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PROJECT RISK MANAGEMENT PRACTICES AND IMPACTS ON PROJECT PERFORMANCE OF ROAD CONSTRUCTION PROJECTS: THE CASE OF VIVA ENGINEERING PLC ROAD CONSTRUCTION PROJECTS

BY

YBELTAL KERE

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ADDIS ABABA, ETHIOPIA

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A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF

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DECLARATION

I, the undersigned, hereby declare that this thesis entitled "PROJECT RISK MANAGEMENT PRACTICES AND IMPACTS ON PROJECT PERFORMANCE OF ROAD CONSTRUCTION PROJECTS: THE CASE OF VIVA ENGINEERING PLC ROAD CONSTRUCTION PROJECTS" is my original work and that all sources of materials used for this study have been identified and acknowledged as complete references. This research study has not been previously submitted in full or partial fulfillment for a degree in this or any other recognized educational institution. This research study is being submitted in partial fulfillment of the requirement for Master of Arts in Project Management.

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ADVISOR's APPROVAL

This is to certify that the thesis entitled: " PROJECT RISK MANAGEMENT PRACTICES AND IMPACTS ON PROJECT PERFORMANCE OF ROAD CONSTRUCTION PROJECTS: THE CASE OF VIVA ENGINEERING PLC ROAD CONSTRUCTION PROJECTS" submitted in partial fulfillment of the requirements for the degree of Master of Science in Project Management, is a record of original research carried out by YBELTAL KERE, under my supervision. No part of the thesis has been submitted for any other degree or diploma. The assistance and support received during this investigation have been duly acknowledged. Therefore, I recommend it for acceptance as fulfilling the thesis requirements.

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Dr. Muluadam Alemu		**01/08/2025**

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THESIS TITLE

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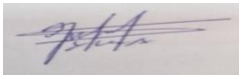
Yilkal Wassie (Asset Prof)		
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List of Acronyms and Abbreviations

PMI Project Management Institute

PRM Project Risk Management

APM Association for Project Management

ISO International Organization for Standardization

PMI Project Management Institute

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Abstract

Risk management is one of the nine key knowledge areas highlighted by the Project Management Institute (PMI). It involves anticipating unforeseen circumstances that may arise beyond the project manager's control at the project's outset. The construction industry is naturally laden with risks that can threaten the success of projects, especially in road construction initiatives carried out by private firms. The research was done at private firm called Viva Engineering PLC*, a grade one engineering company, to assess existing project risk management practices at its two road construction projects. The study used a* mixed-methods approach, integrating qualitative and quantitative research techniques with concurrent design research methods. *In conducting the study, primary and secondary data are collected using structured survey questionnaires, interviews and other published materials. Census sampling technique was used, sample of 20 participants from the total population of 20 found 18 from two projects and two from the headquarter. Descriptive statistics were used to analyze the data gathered. The findings of the paper revealed that though Viva engineering PLC has a company policy to guide and direct managing risks the existing practice is way far from the standard stipulated in the company guidelines and procedures and to the industry level. Both the quantitative and qualitative analysis findings shows that the company lacks proper risk management in all risk management process from risk identification, analysis, risk response planning to risk control and monitoring stage. The study finds also financial, socio-political, construction, right of way, and material risks are the top risks of high probable occurrence and high impact on the project quality, cost and completion time. The study suggests and recommends that, in order to bring the gaps on project risk management practices and improve its performance in future projects, the company should build a company culture that considers risk management practices, gives attention to risk management by assigning a risk management department at the head office level and a responsible team at the project, allocating fair resources both financially and man power and create awareness, give trainings,.. etc.*

Key words: Construction project, Risk, Project Risk Management, Risk identification, Risk analysis and Risk response.

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CHAPTER ONE

INTRODUCTION

1.1 Background of study

Risk management is one of the nine key knowledge areas highlighted by the Project Management Institute (PMI). It involves anticipating unforeseen circumstances that may arise beyond the project manager's control at the project's outset. In the context of construction project management, risk management is a thorough and systematic approach to identifying, analyzing, and addressing risks to meet project objectives.

Effective risk management is a crucial aspect of the decision-making process in the construction industry. Like any other economic endeavor, construction projects inherently carry risks. According to Vidal and Marle (2007), project systems are fundamentally complex. Road construction projects, in particular, face a wide range of hazards and intricate risks due to the interrelated nature of their activities and the involvement of various contracting parties and stakeholders. Each stakeholder has their own specific interests, which may not align with the overall objectives of the project. This divergence can result in an increased likelihood of encountering various challenges or risks, ultimately leading to less effective risk management practices.

A researcher describes, "Risk management is understood as a significant practice in order to accomplish better construction projects successfully. Success in construction project is witnessed partly by its practical risk management performance in terms of project time, cost, quality, client satisfaction and safety among other things" (Meskerem Bekana, 2020).

Over the past thirty years, the Ethiopian government (GOE) has focused on strengthening the capabilities of Ethiopian domestic contractors (EDCs), leading to the establishment of numerous private and public construction firms. Despite these efforts, concerns remain regarding the performance of some EDCs like Viva Engineering Plc., which is one of EDCs engage indifferent types of construction, especially on road construction and the company is point of focus of this study. This research paper has tried to identify and prioritize the risks faced by the company involved in different levels of its road construction projects.

This study has tried to identify critical risk factors like the existence of inadequate planning, financial instability, technical incapability, and organizational, at Viva Engineering project risk management practices at their road construction projects. These are all likely to be manifested in most domestic roads and other contractors suggested and shown by studies conducted in the area.

In response to these challenges, the Government of Ethiopia **(**GOE) has implemented a series of Road Sector Development Programs (RSDPs) since 1997 (ERA, 2011; ERA, 2016). A core strategic objective of these initiatives has been to enhance institutional capacity within the road sector. To this end, the government has undertaken various activities aimed at attracting private-sector investment and bolstering the capabilities of existing construction firms. As a result, a significant number of Ethiopian domestic contractors (EDCs) have emerged, contrasting sharply with the limited capacity of contractors that existed before the RSDP initiatives (MOFED, 2002).

This research sheds light on the risks faced by particularly Viva Engineering, in general, domestic contractors in the road construction sector. The findings will assist construction firms in developing effective risk management strategies to mitigate these challenges.

1.2 Statement of the Problem

The construction industry is naturally laden with risks that can threaten the success of projects, especially in road construction initiatives carried out by firms such as Viva Engineering. While effective project risk management is crucial, there are considerable obstacles in recognizing, evaluating, and addressing risks unique to road construction. These difficulties can result in delays, budget excesses, subpar quality and performance, safety issues, and ultimately, project failures.

Research has been done to address the above shortcomings connected to project risk management, but the research mainly focused on either at the high-level cover government institutes and agencies like AACRA (Kiduse Fikiru, 2023) and ERA (Yohannes Abera Tesfaye, 2020) and (Worku, Michael and Gurmel, 2023) or comparing local and international contractors (Eshetu Adugna, 2017). The research gap shows that the problem with local private contractor road project risk management is not properly addressed.

Key Issues: When the researcher was working for the company, he observed plenty shortcomings in the company’s projects risk management:

- **Inadequate Risk Identification**: There are insufficient processes for identifying risks unique to road construction projects at Viva Engineering. This can result in overlooked hazards such as environmental conditions, regulatory changes, and site-specific challenges that could adversely affect project timelines and costs.
- **Ineffective Risk Assessment**: The existing methodologies for risk assessment is not adequately evaluate the likelihood and potential impact of identified risks. This inadequacy can lead to misallocation of resources and failure to prioritize high-impact risks effectively, thereby increasing vulnerability during project execution.
- **Reactive Risk Management Approach or Inadequate Risk Response Planning**: A tendency to respond to risks only after they materialize rather than proactively managing them can exacerbate issues. This reactive approach may stem from a lack of structured risk management frameworks and insufficient training among staff regarding best practices in risk mitigation.
- **Ineffective Risk Control, Monitoring, and Lack of Proper Documentation, reporting, and Communication Gap:** Effective risk management requires clear communication among all stakeholders involved in road construction projects. At Viva Engineering, ambiguities in roles and responsibilities related to risk management have led to ineffective oversight and accountability, further complicating the management of potential risks.

1.3 Objectives of the Study

1.3.1 General Objectives

The general objective of the study is to evaluate and analyze the project risk management practices employed by Viva Engineering in the implementation of road construction projects, with the aim of identifying strengths, weaknesses, and areas for improvement.

1.3.2 Specific Objectives

1. To assess the existing risk management practices utilized by Viva Engineering in their road construction projects.
2. To identify the key risks associated with road construction projects that are commonly encountered by Viva Engineering.

3. To analyze how the current risk management practices impact project outcomes, including cost, time, and quality.

1.4 Research Questions

1. How does the current risk management practices at Viva Engineering look like; in terms of risk identification, risk analysis, risk responses strategies, control and monitoring of risks and documenting and reporting of risks events in its projects?
2. What are the major risk factors undertaken and their rank in probability of occurrence in the projects?
3. Which project risk factors have the highest impact on project quality, time and cost objectives?

1.5 Definition of Terms

1.5.1 These are the operational definition of key terms:

Risk: A potential impact on a project's timeline, performance, or budget. (PMBOK® Guide) (7th ed.)

Project Risk Management: The process of identifying, analyzing, and responding to risks that could occur during a project. The goal is to keep the project on track and meet its goals. (PMBOK® Guide)

Risk Identifying: The process of identifying, describing, and cataloging potential risks to a project. It is the first step in the risk management process. Cooper, D. F., et al. (2005).

Risk Analyzing: The process of identifying and analyzing potential issues that could negatively affect a project. The goal is to help avoid or mitigate those risks. Hillson, D. (2003).

Risk Response Strategy: The process of developing strategic options and determining actions to reduce threats to a project's objectives. A project team member is assigned to take responsibility for each risk response. Office of Government Commerce. (2009).

1.6 Significance of the Study

This paper aims to identify and analyze the risks associated with Viva Engineering Road construction projects. By improving risk management practices, the research can contribute to higher success rates in project completion, minimizing failures, delays, and cost overruns.

Effective risk management provides a structured approach to decision-making by enabling project managers to understand potential risks and their impacts. This study will enhance decision-making processes at Viva Engineering, allowing for better resource allocation and project planning.

Road construction projects often involve significant safety risks and regulatory requirements. By establishing robust risk management practices, the study will help ensure compliance with safety standards and regulations, thereby protecting workers and reducing liability.

The research will promote better communication among stakeholders by identifying roles and responsibilities related to risk management. Improved communication can lead to greater stakeholder confidence and collaboration throughout the project lifecycle.

The findings of this study will serve as a valuable framework for future road construction projects at Viva Engineering and similar companies engaged in similar businesses. By documenting best practices and lessons learned, the research can guide the implementation of effective risk management strategies in upcoming projects.

This study will add to the existing body of knowledge on project risk management in the construction industry, particularly in the context of road construction. It can serve as a reference for future research and practical applications in similar settings.

By highlighting areas for improvement in current risk management practices, this research can drive organizational change within Viva Engineering, fostering a culture of proactive risk awareness and management that enhances overall project performance.

Overall, this study is significant not only for improving the operational efficiency of Viva Engineering’s Road construction projects but also for contributing to broader discussions on effective risk management practices within the construction industry.

1.7 Scope and Limitations of the Study

1.7.1 Scope of the Study

1. Project Focus: The study focuses specifically on road construction projects undertaken by Viva Engineering, examining their risk management practices throughout the project lifecycle.

2. Geographical Limitation: The research will be limited to projects executed within a specific geographical area (e.g., a particular region or country) where Viva Engineering operates.

3. Stakeholder Engagement: The study involves a survey via questionnaires and interviews, including project managers, engineers, and associated key employees, to gather qualitative data on risk management practices.

4. Time Frame: The analysis has covered projects completed and on due completion within the last three years to ensure relevance and to account for recent industry trends and challenges.

5. Risk Categories: The study has categorized risks into various types (e.g., financial, environmental, technical, and regulatory) to facilitate a comprehensive understanding of the risk landscape in road construction.

6. Evaluation Criteria: The effectiveness of risk management practices is evaluated based on criteria such as cost overruns, project delays, quality issues, and other project-related criteria.

1.7.2 Limitations of the Study

1. Sample Size: The study may be limited by the number of projects and respondents that can be feasibly included, which may affect the generalizability of the findings.

2. Subjectivity: Stakeholder perceptions gathered through interviews and surveys may introduce bias, as personal experiences and opinions can vary widely.

3. Data Availability: Access to detailed project documentation and historical data may be restricted due to confidentiality agreements or company policies, potentially limiting the depth of analysis.

4. Dynamic Environment: The construction industry is subjected to rapid changes in regulations, technology, and market conditions, which may affect the applicability of the findings over time.

5. Focus on One Company: Since the study concentrates solely on Viva Engineering, the findings may not be representative of broader industry practices or applicable to other companies in the construction sector.

6. External Factors: The study may not fully account for external factors (e.g., economic downturns, natural disasters) that can significantly affect project risks but are beyond the control of the company.

7. The study faced other limitations such as:

- Potential bias in self-reported data from surveys and interviews.
- Limited generalizability due to the focus on a single company.

Inaccessibility of key personnel of the company for interview due to short of time.

1.8 Organization of the Paper

The study is organized into five chapters. Chapter One outlines the background, problem statement, scope, significance, and objectives of the research project. Chapter Two reviews relevant literature to provide insight into the research topic. Chapter Three details the research methodology employed by the researcher. Chapter Four presents the findings and discusses their implications. Finally, Chapter Five summarizes the study's findings and offers recommendations aimed at addressing the identified problem, along with suggestions for future research.

CHAPTER TWO

LITERATURE REVIEW

After selecting a topic, it is crucial to examine all pertinent materials related to that topic. The literature review starts with the search for an appropriate topic and continues throughout the research process. Given that a research report, whether a dissertation or thesis, aims to provide a thorough investigation and contribute to existing knowledge, it is important to ensure that the proposed study has not been conducted before.

This chapter discusses the paper's theoretical framework, empirical framework, Knowledge gap, and Conceptual framework. The chapter goes through the works of literature to assess what has been said about risk and risk management theoretical aspects; then discusses papers so far written on the subject particularly on similar projects in Ethiopia, of empirical aspects of the subject so that can show knowledge gaps in the area that this paper aims to show. In the end, a conceptual framework is drafted.

1.9 Theoretical

1.9.1 What is Risk?

According to the Stanford Office of the Chief Risk Officer. (n.d.) (2024) Risk can be defined as the possibility of loss, injury, or other adverse outcomes resulting from uncertain events. It involves the uncertainty surrounding the effects or implications of an activity concerning something valuable, such as health, wealth, property, or the environment. Essentially, risk encompasses both the likelihood of an undesirable event occurring and the potential consequences of that event. Thus, we can define risk in simple terms, which refers to the degree of uncertainty and potential financial loss associated with an investment or activity.

With the same token Lowrance (1976): defines risk, as "Risk is a measure of the probability and severity of adverse effects." It implies future uncertainty regarding deviations from expected earnings or outcomes, affecting factors that humans value, such as health, wealth, and well-being. Risk is the possibility of something bad happening.

Risk involves uncertainty about the effects/implications of an activity concerning something that human’s value, often focusing on negative, undesirable consequences. Many different definitions

have been proposed. Kendrick, T. (2015) “In projects, a risk can be almost any uncertain event associated with the work.”

1.9.2 What is Risk in Project Management terms?

Different Scholars and professional institutes have provided various definitions of risk in the context of project management.

To begin with “The Project Management Institute (PMI)” definition, which is a global organization dedicated to promoting project management practices and standards, defines risk as “Risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives such as scope, schedule, cost, and quality."

According to Rowe (1988) Risk is the potential for realization of unwanted, negative consequences of an event. Kates and Kasperson (1983) are other scholars who define risk as the possibility that human actions or events lead to consequences that harm aspects of things those human beings value.

Yates and Stone (1992) define risk as the possibility of loss, the chance that an outcome will not be as expected, or the possibility of deviating, in an unfavorable direction, from a desired outcome. All the above scholars define risk in the negative form as loss, harm or deviation from positive outcome except the institute, PMI, with the expression of “…has a positive or negative effect on one or more project objectives…” However, Chapman and Ward (2003) define risk as "Risk is exposure to a proposition of which one is uncertain." the author don’t explicitly define the outcome as a negative or positive, which in context can be interpreted as both outcomes.

Those all definitions by scholars which are depicted in the above or undescribed here possess the below components or elements.

- **Uncertainty**: Risks involve uncertain events or conditions that may or may not occur.
- **Positive or negative impact**: Risks can have either a favorable or an unfavorable effect on project objectives.
- **Project objectives**: Risks can affect various project goals, such as scope, schedule, cost, and quality.

In project management texts, scholars often categorize Risks into two types:

1. **Threats**: Uncertain events that can negatively affect project objectives.
2. **Opportunities**: Uncertain events that can positively affect project objectives.

Effective project risk management involves identifying, assessing, and developing appropriate responses to both threats and opportunities to optimize project success. By proactively managing

risks, project managers can steer projects to successful outcomes by minimizing threats and capitalizing on opportunities.

Hence, in project management terms Risk refers to any uncertain event or condition that can affect, in either a negative or positive way, a project's timeline, performance, or budget or generally objective of the project. It encompasses potential challenges related to resources, technology, and other factors that could affect project outcomes. Understanding and managing risks is crucial for successful project delivery.

1.9.3 Why should risk be managed in the context of project management?

In the above, we have seen that risk has been expressed in different forms, expressions, and aspects referring to project management and for the sake of risk itself. The most common key characters and attributes, expressed above in the definition, are uncertainty, probability/frequency, effect/impact, loss/benefit, and so on, consistently appear in many of these definitions. The frequently referred definition is ISO definition a commonly referred or used definition of risk (ISO 2018) definition stated as '*risk is the effect of uncertainty on objectives'*. The other common definition offered by PMI stated in the above is that it is in association with a project as *'risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives'* (PMI 2013).

Many risks faced by projects cannot be eliminated (Enshassi et al. 2006; Smith et al. 2006), hence, success is measured in terms of the effectiveness of project risk management (PRM) approach adopted (Hillson 2012). PRM, according to IRM (2002), is the process in which organizations methodically address the risks attaching to their activities to achieve sustained benefit within each activity and across the portfolio of all activities.

Scholars have identified numerous benefits of effective Project Risk Management (PRM). Here are some key advantages:

For Better Project Planning: Project planning is one of the key knowledge areas of project management, hence, integrating risk management into project planning allows managers to anticipate and address potential risks early. Kendric reiterates this proactive approach leads to informed decision-making, effective resource allocation, and realistic timelines and budgets (Kendrick, 2015). For better project planning project planners, need to consider the integration of project risk management during the planning stage of the project.

For Well Informed Decision Making: PMI illustrates the importance and benefits of project risk management to project managers and perspective decision makers related to a project regarding to improved decision making. Risk management enables project managers with valuable insights, enabling them to make better-informed decisions throughout the project lifecycle. Understanding potential risks helps evaluate alternative approaches and allocate resources strategically. Which makes easier for project managers an accurate decision (Project Management Institute, 2017).

Proactive Risk Identification and Mitigation: A project is certain to experience some sort of risks, those risks should not happen as a surprise for which the project might fall into a trap of failure, loss or undesirable outcome. Hilson explains how a structured risk management process enables project teams to identify and address risks before they escalate into significant issues. This reduces the likelihood of project delays, cost overruns, and quality problems (Hillson, 2009). Project risk management is vital concerning to identifying risks that might face during project execution and makes ready for mitigation of those risks expected to happen before hand.

In conclusion, according to TenSix well-integrated risk management can reduce surprises. A robust risk management process minimizes unexpected events that can lead to increased costs. Continuous monitoring and response strategies help project teams manage risks effectively, reducing the likelihood of cost overruns (TenSix, 2017).

Enhances Communication: Implementing risk management practices fosters transparency and trust among stakeholders through effective communication. Raz and Michael recommends effective communication regarding identified risks and response strategies enhance stakeholder engagement and confidence in project management (Raz & Michael, 2001). Integrated risk management practices bring trust of stakeholders through enhanced communication among project team members.

Increased Project Resilience: By incorporating risk management to project during project planning stage and beyond i.e, during execution and completion stage of a project, projects become more resilient to uncertainties. Teams are better, as stated by Chapman & Ward, prepared to handle unexpected events or changes, ensuring that project objectives are met despite challenges (Chapman & Ward, 2003). A still stand solid projects are certainly successful and yields expected outcome, which would meet its objectives and goals.

Cost and Schedule Control: Cost and Schedule are a few vital elements of project management. A project manager who can achieve or meet these parameters of a project is the who meets the project

objective. Kenzer argues that proactive risk management helps control costs and schedules by identifying potential risks that could affect project resources and timelines. This allows for the allocation of contingency reserves and the development of effective risk response plans (Kerzner, 2017). Another scholar called Usmani explains about Effective Resource Allocation. He discusses risk management helps in the optimal allocation of resources by identifying areas requiring more attention and funding. This ensures efficient use of financial resources, reducing waste and enhancing project profitability (Usmani, 2022).

Project Continuous Improvement: Risk management fosters a culture of continuous improvement within project teams. Lessons learned from previous projects can be integrated into future risk management processes, enhancing overall project execution capabilities (Raz & Michael, 2001).

Increased Return on Investment (ROI): Projects that effectively manage risks are more likely to be completed on time and within budget, leading to better returns. This is particularly important for securing executive support and trust for future initiatives (Hillson, 2009). By proactively identifying, assessing, and managing risks, project managers can navigate uncertainties and drive projects toward their objectives, ultimately enhancing overall project success and stakeholder satisfaction.

In summary, the integration of Project Risk Management into the overall project management process significantly enhances Project Cost Control. By proactively identifying and managing risks, project managers can mitigate potential cost impacts, improve decision-making, and ultimately drive project success.

1.9.4 Scopes of Project Risk Management

Risk management has a broad scope, covering potential losses, injuries, or adverse outcomes that may arise from uncertain events. It emphasizes the importance of understanding both the probability and impact of risks to effectively manage them. The scope of risk management extends across various domains, including health, finance, operations, and strategic decision-making. By proactively Planning, identifying, assessing, analyzing, preparing risk responses, risk control and mitigating risks, organizations can enhance their resilience and increase the likelihood of achieving their objectives (Usmani, M. F. 2022).

Risk management can differ between projects. For example, large-scale projects may require detailed planning for each risk, while smaller projects may only require a prioritized list of risks. Raz & Michael, (2001).

Although different approaches are used to describe Project risk management steps and scopes, several of the project risk management frameworks involve some common basic stages. Upon reviewing the risk management processes provided in diverse literature, Goh and Abdul-Rahman (2013) declared that ***risk planning, risk identification, risk analysis, risk response and risk monitoring and control*** are the well-accepted steps in the project risk management process. According to Zhao et al. (2015) and Low et al. (2009), the fundamental stages are *risk planning*, *risk identification*, *risk analysis*, and *risk response*. Hence, we will elaborate on the five risk management steps, namely, the planning, identification, analysis, risk responses and evaluation of risk events that may affect the performance of the project.

Figure 2.1 : Scopes or Process of risk management (Hillson, 2014)

Risk Planning

Any project risk management commences by planning a risk management. According to Bissonette (2016), effective project risk planning involves identifying potential risks, analyzing their impact, and developing strategies to mitigate them. Integrating risk planning into the overall project management process is crucial for success. The Project Management Institute (2017) states that "risk management is not a separate process from the other project management processes. It is a continuous process that runs throughout the project life cycle." By proactively managing risks, project managers can enhance the likelihood of achieving project objectives.

In conclusion, effective project risk planning involves identifying, analyzing, responding to, and monitoring risks throughout the project lifecycle. By incorporating risk planning into project management, teams can navigate uncertainties and drive projects to successful outcomes.

Risk identification

Risk identification is the second stage in project risk management; it involves finding, recognizing, and recording risks that could affect the achievement of an organization's objectives (BSI 2010; ISO 2018). Identifying potential risks is a crucial first step in risk planning. Hillson (2009) emphasizes, "Risk identification is the process of determining which risks might affect the project and documenting their characteristics." This involves reviewing project information, conducting brainstorming sessions, and using tools like checklists and risk taxonomies.

According to FHWA (2006), risk identification is conducted for two specific objectives: (i) to identify and categorize risks and (ii) to document the identified risks. Yet it is also important to note that, trying to identify all the risks, according to El-Sayegh (2008), is time-consuming and counterproductive. As a result, literature, such as APM (2008), suggests avoiding wasting time and resources on dealing with uncertainties that are of relatively low importance in terms of their effect on objectives. Subsequently, El-Sayegh (2008) and Barkley (2004) have suggested focusing on identifying and dealing with the most significant risk events among all others.

Different tools and techniques are included in literatures to identify risks (APM 2008; BSI 2010; PMI 2013). Brainstorming, scenario planning, and expert interviews are among the many different approaches. At the end of this piece of article, (Theoretical article review), Some risks are discussed which occurred commonly in developing countries, like Ethiopia, under a title **Common risk events of construction companies in developing countries**.

Risk analysis

Once the potential risk events are produced, the risk analysis follows which examines each identified risk and determines risk scores. After identifying risks, project teams must analyze them to determine their likelihood of occurrence and potential impact. Raz and Michael (2001) suggest using a probability-impact matrix to map risks based on their probability and potential damage to the project. This helps prioritize critical risks that require the most attention.

A probability – impact matrix is the most common and familiar risk analysis techniques (APM 2008) used to determine the relative risk scores (values) by multiplying the measures of probability and impact of the event (BSI 2010; Elmontsri 2013).

It is also commonly suggested to avoid wasting time and resources on analysis of uncertainties that are of relatively less importance in terms of their impact on the set objectives. The ultimate goal of risk analysis is, therefore, to prioritize risks (APM 2008; Ehsanifar and Hemesy 2019) that helps to extricate risks that matter most. Besides the APM (2008) guideline has outlined two essential reasons for prioritizing risk: (1) to inform stakeholders of the range of outcomes arising from uncertainty, and (2) to prioritize risk responses for the effective management of risks.

Developing Risk Response Strategies

Once risks are identified and analyzed, project managers must develop strategies to address them. Chapman and Ward (2003) outline four main risk response strategies: avoiding, accepting, transferring, or mitigating the risk. The appropriate strategy depends on the risk's priority and the project's constraints. Many scholars emphasize the importance of developing effective risk response strategies as part of project risk planning. Here are the key steps involved in creating a risk response strategy:

Identify Risk Response Options: The first step is to identify potential risk response options based on a comprehensive understanding of how risks arise. This involves considering strategies to avoid, transfer, mitigate, or accept the risk (Hillson, 2009).

Select Risk Response Options: After identifying the options, project managers must select the most appropriate strategies based on factors like cost-benefit analysis, stakeholder preferences, and project constraints. The chosen strategies should be feasible, effective, and efficient (Raz & Michael, 2001).

Assign Risk Ownership: Clear ownership and accountability are crucial for successful risk response. Responsibilities for implementing the risk response plan should be assigned to specific individuals or teams (Project Management Institute, 2017).

Prepare Risk Response Plans: Risk response plans should provide details on the actions to be taken, the risks they address, resources to be utilized, budget allocation, implementation timelines, and review mechanisms (Stanford Office of the Chief Risk Officer, n.d.).

Implement and Monitor Risk Responses: Risk response execution involves communicating the plan to stakeholders, implementing the planned actions, monitoring and controlling the responses, and evaluating their effectiveness. The risk register and management plan should be updated accordingly (Kerzner, 2017). By following these steps and incorporating the insights from other scholars, project managers can develop and implement effective risk response strategies that enhance the likelihood of project success.

Monitoring and Controlling Risks

Effective risk planning involves continuously monitoring identified risks, identifying new risks, and evaluating the effectiveness of risk responses. Kerzner (2017) emphasizes the importance of "risk monitoring and control" to track identified risks, monitor residual risks, and evaluate the overall risk management process. Monitoring and controlling risks is a crucial component of effective project management, ensuring that risks are continuously assessed and managed throughout the project lifecycle.

Definition and Importance: Risk monitoring and control refers to the ongoing process of identifying, assessing, and responding to risks that may affect a project's objectives. According to Sitemate (n.d.), this process begins at the start of a project and continues throughout its duration, allowing project teams to track known risks while also identifying new ones as the project evolves. The overarching goal is to mitigate or eliminate risks that could derail the project.

1.9.5 Key Processes of Project Risk Management

1. **Continuous Identification**: Effective risk monitoring involves continuously identifying risks and evaluating their impact on project objectives. This includes reassessing existing risks and identifying new ones that may arise due to changes in project scope or external factors (Systemico, n.d.).
2. **Risk Assessment**: Regular assessments of identified risks help determine their status and relevance. This involves analyzing the likelihood of risks occurring and their potential impact on project performance (KFUPM, n.d.).
3. **Implementation of Risk Responses**: Monitoring ensures that the appropriate risk response strategies are implemented as planned. This includes evaluating these responses' effectiveness and making necessary adjustments (360Factors, 2022).

4. **Communication and Reporting**: Effective communication is essential for risk monitoring. Regular updates and reports to stakeholders help ensure everyone is aware of the current risk status and any changes in risk exposure (360Factors, 2022).
5. **Documentation and Updates**: Maintaining a risk register is critical for tracking risks and documenting changes. The risk register should be updated regularly to reflect new risks, changes in risk status, and the outcomes of risk response actions (KFUPM, n.d.).

Tools and Techniques

Various tools and techniques can be employed to enhance risk monitoring and control:

- **Risk Audits**: These are conducted to evaluate the effectiveness of risk management strategies and ensure compliance with risk management plans (KFUPM, n.d.).
- **Variance and Trend Analysis**: This technique helps monitor project performance against established baselines, allowing project managers to identify deviations that may indicate emerging risks (KFUPM, n.d.).
- **Status Meetings**: Regular meetings can facilitate discussions about risks, ensuring that the project team remains vigilant and responsive to changes (Sitemate, n.d.).

In conclusion, monitoring and controlling risks is an ongoing process that plays a vital role in project success. By continuously identifying, assessing, and responding to risks, project managers can enhance their ability to achieve project objectives while minimizing the impact of uncertainties.

1.9.6 Common risk events of construction companies in developing countries

Overall, the construction industry faces a higher frequency of risk events that significantly impact business operations compared to many other sectors (Wang and Chou 2003; Enshassi et al. 2006; El-Sayegh 2008; Abd Karim et al. 2012). As previously mentioned, while many of these risks are unavoidable (Enshassi et al. 2006; Smith et al. 2006), attempting to identify every possible risk can be both time-consuming and ineffective (El-Sayegh 2008). Therefore, as recommended by El-Sayegh (2008) and Barkley (2004), this study aims to pinpoint the most critical risk events within the construction industry.

Risk events are typically gathered from existing literature and expert insights (Ehsanifar and Hemesy 2019). A comprehensive review of 21 relevant studies from 13 developing nations revealed various risks associated with the construction sector. These identified risks were then assessed in relation to Ethiopia's road sector. Ultimately, the 47 risk events listed in Table 1 were deemed pertinent for Ethiopian construction companies engaged in federal road projects.

1.10 Empirical Review

Cyrus and Elizabeth (2022) studied practices and performance of risk management of road construction in TransNzoia County in Kenya and observed that the risk of road design affects the overall performance of the road construction. The researchers aspire to analyze only one type of risk among several kinds of risks that can appear in road construction projects. Road construction projects are inherently complex endeavors that involve a multitude of risks, ranging from financial uncertainties to environmental impacts. Among these, the decision to analyze only one type of risk can be seen as both a strategic choice and a limitation. The paper examined the implications of focusing on a singular risk within the broader context of road construction, examining the rationale behind this approach, its potential benefits, and its inherent challenges.

Bahiru, Jaeho and Tai (2017) conducted a research on impact of risk in civil work construction project performance. The researchers investigated risk impacts on time, cost and quality. The examiners concluded that poor productivity of labor and working equipment/material failure were causes of high risks. The paper only studied the various types of risks encountered in building construction, their specific impacts on cost, quality, and time. Building construction is a multifaceted endeavor characterized by a range of risks that can significantly affect project outcomes. Among these risks, the effects on cost, quality, and time are particularly critical, as they directly influence the success of construction projects.

Worku, Michael and Gurmel (2023) conducted a research in order to identify and rank risk events that have a potential impact on the performance of Ethiopian domestic contractors working on Federal road construction projects. The researchers categorized the risks into three: business environment, construction and site related risks. The study find out that the risks identified on road construction were cash flow problem, inadequate planning, lack of access to foreign currency, delay in possession of site (ROW), frequent breakdown of equipment, delay in delivery of material and equipment, financial failure, inflation, delay in payments and poor commitment and coordination within the contractors' team. The research only identified the risks and doesn't describe all the stages of risk management which are

identification of risks, risk analysis, evaluation (ranking of risks) and monitoring & control of risks (risk response).

Yisakor S., Nokulunga X. and Didibhuku W. (2020) conducted research on the impacts of poor risk management in Ethiopian construction industry. The study concludes that the major impacts of risks in the construction industry are unplanned expenses, project delays, project failure, loss of profit and cost overgrowth whereas improper use of labor, inadequate project accountability and material scarcity are the minor impacts of identified risks. The study solely concentrated on assessing the major and minor impacts of risks in the construction field.

1.11 Knowledge gap

As can be seen from the empirical review, studies conducted related to the subject, project risk management practices, are mainly either on institutes and authorities of state-owned like ERA, and ACCRA (Kiduse Fikiru, 2023), or an overall comparison between foreign and local contractors regarding to their practice of project risk management (Yohannes Abera Tesfaye, 2020). There is no adequate and detailed study, about local contractor's project risk management practices on their road construction projects within the past 10 years.

Conducting showcase study research on one of the private companies, in this case, Viva Engineering, about their project risk management practices and the impact on the project quality, cost, and time will certainly benefit the organization in particular; the private companies and sector engaged in road construction at large.

Hence, this study will specifically focus in filling the above knowledge gap and focus on the practices of project risk management and its impact on quality, cost and time of the project.

1.12 Conceptual Framework

The conceptual framework outlines the systematic approach to project risk management practices and its impact specific to road construction projects at Viva Engineering. It integrates various components that contribute to effective risk management throughout the project lifecycle.

This conceptual framework serves as a guide for Viva Engineering to enhance its project risk management practices in road construction projects. By systematically addressing each risk factors or source of risks, the company can improve its ability to anticipate, mitigate, and respond to risks, or in general its practices of project risk management and the impact to the project completion time, execution cost and quality ultimately

The framework emphasizes that a keen and careful implementation of risk management should be executed iteratively throughout the project lifecycle. After addressing critical risk factors and crucial at each stage, ensure that all parties are aware of potential risks and the strategies to manage them. After addressing critical risk factors and their occurrence, it is crucial to recognize impacts on the project cost, quality and completion time.

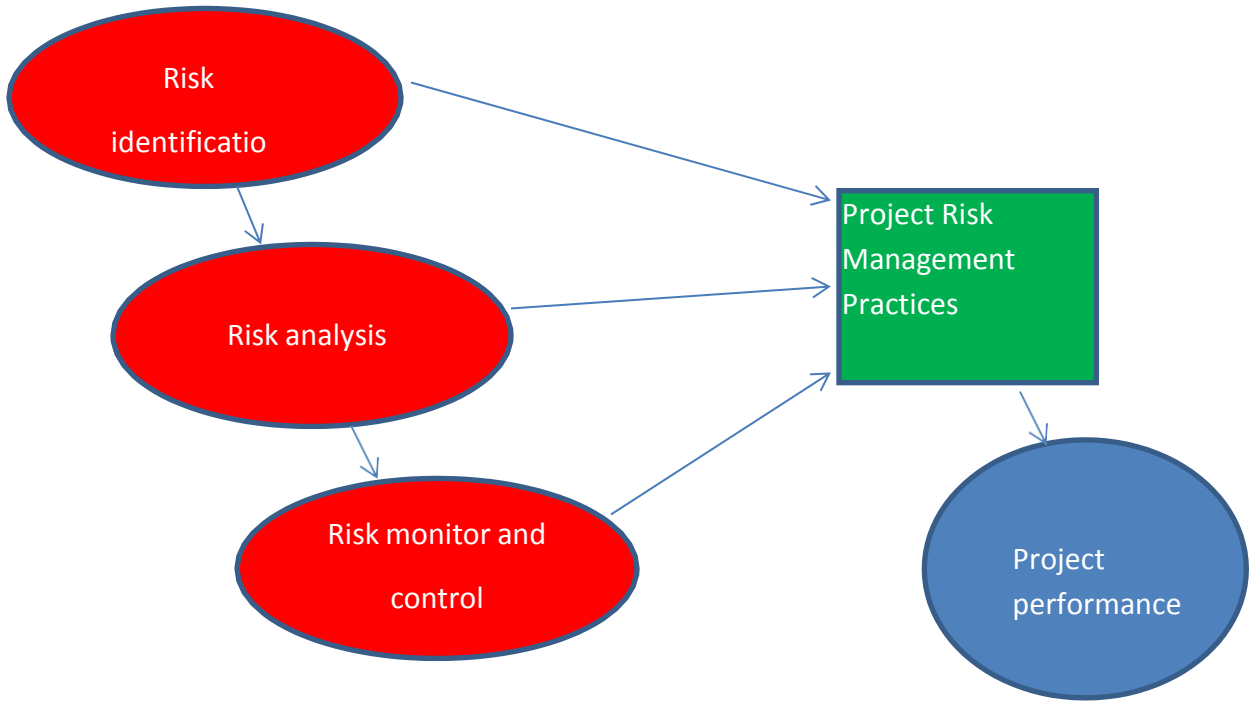


Figure 2.2 : Conceptual Framework Graphical Presentation

CHAPTER THREE

RESEARCH METHODOLOGY

1.13 Introduction

In order to achieve the objective of this paper, using of appropriate methodology that helps to approach the research scientifically is the priority attention given by the writer. Therefore, this chapter includes research design, population and sampling technique, instruments for data collection, procedure of data collection and method of data analysis.

This methodology outlines the approach to assessing project risk management practices at Viva Engineering, a construction company. The study aimed to identify, evaluate, and recommend improvements in risk management strategies to enhance project performance and mitigate potential risks.

1.14 Research Design and methodology

The study employed a mixed-methods approach, integrating qualitative and quantitative research techniques with concurrent design. This combination provides a comprehensive understanding of risk management practices within the organization.

It is said above that the paper used a concurrent design; a concurrent design involves simultaneous collection and examination of both quantitative and qualitative data throughout the paper. This approach is handy for this paper aimed to compare and contrast various viewpoints of information regarding specific risk sources.

- **Qualitative Research**: To gather in-depth insights into the perceptions and experiences of employees regarding risk management practices.
- **Quantitative Research**: To statistically analyze data related to project outcomes like cost, time and quality of the project, risk incidents, and mitigation effectiveness.

1.15 Study Population and Sampling Technique

A study population is a group of people, objects, or events that are the focus of a study or statistical analysis, or a group considered for a study or statistical reasoning. In this study, the population is employees of the company at the two road construction projects who are engineers by profession and

site engineers, material engineers, and project managers and at the head office the company manager, and the projects coordinator by position and role.

Research studies require specific groups of interest to draw conclusions and decide based on their results. This group of interest is known as a sample. The method used to select respondents is known as sampling.

The sampling technique is census. A census is a complete enumeration of a population, meaning that data is collected from every individual or unit in the population. Census data is generally more accurate and precise than sampling data. However, census data collection is usually more time-consuming and expensive than sampling. In our case, since the respondents are a few and are manageable; we opted to devise the census sampling technique.

Table 3-1- Study population and sample size

Branch	**No of respondents/Frequency**	**Proportion (%)**
Head Office	2	10%
Project 1	9	45%
Project 2	9	45%
Total	**20**	**100**

Source: Own survey (2024)

1.16 Data Collection Methods

1.16.1 Primary Data Collection

- **Surveys**: A structured questionnaire distributed to company managers, project coordinator, project managers, site engineers, and other relevant staff at Viva Engineering. The survey focused on:
    - Awareness of risk management practices.
    - Types of risks encountered (e.g., safety, financial, environmental).
    - Occurrence/frequencies of risks.
    - Impacts of risks on the project outcome.
- **Interviews**: Semi-structured interviews had been conducted with company manager and one of the project manager. These interviews explore:
    - Personal experience with risk management.

- Challenges faced in implementing risk strategies.
- Suggestions for improvement.

1.16.2 Secondary Data Collection

- **Document Analysis**: Review of existing project documentation, including:
  - Company policy
  - Risk management plans.
  - Project reports.
- **Literature Review**: Analysis of academic articles and industry reports on construction risk management practices to contextualize findings within broader industry trends.

1.17 Sampling Strategy

A census method employed to select participants who have direct experience with project risk management at Viva Engineering. The sample includes:

- Approximately 20 employees for surveys.
- Two key stakeholders for interviews.

1.18 Data Analysis Techniques

1.18.1 Qualitative Analysis

- **Thematic Analysis**: Interview responses were transcribed and analyzed thematically to identify common patterns and insights related to risk management practices.

1.18.2 Quantitative Analysis

- **Statistical Analysis**: Survey data is analyzed using statistical software to calculate descriptive statistics to determine relationships between risk management practices, impacts and project performance.

1.19 Reliability and validity

As Joppe M. (2000) noted, instrument validity refers to the capacity to accurately measure what is intended based on the study's objectives. This ensures that all relevant variables are included while irrelevant ones are excluded, guaranteeing that each variable is measured accurately.

To achieve this, a universally accepted sampling method was employed to obtain a representative population sample. Special attention was given to formulating objective and comprehensible questions, enabling employees to respond accurately based on their knowledge. Efforts were made to avoid vague or confusing language that could mislead employees while completing the questionnaires. The final version of the questionnaire was developed in close consultation with my advisor and subject matter experts. To address any ambiguous claims, similar questions were posed

to key informant participants for triangulation purposes. Additionally, secondary documentation was reviewed and personal interviews were made to verify the factual claims made by respondents.

1.20 Ethical Considerations

- Informed consent obtained from all participants before data collection.
- Confidentiality will be maintained by anonymizing responses.
- Participants will have the right to withdraw from the study at any time without any consequences.

1.21 Conclusion

This methodology aims to provide a structured approach to evaluating project risk management practices at Viva Engineering. By employing mixed methods for data collection and analysis, the study seeks to offer actionable recommendations for improving risk management strategies within the construction industry.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This session of the study deals with the analysis and interpretation of data collected from the questionnaire and interviews taken from/ filled by company employees and managers. Out of the 20 questioners distributed to targeted project employees, 19 were returned, and the analysis is conducted on those. For the analysis and interpretation, tables, graphs, and charts are used to foster ease of understanding.

The questionnaire has eight sections, which fall under four categories:

1. Demographic profile of the respondents, which comprises age, sex, work experience with the company and level of education of the respondents.
2. Project risk management practices of the company in the eye of the employees and managers. This part starts with a general risk management practice questions to the detailed once like Risk identification and registration, risk analysis, risk response preparation, risk control, monitoring with documentation, and reporting.
3. The third category of the questionnaire is questions incorporate types of risks undertaken in the project or sources of risks.
4. The last and fourth category is the impact of those risks in the project quality, cost and completion time.

The interview was a semi-structured interview aimed to triangulate the result comes from the questionnaire. The interview was done through telephone to the company manager and one of the project managers.

The interview systematically covers all questions raised in the questionnaire, tried to know how and what they know about risk management, what are the challenges facing implementing the risk management strategies and their understanding pratcing of risk management in the projects.

Generally, the interview has four parts,

1. Project risk management practice in the company/project
2. Challenges of implementation risk management and major risks faced
3. Impacts of risks on project performance
4. Recommendation and suggestions for improvement

4.1 Demographic Characteristics of Respondents

The demographic profiles of the questionnaire respondents who participated in the study, comprising of age, gender, level of education, and employee experience in the company, is shown in Table-2. Demographic details of questionnaire respondents showed that 18 of the 19 respondents (95%) were male and only one participant (5%) was female. The result shows that male participators dominate the sample respondents.

About 53% or 10 of the respondents from the total 19 respondents were in the 36-45 age group, and 26-35 years age group comprises 42% of the total respondents which is 8 out of 19 participators, only 5% or 1 respondent found to be less than 26 years old; showing the fact that projects are filled by a prime working age group.

Table 4.1 -Demographic characteristics of respondents by sex and gender

1. Sex/Gender

Sex	No. of respondents/Ferq	%
Male	18	95
Female	1	5

2. Age group

Age group	No. of respondents/Freq	%
<26	1	5
26-35	8	42
36-45	10	53
46-55	0	0
>56	0	0

Source: Own Survey (2024)

The above age group supported by the respondents held a range of educational qualifications between First Degree BSc and BA to MA/MSc Degree level. The largest number of respondents 17 (89%) are qualified with BA/BSc degree, followed by MA/MSc graduates with two (11%) while no respondents had a Diploma. These results of the respondents' level of education reveal again the employees are in the prime working group.

About 9 respondents from 19 (47%) of the participants had experience of 6-10 years in the company, 7 respondents (37%) had 1-5 years of experience, 2 respondents had experience of 11-15 years, and only one respondent had more than 16 years of experience in the company. This shows that the respondents have ambient experience with the company.

Table 4.2 Demographic characteristics of respondents by level of education and years of experience

3. Level of Education

Level	Number of respondents	%
Diploma	0	0
First Degree BA/BSc	17	89
MSc/MA and above	2	11

4. Years of Experience in the company

Years	Respondents/Freq	%
<1	0	0
1-5	7	37
6-10	9	47
11-15	2	11
>16	1	5

Source: Own survey (2024)

4.2 Project Risk Management Practices

This section shows and presents the general risk management practices in projects and the detailed practices of the project risk management process: project risk identification, risk analysis performance, risk response preparation and practices, risk monitoring and controlling, and risk documenting and reporting practices in projects.

4.2.1 General Risk management practices in the projects

The tables below show the general Risk management practices in the company in its projects. Eight questions were asked to respond, all related to general risk management practices in their perspective projects.

The questions can be classified into two “yes” or “no” questions and multiple-choice questions. The multiple-choice questions asked participants to rate the company's different project risk management

practices of the company in the project at five different rates as per the Likert scale, Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree.

For the first question, whether the company follows project risk management techniques in the project was asked their feeling and the response is more than a third of participants (36.84%) agreed. In contrast, the same number of participants, 7 out of 19, are indifferent or neutral. In contrast, a few respondents, three (15.79%) disagree and few respondents, two from the head office (who are leaders of the company) strongly agree and no body disagree. The result tells us that there is a practice of PRM techniques but still there is a much mile to go ahead and the two respondents' answer, from the head office, is worrisome, which signals they are delighted in their practices which may hinder future improvement.

The second question which respondents was asked to answer was a yes no answer about the presence of company guidelines/manual to direct the risk management practices. The majority, 84.21% (16 respondents), confirms the availability of the document while the rest are not sure the presence of it. This shows that even if there is no doubt the availability of the guideline or policy but a few, 3 respondents (15.79%), were not communicated its presence.

Table 4.3 Practice of risk management techniques

1. Viva has a practice of risk management techniques

	No. of respondents/Freq	%
Strongly Agree	2	10.53
Agree	7	36.84
Neutral	7	36.84
Disagree	3	15.79
Strongly Disagree	0	0

Source: Own Survey (2024)

Table 4.4 Policy or Guideline/Manual

2. There is a policy or guideline/manual in Viva to manage risk

	No. of respondents/Freq	%
Yes	16	84.21
No	0	0.00
I am not sure	3	15 .79

Source: Own Survey (2024)

The next question was about the availability of a risk management officer/team in the project. Seven respondents have no clue about its absence or availability while a significant number, 9 (47.37%), of participants, confirm the absence of a team or officer. Three (15.79%) responded that there is a team or officer responsible for risk management. It can be deduced from the above figures that there is no assigned person or team responsible for project risk management.

The fourth question was continual from the third question for those who answered "No". As seen from the above question 9 of the respondents answered "No", thus these participants were asked who is then responsible for in the absence of a risk officer. Seven (77.78%) of the respondents said the project manager is responsible for managing risks in the project, the rest, 22.22%, said the head office is responsible for the project risk management in the project.

Table 4.5 Risk management officer/team

3. There is risk management officer/team in the project

	No. Respondents/Freq	%
Yes	3	15.79
No	9	47.37
I am not sure	7	36.84

Source: Own survey (2024)

4. If your answer, for question no. 3, is No who is responsible in the absence of the officer/team?

	Frequency	%
Head Office	2	22.22
Project manager	7	77.78

Source: Own Survey (2024)

Respondents were asked in the fifth and sixth questions about the continuous practice of risk management throughout the project life cycle and the availability of RISK REGISTER at the project. A significant number of respondents, 42.11% (8 out of 19) agree with the continuous practice of project risk management throughout the project life cycle while more than a quarter of the total 19 participators (26.32%) disagree. Only two (10.53%) responders strongly agree about the said practice. In addition, four respondents are neutral. This result shows there need to be an improvement in practicing risk management in the projects until the 26.32 % disagreed and 21.05% indifferent respondents came to in the agree and strongly agree position.

All participants confirmed the availability of RISK REGISTER in the project, which is a positive sign that a risk management culture will be started and improved in future projects.

Table 4.6 Risk management undertaken continuously and risk register

5. Risk management is undertaken continuously throughout the project life cycle

	Number of respondents/Freq	%
Strongly Agree	2	10.53
Agree	8	42.11
Neutral	4	21.05
Disagree	5	26.32
Strongly Disagree	0	0.00

Source: Own survey (2024)

6. There is Risk Register in the project site

Column1	No. of respondents/Freq	%
Yes	19	100
No	0	0
I am not sure	0	0

Source: Own survey (2024)

The seventh question has a link to the third and fifth questions, which can be used as a litmus paper for the company's management regarding the degree to which project risk management has given attention by assigning a team and scope, which needs a fair resource allocation to execute the practice throughout the project life cycle. The result depicted that more than half of the respondents, 52%, believe there is no fair allocation of resources to manage risks in the project; only 15.79% of respondents agree with enough resource allocation and 31.58% of respondents feel neutral about resource allocations. Viva Engineering need to give attention to project risk allocation in future projects.

Table 4.7 Resource allocation and proper risk documentation

7. VIVA allocates enough resources for the risk management practices in the project

	No. of respondents/Freq	%
Strongly Agree	0	0
Agree	3	15.79
Neutral	6	31.58
Disagree	7	36.84
Strongly Disagree	3	15.79

Source: Own survey (2024)

The eighth question is the existence of good practice and culture of risk management in the projects, documenting risks in the project. We have seen the above sixth question that the company has Risk Register, but it has to be checked whether registered risks and newly identified risks are properly updated and documented which is an expression of good practice and company culture. As seen from the result in the table below 21.50% of participants witnessed the lack of proper documentation even though there is a risk register. However, nearly half, 47.37%, of participants believe there is an appropriate documentation of risks and nearly a third of respondents are neutral.

8. There is an appropriate risk documentation system in your project/Risks are documented

	No. of respondents/Freq	%
Strongly Agree	2	10.53
Agree	7	36.84
Neutral	6	31.58
Disagree	3	15.79
Strongly Disagree	1	5.26

Source: Own Survey (2024)

4.2.2 Risk Identification practices in the projects

Questions in this section are part of risk management practices, which are a continuity to the general risk management practices presented above. This part went through the details specific to risk identification.

Four questions were included to assess the company's project risk identification practice. The respondents' answers will be presented below.

The first question was related to the teams' role in identifying risks. The first thing in project risk management is identifying risks facing the project. To have successful risk management, the task force should start identifying possible risks; during this process to hit the target fruitfully, the identification work should participate, stakeholders, employees in the project, or teams need to have a key role in identifying risks. In this regard, the result shows here in the below table that the majority, 57.90%, gave positive feedback either "Strongly Agree" (15.79%) about the team's role in identifying risks or agreed, 42.11%, of them. About 26.32% of respondents "Disagree" which shows there are still respondents who are discontented with the participation of teams in identifying risks and the rest of the participators, 21.05%, are "Neutral". These numbers are not insignificant; the company has to make sure that all project employees should feel teams get the space to play a key role in identifying risks.

Table 4.8 Role of teams in identifying risks

1. All the teams play roles in identifying risks

	No. of respondents/Freq	%
Strongly Agree	3	15.79
Agree	8	42.11
Neutral	4	21.05
Disagree	5	26.32
Strongly Disagree	0	0.00

Source: Own Survey (2024)

Respondents were asked which methods, among those listed, were devised to identify risks in the projects. All of the respondents chose "**Document review**" was used then 89.47% said "**Information gathering**" also applied, the third method, 63.16%, used was "**Expert Judgment**". However, "**SWOT Analysis**" and "**Checklist Analysis**" methods were not applicable. It's valid to use methods like Document review, Information gathering and Expert Judgement, but it has to be diversified by including other methods like SWOT and Checklist analysis which would strengthen the other methods like after reviewing documents from past projects which were executed by the company or companies of similar business operators SWOT and checklist can be applied to strengthen identification of risks.

Table 4.9 Risk identification used methods and frequent encounter risks

2. What risk identification methods are used for the projects in VIVA

Methods	No. Respondents/Freq	%	Rank
Document Review	19	100	1
Information gathering	17	89.47	2
SWOT Analysis	0	0	4
Expert Judgment	12	63.16	3
Checklist Analysis	0	0	4

Source: Own survey (2024)

The last two questions presented to the respondents were the sources of risks most encountered during identification and whether they used a risk registry to record or document identified risks.

The respondents were given the option of choosing the possible sources of risks. All respondents encountered Financial and Technical risks when identifying risks, and 78.95% of participants encountered environmental risks. Thus, the company should give attention to financial and Technical risk resources in its future projects.

All the respondents confirmed identified risks recorded or documented in a **Risk Registry**.

3.Sources of risks/Identified risks usually encounter in the projects

Risk resources	No. of respondents/Freq	%
Financial	19	100
Technical	19	100
Environmental	15	78.95

Source: Own Survey (2024)

Table 4.10 Identified risks listed in the risk register

4. Does the company use a risk registry to list identified risks?

Column1	No. of respondents/Freq	%
Yes	19	100
No	0	0
I am not sure	0	0

Source: Own Survey (2024)

In conclusion, during risk identification, the company showed a positive stand in having a risk register and listing all risks in the register. Financial and technical risks are the major risk sources where the company has to give big attention to those risks originating from them, but it does not mean that the company should not give attention to other sources, instead during resource allocation, and other things bigger attention should got to those risk resources. The company also makes sure the teams play a key role during risk identification and need to work in diversifying risk identification methods.

4.2.3 Risk Analysis practices in the projects

In a project risk management practice procedure, after risks are identified, they must be analyzed so that all risks are treated differently. Risks with high occurrence and impact would be given appropriate attention and resources to handle. Risks with less occurrence, low impact, or unavoidable and out of capacity will be given less or no attention, either supervised closely or ignored at all.

At this stage of project risk management, we asked participants whether risks' characteristics are considered before being analyzed, whether measurements are available to analyze risks, whether documents are updated after the risk analysis process, and which methods are applied to analyze risks.

Table 4.11 Risk characteristics considered during analysis

1. Characteristics of risk are considered before analyzing the identified risk

Column1	No. of respondents/Freq	%
Strongly Agree	6	31.58
Agree	9	47.37
Neutral	4	21.05
Disagree	0	0
Strongly Disagree	0	0

Source: Own survey (2024)

2. There are measurements to analyze risk

Column1	No. of respondents/Freq	%
Strongly Agree	7	36.84
Agree	6	31.58
Neutral	6	31.58
Disagree	0	0
Strongly Disagree	0	0

Source: Own survey (2024)

3. What risk analysis methods are used for the projects

Methods	No. of respondents/Freq	%
Quantitative	16	84.21
Expert Judgment	12	63.16
Sensitivity analysis	3	15.79
Probability and Impact Matrix	6	31.58
Risk Categorization	18	94.74
Modeling	0	0

Source: Own survey (2024)

4. Project documents are updated after assessment of the risk that might occur

	No. of respondents/Freq	%
Strongly Agree	4	21.05
Agree	6	31.58
Neutral	9	47.37
Disagree	0	0
Strongly Disagree	0	0

Table 4.12 Measurements and methods used to analyze risks, risks updated after analysis

The results are shown in the above tables for those four questions asked to participants revealing that Viva is doing well in risk analysis.

More than 78% of respondents confirmed the consideration of characteristics of the risks either strongly agreed (31.58%) or agreed (47.37%). Even a single respondent neither disagreed nor agreed; only 21.08% were neutral. This shows Viva Engineering advised to keep up the good job.

The availability of measurements for analyzing identified risks results are shown in the above table approves the above result, 68.42% confirmed measurements availability and only 31.58% were neutral. Here again, Viva is doing well in using measurements while analyzing risks.

As shown in the third table of projects, different diversified analyzing methods are used except Modeling, which is recommended for future projects. 94.74% of respondents used Risk Categorizing methods followed by quantitative methods, which 84.21% of respondents used; third-ranked respondents, 63.16%, said the expert judgment method applied while only 31.58% of respondents said risk matrix affected risk-analyzing method used and only 15.79% respondents said sensitivity analyzing method used.

Once again, the author recommends keeping up and improving with a good job by including modeling to diversify the methods used for risk analysis.

4.2.4 Risk response plan practices in the projects

This stage comes after risks are analyzed; those risks, analyzed and listed based on their probability of occurrence and affected the project outcomes, are prioritized and gone to the next phase, i.e, **Risk Response** preparation.

Risk response plan is prepared for projects to reduce or eliminate threats and ensure a project's success; a risk response plan provides options for addressing risks, including contingency plans.

According to the above, this study asked respondents, which risk response methods listed below used in their perspective projects.

a) **Risk avoidance**: is when the project team acts to eliminate the threat or protect the project from its impact by removing the cause of the risk of executing the project in a different direction while still aiming to accomplish project objectives.

b) **Risk transfer**: involves shifting ownership of a threat to a third party to manage the risk and to bear the impact if the threat occurs.

c) **Risk mitigation**: action is taken to reduce the probability and/or impact of an adverse risk event to an acceptable threshold.

d) **Risk acceptance**: acknowledges the existence of a threat, but no proactive action is taken.

e**) Risk exploit**: The exploit strategy may be selected to capture the benefit associated with a particular opportunity by ensuring that it happens, increasing the probability of occurrence to 100%.

f) **Risk share**: allocate risk ownership of an opportunity to another party who is best able to maximize its probability of occurrence and increase the potential benefits if it does happen.

g) **Risk enhancement:** This strategy aims to alter the "size" of the positive risk. The opportunity is enhanced by increasing its probability and/or impact, thereby maximizing the project's benefits.

h) **Contingency Plan:** This involves using a fallback plan if a risk occurs.

The study shows in the below table Risk avoidance and risk acceptance are the universally used risk response plans; while risk exploit and risk share are the second most commonly used risk response plan with a staggering number of 68.42% each. Risk transfer is the third ranked response method used with 52.63% of respondent confirmed using the plan followed by Risk enhancement with 36.84% of respondent claimed used. Risk mitigation, 15.79%, and contingency plan, 10.53% with the low turnout number of respondent said used.

Figure 4-1 Risk responses used

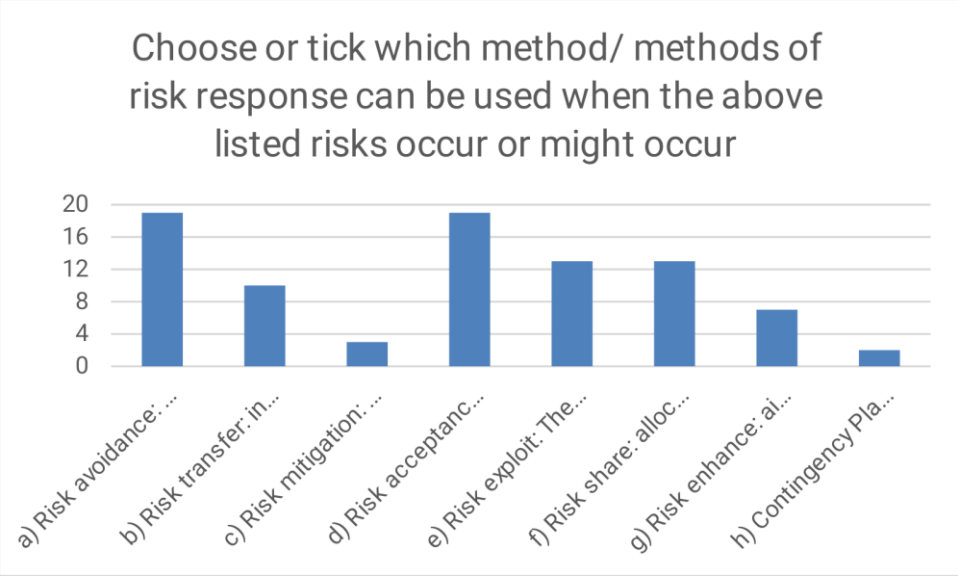


Table 4.13 Risk responses used

Responses	No. of respondents/Freq	%
a) Risk avoidance	19	100
b) Risk transfer	10	52.63
c) Risk mitigation	3	15.79
d) Risk Acceptance	19	100
e) Risk exploit	13	68.42
f) Risk share	13	68.42
g) Risk enhancement	7	36.84
h) Contingency Plan	2	10.53

Source: Own survey (2024)

The company should have a contingency plan as its risk response mechanism. It should also improve using risk enhancement, risk mitigation, and include them in its future projects.

4.2.5 Risk Monitoring and Control practices in the projects

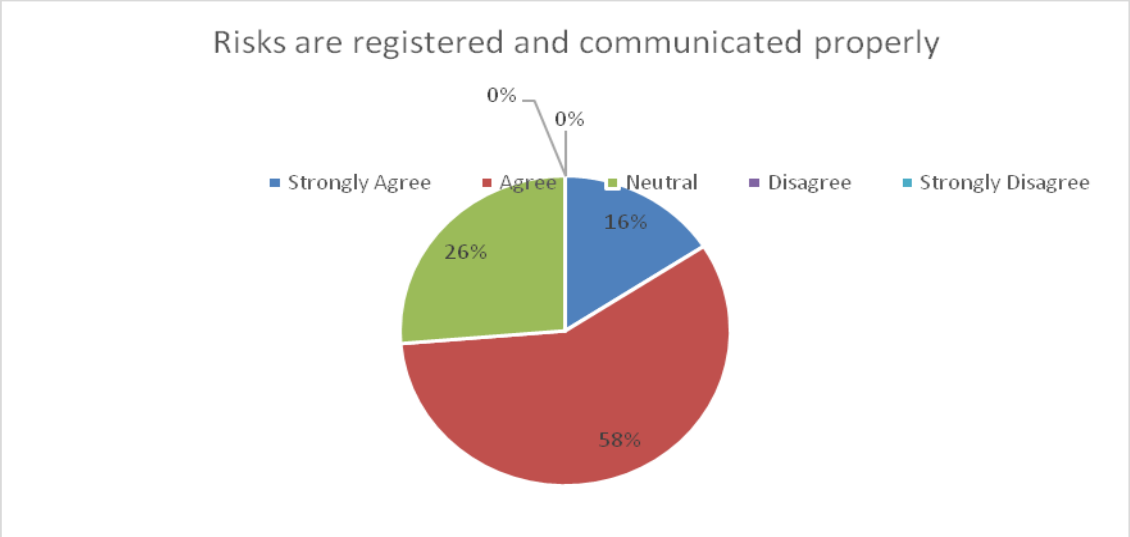
Those risk practice processes discussed and examined above are preparing for the last stage, i.e, to execute risk management called **Risk Control and Monitoring.**

Identified risks are analyzed based on the risk analysis risk response plan prepared for prioritized risks, and those responses and risks should be controlled and monitored.

Nine questions were included in the questionnaire to find out how risks were monitored and controlled in their projects. These questions encompass different aspects of risk control and monitoring practices.

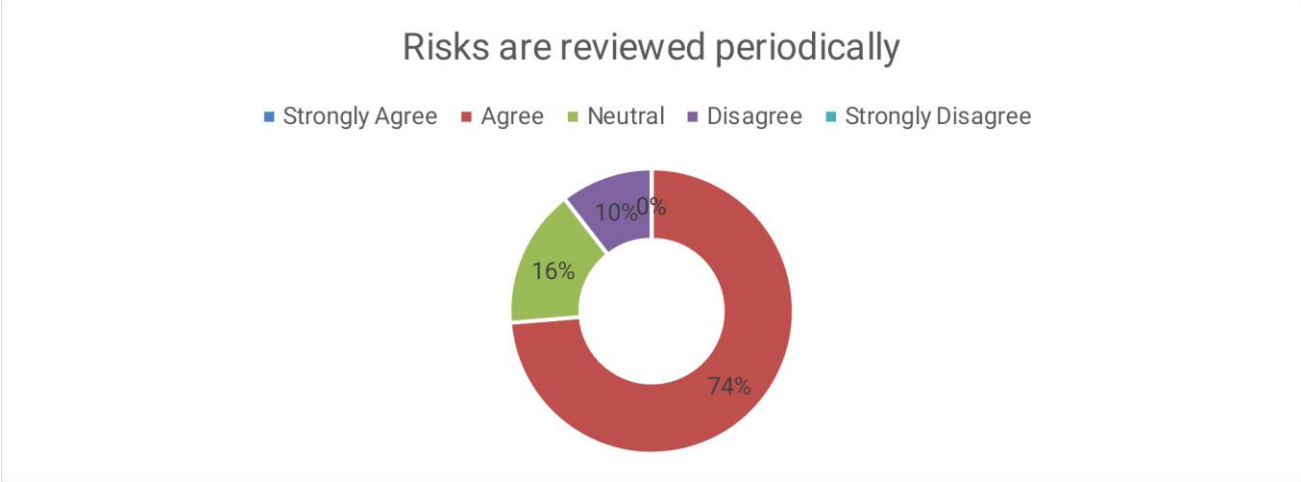
1. Risks are documented and communicated properly: This was the first question presented to the respondents. As seen from the pie chart below, most respondents, 58%, agreed and 16% of respondents strongly agreed that risks are documented and communicated properly, which means a total of 74% of respondents gave positive feedback. While about 26% of participants gave neutral feedback. From the result, it can conclude risks registered and communicated.

Figure 4.2 Pie chart Risks registered and communicated



Source: Own survey (2024)

Figure 4-3 Pie chart Risk reviewed periodically

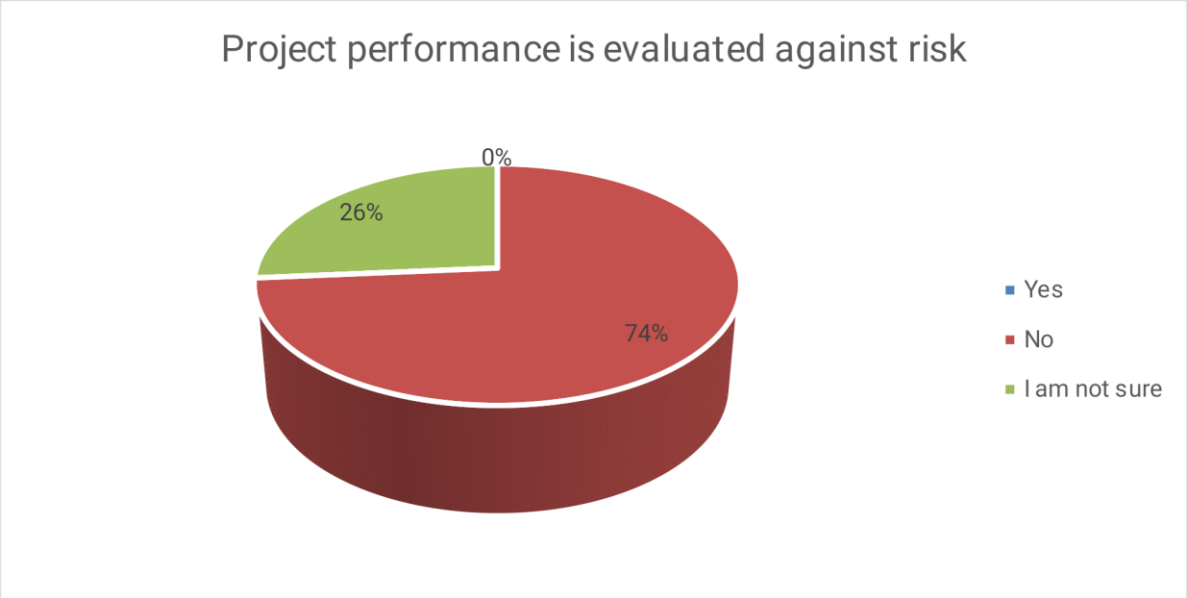


Source: Own survey (2024)

2. Risks reviewed periodically: One of the key day-to-day risk management tasks during monitoring and controlling is reviewing risks periodically. From the above pie chart, it can be seen that 74% of respondents agreed while 10% strongly agreed and only 16% are indifferent. It is an easy conclusion that risks are periodically reviewed. This paper suggests viva engineering to keep this progress.

3. Project performance is evaluated against risk:

Figure 4-4 Project performance evaluation and Risk



Source: Own survey (2024)

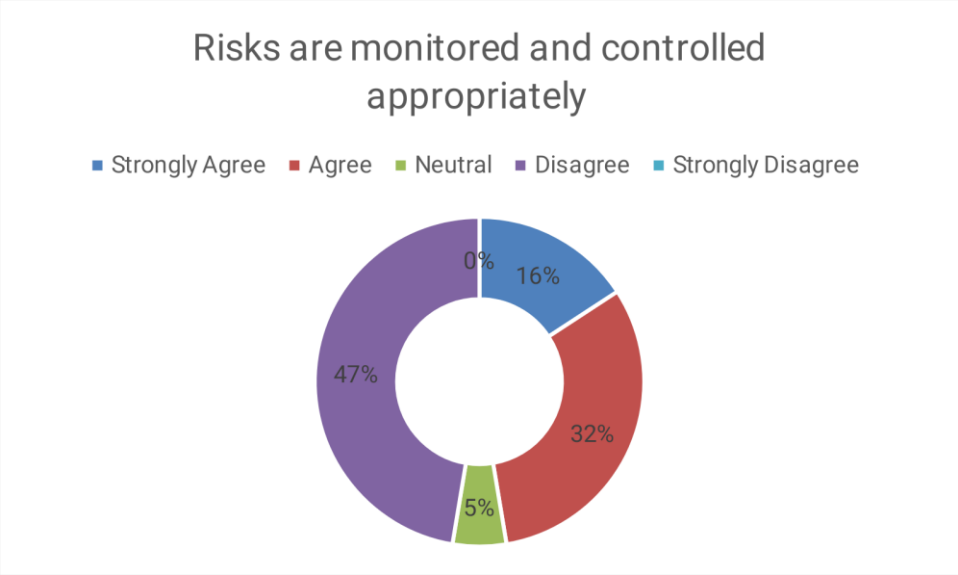
If a given company wants to be effective and successful in its project accomplishment, it should take risk management seriously and if it takes risk management seriously project risk management it should evaluate its project performance against risk.

The above chart displays the replies got from the questionnaire of respondents; 74% said project performance never evaluated against risk while the rest have no clue.

Boldly the result tells us that the company does not take project risk management seriously. This paper want to advise it is a wise decision to evaluate their project performance against risk otherwise it a futile wish to complete a project on time, with the standard quality and under intended cost.

4. Risks are Monitored and Controlled appropriately:

Figure 4-5 Pie chart Risk monitor and Control



Source: Own survey (2024)

As shown from the chart, respondents don't believe that risks are not monitored and controlled properly, which approves the above conclusion: The company doesn't take risk management seriously since monitoring and controlling risks is the main task of project risk management. Once again, the study suggests thinking twice about risk handling, which has a big impact on the project's outcome.

5. The project monitors, controls and reviews the process for risk management to ensure that it complies with standards and procedures:

The result of this question slightly contradicts the above results, where we concluded the company does not take the PRM seriously. However, here we have already been informed that, at the general risk management practices section, the company has policy, guidelines/procedures of PRM; thus, the respondents must have looked the practice of comparing and controlling of the risk management with its standards and procedure documents.

Table 4.14 Information available in the project used to supplement control risk

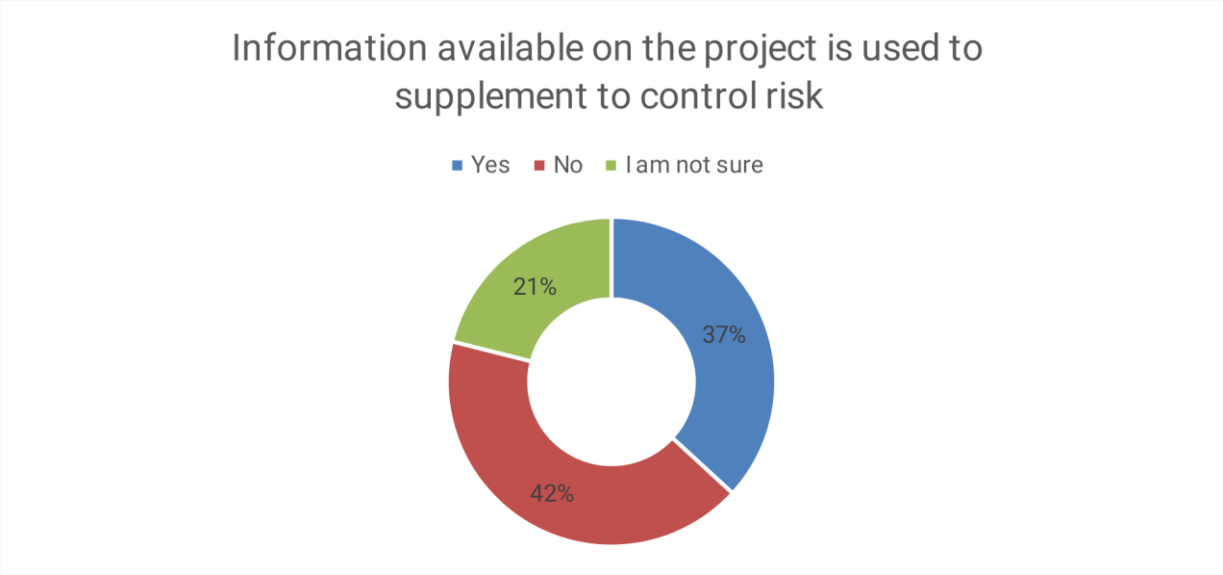
6. Information available in the project is used to supplement to control risk:

Column1	No. of Respondents/Freq	%
Strongly Agree	0	0
Agree	11	57.89
Neutral	3	15.79
Disagree	5	26.32
Strongly Disagree	0	0

Source: Own survey (2024)

Respondents to this question give a mixed signal, 42% said not used the other 37% said, yes information available in the project used to supplement to control risks; the rest 21% had no clue. Here it can be easily observed communication gap. Control risk is a continuous action, which needs to be updated based on the available information in the project for control enhancement.

Figure 4-6 Available information used to supplement project control



Source: Own survey (2024)

7. Risks that occur within the project are controlled in a way that goes with the goal and objective of the project:

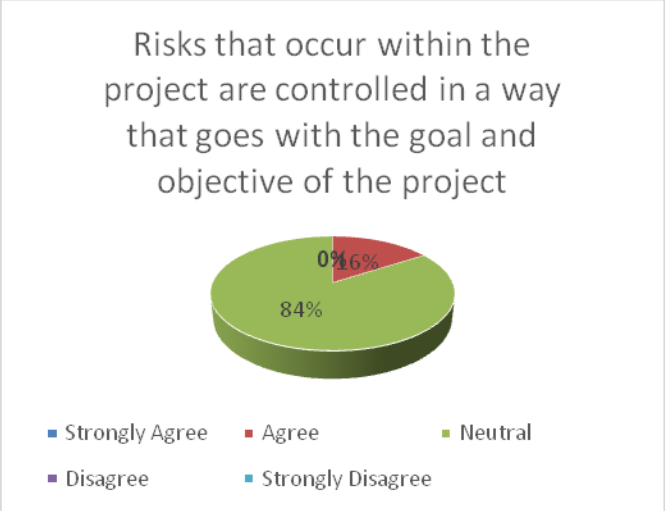
The result displayed in the table below exhibits 84.21% of respondents were not sure if risks controlled in the way goes with the goal and objective of the project, perhaps the figure includes

some top management of the projects; this demonstrates the need for awareness. Only around 16% agree with the statement.

Table 4.15 Risk control and project goal and objective

Column1	No. of respondents/Freq	%
Strongly Agree	0	0
Agree	3	15.79
Neutral	16	84.21
Disagree	0	0
Strongly Disagree	0	0

Source: Own survey (2024)



Reports prepared at the end:

Respondents may find this question confusing, as both projects where participators were working were ongoing. The question is intended for those who had experience within the company; it is an experience question. Only three respondents (15.79%) said yes, and the rest 16 respondents (84.21%) replied not sure. The "yes" respondents, for sure, are managers.

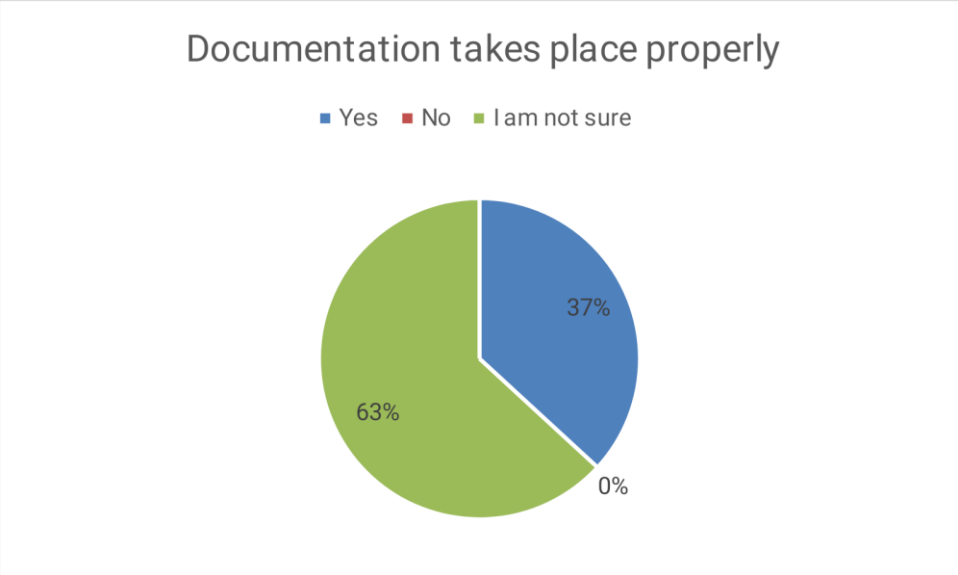
Source: Own survey (2024)

Figure 4-7 Reports prepared

8. Documentation takes place properly:

Documentation comes after all PRM practices takes place; this documentation may be used in the project itself or as an archive for future projects reference.

Figure 4-8 Risk documentation



Source: Own survey (2024)

As seen above from the pie chart the majority of respondents are not sure, it can be guessed that some had to wait until the end of the project to answer or some were not aware due to their responsibility difference. 37% of respondents said documentation takes place properly.

We conclude that the second part of the questionnaire concerns risk management practice, starting with general risk practice and then risk identification, risk analysis, risk response plan, and risk monitoring and control. As seen from the above responses, each practice is way behind normal or standard practices. The company need to improve its risk practice in every stage of risk management. We will see in the after coming sections what would look like the impact of poor practice.

First, we would see which risks were under taken in the projects.

4.3 Major Risks Undertaken at the Projects

The table below presented list of sources of risks and their probability occurrence in the project collected from questioner respondents'.

Table 4.16 Major risks undertaken

What are the major sources of risks in VIVA projects? Please identify from the list and rank their probability of occurrence.											
Probability of occurrence (1 indicates=0%(no present), 2 indicates= 1-10% (rare), 3 indicates=10-50% (possible), 4 indicates= 50-90% (likely), 5 indicates= 90-100% (Almost certain to certain)											
Sources of risk	1	%	2	%	3	%	4	%	5	%	Rank
	Freq		Freq		Freq		Freq		Freq		
Technical risk	0	0.00	0	0.00	0	0.00	6	31.58	13	68.42	5
Construction risk	0	0.00	0	0.00	0	0.00	4	21.05	15	78.95	4
Physical risk	1	5.26	2	10.53	4	21.05	12	63.16	0	0.00	10
Organizational risk	5	26.32	6	31.58	4	21.05	3	15.79	1	5.26	11
Financial risk	0	0.00	0	0.00	0	0.00	0	0.00	19	100.00	1
Socio-Political risk	0	0.00	0	0.00	0	0.00	2	10.53	17	89.47	3
Environmental risk	5	26.32	7	36.84	4	21.05	2	10.53	1	5.26	9
Design risk	0	0.00	1	5.26	4	21.05	11	57.89	3	15.79	6
Legal risk	1	5.26	3	15.79	10	52.63	3	15.79	1	5.26	8
Material risk	0	0.00	3	15.79	9	47.37	5	26.32	2	10.53	7
Right of way risk	0	0.00	0	0.00	0	0.00	1	5.26	18	94.74	2

Source: Own survey (2024)

In the two projects, according to analysis from respondents, financial risk outstripped the other 11 sources of risk, which means it is imminent. Right-of-way risks followed, followed by Socio-Political risks. Construction risk is the fourth ranked followed by technical risk then Design risk comes as a sixth rank. The rest come as follows from seventh to eleventh consecutively Material risk, Legal risk, Environmental risk, physical risk and Organizational risk.

Based on the outcomes of respondents' analysis the projects shall give attentions and follow closely to risks those would happen certainly like financial risks, Right of way risks, Socio-political risks, Technical and construction risks.

4.4 Impacts of PRM on the Project's Quality, Cost and Time Completion

This section analysis collected respondents' answers from the questionnaire about impacts of risks to the main project performance, quality, cost and time.

4.4.1 Impact on Project Quality

Table 4.17 Risks Impact on Project Quality

From your experience please indicate the impact of risks on Quality: (1 indicates Very Low, 2 indicates Low, 3 indicates Medium, 4 indicates High and 5 indicates Very High)											
Risks	**1**	%	**2**	%	**3**	%	**4**	%	**5**	%	**Rank**
	Freq		Freq		Freq		Freq		Freq		
Technical risk	0	0.00	0	0.00	0	0.00	5	26.32	14	73.68	4
Construction risk	0	0.00	0	0.00	0	0.00	1	5.26	18	94.74	2
Physical risk	0	0.00	3	15.79	6	31.58	10	52.63	0	0.00	8
Organizational risk	4	21.05	3	15.79	4	21.05	6	31.58	2	10.53	7
Financial risk	0	0.00	0	0.00	0	0.00	0	0.00	19	100.00	1
Socio-Political risk	0	0.00	0	0.00	0	0.00	2	10.53	17	89.47	3
Environmental risk	3	15.79	4	21.05	8	42.11	2	10.53	2	10.53	9
Design risk	0	0.00	0	0.00	2	10.53	5	26.32	12	63.16	6
Legal risk	5	26.32	7	36.84	4	21.05	3	15.79	0	0.00	10
Material risk	0	0.00	0	0.00	1	5.26	4	21.05	14	73.68	5
Right of way risk	8	42.11	6	31.58	5	26.32	0	0.00	0	0.00	11

Source: Own survey (2024)

As seen from the table analysis, the findings regarding the impact of various risks on project quality, financial and construction risks were marked as the most significant, with 100% and 94.74% of respondents indicating a very high impact, respectively. Next to the above-mentioned risks, Socio-political, technical, and material risks were also noted to have a considerably very high impact, with 89.47%, 73.68%, and 73.68%, of respondents respectively. In contrast, Environmental, Legal and Right of way risks received lower scores. The results underscore financial, and construction risks are the primary factors affecting project quality, while Socio-political, technical, and material risks also play a significant role. In contrary, Environmental, Legal, right of way, and physical risks have a relatively minor impact on project quality.

4.4.2 Impact on Project Cost

Table 4.18 Risks Impact on Project Cost

From your experience, please indicate the impact of risks on Cost:

(1 indicates Very Low, 2 indicates Low, 3 indicates Medium, 4 indicates High and 5 indicates Very High)											
Risk Sources	**1**		**2**		**3**		**4**		**5**		**Rank**
	Freq	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	**Freq**	**%**	
Technical risk	0	0.00	0	0.00	1	5.26	6	31.58	12	63.16	7
Construction risk	0	0.00	0	0.00	0	0.00	1	5.26	18	94.74	2
Physical risk	2	10.53	6	31.58	6	31.58	5	26.32	0	0.00	11
Organizational risk	2	10.53	3	15.79	6	31.58	5	26.32	3	15.79	8
Financial risk	0	0.00	0	0.00	0	0.00	0	0.00	19	100.00	1
Socio-Political risk	0	0.00	0	0.00	2	10.53	3	15.79	14	73.68	4
Environmental risk	3	15.79	4	21.05	9	47.37	1	5.26	2	10.53	10
Design risk	0	0.00	0	0.00	3	15.79	3	15.79	13	68.42	6
Legal risk	3	15.79	7	36.84	4	21.05	3	15.79	2	10.53	9
Material risk	0	0.00	0	0.00	1	5.26	5	26.32	13	68.42	5
Right of way risk	0	0.00	0	0.00	1	5.26	3	15.79	15	78.95	3

Source: Own survey (2024)

The findings indicate that, referring to the above table, financial, construction, and right-of-way risks were the primary factors identified as having a significantly very high impact on project costs, with 100%, 94.74%, and 78.95%, of respondents confirmed respectively. Additionally, Right-of-way, Socio-political, and material risks were also noted to have a considerable impact, with very high scores of 78.95%, 73.68%, and 68.42%, respectively. Comparatively, Legal, environmental, and physical risks possessed lower ratings. Overall, the results highlight that financial, construction, and Right-of-way risks were rated the most critical risk factors affecting project costs gravely, while socio-political, material, and Design risks also contribute to a notable extent impact on cost of the project. In contrary, Legal, environmental, and physical risks had a comparative minor influence on the project costs.

4.4.3 Impact on Project completion time

Below is presented an analysis result of a collected data from the questionnaire respondents about the impact of risks on the completion time of the project.

Table 4.19 Risks Impact on Project Completion Time

From your experience please indicate the impact of risks on Time:											
(1 indicates Very Low, 2 indicates Low, 3 indicates Medium, 4 indicates High and 5 indicates Very High)											
Risk Sources	**1**	**12**	**2**	**22**	**3**	**32**	**4**	**42**	**5**	**53**	**Rank**
	Freq		**Freq**		**Freq**		**Freq**		**Freq**		
Technical risk	0	0.00	0	0.00	1	5.26	4	21.05	14	73.68	4
Construction risk	0	0.00	0	0.00	1	5.26	2	10.53	16	84.21	2
Physical risk	4	21.05	7	36.84	5	26.32	3	15.79	0	0.00	11
Organizational risk	3	15.79	5	26.32	5	26.32	6	31.58	0	0.00	10
Financial risk	0	0.00	0	0.00	0	0.00	0	0.00	19	100.00	1
Socio-Political risk	0	0.00	0	0.00	2	10.53	3	15.79	14	73.68	5
Environmental risk	3	15.79	4	21.05	9	47.37	1	5.26	2	10.53	9
Design risk	0	0.00	0	0.00	3	15.79	3	15.79	13	68.42	7
Legal risk	3	15.79	7	36.84	4	21.05	3	15.79	2	10.53	8
Material risk	0	0.00	0	0.00	1	5.26	5	26.32	13	68.42	6
Right of way risk	0	0.00	0	0.00	1	5.26	3	15.79	15	78.95	3

Source: Own survey (2024)

According to the responses gathered from the distributed questionnaire, financial risks were identified as the most significant risk factor affecting project timelines, reported by 100% of the respondents. Additionally, construction risks, right-of-way risks, technical risks, and Socio-political risks were noted to have a high impact on project timelines, with 84.21%, 78.95%, 73.68%, and 73.68%, respectively. In contrast, Environmental, Organizational and physical risks were associated with a lower impact on project time. The analysis indicates that financial risks are the primary concern regarding their effect on project timelines. Furthermore, construction risks, right-of-way risks, technical risks, and Socio-political risks also present a relatively high impact on project completion time, while physical risks have a minor effect on project time

4.5 Results from Discussion of the Interview

The interview result was analyzed with four themes, which would be used to triangulate quantitative results from questionnaires.

Theme 1: Risk management practice at the company/project:

Both the company manager and the project manager interview reveals that the project risk management practice is not up to the expected or the standard stipulated in the company risk management policy. The difference between the interviewees is the company manager spoke from the company view while the later talked in accordance to the project he is responsible.

The project manager said, “I acknowledge that we give less attention to risk management compared to other project management body of knowledge”

The company manager confirms the project manager’s view “We always pledged to give attention to risk management during at the early phase of a project but soon when the project reached at the commencement stage subtly but surely sleeps away all attention from PRM to other project management areas which appeared to cost us more”. “But never directed project leaders to abandon risk management, the trick is any resource allocated by head office the project managers would defect it to other area where they think more important to enhance the project performance. And there is misunderstanding those HSE officers with risk officers.”

In conclusion, the study finds the qualitative result supports the view of questionnaire respondents.

Theme 2: Major risks undertaken by the projects:

The interviewees confirmed financial risk sources are the leading risks undertaken by the projects and the company more specifically, payment delays, construction price inflation, currency devaluation and availability of bank/finance loans.

Other risks mentioned next to finance are construction risks (starting from tendering to skilled labor, construction material quality and availability), Socio-political risks (riots, violence, ethnic and religion conflicts, war and other related risks), right of way (unwillingness of property owners and farmland owners to give clearance for construction), Material risks (Machinery availability, construction material availability,) and design risks.

“Socio-political risks used to be less probable occurrence but for the last five or six years this risk becomes the most imminent and costly risks which the company gives number one risks that would inflict the impact to other risks like financial and material risks.” Said the company manager. The project manager agreed to the point by adding “...which makes it difficult to find qualified work force and machinery to deploy at site out of the capital city contrary to most project sites are in rural areas where places are prone to conflicts”.

Qualitative results support quantitative analysis where financial risks are the most common, except here at the top company/project leaders see socio-political risk comes to the second while in quantitative analysis right of way ranks second. Interviewees blamed socio-political risk has a precarious effect on other risks like financial and right of way.

Theme 3: Risks impact on the project performance; quality, cost and time:

Both interviewees revealed that financial risk is the leading in affecting the project quality, cost, and completion time; whereas socio-political risk is the second followed by right of way to time and cost but for quality material and construction have much more impact than right of way.

More or less the study finds out the qualitative analysis complied the quantitative findings.

Theme 4: Way looking forward:

As leaders of the project/company, interviewees were asked to suggest what to improve.

The company manager confessed the lack of awareness and knowledge in the area; and suggested on job trainings and awareness sessions needed for those who are involved in decision-making and execution both in the head office and project level. Moreover, as PRM is one of the project management bodies of knowledge area, there should be a serious engagement owning to its grave consequences on project outcomes and performance.

The project manager suggests the initiative should come from the head office as resources and major directives come from. Having company guidelines is a good to start but needs a serious attention and awareness.

Discussion: It is notable from both interviewees, the company manager, and the project manager that the project risk management practice is not up to the expected or the standard stipulated in the company risk management policy which is aligned to the result from the questionnaire.

The major risk undertaking defined by the questionnaire participants are cognizant of the interviewees; financial risks being the first followed by construction and socio-political risks.

Results from both the questionnaire and interview reveal the impact of those risks (Finance, construction, Socio-political, Right-of-way, etc) impacts the project quality, cost and time seriously.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The study evaluated how Viva Engineering manages project risks in two of its road construction projects. The main goal, outlined in section 1.3 of the introduction, was to examine their current project risk management practices. To achieve this, the research looked at how risks are identified, analyzed, monitored, and controlled. It also aimed to identify the major types of risks and rank them based on their likelihood of occurring and their potential impact on project quality, cost, and timeline. The study utilized literature review, project reports, and closed-ended questionnaires to gather the necessary information. The data collected from the

In conclusion, the data gathered from the respondents were analyzed and interpreted, with the key findings summarized in a manner that addresses the objectives of the study. Based on this analysis, the following conclusions can be drawn:

5.1 Summary of Key Findings and Conclusions

The data collected from the questionnaire and interview analyzed in chapter 4, was set in accordance and pursuant to the objective, to be specific, the specific objective of the study, section 1.3, to answer the research questions posed on section 1.4. There were four objectives to answer three research questions. Below are the key findings based on the first three objectives of the study and research questions the last objective is the last section of this chapter, recommendation:

5.1.1 Key findings and conclusion on risk management practice of the company

This study finds and concludes from the analyzed data of the current or existing project risk management practices of the company in its two-road construction projects through examining its general practices, risk identification, risk analysis, risk response preparation and its risk monitoring and control performance the following:

- The company has guidelines/policy that risk management of the project to be directed and guided.
- The study also finds out that there is no assigned responsible department or team/official for risk management at both projects.
- The study shows there is risk register in the projects and all identified risks registered.

- Teams' role in identifying risks is not satisfactory.
- Risk identification methods are not diversified; document review, information gathering and expert judgment are the only methods used.
- Risk analysis had been done after considering characteristics of risks and measurement used during analysis. Most analyzing methods applied but modeling. In addition, documents often updated after analysis.
- Risk avoidance and acceptance used more often while risk exploit and share were the next risk response. Risk mitigation and contingency planning are the low turnouts.
- Monitoring and controlling of risks is not up to expectation.

To summarize, the study concludes Risk identification, analysis, respond planning and monitoring & controlling performance is too low for the standard and to company policy with low performance by judging from the result can be seen above.

5.1.2 Key findings and conclusions on major risks under taken at the projects

In the two projects, according to the study's findings:

- Financial risk outstripped all sources of risk, which means it is imminent.
- Right-of-way risks is the second risk resource, followed by Socio-Political risks.
- Construction risk is the fourth ranked followed by technical risk then Design risk comes as a sixth rank.
- Material, Legal, Environmental, physical and Organizational risks are the least risks among major risks undertaken in the projects as the study finds out ranked from 7^{th} to 11^{th} consecutively.

5.1.3 Impacts of PRM on the Project's Quality, Cost and Time Completion

The following findings and conclusions drawn from the study impacts on the project performance:

- Financial, Construction, and Socio-political risks are the first three risks that severely affected the project's quality.
- Technical, material, design, physical and organizational risks are the second group of risks that affect the quality of the projects while right of way, legal and environment risks have less impact than other risks mentioned above.
- Cost of the projects harshly wedged by financial, construction, and right of way risks followed by socio-political, material, design, technical and organizational risks.
- Legal, Environmental, and physical risks are risks with the least affected the project cost.

- Again, here financial risk affected the project completion time severely followed by Construction, right of way, Technical, Socio-political, Material and Design risks consecutively.
- Environmental, organizational and physical risks affect the project completion time less.
- Financial risk is the only risk that affected the project performance imminently while construction, material, and right of way risks impact projects ranked in the top four at least in the two of the project performance.
- Organizational, physical, legal and environmental risks impact is less in overall project performance.

Generally, the study finds out and concludes the risk management practices of viva engineering is beyond far from the expectation. Financial risk is the most frequent encounter and severely affected the project performance.

5.2 Recommendation

Based on the study findings and conclusions above, the researcher recommends the following in order bring the gaps on project riskmanagement practices and improve its performance in future projects.

- The company advised checking and working on company culture to make sure the risk management practice is inherited in future projects culture.
- The author recommends that the company should make sure the teams play a key role during risk identification and need to work in diversifying risk identification methods.
- The company shall assign a responsible body, officer/team or department in the organization and in the projects to make sure that risk management is practiced at the level of expectation in accordance to the policy, guidelines/procedures of the project risk management document.
- While keeping up the good practice like considering characteristics of risks and measurement used during analysis and updating documents often after analysis, the study also recommends the company need to improve analyzing methods applied to include modeling.
- The company should have a contingency plan as a risk response during project risk response planning also; risk mitigation should be included in its risk response plan.
- The study recommends continuous monitoring and controlling risks throughout the

project life cycle and risk management process and there should be periodical review of risks and communicated properly reviews and other process of the risk management process to the projects' team and other stakeholders. In addition, performance of the project must be evaluated against the risk management practice.

- The projects/company should give great attention and follow closely to financial, Right of way, Socio-political, Technical and construction risks, as these are the risks with high certainty to occur and have great impact on the project quality, cost, and completion time. However, it does not mean that the company should not give attention to other sources, instead during resource allocation, and other things, s substantial attention should go to those risks with high probability of occurrence and significant impact the project quality, cost and completion time.

5.3 Suggestions for future research

The author believed that the study covers range of project risk management and its process at **Viva Engineering Company** at its two of projects of road construction; the author gives the following suggestion:

- Details of risks not studied would have been studied as financial risk is by itself a source of risk, which has many risks under it.
- However, this study aimed to find out the practices of risk management of the company, identifying types of risks undertaken and their impact on the project performance it can be studied detailed of the impact risk by risk.
- Comparative study is recommended in future studies with other similar private companies within any construction or the same similar road construction to come to a firm conclusion.

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Appendix

St. Mary's University

School of Graduate Studies

Assessment of Project Risk Management Practices at Viva Engineering

Dear respondent,

My name is Ybeltal Kere Gebrameskel; I am Post Graduate student in Project Management at St. Mary's University. As part of my MA requirement, I am doing project work entitled: "Assessment of Project Risk Management Practices at Viva Engineering."

I kindly request you to participate in this research work by completing the posted questionnaire @telegram. In order to ensure that all information will remain confidential please do not include your name in the questionnaire. I also sincerely request you to respond to the questions as honestly as possible and your respond will appear automatically at telegram.

Your willingness and cooperation in giving reliable information is well appreciated and the information you provide will be used for academic purpose and will be kept strictly confidential.

Knowing that your time is valuable please, take few minutes of your time to complete the questionnaire.

For your responses via telegram and for any questions contact me via WhatsApp and telegram @ +251-911560308.

Thank you in advance for your cooperation.

With regards Ybeltal Kere

N.B Please mark one of the alternative choices that would describe you best:

PART I – Demographic Information:

1. Sex

Male Female

2. Age

25-35 36-45 46-55 56-65

3. Level of Education

Diploma Degree MA/MsC PhD

4. Year of Experience in Viva

<1 2-5 6-10 11-15 >15

PART II Risk management practices

1. Viva has a practice of risk management techniques

Strongly Agree Agree Neutral Disagree Strongly Disagree

2. There is policy or guideline/manual in VIVA to manage risk

Strongly Agree Agree Neutral Disagree Strongly Disagree

3. There is risk management department responsible for project risk management @Viva

Strongly Agree Agree Neutral Disagree Strongly Disagree

4. If your answer for question number 3 is disagree or strongly disagree who is responsible?

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5. There is risk management officer/team in VIVA

Strongly Agree Agree Neutral Disagree Strongly Disagree

6. Risk management is undertaken continuously throughout the project work

Strongly Agree Agree Neutral Disagree Strongly Disagree

7. VIVA and its projects have a risk register

Strongly Agree Agree Neutral Disagree Strongly Disagree

8. VIVA allocates enough resources for the risk management practices Strongly

Agree Agree Neutral Disagree Strongly Disagree

9. There is an appropriate documentation system in projects

Strongly Agree Agree Neutral Disagree Strongly Disagree

PART III Risk identification

1. All the teams play roles on identifying risks

Strongly Agree Agree Neutral Disagree Strongly Disagree

2. What risk identification methods are used for the projects in VIVA?

Document review

Information gatheringSWOT

analysis Expert judgment

Checklist analysis Other

please specify

3. Sources of risks usually encounters in projects

Financial

Technical Environmental

Other please specify

Part IV Risk Analysis

1. Characteristics of risk are considered before analyzing the identified risk Strongly

Agree Agree Neutral Disagree Strongly Disagree

2. There is a measurement to analyze risk

Strongly Agree Agree Neutral Disagree Strongly Disagree

3. Project documents are updated after assessment of the risk that might occur

Strongly Agree Agree Neutral Disagree Strongly Disagree

4. What risk analysis methods are used for the projects in VIVA?

Quantitative risk analysisExpert
judgment Sensitivity analysis
Probability and impact matrixRisk
categorization
Modeling

Risk urgency assessment

Other please specify

Part V Monitoring and Control

1. Risks are registered and communicated properly

Strongly Agree Agree Neutral Disagree Strongly Disagree

2. Risks are reviewed periodically

Strongly Agree Agree Neutral Disagree Strongly Disagree

3. Project performance is evaluated against risk

Strongly Agree Agree Neutral Disagree Strongly Disagree

4. Risks are monitored and controlled appropriately

Strongly Agree Agree Neutral Disagree Strongly Disagree

5. The project monitor, control and review the process for risk management to ensure thatit complies with standards and procedures

Strongly Agree Agree Neutral Disagree Strongly Disagree

6. Information available on the project is used to supplement to control risk Strongly

Agree Agree Neutral Disagree Strongly Disagree

7. Risks that occur within the project are controlled in a way that goes with the goal and objective of the project

Strongly Agree Agree Neutral Disagree Strongly Disagree

Part VI Major Risks undertaken in VIVA

(1 indicates = 0% (no present), 2 indicates 1-10% (rare), 3 indicate 10%-50% (possible), 4 indicates 50%-90% (Likely), 5 indicates 90%-100% (Almost certain to certain).

1. What are the major sources of risks in VIVA projects? Please identify from the list andrank their probability of occurrence

Probability of occurrence

1 2 3 4 5

a. Technical risk
b. Construction risk
c. Physical risk
d. Organizational risk
e. Financial risk
f. Socio political risk
g. Environmental risk
h. Design risk
i. legal risk
j. material risk
k. Right of way risk
l. Other please specify

From your experience please indicate the impact of risks on cost time and quality (1 indicatesVery Low, 2 indicates Low, 3 indicates Medium, 4 indicates High and 5 indicates Very High)

	Impact of risk on project														
	Quality					Cost					Time				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
a. Technical risk															
b. Construction risk															
c. Physical risk															
d. Organizational risk															
e. Financial risk															
f. Socio political risk															
g. Environmental risk															
h. Design risk															
i. Legal risk															
j. Material risk															
k. Right of way risk															
l. Others please specify															

Interview Questions:

This interview aims to understand the risk project management practices and challenges in Viva Engineering Company. The interviewees are the company manager and project managers

A) Risk Management Practice

1. What is risk management for you?
2. What is good PRM practice?
3. How do you rate your company/project practice?
4. Discuss risk management process from identification to controlling and monitoring by relating to the road construction projects going on at your company/project.

B) Major risks undertaken

1. Which risks are the most likely to happen and undertaken and why?

C) Risks Impact on project performance

1. Which risks have a greater impact on quality of the project
2. Which risks impact cost harshly?
3. Which risks impact time?

D) Challenges facing implementing PRM strategies and recommendation to improve PRM practice

1. What challenges do you face during implementing PRM?
2. What do you want to improve for better PRM practice?