **Construction Risks:** This group's risk factors include labor conflicts, strikes, inappropriate building program, and design modifications. Out of this category, project postponement, delayed handover, untested engineering procedures, and poor project feasibility are the four least risk factors.
3. **Financial Risks:** Risk factors such as unstable price, foreign currency exchange rate and inflation.
4. **Socio-political Risks:** Modifications in legislation and regulations, environmental and safety guidelines, bribery and corruption, language and cultural differences, law enforcement, warfare and civil unrest, and the need for permits and their authorization.
5. **Physical Risks:** Incidents and deaths, material and equipment shortages, and material and equipment theft.
6. **Organizational Risks:** includes unqualified personal, overly stringent processes, and poor communication.
7. **Environmental Risks:** The most important risk factors for this group include natural catastrophes, pollution, weather, and safety.

2.3 Empirical Literature

Numerous domestic and foreign research initiatives centered on the construction sector have been conducted in the area of RM practice. This part discusses the empirical review of a few research that are relevant to the goal of this investigation.

(Putu, et al., 2005) a paper titled "Nature of the Critical Risk Factors Affecting Project Performance in Indonesian Building Contracts," they investigated the risk concerns that cause time and expense overruns in Indonesian construction projects. To measure risk levels in terms of time and money, the study relied mostly on structured questionnaire interviews with project managers. A survey of twenty-two building projects was conducted. The following were determined to be the most important factors: high price inflation, poor design, owner-initiated design changes, delayed contract payments, bad weather, unforeseen site conditions, inadequate financial regulation, poor building work, delayed delivery of workshop illustrations, and challenges in obtaining both skilled and unskilled labor, materials, and tools. It also demonstrated the connections between the major risks that have an impact on the project budget and schedule as reported by the building contractors.

(Tahir, et al., 2019) The influence on success was explored using data from a building sector research in Pakistan. They looked at the relationship between risk management techniques and project success, and found that these techniques consist of four elements, three of which help to enforce and reinforce the fourth. The fourth component serves as a mediator; the other three are independent variables. Risk control served as a mediator between the independent variables, which were risk identification, risk assessment, and risk response. As a result, the dependent variable is used to determine the project's success. The researchers performed a survey and discovered that the level of identification had no significant link with achievement.

(Yadeta, 2020) Critical risks were investigated in Ethiopian building projects. The relative relevance index was used to statistically analyse a total of 72 variables or risk factors. Key participants in building projects were interviewed as part of a qualitative study aimed at identifying specific risk indicators based on their experiences. The research revealed a number of noteworthy risks associated with Ethiopian building projects. Including inadequate scheduling, equipment and labor productivity issues, payment delays, and approval-related financial risks. Additionally, political risks such as bribery and corruption, economic risks like price inflation, and management risks such as the power of the engineer and subcontractor performance were also identified. The majority of these risks were associated with construction and management issues, indicating a need for increased attention to these areas to mitigate potential risks.

(Azhar, et al., 2008) noted that the construction business faces greater risk and unpredictability than many other industries and does not have a strong track record of risk management. Late project completion, exceeding expected expenditures, and, in certain cases, failing to meet required quality and operating standards, has earned the sector a negative reputation. Thus, effective management of construction-related risks remains a significant problem for industry stakeholders. Contractors are under growing pressure to reduce direct and indirect project costs as the construction industry becomes more competitive. Many contractors have discovered that creating, executing, and maintaining a risk management strategy may significantly assist them enhance their competitive position. This article employed a questionnaire survey to examine the existing risk management strategies used by building contractors in Alabama's construction sector. The findings show that the utilization of risk management approaches in Alabama ranges from low to considerable, depending on firm size and risk tolerance level.

(Ba Hamid, et al., 2019) The essay focused on identifying significant risk variables that impact building projects in underdeveloped nations. To achieve this goal, a literature study on risk management in building projects was conducted. The authors provided evidence that there is little knowledge about the risk factors affecting construction projects, which depend on risk management to meet project objectives. Key factors impacting construction projects in developing countries include accidents and safety concerns, as well as the necessity of acquiring licenses and permits and the timing of such requests.

Since all of these traits were in line with earlier studies conducted in other developing countries, the article suggests that the study's findings may be viewed as the primary risk factors affecting the building industry in developing countries. However, the study's conclusions are only applicable to poor nations.

2.4 Theoretical Framework

The study will be guided by the concept that project risk management practices including risk management tools and techniques which influence the success of a project. The study's theoretical framework starts by examining risk management processes practices and identifying risk factors. It then proceeds with a quantitative assessment and ranking of critical risk factors, which are classified into seven major categories. It also examines into potential risks encountered and the response strategies employed.

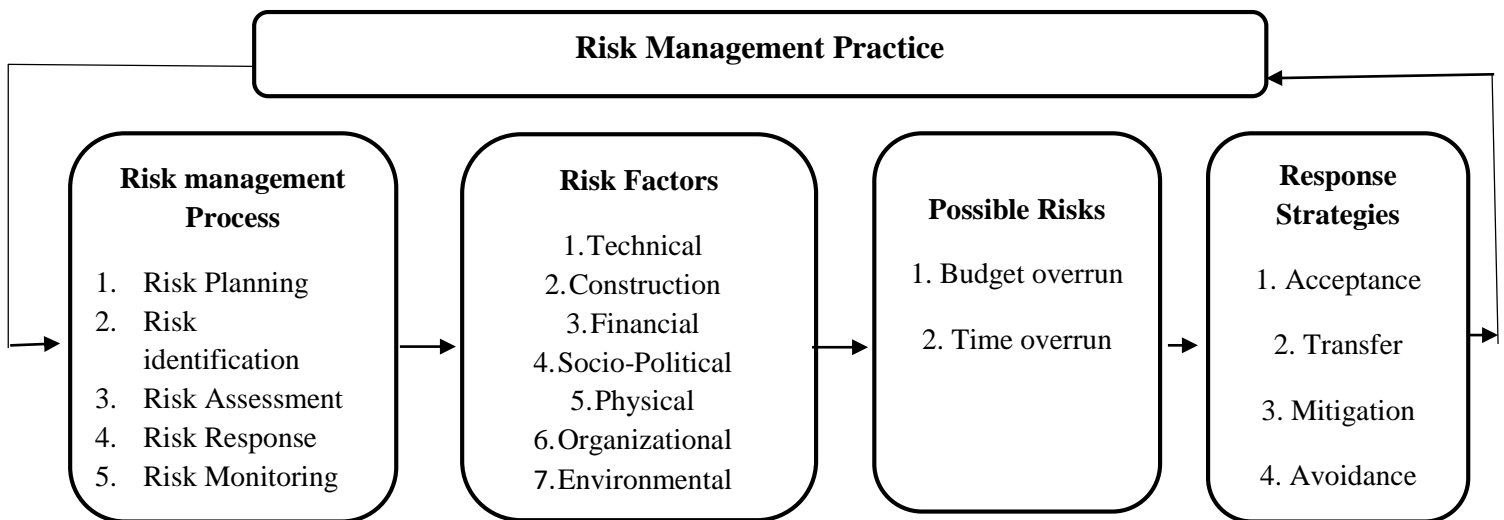


Figure 2- 2 Theoretical Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers the study's methodology, the kind of research design that was used, the target population, sample size, sampling procedures, sample acquisition process, research equipment, and data gathering strategy. It also described data analysis and presentation techniques.

3.2 Research Design and Approach

For the purposes of this study, a descriptive research design approach is chosen among a variety of research designs. Descriptive research design, according to (Thakur, 2021) is a theory-based design in which the researcher's main goal is to describe the issue that serves as the study's subject. It is used in surveys, case studies, naturalistic observations, and other similar tasks. This approach consists of gathering, analyzing, and presenting data. It enables the researcher to articulate the issue statement in a clear and concise manner so that others may see why this form of study is necessary.

As a result, descriptive research was seen to be a suitable technique in identifying various aspects of risk in building construction projects, it was chosen to address the study questions. The descriptive technique is used to characterize and evaluate the likelihood of risk variables that have a high chance of occurring and have a significant impact on the project's success goals. Through a process of data collection, this research approach will examine the status of risk management practice on this building construction project. This will allow for a more thorough description and evaluation of the challenges in risk management practice.

This study employed a mixed method research methodology to achieve its research goal. It helped to achieve the best results from both quantitative and qualitative methodologies.

3.3 Target Population

The limited population made the purposive sampling technique appropriate for this study. Purposive sampling aims to address research questions by focusing on specific aspects of a population of interest.

Risk management is an iterative process of finding, analyzing, responding to, and monitoring risk, as we saw in the literature review. A thorough understanding of the construction business and project management are prerequisites for the entire procedure. Thus, project managers, foreman, site engineers, office engineers, contract administrators, quantity supervisors, resident engineers and company management were the chosen target units in order to provide an informed and comprehensive data set.

3.4 Data Collection Techniques and Procedures

In this study, primary and secondary data sources were also utilized. First, the elements influencing cost and schedule overruns were identified using secondary data gathered from books, articles, working papers, theses, reports, and the internet. Second, using a questioner, primary data was gathered.

The questioners are adopted and modified from (El-Karim, et al., 2017) and researcher (Dessalegn, 2023) for the purpose of this research paper. The questionnaire utilized for this study is divided into four sections: the first asks participant-specific questions about their experience in the project, the second section employs Likert scale questions to assess on which steps of the project management process PRM is highly implemented. The third portion also employs Likert scale questions to assess risk's likelihood of occurring and how it affects project cost and completion time. Lastly, the fourth section of the questionnaire, which asks a multiple-choice question to determine the best kind of answer for each kind of risk.

3.5 Data Analysis Techniques

A questionnaire is used in the research process in order to verify the study's conclusions. A list of the risks associated with building construction projects are used as a foundation for the questionnaire's compilation in order to conduct a quantitative analysis.

Quantifying the elements that were discovered in the literature was the aim of the quantitative investigation. Survey data will be analyzed using quantitative descriptive statistics using IBM SPSS Statistics version 27 statistical software.

3.6 Reliability and Validity

Validity is the concept used to assess the quality of research. Reliability refers to establishing that research methodologies provide consistent outcomes. Reliability refers to the accuracy and precision of a measuring technique. To assure data authenticity, the research examined credible sources, including published books and recent publications on project risk management by various writers and also used a closed-ended questionnaire to ensure data comparability.

The questionnaire's reliability was assessed using the Cronbach-Alpha test coefficient in SPSS version 27 software. As described in the table 2-1 and table 2-2, the reliability analysis's alpha value is over 0.659, which according to (Taber, 2018) deems satisfactory.

Table 2- 1 Reliability test result for risk management process responses

Risk management process		
Variables	Cronbach's Alpha	No. of Items
Plan risk management	.797	6
Risk Identification	.659	5
Risk Assessment	.789	3
Risk Response	.684	3
Risk Monitor And Control	.888	4

Source: SPSS version 27 output (2024)

Table 2- 2 Reliability test results for risk factors responses

Risk factors				
Variable	Cronbach's Alpha			No. of Items
	Probability Of Occurrence	Impact on project cost	Impact on project Time	
Technical Risk	.702	7.33	.736	5
Construction Risk	.682	6.97	.740	8
Financial Risk	.736	.827	.789	4
Socio-Political Risk	.787	.777	.755	6
Physical Risk	.758	.729	.735	3
Organizational Risk	.825	.794	.797	5
Environmental Risk	.746	.696	.745	3

Source: SPSS version 27 output (2024)

3.7 Ethical Issues

Each participant who completed the research questionnaire will receive a proper explanation of the study's purpose. In this sense, the identities of the participants will remain confidential, and no one not directly associated with the research will have access to the data. The participant will be informed of the study's benefits in order to protect their rights. Additionally, all secondary sources consulted for this research have been properly mentioned, and the information acquired for this analysis will only be used for this specific study.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

A total of 31 questioners were sent out to people who are currently working on the project, including project managers, foremen, site engineers, office engineers, contract administrators, quantity supervisors, resident engineers, and company management. Of the 31 questioners, every one of them received a response. The findings from the replies were examined in this chapter in the following ways. The first thing to be distinguished is which stage of the project management process PRM is heavily used in. Subsequently, risks with a high likelihood of happening, influence on project expenses, and time were also identified. Lastly, for each risk factor, the risk response strategies that received high ratings from participants are determined using the third section of the questioner.

4.2 General Profile of Respondents

The purpose of this questionnaire portion was to ascertain the overall demographics of the participants. It contains the respondent's job title, educational background, years of project experience and whether if the respondent has taken project risk management training or not.

i. Respondents job position



Figure 4- 1 Respondent’s job position

The responses are divided into three groups of stakeholders: contractor, client, and consultant. The contractor accounts for 48% of the respondents and includes project managers, foremen, site engineers, and office engineers.

From the client side, 29% of respondents are high ranking managers, finance manager and contract administrators. Finally, the consultant side, which accounts for 23% of the responses, consists of resident and office engineers.

ii. Respondents educational level

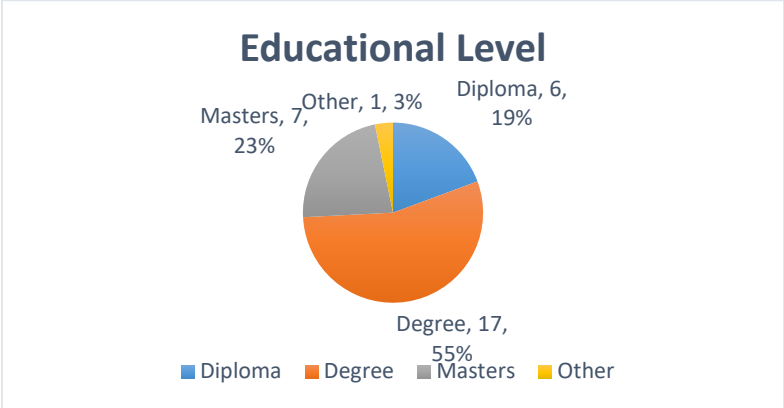


Figure 4- 2 Respondent’s education level

The above pie chart shows the educational level of the respondents. 55% percent of the respondents are degree holders while 23% percent holds Master’s degree. A small percentage of the respondents holds diploma and other educational levels. The majority of respondents have a bachelor's degree or higher, which suggests that most workers have a solid educational foundation and understanding to understand project risk management concepts and procedures easily. This helps the research achieve its goals.

iii. Working experience on the project

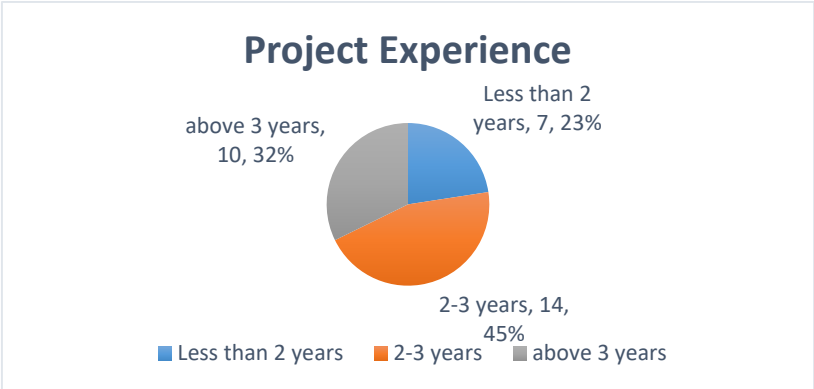


Figure 4- 3 Respondent’s working experience on the project

As indicated in the figure above, from all the respondents 32% percent have worked on the project for more than 3 years while 45% have worked two up to three years. 23% percent have worked less than two years on the project.

iv. Project Risk management training



Figure 4- 4 Respondent’s project risk management training

As indicated on the figure above more than half of the respondents (58%) have not taken any sort of project risk management training. But a significant amount of respondents (42%) have taken project risk management training through the company or on their own accord.

4.3 Descriptive Statistics of Risk Management Practices

The following tables, broken down into each category, explain the descriptive statistics of the risk management practice factors' mean scores and standard deviation. Descriptive statistics were mostly used to show the average answers of participants to each question that was part of each category and variable. In order to accomplish the study's research goals, the interpretation is then based on the average mean and frequency of each independent variable inquiry. According to (Alkharusi, 2022) for descriptive analysis and interpretation of data from a five point Likert scales is as follows, 1-1.80 Very low, 1.81-2.61 fair, 2.62-3.42 Moderate, 3.43-4.23 Good, 4.24-5.00 excellent or very good.

4.4 Project Risk Management Practices

In order to ascertain which stages of the project management process the project is deficient in best practices, this component of the study examines the project management practice inside the project. The analysis and conversation are summarized as follows:

4.4.1 Project risk planning responses

Planning how to manage risk is a complex endeavor that must begin early in the project planning process. In most circumstances, the amount of engagement during the first phase determines the total risk coping process. To effectively go through the complete process of risk management in the contract, you must begin from the same beginning point, which is the formulation of a risk management strategy.

The questionnaire included five questions to assess project risk planning, which were as follows: whether risk management planning took place before the project began, whether it was carried out systematically and with careful attention, whether relevant stakeholders were involved, whether risk management expertise and tools were used, and whether project team members received training on handling risks. The survey findings are summarized in the table below.

Table 4- 1 Response about project risk planning

	N	Mean	Std. Deviation
Risk management strategy was put into action before the project ever started.	31	3.32	.90874
Planning for risk management is done methodically and with appropriate care.	31	3.03	.94812
Planning includes participation from the relevant parties.	31	3.49	.92632
During risk management planning, sufficient resources and instruments for risk management are used, and relevant meetings are convened.	31	2.97	.91228
Project team members are adequately trained or knowledgeable about managing uncertainty.	31	2.70	.82436
Valid N (listwise)	31		

Source: SPSS Version 27 output (2024)

When analyzing the individual means from the table above, it was found that a moderate level of respondents (3.32) agreed that risk management was planned and recognized prior to the start of the project. Most of the respondents (3.49) noted that important stakeholders were considered during the planning phase. As for the systematic execution of risk management (3.03), expertise and tools used (2.97), and team members receiving training on how to handle risk (2.7), many respondents were impartial. In summary, with an average mean value of 3.10, most respondents feel that moderate emphasis was given to project risk planning.

4.2.1 Project risk identification responses

Recognizing and understanding potential risks is crucial for planning and ensuring the success of a project. Project personnel need to document the characteristics of risks and their potential impact on the project outcome. It's important to identify risks in order to comprehend their nature and determine how to address them, which ultimately affects stakeholders' decisions in creating a sustainable project. (George, 2020). Five questions are identified for this part of the questioner. This questions are concerned with, when risk is identified, who were involved, how structured the risk identification is, the use of checklist and sources of risks and their impact. The table below show the responses related to the mentioned techniques.

Table 4- 2 Responses about project risk identification

	N	Mean	Std. Deviation
Identifying risks occurs early on in the project or at its start.	31	4.12	.56225
The process of identifying risks involves every member of the project team.	31	3.54	.80989
Structured and formal risk identification is used.	31	3.32	.97936
This stage clearly identifies the risk in order to provide the groundwork for the subsequent actions.	31	3.03	.94812
The project identified the causes and prospective consequences of the risks, as well as the regions of influence and their sources.	31	2.97	.83602
Valid N (listwise)	31		

Source: SPSS Version 27 output (2024)

The above table shows that a substantial number of respondents (4.12) believe that risk is recognized at the outset of project initiation, while the majority of respondents (3.54) indicated that project team members were involved in identifying risks.

A moderate number of respondents provided mostly neutral responses to whether structured and formal risk identification was conducted (3.32), whether a checklist was maintained to assist the next step (3.03), and if areas of impact and potential effects were pinpointed in this phase of the process (2.97). The average mean score of 3.4 indicates that the project has placed considerable emphasis on the risk identification process.

4.2.2 Project risk analysis responses

Risk assessment may be done using both qualitative and quantitative methodologies. As a result, the probability of risk emergence, the impact it may have on the project's activities, and the risk emergence trigger factor are evaluated. Risk appraisal should take into account the impacted activity and your control over the risk. During the prioritization process, the project manager should be the final decision maker by determining which risks are the most concerning. (Rosu, et al., 2017).

The questions on this part of the questionnaire deal with whether or not measurement systems were employed in analyzing the identified risks, their tendency to occur, and modifying project documents after risk examination. The tables below show the outcomes.

Table 4- 3 Responses about project risk analysis

Descriptive Statistics			
	N	Mean	Std. Deviation
An accurate and reliable measuring technique is used to examine the risks that have been identified.	31	2.83	.68784
Risks are specifically evaluated in terms of their ability to materialize and the extent to which they impact the success of a project.	31	2.51	.76902
Project documentation are changed when risks are investigated.	31	2.32	.74776
Valid N (listwise)	31		

Source: SPSS Version 27 output (2024)

Table 4-3 shows respondents' responses regarding project risk analysis practice within the project, it can be seen that a moderate emphasis (2.83) was given to the employment of consistent and proper measurement systems to analyze risk.

But a very small percentage of respondents thought that risk was assessed in terms of its propensity to materialize, its impact, and the project's success. (2.51). Additionally, a very small number of respondents agreed on the risk being documented and modified after analysis (2.32). The average mean score of 2.56, which lies at a low level on the agreement scale, reflects that project risk analysis was not undertaken properly and has been given low emphasis within the project.

4.2.3 Project risk response responses

According to (Rosu, et al., 2017) Risk response development is a vital component of the risk management process that entails determining the best ways to avoid or respond to recognized risks. This step determines if and how action will be done to address determined risks. Because certain risk occurrences may have good results, it is important to examine responses to both threat and opportunity. The questions in this part of the questioner deal with project risk response practice undertaken in the project. The result of response related with risk response strategies are summarized and presented as in the table below.

Table 4- 4 Responses about project risk responses

Descriptive Statistics			
	N	Mean	Std. Deviation
The project's risk response plan is well-established.	31	3.51	.72438
Factors like finances and schedule are considered while handling risk.	31	3.90	.81121
Within the project, a well-thought-out plan was put into place to track risk reactions that affect the project.	31	3.68	.93785
Valid N (listwise)	31		

Source: SPSS Version 27 output (2024)

The survey asked participants about the project's risk response strategy. The majority of respondents (3.51) agreed that the project had a well-established risk response strategy. They also agreed that time and budget constraints were taken into account when addressing risks (3.9).

Additionally, most respondents (3.68) agreed that an effectively designed strategy was applied to monitor risk responses. With an average score of 3.7 for the project's risk response practice, it's clear that the project placed significant importance on the risk response phase.

4.2.4 Project risk monitor and control responses

Risk monitoring refers to the ongoing practice of tracking recognized risks, assessing the effectiveness of mitigation strategies, and keeping risk information current. This procedure occurs throughout the life cycle of a project. (Aung, et al., 2023). This process helps ensure that risk management remains relevant and responsive to changing project conditions. The table below shows responses in relation to the project's risk monitoring and controlling procedures.

Table 4- 5 Responses about project risk monitoring and control

Descriptive Statistics			
	N	Mean	Std. Deviation
The project's risk monitoring and management procedures follow the necessary norms and regulations.	31	2.30	.73908
Periodically, risks are reassessed.	31	2.22	.80456
Throughout the project, the effectiveness of the risk management method is assessed.	31	2.22	.80456
Risks are appropriately documented and shared.	31	2.12	.95715
Valid N (listwise)	31		

Source: SPSS Version 27 output (2024)

Based on the responses in the table above, it is evident that the project did not adhere to standards for project risk monitoring and control as only a small percentage of respondents agreed on that (2.30). Very few respondents agreed that project risk is reviewed periodically (2.22), and that the effectiveness of the risk management process is evaluated throughout the project (2.22), as well as the registration and proper communication of risks (2.12).

With the average mean score value of 2.21, it can be deduced that project risk monitoring and controlling received little to no emphasis during the project.

4.3 The descriptive analysis summary

Respondents rated project's use of project risk management process on a Likert scale of 1 to 5. In order to facilitate the generalization of the results of the descriptive analysis, the mean score for each of the five risk management strategies has been calculated and is shown in the figure below:

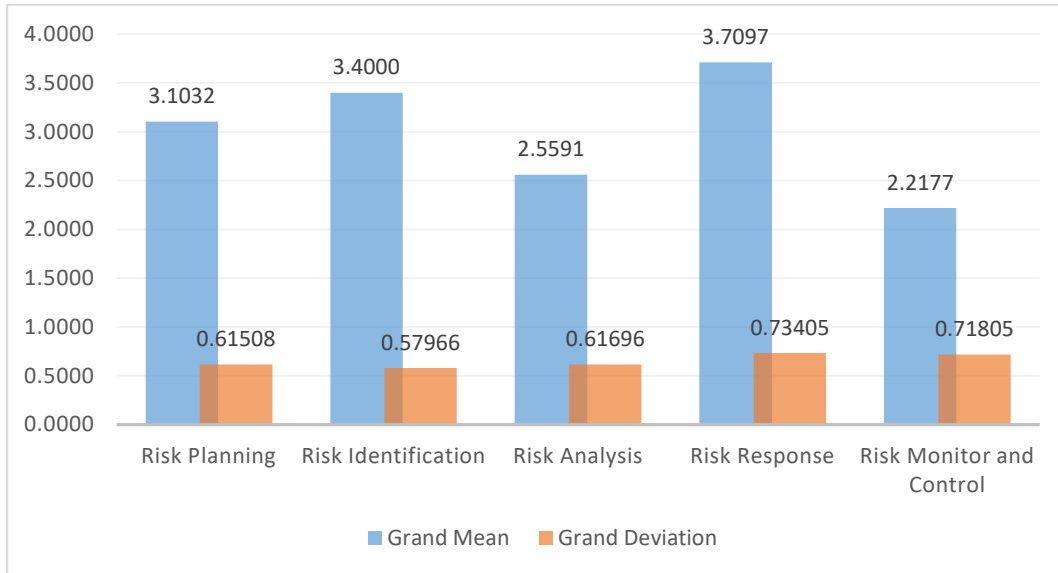


Figure 4- 5 Descriptive analysis summary of project risk process

In the context of the construction project for Walia Luxury Hotel Apartments, it is noted that the emphasis on risk management and procedures has generally resulted in above-average or average mean scores, except for risk analysis (2.55) and risk monitoring and control (2.21). The project's risk planning (3.10) and risk identification (3.4) were deemed moderately acceptable. The average mean score of the risk response phase (3.70) significantly surpassed all other processes, indicating a high level of attention given to responding to identified risks. In contrast, risk monitoring and control received less attention compared to all other phases (2.21).

In general, the results show that, as compared to the recommended practice of project risk management, the organization was not fully implementing the project risk management system.

4.4 Risk Factors

Risk management involves five main process, namely project risk planning, project risk identification, project risk analysis, project risk response and project risk monitoring and control. of this process, project risk identification plays a very significant roll on project risk management practice and serves as a base for the other process.

Risk factors are identified in this particular process. Risk factors will give an insight to the challenges faced by projects while undertaking project risk management. In this section, the results of descriptive analysis done via SPSS version 27 of the rating of the risks identified through literature review are discussed.

Based on the opinions of contractors, consultants, and clients, the likelihood of occurrence of various risks is rated using mean scores and a ranking system. The risk variables are ranked in the table below according to their overall input from respondents, as well as their estimate and chance of occurrence and influence on project cost and time.

Table 4- 6 Probability occurrence, impact on time and cost responses

Descriptive Statistics							
Risk Factors	N	Probability of Occurrence		Impact on Cost		Impact on Time	
		Mean	Rank	Mean	Rank	Mean	Rank
1. Design Risk							
1.1 Incomplete Design	31	3.89	4	4.17	2	4.32	1
1.2 Inadequate Site Investigation	31	3.51	6	3.90	4	4.03	5
1.3 Uncertainty of resources and availability of materials	31	3.49	7	3.70	7	4.07	3
1.4 Changes in project scope and requirements	31	2.78	20	3.46	9	3.80	8
1.5 Unqualified designers	31	2.69	22	3.17	11	3.26	11
2. Construction Risk							
2.1 labor disputes	31	2.46	29	2.88	18	2.90	19
2.2 Strikes	31	2.30	33	2.70	25	2.74	24
2.3 Design changes	31	2.97	11	4.32	1	4.22	2
2.4 Unsuitable construction program	31	2.78	19	2.90	16	2.97	15
2.5 Site condition	31	2.90	12	2.97	15	3.00	13

2.6 Equipment failures	31	2.83	17	3.59	8	3.80	7
2.7 Contract disputes	31	2.51	27	2.74	24	2.80	22
2.8 Labor productivity	31	2.83	16	3.07	13	2.97	16
3. Financial Risk							
3.1 Price fluctuations	31	4.59	1	3.83	5	3.93	6
3.2 Exchange rate	31	4.30	2	3.70	6	3.68	9
3.3 Inflation	31	4.17	3	4.12	3	4.03	4
3.4 Payment delays	31	3.68	5	3.30	10	3.41	10
4. Socio-Political Risk							
4.1 Changes in laws and regulations	31	3.03	10	3.03	14	3.00	13
4.2 Pollution and safety rules	31	2.83	15	2.80	20	2.64	26
4.3 Bribery/corruption	31	2.64	23	2.68	26	2.59	27
4.4 Law & order	31	2.45	28	2.46	30	2.39	31
4.5 War and civil disorder	31	2.36	30	2.36	32	2.36	33
4.6 Requirement for permits and their approval	31	2.51	26	2.51	29	2.41	29
5. Physical Risk							
5.1 Accidents and fatalities	31	2.83	14	2.80	22	2.78	23
5.2 Shortages of equipment and material	31	2.80	18	2.80	21	2.80	21
5.3 Equipment and material theft	31	2.51	25	2.88	19	2.90	18
6. Organizational Risk							
6.1 Excessive procedures	31	3.26	8	2.78	23	2.88	20
6.2 Lack of qualified staff	31	3.07	9	3.07	12	3.12	12
6.3 Poor communication between involved parties	31	2.88	13	2.88	17	2.93	17
6.4 Attitudes of participants	31	2.61	24	2.39	31	2.41	30
6.5 Contractual relations	31	2.30	32	2.32	33	2.36	32
7. Environmental Risk							
7.1 Weather conditions	31	2.70	21	2.54	28	2.64	25
7.2 Pollution and safety	31	2.32	31	2.30	34	2.07	34
7.3 Natural disasters	31	2.20	34	2.59	27	2.46	28
Valid N (listwise)	31						

Source: SPSS Version 27 output (2024)

4.4.1 Probability of risk factors occurrence

As stated in the literature review risks associated with construction industry can be broadly categorized into: Technical risks, construction risks, financial risks, socio-political risks, physical risks, organizational risks and environmental risks. (Maseko, 2017).

Within these risk a total of 34 risk factors were identified. The following analysis will assess which risk has the highest probability of occurrence according to respondents. The respondents responded using a five point Likert scale which ranges from 1-5 and their responses are ranked based on the mean value to find out which risk factor has the highest probability of occurrence. Top five risk factors that have the highest probably of occurrence are discussed below.

As shown in the table above the top five risk factors that have the highest probability of occurrence are price fluctuation, exchange rate, inflation, incomplete design and payment delays. In this analysis we can clearly see a trend that most of the risk factors ranked high in terms of probability of occurrence are classified as financial risks. According to the respondents the top ranked risk factor in terms of probability of occurrence is price fluctuations with a mean value of 4.59.

In the study (Ba Hamid, et al., 2019) titled “Risk factors affecting the construction projects in the developing countries”, the authors studied 45 different studies and grouped 57 risk factors affecting the construction industry in developing countries and found out that the main factor referenced on 34 of those studies is price fluctuation and inflation. Inflation sits third in terms of probability of occurrence with a mean value of 4.17 in this research.

The second highly ranked risk factor that have a high probability of occurrence is exchange rate with a mean value score of 4.30. The global exchange rate and other macroeconomic factors have an effect on the construction industry in many different nations. The primary driver of fluctuations in construction material pricing in emerging countries is foreign exchange. The construction sector faces a significant danger from the rising cost of building materials, which might lead to discrepancies in construction costs and ultimately, project abandonment. (Muhammed & Adindu, 2021).

Incomplete design with the mean average score of 3.89 is indicated as the fourth highest risk factor to have high probability of occurrence. Causes of incomplete design according to (Bassa, 2019) include, incomplete contract documents, errors and omissions in the design, client-initiated changes to the plan, and varying site conditions. This might have contributed to the fact that one of the most frequent risk factors is incomplete design.

The fifth highly ranked risk factor that have a high probability of occurrence is payment delays with a mean score value of 3.68. (Yadeta, 2020) performed a study to investigate critical risks in construction project in Ethiopia. The research involved sending questionnaires to nine different regions, targeting clients, contractors, and consultants, as well as conducting interviews. The study revealed that payment delays ranked as the third most significant issue in the Ethiopian construction industry.

The researcher also observed that these delays pose financial risks and are likely to impact project progress due to payment delays from clients and consultants. This could be attributed to managers' lack of timely decision-making.

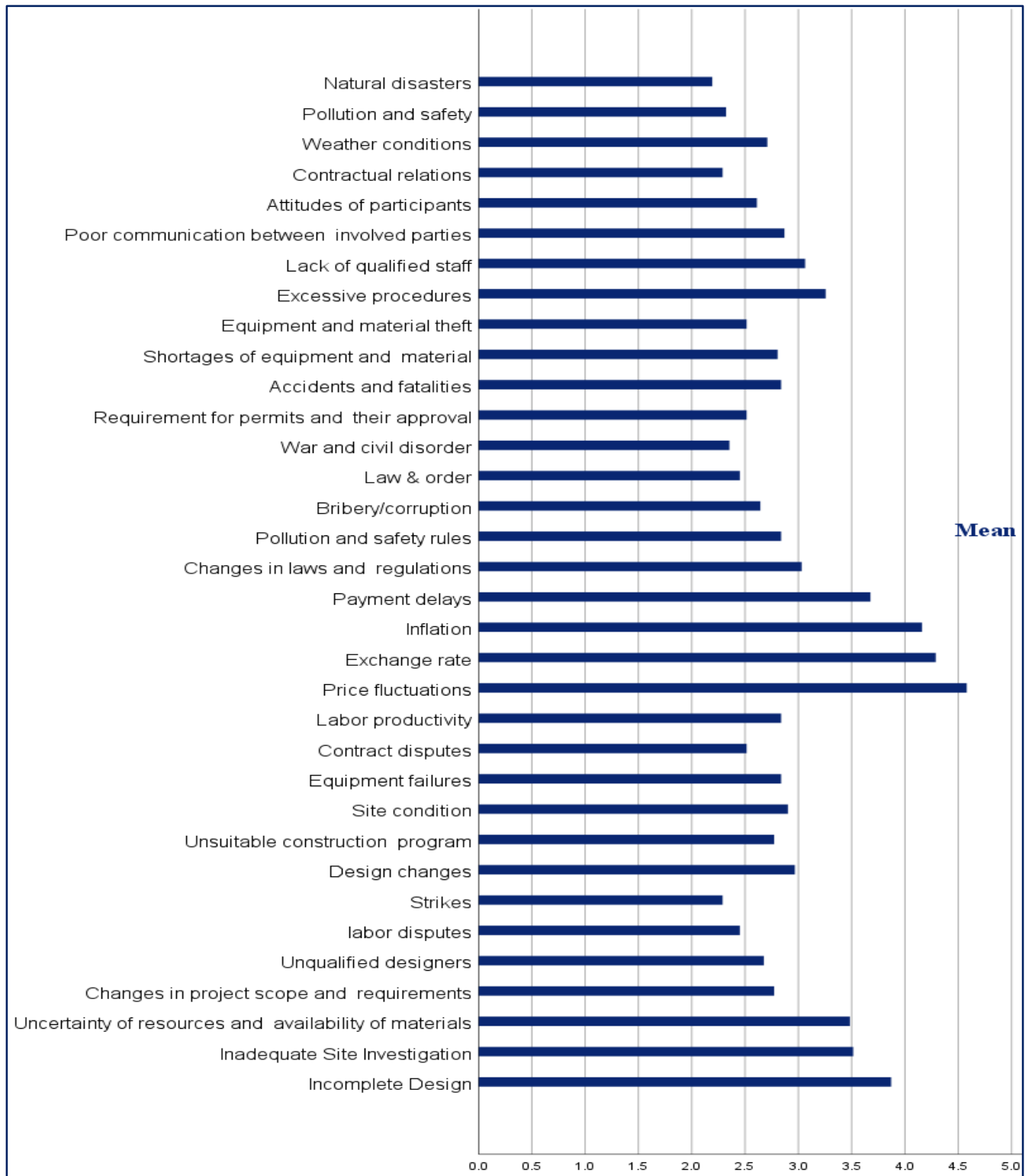


Figure 4- 6 Probability of occurrences of risk factors

4.4.2 Impact on budget and completion time of the project

In this part of the questioner respondents were asked to rate the impact of the identified risk factors in terms of their impact on project cost and time. Their response was ranked based on the mean score. Out of the 34 risk factors identified and rated, the top five risk factors having an effect on the project's budget and time will be thoroughly discussed. The criteria for the respondent's response was based on the table below.

Rank	Schedule	Cost
Very High (5)	>1 Year	> 5 Million ETB
High (4)	4-6 months	2-5 Million ETB
Moderate (3)	2-3 months	1-2 Million ETB
Low (2)	1-2 months	500,000 - 1 Million ETB
Very Low (1)	< 3weeks	< 500,000 ETB

Table 4- 7 Criteria for time and budget delay

As shown in Table 4-6, respondents identified that design changes have the most significant impact on the project's budget, with a mean score of 4.32, and the second most significant impact on time, with a mean score of 4.22. (Aslam, et al., 2019) stated that design change is any alteration made to a project's construction or design after a contract has been approved and signed. These modifications pertain not only to issues in line with the terms of the agreement but also to adjustments to the working environment. Any additions, deletions, or modifications made to the initial scope of work after a contract is granted are considered these alterations. It frequently happens on building projects and might result in a modification to the contract time or budget.

The first highly rated risk factor in terms of having an impact on time and second for having an impact on budget is incomplete design with a mean score value of 4.32 and 4.17 respectively. According to a the research by (Andi & Minato, 2003), design document-related issues were also seen as significant in a number of countries, including the US, Hong Kong, and Australia. Both owners and contractors consider design to be vital to the success of a project, especially in Japan. Similar research on the quality of design documents carried out by the author in Indonesia revealed that time constraints, work overload, a lack of coordination between design disciplines, and ambiguous and changing client requirements are the main causes of incomplete or defective design documents.

Inflation according to respondents is placed third in terms of having an impact on the project's budget and fourth for its impact on the project's completion time with mean score values of 4.12 and 4.03 respectively. The budget is the most crucial component of any building project. Budget adjustments are common for long-term undertakings. The annual increases in the price of labor, building supplies, and machinery brought on by inflation are among the reasons for this. The difference between the project's starting and ending expenses is mostly caused by inflation, which also drives up the cost of labor, supplies, and equipment. Variable building costs and continuously fluctuating material and cost prices make economic growth unpredictable. Inflation has an impact on the labor market, the consumer price index, and economic development. (Musarat, et al., 2021)

According to this research the third risk factor with highest impact on project time with the mean score of 4.06 is uncertainty of resources and availability of materials. According to research, the expenses of building materials and equipment account for more than 70% of the entire project cost. As a result, the manager of a typical construction project is expected to stress how crucial it is to manage the scarce material resources in order to prevent long-term effects on the project. Research has shown that inadequate material management leads to project failure and project abandonment when budget exceeds expectations. When construction materials and equipment are used properly, the project will be more productive, more cost-effective, and completed on schedule. (Sila. & Gakobo., 2021)

The fourth highest ranked risk factor with regards to impacting project budget and fifth highest ranked risk factor impacting time according to this research is inadequate site investigation with a mean score value of 3.9 and 4.03 respectively. Ground-related issues have often been the cause of contractual claims with significant schedule and cost overruns on both large and small construction projects. According to European statistics, between 80% and 85% of all building failures and damages are related to unforeseen and unfavorable ground conditions. If there is insufficient site evaluation, clients are continuously at risk of costly delays, redesign, and delayed project completion because of unknown ground conditions. (Hytiris, et al., 2014).

The fifth highly ranked risk factor in terms of having an impact on the project's budget is price fluctuation with a mean score value of 3.83.

According to (Mishra & Regmi, 2017) the market price fluctuations and inadequacies of construction inputs are also major impediments to the expansion of the construction sector. Sharp price rises force contractors to fail to finish projects within the client's accepted time and quality margins as well as within their own projected cost margin. There are a number of causes for volatility, the main ones being:

- Imbalances in supply and demand
- Exchange rates fluctuate; If there is depreciation in the exchange rate, then exports will become cheaper abroad, but imports will appear to be more expensive. Firms will be paying more for their overseas raw materials leading to increase prices of domestic economy.
- Imported inflation; A broad and long-lasting price increase brought on by rising import costs. The price of raw materials and all imported goods are affected by this price increase.

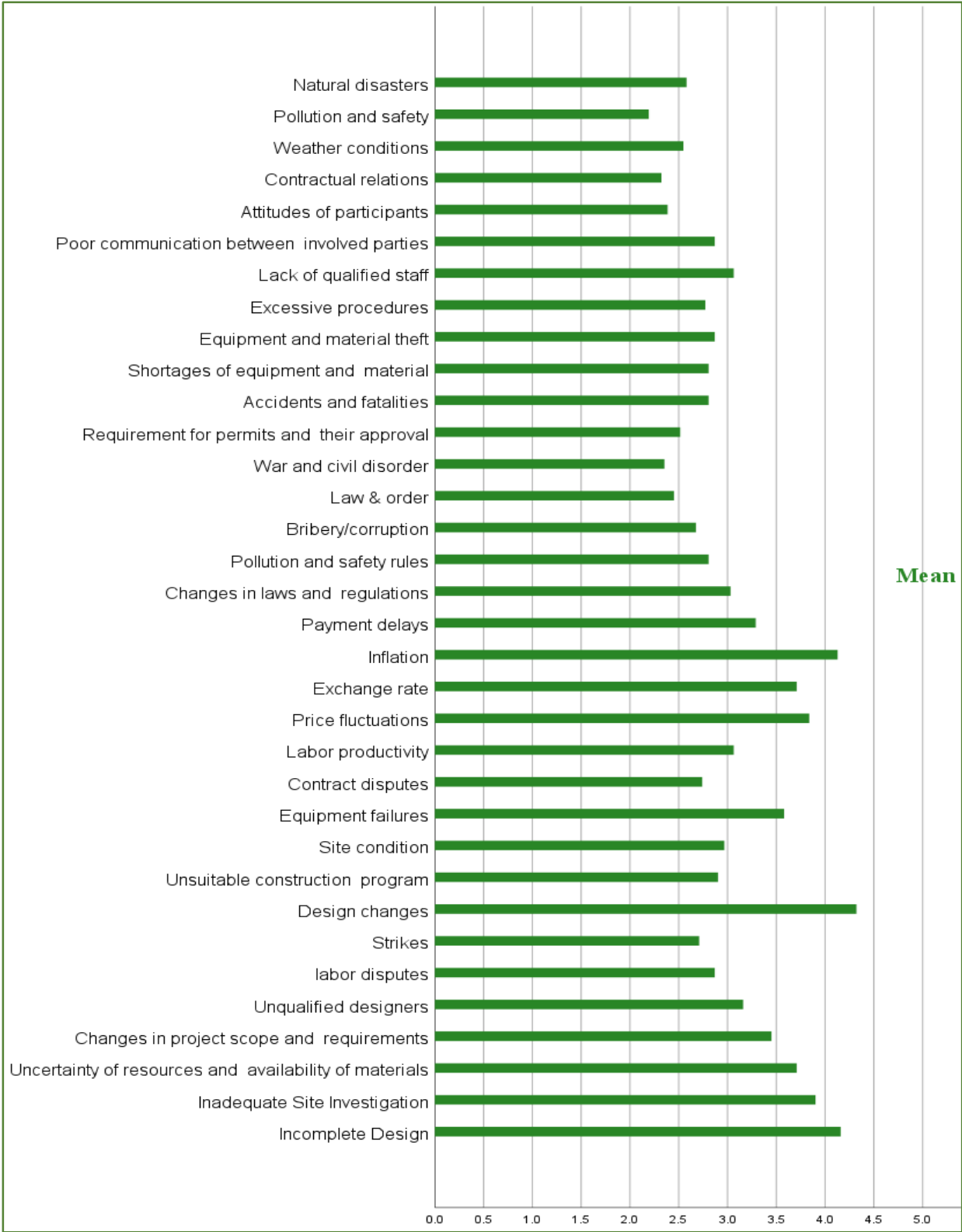


Figure 4- 7 Impact on cost of the project (budget)

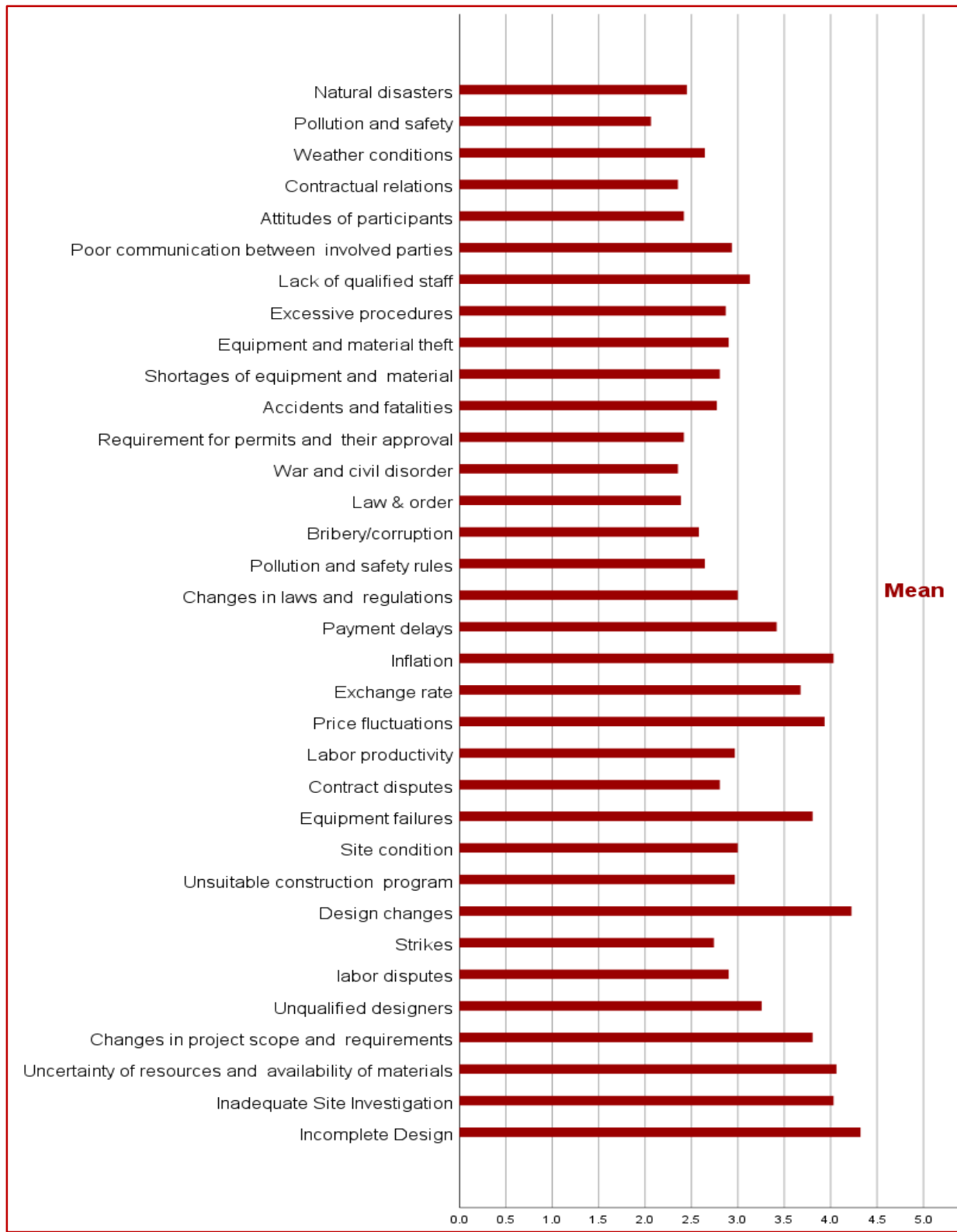


Figure 4- 8 Impact on completion time of the project

4.5 Risk Response

After determining the likelihood of occurrence of the risks with the highest probability of occurring and their impact on project objectives, as discussed in the literature review, the next step is to design a strategy that helps minimize the negative effects of the risks using the identified risk response methods. The table below summarizes and analyses the participants' answer choices for the risks in this area.

Table 4- 8 Risk Response

		Risk Avoidance	Risk Transfer	Risk Mitigation	Risk Acceptance
	1. Technical Risks				
1.1	Incomplete Design	61.3%	3.2%	16.1%	19.4%
1.2	Inadequate Site Investigation	48.4%		19.4%	32.3%
1.3	Uncertainty of resources and availability of materials	29.0%	12.9%	32.3%	25.8%
1.4	Changes in project scope and requirements	9.7%	38.7%	6.5%	45.2%
1.5	Unqualified designers	45.2%	12.9%	16.1%	25.8%
	2. Construction Risks				
2.1	labor disputes	25.8%	35.5%	25.8%	12.9%
2.2	Strikes	19.4%	38.7%	32.3%	9.7%
2.3	Design changes	12.9%	3.2%	41.9%	41.9%
2.4	Unsuitable construction program	22.6%	3.2%	45.2%	29%
2.5	Site condition	9.7%	12.9%	41.9%	35.5%
2.6	Equipment failures	12.9%	61.3%	16.1%	9.7%
2.7	Contract disputes	19.4%	19.4%	38.7%	22.6%
2.8	Labor productivity	38.7%	3.2%	45.2%	12.9%
	3. Financial Risks				
3.1	Price fluctuations	9.7%	6.5%	22.6%	61.3%
3.2	Exchange rate			22.6%	77.4%
3.3	Inflation	16.1%		32.3%	51.6%

3.4	Payment delays	51.6%		38.7%	9.7%
	4. Socio-Political Risks				
4.1	Changes in laws and regulations	19.4%		29.0%	51.6%
4.2	Pollution and safety rules	12.9%		22.6%	64.5%
4.3	Bribery/corruption	45.2%	3.2%	12.9%	38.7%
4.4	Law & order	19.4%		25.8%	54.8%
4.5	War and civil disorder	6.5%	25.8%	12.9%	54.8%
4.6	Requirement for permits and their approval	16.1%		25.8%	58.1%
	5. Physical Risks				
5.1	Accidents and fatalities	64.5%	9.7%	19.4%	6.5%
5.2	Shortages of equipment and material	35.5%	22.6%	16.1%	25.8%
5.3	Equipment and material theft	48.4%	22.6%	12.9%	16.1%
	6. Organizational Risks				
6.1	Excessive procedures	54.8%		25.8%	19.4%
6.2	Lack of qualified staff	38.7%	6.5%	29.0%	25.8%
6.3	Poor communication between involved parties	45.2%		41.9%	12.9%
6.4	Attitudes of participants	45.2%	16.1%	9.7%	29.0%
6.5	Contractual relations	16.1%	25.8%	35.5%	22.6%
	7. Environmental Risks				
7.1	Weather conditions	16.1%	25.8%	12.9%	45.2%
7.2	Pollution and safety	12.9%		67.7%	19.4%
7.3	Natural disasters	6.5%	19.4%	6.5%	67.7%

Source: SPSS Version 27 output (2024)

The percentage of participants' responses for risk response is displayed in the above table. The risks that are most likely to impact the objectives of the project are listed in the preceding section. The suggested response strategies suggested by participants for the risks that have a significant impact on the objectives of the project is summarized in the graph below. The risk factors that are identified by respondents in terms of having the biggest impact are incomplete design, inadequate site investigation. Uncertainty of resources and availability of materials, design change, price fluctuation, exchange rate, inflation and payment delays. As shown in the graph below most respondents preferred risk acceptance response for financial risks (Price fluctuations 61.3%, Exchange rate 77.4% and Inflation 51.6%). This might be related to with so little what they can do come up with financial risk except payment delays (51.6%) which most respondents opted for risk avoidance.

For the highly ranked technical risks such as incomplete design 61.3% of the respondents opted for risk avoidance, for inadequate site investigation 48.4% also opted for risk avoidance. But for uncertainty of resources and availability of materials 32.3% preferred to mitigate the risk. Form the identified construction risk (Design risk), equal amount of respondents has a split response between accepting and mitigating the risk with 41.9%.

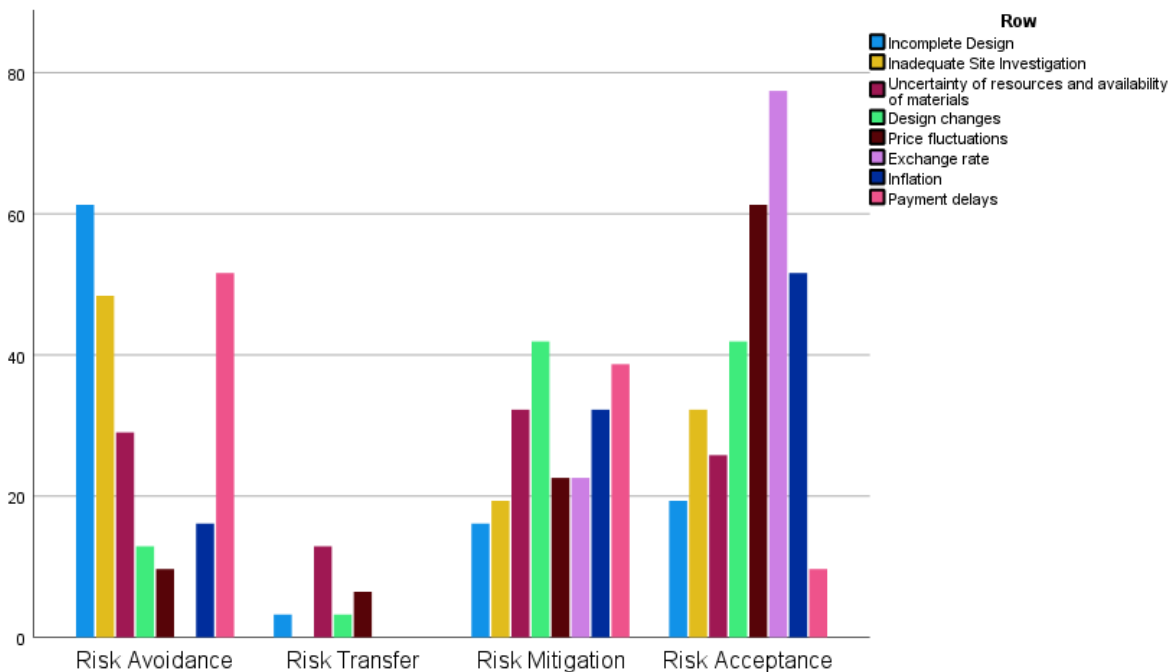


Figure 4- 9 Risk response for risk factors with high impact on project cost and time

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATION

5.1 INTRODUCTION

In this chapter a summary, conclusion and recommendations are stated with regards to the data that was analyzed and interpreted.

5.2 SUMMARY OF FINDINGS

The study aimed to examine the risk management processes used in the project and identify the critical risk factors that affect the project's time and budget. It also sought to determine possible responses to these influential risk factors. Participants were asked questions about each stage of the project risk processes and were also asked to rate the likelihood and impact of each risk factor on the project's time and budget. Finally, participants selected appropriate risk response strategies

Based on the responses from the participants to the project risk management practices, it was found that the implementation and attention given to risk management planning in this project was only moderate. However, many participants feel that systematic execution of risk management, expertise and tools, and project risk management did not meet the necessary standards.

The process of identifying project risks was well executed. Potential risks were pinpointed at the beginning of the project, and key stakeholders were actively involved in this identification. While somewhat moderate, many participants agree that a structured and formal approach to risk identification was followed, and a checklist was maintained to guide the subsequent stages of the process.

The project risk analysis for the project was found to be poorly executed according to the respondents. Risks were not fully analyzed in terms of their likelihood to occur, impact size, and their effect on the project's success. In addition, the risks were not documented and modified after the analysis.

Of all the steps in the project risk management process, respondents emphasized that project risk response received the most attention. The project's risk response plan is well-established. The project took time and money into account while managing risk, and it kept a close eye on any impact that risk responses may have.

The project risk monitoring and control process is the least implemented in project risk management. It does not follow the necessary principles and standards, according to respondents. Risks are not adequately assessed at regular intervals over the project's life cycle, reviewed, or effectively communicated.

The mean values of every project risk management procedure were also looked at in the descriptive analysis. According to the research, project risk response is given greater weight and attention than other process phases, however project risk monitoring and control is given the least amount of attention.

In response to the second research question, respondents were asked to rate risk factors based on their probability of occurrence and impact on budget and time. A total of 34 risk factors were presented to respondents and were analyzed using a ranking mechanism. The findings revealed that in terms of occurrence probability, the top five risk factors were price fluctuation, exchange rate, inflation, incomplete design, and payment delays, indicating that most of the risks are financially related. Regarding the greatest effect on project time and budget, the top-rated risk factors were design change, incomplete design, inadequate site investigation, uncertainty of resources, price fluctuation, and inflation. Lastly, risk response strategies were proposed for the identified risk factors. For financial risk factors, risk acceptance was mainly proposed. For the design change risk factor, risk mitigation and acceptance were equally recognized as responses by the respondents. For technical risks, respondents believed that risk avoidance is the appropriate risk response strategy

5.3 CONCLUSION

One of the most significant things that may help many different industries grow and raise the nation's gross domestic product (GDP) is the development of infrastructures. Every construction project is different, and there are always possible risks involved. Risk is characterized as any event or course of action that might compromise the accomplishment of project goals. (Landage, 2016).

The construction industry is particularly susceptible to complicated and changing project conditions that heighten uncertainty and risk, which leads to cost overruns and schedule delays in building construction projects as evidently seen in this project.

This study examined the practice of project risk management, including the identification and ranking of risk factors, determination of their impact, and prevalent response trends. The study found that while most steps of project risk management were implemented, project risk analysis and project monitoring were not given the required attention. It also found that financial risks had the highest probability of occurrence and the most significant impact on time and budget.

Overall, the study underscores the importance of addressing the identified shortcomings in the project's risk management processes, particularly in the areas of risk analysis, monitoring, and control. By implementing the necessary improvements in these areas, the project can better address and mitigate the identified risk factors, especially those related to financial and technical aspects, ultimately contributing to more effective project risk management.

5.4 RECOMMENDATIONS

The findings of the research suggested that consultants, builders, clients, and other stakeholders take into account the following areas for improvement in risk management for the construction of the Waliya luxury apartment building.

- Implementing risk management is essential at all project lifecycle stages. However, the respondents said that the project mainly emphasized on project risk planning, project risk identification and response. Every stage of the project needs to include risk management.

- Project risk analysis and project risk monitoring should be given enough attention as they aid the assessment of the impact of the risks and the rectification of risks from the planned risk response.
- It is advised to investigate and measure the "effects" of the risk variables investigated, particularly the ones thought to be most significant.
- The contractor cannot control financial risks, especially those related to price fluctuations, exchange rates, and inflation, which have the highest probability of impacting the project's timeline and budget. Therefore, a flexible contingency plan needs to be in place to account for these risks without negatively affecting the project's budget or schedule.
- Clients should be directly involved in project design to reduce the need for change orders, particularly when building is underway.
- Putting in place a well-documented process that ought to serve as a one-stop shop for any risks that arise throughout the course of a project.

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APPENDIX: QUESTIONNAIRE

Addis Ababa University School of Commerce

Masters of Art in Project Management

Project Risk Management Practice: The Case of Walia Luxury Hotel Apartments

To the respondents, my name is Tsinukal Aweke I am a postgraduate student of Addis Ababa University School of Commerce, department of project management. The purpose of this questionnaire is to determine and evaluate the most popular and regularly employed risk management techniques in Walia Luxury Hotel Apartments construction projects. As such, I respectfully ask that you take the time to carefully consider each question and answer it truthfully. Your whole submission will be treated with the utmost confidentiality and used exclusively for this research. I appreciate your kind cooperation in advance.

Tsinukal Aweke

Addis Ababa, Ethiopia

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Section A: Respondent's Bibliography

1. Respondent's Title _____

2. Educational level

a. Diploma b. Degree c. Masters d. other

3. Experience for working on a project

a. Less than 2 years b. 2-3 years c. above 3 years

4. Taken Project Risk Management Training

a. Yes b. No

Section B: Risk management process

Please answer by marking in the box that corresponds to your choice (1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree and 5 = Strongly Agree)

		Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
		1	2	3	4	5
RISK PLANNING						
1	Risk management strategy was put into action before the project ever started.					
2	Planning for risk management is done methodically and with appropriate care.					
3	Planning includes participation from the relevant parties.					
4	During risk management planning, sufficient resources and instruments for risk management are used, and relevant meetings are convened.					
5	Project team members are adequately trained or knowledgeable about managing uncertainty.					
RISK IDENTIFICATION						
7	Identifying risks occurs early on in the project or at its start.					
8	The process of identifying risks involves every member of the project team.					
9	Structured and formal risk identification is used.					
10	This stage clearly identifies the risk in order to provide the groundwork for the subsequent actions.					
11	The project identified the causes and prospective consequences of the risks, as well as the regions of influence and their sources.					
RISK ANALYSIS						
12	An accurate and reliable measuring technique is used to examine the risks that have been identified.					
13	Risks are specifically evaluated in terms of their ability to materialize and the extent to which they impact the success of a project.					
14	Project documentation are changed when risks are investigated.					

		Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
		1	2	3	4	5
RISK RESPONSE						
15	The project's risk response plan is well-established.					
16	Factors like finances and schedule are considered while handling risk.					
17	Within the project, a well-thought-out plan was put into place to track risk reactions that affect the project.					
RISK MONITOR AND CONTROL						
18	The project's risk monitoring and management procedures follow the necessary norms and regulations.					
19	Periodically, risks are reassessed.					
20	Throughout the project, the effectiveness of the risk management method is assessed.					
21	Risks are appropriately documented and shared.					

Section C: Risk Factors

Rank	Descriptor	Description	Probability
Very High (5)	Almost Certain	Even Chance	>50%
High (4)	Likely	Occurred multiple times	>25%
Moderate (3)	Possible	Occurred a couple of times	>10%
Low (2)	Unlikely	Occurred once	>5%
Very Low (1)	Rare	Almost never occurred	<5%

Rank	Schedule	Cost
Very High (5)	>1 Year	> 5 Million ETB
High (4)	4-6 months	2-5 Million ETB
Moderate (3)	2-3 months	1-2 Million ETB
Low (2)	1-2 months	500,000 - 1 Million ETB
Very Low (1)	< 3weeks	< 500,000 ETB

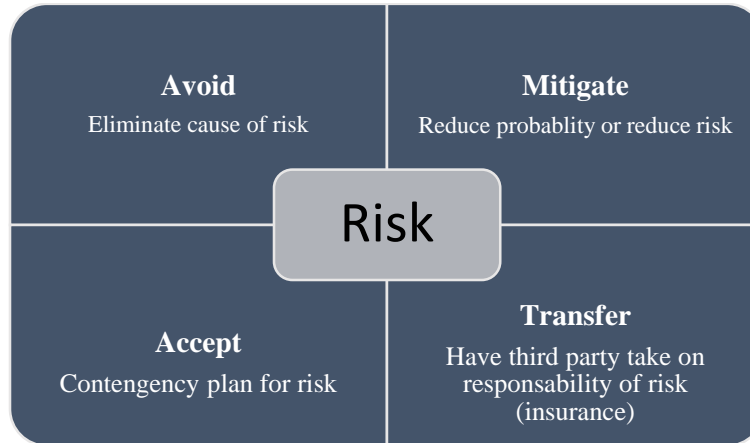
Rank the probability of the occurrence of the listed factors and their impact on a project's time and cost as referenced above on the tables.

	Risk Factors	Probability of Occurrence					Impact on cost of the project (budget)					Impact on completion time of the project				
		Very Low	Low	Mode rate	High	Very High	Very Low	Low	Mode rate	High	Very High	Very Low	Low	Mode rate	High	Very High
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
	1. Technical Risks															
1.1	Incomplete Design															
1.2	Inadequate Site Investigation															
1.3	Uncertainty of resources and availability of materials															
1.4	Changes in project scope and requirements															
1.5	Unqualified designers															
	2. Construction Risks															
2.1	labor disputes															
2.2	Strikes															
2.3	Design changes															
2.4	Unsuitable construction program															
2.5	Site condition															
2.6	Equipment failures															
2.7	Contract disputes															
2.8	Labor productivity															
	3. Financial Risks															
3.1	Price fluctuations															
3.2	Exchange rate															
3.3	Inflation															
3.4	Payment delays															

	4. Socio-Political Risks																
4.1	Changes in laws and regulations																
4.2	Pollution and safety rules																
4.3	Bribery/corruption																
4.4	Law & order																
4.5	War and civil disorder																
4.6	Requirement for permits and their approval																
	5. Physical Risks																
5.1	Accidents and fatalities																
5.2	Shortages of equipment and material																
5.3	Equipment and material theft																
	6. Organizational Risks																
6.1	Excessive procedures																
6.2	Lack of qualified staff																
6.3	Poor communication between involved parties																
6.4	Attitudes of participants																
6.5	Contractual relations																
	7. Environmental Risks																
7.1	Weather conditions																
7.2	Pollution and safety																
7.3	Natural disasters																

Section D: Risk response strategies

Choose which method of risk response can be used if the listed risks occur or might occur.



	Risk Factors	Risk Avoidance	Risk Transfer	Risk Mitigation	Risk Acceptance
	1. Technical Risks				
1.1	Incomplete Design				
1.2	Inadequate Site Investigation				
1.3	Uncertainty of resources and availability of materials				
1.4	Changes in project scope and requirements				
1.5	Unqualified designers				
	2. Construction Risks				
2.1	labor disputes				
2.2	Strikes				
2.3	Design changes				
2.4	Unsuitable construction program				
2.5	Site condition				
2.6	Equipment failures				
2.7	Contract disputes				
2.8	Labor productivity				

	Risk Factors	Risk Avoidance	Risk Transfer	Risk Mitigation	Risk Acceptance
	3. Financial Risks				
3.1	Price fluctuations				
3.2	Exchange rate				
3.3	Inflation				
3.4	Payment delays				
	4. Socio-Political Risks				
4.1	Changes in laws and regulations				
4.2	Pollution and safety rules				
4.3	Bribery/corruption				
4.4	Law & order				
4.5	War and civil disorder				
4.6	Requirement for permits and their approval				
	5. Physical Risks				
5.1	Accidents and fatalities				
5.2	Shortages of equipment and material				
5.3	Equipment and material theft				
	6. Organizational Risks				
6.1	Excessive procedures				
6.2	Lack of qualified staff				
6.3	Poor communication between involved parties				
6.4	Attitudes of participants				
6.5	Contractual relations				
	7. Environmental Risks				
7.1	Weather conditions				
7.2	Pollution and safety				
7.3	Natural disasters				