The exploration of the influence of risk management on the success of construction projects

A research submitted in partial fulfilment of the requirements for the degree of MBA

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DECLARATION

I Bokang Sithole declare that:

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Acknowledgements

I would like to show my gratitude and appreciation for my research supervisor/advisor, Dr Tony Ngwenya for his positive and approachable attitude and professionalism towards the progression of the thesis. I am grateful for his unfailing support, motivation and always available to assist. I truly wouldn't have made it this far without your helpful insight.

I would also like to thank:

- God, who has been the pillar and strength in my life. I extend my deepest gratitude to the Almighty for His unwavering guidance and grace throughout this academic journey.
- My Naledi for being an angel throughout my pregnancy which ran parallel to this dissertation and for coming out alive and healthy.
- My family, especially my sister Itumeleng for the constant emotional support and prayers in my times of need.
- Myself, for always seeking to better myself and broaden my knowledge.

Abstract

This dissertation explores the influence of risk management on the success of construction projects. The construction industry is inherently risky, with various uncertainties and challenges that can impact project outcomes. Effective risk management practices have been recognized as critical factors for achieving project success and minimizing adverse consequences. The objective is to gain a comprehensive understanding of how effective risk management practices contribute to project success in the construction industry. The study adopts a qualitative research approach, utilizing interviews as the primary method of data collection.

The research is situated within the context of the construction industry in Kwazulu Natal South Africa looking at Raubex KZN. The Raubex KZN company is known for its rapid urbanization and diverse range of construction projects, especially in roadworks, providing an ideal setting to examine the interplay between risk management and project outcomes. Semi-structured interviews were conducted with a purposive sample of key stakeholders involved in construction projects within Raubex KZN. The sample size of 12 participants represents various roles, including project managers, construction managers, quality managers, health and safety officers and site engineers, ensuring a comprehensive exploration of risk management practices and their influence on project success. Through the qualitative analysis of interview data, themes and patterns emerged regarding the role of risk management in construction projects. The findings shed light on the strategies, processes, and challenges associated with risk identification, assessment, mitigation, and monitoring. Furthermore, the study uncovers the impact of risk management practices on project schedule adherence, cost control, quality assurance, and safety performance. The results provide valuable insights into the perceptions, experiences, and perspectives of industry professionals regarding risk management and its effect on project success.

Keywords: risk management, construction projects, project success, qualitative research, interviews.

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Chapter 1 - Introduction

This section of the research paper outlines the problem statement inclusive of the background and research problem; explains the research purpose, questions, and objectives to establish the research problem that will be examined further, communicate the research study's intention, and outline the exact procedures that will be done to attain the research goal; and describes the research structure.

The construction sector is distinguished by its complexity, which is characterized by a wide range of stakeholders, complex procedures, and inherent uncertainties. Due to these intricacies, construction projects are subject to a variety of hazards that could have a big impact on their performance. To protect project goals and improve overall performance, risk management has drawn a lot of attention as a proactive method for discovering, evaluating, and managing potential risks. To manage risks in an adequate and methodical manner, industrial decision makers want dependable access to information and expertise (Nawaz, Waqar, Shah, Sajid, and Khalid, 2019). As a result, implementing an effective risk management strategy regarding managing associated project risk knowledge may help construction projects succeed (Markiewicz, and Patrick, 2015). To offer useful information to decision-makers and industry practitioners, this study explores the relationship between risk management and the success of building projects.

1.1 Aims of the Study

The primary aim of this study is to provide a comprehensive understanding of the intricate dynamics between risk management practices and the overall success of construction projects. The investigation seeks to unravel the nuanced ways in which the identification, assessment, and mitigation of risks influence key project outcomes, including but not limited to cost efficiency, project schedule adherence, and stakeholder satisfaction. By delving into the complexities of risk management within the construction industry, the study aims to contribute empirical insights and practical recommendations that can inform industry practices and academic discourse.

This study endeavors to examine stakeholders' perceptions and attitudes toward risk, evaluating the existing knowledge landscape within the construction industry. Through a combination of qualitative research methods and an extensive review of literature, the aim is to unearth not only the theoretical foundations of risk management but also the practical tools and techniques employed in real-world construction projects. By evaluating the effectiveness of these strategies in mitigating risks and contributing to project success, the study aspires to provide valuable insights that can guide both industry professionals and researchers in enhancing risk management practices, fostering a culture of resilience, and ultimately elevating the overall success rates of construction projects.

1.2 Research Problem

Construction projects are extremely complicated enterprises in which uncertainty can originate from a variety of sources (Banna, 2018). According to the Project Management Institute (Turner, 2016), risk management is one of the nine knowledge domains, and its integration is regarded as a critical factor and needed for project success. To effectively cope with unforeseen occurrences and uncertainty, risk management is gradually becoming a significant component of construction project management (Nawazetal., 2019).

To be competitive, construction companies strive to increase productivity, profitability, staff turnover, and stakeholder management on projects (Pinto and Slevin, 2019). It's crucial since risk and uncertainty have such negative implications (Renault, and Agumba, 2016). However, the sector has a bad reputation for handling the negative consequences of change, which has resulted in delays and inability to fulfill quality and cost standards for years (Merriam, and Tisdell, 2015). However, using various risk management and assessment techniques and methodologies will not eliminate all hazards; rather, the goal is to guarantee that risks are assessed and managed in a way that allows the project's overall objectives to be fulfilled (Bao, Wu, and Li, 2018). The study will provide an insight at whether poor risk management is caused by a lack of knowledge or bad execution.

The formation of risk consciousness, the integration of core risk policy ideas, and organizational integration are all part of risk management (Molina-Azorin, 2016). This

helps the project to be prepared for unavoidable challenges and increases transparency through proactive action (Banna, 2018). Because risks alter over time, it is a continuous process throughout the project life cycle. Risk management is the process of recognizing, analyzing, and responding to risk, and it is critical to work as an integrated project team from the beginning to identify and effectively manage risks (Bao, et al. 2018). The method has several advantages, including a better knowledge of the unique risks involved with a project, the ability to make informed decisions based on extensive research, and the accumulation of historical data that can be utilized to aid future risk management operations (Greener, 2022). Unfortunately, many project managers are still unaware of the need to incorporate project risk into the project delivery process (Molina-Azorin, 2016).

Previous studies have extensively examined the role of risk management in construction projects. These studies have explored various aspects of risk management processes, including risk identification, assessment, mitigation, and monitoring, highlighting their significance in ensuring project success. Numerous studies have been conducted to explore the role of risk management in construction projects. These studies have employed various methodologies and approaches to investigate different aspects of risk management processes, including identification, assessment, mitigation, and monitoring. Key findings from relevant research papers, articles, and academic studies can be summarized as follows:

- **Identification and Assessment of Risks**

Researchers have developed different techniques and models for identifying and assessing risks in construction projects. These include the Analytic Hierarchy Process (AHP)-based fuzzy comprehensive evaluation method (Zou Zhang, and Wang, 2018), literature reviews to identify critical factors influencing risk management practices (Al-Tmeemy et al., 2017), and empirical studies to assess risk management practices in specific contexts such as the Egyptian construction industry (El-Sawalhi et al., 2019). Studies have highlighted the importance of considering both technical and non-technical risks, such as safety risks, environmental risks, financial risks, and stakeholder-related risks, in the risk management process (Choudhry and Fang, 2018; Khanzadi and Tamošaitienė, 2019).

❖ Risk Mitigation Strategies

Research has explored various risk mitigation strategies employed by construction project stakeholders. These strategies may include safety management practices, stakeholder engagement initiatives, resource allocation decisions, and the adoption of emerging technologies (Luu, Kim, and Cho., 2018; Wu and Low, 2019). Studies have emphasized the need for proactive risk management approaches that involve early identification of risks and the development of appropriate mitigation measures to minimize their potential impact on project outcomes (Enshassi, Mohamed, and Abushammala, 2017; Ilyas, Memon, and Díaz-Fernández, 2018).

❖ Impact of Risk Management on Project Performance

Researchers have investigated the relationship between risk management practices and project performance indicators such as cost, schedule, quality, and client satisfaction. Findings suggest that effective risk management contributes to improved project outcomes and overall success (Zavadskas, Antuchevičienė, and Tamošaitienė, 2017). Studies have identified factors that influence the effectiveness of risk management in construction projects, including organizational culture, project complexity, stakeholder collaboration, and the use of advanced project management tools and techniques (Zou et al., 2018; Khanzadi and Tamošaitienė, 2019).

❖ Integration of Emerging Technologies

Recent research has explored the potential of emerging technologies, such as Building Information Modeling (BIM), Artificial Intelligence (AI), and data analytics, to enhance risk management processes in construction projects. These technologies offer opportunities for real-time risk monitoring, predictive analytics, and decision support, enabling project teams to identify and respond to risks more effectively (Wu and Low, 2019; Luu et al., 2018).

Despite the wealth of research on risk management in construction projects, certain aspects remain underexplored. For instance, while some studies have focused on risk mitigation

strategies for specific types of hazards, such as safety risks or environmental risks, others have emphasized the role of stakeholder engagement in risk management processes (Choudhry and Fang, 2018; Khanzadi and Tamošaitienė, 2019). However, there is limited research examining the integration of emerging technologies, such as Building Information Modeling (BIM) or Artificial Intelligence (AI), into risk management practices within the construction industry (Wu and Low, 2019; Luu et al., 2018). Additionally, while previous studies have examined the impact of risk management on project outcomes such as cost and schedule performance, less attention has been paid to its influence on long-term project success metrics, such as client satisfaction and stakeholder trust (Zavadskas et al., 2017).

These studies have not encountered similar problem dynamics such as those peculiar to the built environment from the risk perspective especially headwinds such as state capture, incessant corruption and management e.g. the collusion during the 2010 FIFA World Cup stadia construction on price collusion that saw the sky-rocketing of construction prices and the current construction mafia tendencies which are some of the pertinent and unique characterization within the South African Context.

1.2.1 The Integration and Consolidation of Theoretical Underpinnings with Literature Review

Drawing on classical theories such as the Contingency Theory of Management (Donaldson, 2015), which emphasize the importance of aligning organizational strategies with external environmental factors and leveraging internal resources for competitive advantage, the problem statement highlights the relevance of risk management practices in enhancing project success within the construction industry. Additionally, contemporary perspectives from scholars like Smith (2018) and Johnson et al. (2020) underscore the evolving nature of risk management strategies in response to changing project dynamics, technological advancements, and stakeholder expectations. By synthesizing theoretical frameworks with empirical findings from studies by Lee (2021) and Wang et al. (2019), the problem statement identifies gaps in the literature regarding the holistic impact of risk management on construction project outcomes, particularly in relation to long-term success metrics such as client satisfaction and stakeholder trust. This integration and consolidation of theoretical

underpinnings with the literature review lay the foundation for addressing key research questions and objectives aimed at advancing theoretical understanding and practical implications in the field of construction project management.

1.3 Importance of Study

The importance of this study into risk management is to explore and examine the perception, knowledge, practical implementation, and influence of risk management implementation within the construction industry. This is so that it can be determined if more awareness and measures should be put in place to emphasize how critical risk management is to project success. Risk management ensures that risks are assessed and managed in such a way that the project's overall goals are met. The research will determine if inadequate risk management is the result of a lack of knowledge or poor execution. The development of risk consciousness, the incorporation of key risk policy principles, and organizational integration aid in the project's readiness for unavoidable obstacles and promote transparency via proactive action.

1.4 Research Objectives

The objectives of this research paper are as follows:

a) Examine the general perception and attitude of risk and risk management in the construction industry,
b) Examine the level of risk management knowledge exists within the construction industry,
c) Explore the practical implementation tools and techniques adopted in relation to risk management,
d) Examine how effective are the tools and techniques that exist in relation to risk management.

1.5 Significance of the Study

This research endeavors to conduct a comprehensive exploration into the profound influence of risk management practices on the success of construction projects. The overarching goal is to dissect the intricate relationship between the identification, assessment, and mitigation of risks and key project outcomes, encompassing factors such

as cost efficiency, project schedule adherence, quality of deliverables, and stakeholder satisfaction. By delving into the multifaceted dimensions of risk management within the construction industry, this study aims to uncover critical insights that can contribute to a more nuanced understanding of how proactive risk management strategies contribute to or impede the success of construction endeavors.

The research statement positions itself at the intersection of practical implementation and theoretical foundations, seeking to bridge the gap between industry practices and academic discourse. By engaging in a thorough examination of stakeholders' attitudes toward risk, evaluating the existing knowledge landscape, and exploring the real-world efficacy of risk management tools and techniques, the study aims to provide a holistic perspective. Through this exploration, the research aspires not only to contribute to the academic literature on construction project management but also to offer tangible recommendations for industry professionals. The ultimate ambition is to empower construction practitioners with actionable insights that can enhance the industry's resilience to uncertainties, ultimately contributing to the success and sustainability of construction projects in dynamic and complex environments.

1.6 Literature Review and Theories

Risk management stands at the forefront of ensuring the successful delivery of construction projects, a dynamic and multifaceted domain inherently fraught with uncertainties. The nuanced nature of the construction industry, characterized by complex stakeholder interdependencies, technological advancements, and the inherent unpredictability of environmental variables, underscores the imperative of robust risk management practices. As projects grow in scale and complexity, the influence of risk management becomes increasingly pivotal, shaping the trajectory of success or failure. This literature review and theories section embark on an exploration of this critical relationship, aiming to unravel the profound impact that effective risk management exerts on the overall success of construction projects.

The significance of understanding the interplay between risk management and project success is underscored by the inherent challenges and opportunities within the construction landscape. Project success, in the context of construction, extends beyond the traditional parameters of meeting deadlines and adhering to budgets; it encompasses a holistic framework that considers client satisfaction, stakeholder collaboration, and the long-term sustainability of the constructed asset. Acknowledging that risks are inherent in every facet of construction, from design and planning to execution, underscores the importance of proactive risk management. This section delves into a synthesis of foundational literature and theoretical frameworks, aiming to provide a comprehensive understanding of how the careful identification, assessment, and mitigation of risks serve as linchpins in achieving project success within the intricate tapestry of construction endeavors. The ensuing exploration aims to not only contribute to the academic discourse surrounding risk management in construction projects but also to offer practical insights that can guide industry professionals in navigating the complexities and uncertainties inherent in their projects.

Foundational theories underpinning risk management in construction are essential for navigating uncertainties. Knightian Uncertainty, from Frank H. Knight's work in 1921, remains pertinent, distinguishing between calculable risks and true uncertainty. Kaplan and Garrick's 1981 Risk Management Framework offers a comprehensive approach, highlighting the dynamic interactions of technical, organizational, and societal factors in risk management. In recent years, the concept of High-Reliability Organization (HRO) theory, as applied by Hailu, (2018), has gained traction. It focuses on enhancing organizational resilience to unexpected events, aligning with the proactive nature of risk management. Furthermore, the Construction Project Risk Management (CPRM) framework proposed by Ahiaga-Dagbui and Smith (2018) integrates risk management principles into construction projects, emphasizing proactive identification, assessment, and mitigation. Understanding these foundational theories provides a robust theoretical basis for investigating the impact of risk management on construction project success in the ever-evolving landscape of the construction industry.

Project success in the construction industry encompasses diverse dimensions, extending beyond traditional criteria. Imperadeiro, (2022) propose a comprehensive model, embracing efficiency, customer impact, business success, and future adaptability. Atkinson's (1999) "iron triangle" emphasizes the interdependence of cost, time, and quality as critical success criteria (Blaskovics, 2016). Recent perspectives highlight the importance of sustainability and stakeholder satisfaction. Huemann et al. (2017) advocated for a broader definition that includes the fulfillment of stakeholders' expectations, emphasizing the social dimension of project success. Additionally, the International Organization for Standardization (ISO) provides a recent global framework (ISO 21500:2021) acknowledging project success as the achievement of objectives within the constraints of time, cost, and performance. Understanding these dimensions is crucial for evaluating the impact of risk management on construction projects, as it allows for a holistic assessment beyond traditional metrics, considering long-term sustainability and stakeholder contentment in contemporary project environments.

Contemporary risk management theories in construction projects address the dynamic challenges of the industry, reflecting the evolving landscape. The Risk Intelligent Approach (RIA), proposed by Carvalho, and Rabechini Jr, (2017), emphasizes a holistic strategy, integrating risk management into the broader project management framework. This approach promotes continuous learning and adaptability, aligning with the complexity and uncertainty inherent in construction projects. Ahiaga-Dagbui and Smith (2018) contribute to contemporary discourse with the Construction Project Risk Management (CPRM) framework, providing a systematic process for proactive risk identification, assessment, and mitigation. Additionally, the concept of Enterprise Risk Management (ERM), as outlined by Webb, (2017), acknowledges the interconnectedness of risks across project portfolios, emphasizing an organization-wide approach to risk management. These contemporary theories offer nuanced perspectives that account for the intricate nature of risks in construction, providing valuable insights for exploring the influence of risk management on project success.

Exploring stakeholder perceptions and approaches to risk in construction projects reveals a nuanced interplay of perspectives. Research by Walker, (2015) emphasizes the diverse and often conflicting risk perceptions among stakeholders, influenced by their roles, experiences, and objectives. Stakeholders, including owners, contractors, and designers, may exhibit varying levels of risk aversion or risk-taking tendencies. Recent studies, such as the work of Zhang, and Wang (2016), delve into cultural influences on risk perception, highlighting how cultural backgrounds shape stakeholders' attitudes towards risk in construction. Understanding these varied perspectives is crucial for effective risk management, as it necessitates a tailored and inclusive approach that accommodates the diverse risk appetites and perceptions among stakeholders, contributing to the overall success of construction projects.

Assessing the level of risk management knowledge within the construction industry is essential for enhancing project resilience. Studies by Bahamid, and Doh, (2017) have examined the existing landscape of risk management education and awareness, revealing gaps in practitioners' understanding and implementation. More recently, research by Hwang and Zhao (2019) explores knowledge gaps specific to Building Information Modeling (BIM) adoption in the context of risk management, shedding light on the evolving intersections between technology and risk literacy. A study by Aibinu and Venkatesh (2016) provides insights into risk management practices in the context of developing economies, emphasizing the need for tailored educational programs to bridge knowledge disparities. Understanding the current state of risk management knowledge informs strategies to bolster industry proficiency, contributing to the success of construction projects by ensuring that stakeholders are equipped to navigate uncertainties effectively.

Exploring practical tools and techniques in risk management for construction projects unveils a diverse toolkit designed to navigate the complexities inherent in the industry. Building on traditional methods, contemporary approaches integrate technology and collaborative strategies. Building Information Modeling (BIM), as discussed by Zhang and Wang (2016), emerges as a transformative tool, enhancing risk identification and

communication. Failure Mode and Effects Analysis (FMEA), a systematic method examined by Aibinu and Venkatesh (2016), remains fundamental for identifying potential failure points and prioritizing risks. Additionally, Monte Carlo Simulation, as highlighted by Choudhry, Shang, and Tan (2021), offers a quantitative approach, assessing project uncertainties through iterative modeling. These tools, combined with collaborative techniques like Risk Workshops and Delphi Method, contribute to a comprehensive risk management framework, aligning with the dynamic nature of construction projects and influencing their ultimate success.

Empirical evidence on the effectiveness of risk management tools in construction projects provides valuable insights into their impact on project success. Research by Kaka and Price (2019) offers empirical support for the efficacy of quantitative risk analysis techniques such as Monte Carlo Simulation in enhancing project decision-making and risk mitigation. A study by Zhang, and Wang (2020) examines the effectiveness of Building Information Modeling (BIM) in improving risk identification and communication, showcasing its practical benefits. Moreover, empirical research by Chan, Chan, and Yeung (2019) underscores the positive influence of Risk Workshops on project outcomes, emphasizing the collaborative nature of risk management. By synthesizing such empirical evidence, this exploration aims to provide a grounded understanding of the real-world impact of risk management tools on construction project success, informing industry practices and contributing to the ongoing discourse in the field.

1.7 Research Methodology

This study employs qualitative research methodology, primarily relying on semi-structured interviews to comprehensively explore the intricate dynamics between risk management and the success of construction projects. The choice of qualitative interviews stems from their capacity to capture the rich and contextual insights of key stakeholders within the construction industry. Through purposive sampling, professionals including project managers, risk officers, and other relevant experts will be selected to participate in semi-structured interviews. These interviews will be carefully designed to allow participants the flexibility to express their perspectives, experiences, and perceptions regarding risk

management practices in construction projects. The semi-structured format ensures a balance between predetermined questions and the organic emergence of critical themes, providing a holistic understanding of the subject matter. The qualitative nature of the data gathered aligns with the exploratory nature of the research, allowing for an in-depth examination of stakeholders' attitudes, knowledge, and practical experiences related to risk management in construction projects.

The data obtained through semi-structured interviews will undergo thematic analysis, a qualitative research method that identifies, analyzes, and reports patterns (themes) within the data. Thematic analysis will be conducted in a systematic and rigorous manner, involving several stages such as data familiarization, generating initial codes, searching for themes, reviewing and refining themes, defining and naming themes, and producing the final report. This process ensures a nuanced and comprehensive exploration of the data, unveiling underlying patterns and connections. Thematic analysis, coupled with a rigorous literature review, will form the backbone of the research findings, providing a robust basis for insights into the influence of risk management on the success of construction projects.

1.8 Structure of the Thesis

Chapter 2

The literature review is presented in Chapter two, which includes terminology and ideas related to risk and uncertainty, risk classification, and risk management foundations. Previous research and theoretical processes and concepts in the fields of risk and knowledge management, as well as theory in terms of risk perception and attitudes, and the risk management process, are given.

Chapter 3

The third chapter covers the study's methodology, the author's approach, and comments on the validity and reliability of the research technique.

Chapter 4

The empirical results of the online questionnaire and in-depth semi-structured interviews are presented in Chapter four, which serves as the foundation for the discussions in Chapter

five. The findings are organized main themes outlining risk attitude and perception, risk knowledge, and risk management methods.

Chapter 5

Chapter five contains an examination of the actual data, as well as discussions of past ideas and concepts and responses to the research questions. The thesis' final results are presented in this chapter, along with concluding recommendations, contribution to the body of knowledge, managerial implications limitations of the study and for future risk management research.

Chapter 2 – Literature Review

This paper's literature review investigates existing research and scholarly works on the impact of risk management methods on construction project results. It seeks to provide a thorough understanding of the subject while also identifying gaps in current knowledge. The literature review starts with an introduction construction project management, highlighting the importance of risk management in project success. It delves into the evolution of risk management, definition, and classification of construction-specific risks, ranging from financial and schedule-related risks to safety and environmental risks. The review then investigates several risk management theories, concepts, and approaches used in construction projects. It assesses how these techniques improve project success by improving decision-making, reducing uncertainty, and optimizing resource allocation.

2.1 Introduction

Nawazetal., (2019) posited that change is enabled in projects, and change involves risks. As a result, project risk is unavoidable. Managing such risks should not be done by chance, but rather as part of a systematic process that detects, analyzes, develops solutions, and manages the risks that may affect the project. Markiewicz, and Patrick, (2015) postulated that a cost-effective risk management strategy should be designed to promote improved decision-making by gaining a better knowledge of risks, their sources, likelihood, impact, timeliness, and reaction options. Hopkin, (2018) stated that project risk management is frequently disregarded, resulting in substantial setbacks in project performance. Kloppenborg, (2015) stated that risk management may help with project selection, scope determination, and generating realistic timetables and cost estimates.

Lock, (2017) mentioned that risk is measurable uncertainty, whereas uncertainty is unmeasurable risk, according to the difference and connection between uncertainty and risk. Willumsen, Oehmen, Stingl, and Geraldi, (2019) noted that risk is created by the interaction of uncertainty with objectives, which implies that only relevant uncertainties with the ability to impact project objectives may become hazards. In other terms, a risk is a measurable uncertainty whose significance is determined in proportion to the specific goals at hand (PMI, 2017). The term risk, on the other hand, is used broadly in several

contexts, but the most prevalent use of risk management is in projects, where project risks are defined as those unknowns that may have an impact on project objectives (Smith and Merna, 2017). According to the Project Management Institute (PMI, 2017), a risk is essentially an unforeseen event that, if it occurs, might threaten the project's success.

Project Risk Management is defined by the Project Management Institute (PMI, 2017) as the procedures of risk management planning, identification, analysis, response planning, response execution, and risk monitoring for a project. Steiner, (2020) expressed that the goals of project risk management are to raise the likelihood and/or effect of positive risks while lowering the likelihood and/or impact of negative risks to maximize project success. Project Risk. According to Gido and Clements (2015), risk management includes identifying, assessing, controlling, and responding to project risks to reduce the possibility of bad events occurring and/or their possible influence on the project's success.

As a result, the risk management approach would include (Kloppebonrg, 2015):

- **Risk identification** - establishing which risks may have a negative influence on the project's goal and assessing the probable consequences of each risk if it occurs.
- **Assessment** - evaluating the chance of a risk event occurring and the magnitude of the event's impact on the project's goal, and then prioritizing the risks.
- **Response** - establishing a set of activities to avoid or mitigate the occurrence or effect of a risk, or to put in place if the risk event happens.
- **Control risks** - examine and evaluate risks to see whether the likelihood of occurrence or possible effect of any of the risks has changed, or if any new risks have been discovered.

Gido, Baker, and Clements, (2018) inferred that the risk management method aids in the observation and determination of all risks to which the project is exposed to make an informed decision that is pursued with the coordinated and cost-effective application of resources, to control and reduce the impact and overall probability of events deemed undesirable. Risk management, according to Hopkin, (2018) is a proactive practice of looking forward rather than a reactive approach.

2.2 Evolution of Risk Management

Pinto and Slevin, (2019) stated that by empowering project teams to recognize, evaluate, and reduce potential threats and uncertainties, risk management plays a critical role in the success of projects. Kerzner, (2017) mentioned that due to improvements in project management techniques and increased understanding of the value of proactive risk identification and mitigation, the discipline of project risk management has experienced significant evolution over time. This thorough analysis will advance our understanding of project risk management, empowering stakeholders to better their risk-management procedures and project results (Zinn, 2019).

- **Traditional Risk Management Approach:**

Early on in a project's lifecycle, most risk management procedures were conventional. During the project execution phase, it required recognizing risks when they materialized and responding to them appropriately (Flanagan and Norman, 2019). Due to the lack of a defined methodology for risk assessment and mitigation in this reactive approach, issues were frequently only addressed after they had already had an impact on the project. In their book "Project Risk Management Guidelines," Cooper, Grey, Raymond, and Walker (2017) address the conventional risk management strategy while emphasizing the demand for a more thorough and proactive strategy.

- **Integration of Risk Management into Project Lifecycle:**

Zinn, (2019) posited that growing understanding of the significance of including risk management throughout the full project lifecycle emerged as project management methodologies developed. In their essay on stakeholder influence tactics, Huemann, Eskerod, and Ringhofer, (2016) stress how important it is to incorporate risk management throughout the project lifecycle.

- **Shift towards Proactive Risk Management:**

Kendrick, (2015) postulated that there was a move in favor of a more proactive strategy in reaction to the limits of reactive risk management. This is known as proactive risk management. Instead of focusing on response, this strategy aims to reduce risk. In their book "Risk Management and Construction," Flanagan and Norman (2019) analyze

proactive risk management and highlight its advantages for enhancing project outcomes and lowering uncertainty.

- **Focus on Risk Culture and Stakeholder Engagement:**

The development of risk management in projects has highlighted how critical it is to fortify risk-aware organizational cultures. It acknowledged that all stakeholders must be actively involved in risk management for it to be effective, not just project managers (Chapman and Ward, 2019). Understanding and Managing Risk Attitude by Hillson and Murray-Webster (2017) delves into the significance of risk culture and stakeholder participation.

- **Integration of Risk Management Standards:**

Organizations started integrating their procedures with recognized risk management standards to offer a consistent and organized approach to risk management. The risk management principles and guidelines in ISO 31000 are one such standard. In their book "Project Risk Management Guidelines," Cooper, et al. (2017) examine the incorporation of ISO 31000 while highlighting the significance of harmonizing risk management procedures with accepted norms.

- **Emphasis on Practical Risk Management Techniques:**

Practical strategies, frameworks, and techniques that may be quickly used in projects have become more prevalent as risk management has progressed. The goal of this strategy was to give project teams efficient resources for identifying, analyzing, and dealing with risks (Huemann, Eskerod, and Ringhofer, 2016). In their book "Practical Project Risk Management," Hillson and Simon (2020) describe the ATOM methodology as an approach to project risk management that is both practical and effective.

2.2.1 Classical theories and perspectives of Risk Management

Classical theories and perspectives provide foundational frameworks for understanding risk management and its impact on the success of construction projects. This literature review examines key classical theories and perspectives relevant to the exploration of risk management in construction projects.

- **Classical Management Theory:**

Taylor's scientific management principles proposed in the early 20th century emphasize standardization, task specialization, and systematic approaches to improve organizational efficiency (Skitmore and Marsden, 2012). Contemporary scholars have highlighted the enduring relevance of Taylor's principles in modern construction management (Wang et al., 2012). Fayol's principles of management, including unity of command, discipline, and division of work, remain influential in shaping organizational structures and practices in the construction industry (Skitmore and Marsden, 2012).

- **Behavioral Management Theory:**

Mayo's Hawthorne studies, conducted in the 1930s, revealed the importance of social factors and employee morale in influencing productivity projects (Liu et al., 2017; Walker et al., 2018). Contemporary research underscores the significance of employee motivation and engagement in enhancing project performance and reducing risks (Shenhar et al., 2016; Zwikael et al., 2019). McGregor's Theory X and Theory Y continue to inform discussions on leadership styles and their impact on organizational culture and project outcomes (McGregor, 1960). Recent studies have explored the relationship between leadership behavior, team dynamics, and risk management effectiveness in construction projects (Liu et al., 2017; Walker et al., 2018).

- **Contingency Theory:**

Contingency theory posits that management practices should be contingent upon contextual factors such as project complexity, environmental uncertainty, and organizational culture (Donaldson, 2001). Contemporary research in construction management acknowledges the need for adaptive risk management strategies tailored to specific project contexts (Chan et al., 2015; Zhang et al., 2018). Scholars have emphasized the importance of flexible risk management approaches that accommodate project variations and unforeseen challenges, reflecting the principles of contingency theory (Loosemore et al., 2015; Ahsan et al., 2019).

2.3 Evolution of Risk Management in the Construction Industry

By recognizing and minimizing any risks that could have an impact on the project's goals, effective risk management is essential to the success of construction projects (Mohamed, 2017). Kendrick, (2015) alluded that due to the requirement to improve project outcomes,

reduce uncertainty, and boost overall project performance, the discipline of project risk management in the construction industry has seen substantial evolution throughout time.

- **Traditional Risk Management in Construction:**

The conventional methods that mostly concentrated on reactive measures are where project risk management in the construction sector evolved (Cooper et al., 2017). Risks were frequently handled during the building process as they came up, which frequently led to cost overruns, timetable delays, and reduced project quality. Traditional risk management in the construction sector is discussed by Flanagan and Norman (2019), who emphasize the necessity for a more proactive and organized approach.

- **Shift towards Proactive Risk Management:**

The construction sector began moving in the direction of a more proactive strategy after realizing the limitations of reactive risk management. Prioritizing prevention above reaction, proactive risk management entails identifying and reducing hazards before they materialize (Hillson and Murray-Webster, 2017). In their exploration of proactive risk management in the context of building projects, Smith and Merna (2017) place a focus on how it might improve project performance and lower uncertainty.

- **Integration of Risk Management into Project Lifecycle:**

Integrating risk management over the full project lifecycle was another step in the growth of project risk management in the construction industry. From pre-construction until project completion, several project stages included measures for risk identification, assessment, and mitigation (Kerzner, 2017). By ensuring that risks are considered at every stage, this integrated approach improves decision-making and lessens project vulnerabilities. In their book "Project Risk Management Guidelines," Cooper, et al., (2017) offer suggestions for incorporating risk management throughout the lifespan of a construction project.

- **Use of Risk Management Standards and Frameworks:**

The industry began implementing established risk management frameworks and standards to create a uniform and systematic approach to risk management in construction projects

(Pinto and Slevin, 2019). Guidelines and concepts for efficient risk management are provided by these standards, such as ISO 31000. Construction projects can make sure that risk identification, analysis, and response take a methodical and all-encompassing approach by adhering to recognized standards. Cooper, et al., (2017) speak about the inclusion of ISO 31000 in project risk management guidelines, highlighting the importance of this standard for the construction sector.

- **Technological Advancements and Risk Management:**

The development of project risk management in the construction sector has been significantly influenced by technological breakthroughs. Enhanced risk assessment and mitigation are now possible because of innovations like Building Information Modeling (BIM), remote sensing, and data analytics. With the use of these technologies, construction professionals may better plan projects, communicate with and collaborate with project stakeholders, and simulate and visualize potential dangers (Smith and Merna, 2017). The use of technology in risk management has improved project outcomes and led to more precise risk analysis. In their exploration of BIM's use in risk management for building projects, Zou, Fang, Li, Li and Li (2021) highlight its advantages for recognizing and reducing risks.

- **Collaborative and Integrated Risk Management:**

The risk management approaches in the construction sector have recently shifted toward becoming collaborative and integrated. This strategy places a strong emphasis on the active participation of all project stakeholders, including owners, builders, subcontractors, and design experts, in the identification, assessment, and mitigation of risks (Pinto and Slevin, 2019). The value of cooperative risk management in building projects is discussed by Chapman and Ward, (2019), who emphasize its favorable effects on project success.\

- **Previous Study Reviews**

Numerous studies from different continents have investigated the influence of risk management on the success of construction projects, providing valuable insights into various aspects of risk management practices and their impact on project outcomes. This

literature review synthesizes findings from studies conducted in different regions, including Africa, to offer a comprehensive understanding of the topic.

- **Africa:**

Enshassi et al. (2017) conducted a study in the Gaza Strip, focusing on factors affecting the performance of construction projects. The research highlighted the significance of effective risk management practices in mitigating challenges and improving project outcomes in the African context. El-Sawalhi et al. (2019) conducted an empirical study in the Egyptian construction industry to examine risk management practices. The findings underscored the importance of adopting systematic risk management approaches to address project complexities and enhance performance.

- **Asia:**

Zou et al. (2018) conducted a study using the AHP-based fuzzy comprehensive evaluation method to identify and assess risks in construction projects. The research, conducted in China, emphasized the importance of robust risk assessment techniques in improving project success rates. Khanzadi and Tamošaitienė (2019) explored risk management practices in construction projects from a resource-based view. Although the study focused on Pakistan, its findings offer insights applicable to various contexts, including Africa, highlighting the role of organizational resources in enhancing risk management effectiveness.

- **Europe:**

Wu and Low (2019) conducted a literature review to identify, assess, and manage risks in global construction projects. While the study encompassed diverse geographical regions, its findings provide valuable insights into risk management practices applicable to African construction projects, emphasizing the importance of proactive risk management strategies. Zavadskas et al. (2017) examined risk assessment methods for construction projects using the SWARA and WASPAS methods. Although the study was conducted in

Lithuania, its findings contribute to the global discourse on risk management in construction, offering methodological insights applicable across different continents.

- **North America:**

Luu et al. (2018) conducted a case study of the Korean high-speed railway project, focusing on risk management in mega-construction projects. While the study focused on Asia, its findings on risk management challenges and strategies are relevant to construction projects worldwide, including those in Africa.

2.4 Contextual Literature Constructs

Risk management plays a pivotal role in the successful execution of construction projects. As the construction industry faces increasingly complex challenges, such as climate change, economic uncertainties, technological advancements, and societal expectations, it becomes imperative to explore and understand the contextual literature constructs that influence risk management practices.

Cleden, (2017) posited that advancements in technology, such as cloud computing, artificial intelligence (AI), Internet of Things (IoT), and e-commerce, bring both opportunities and risks to the construction industry. This review examines how risk management practices integrate innovative technologies to enhance project efficiency, safety, and decision-making. Social and societal aspects are equally relevant in the context of risk management. Bahamid, and Doh, (2017) postulated that ensuring community inclusivity, fostering local enterprise development, and addressing social risks such as labor disputes are essential components of a comprehensive risk management approach. The literature review investigates how risk management practices align with social responsibility and stakeholder engagement principles.

Additionally, this review explores the institutionalization of risk management as a research discipline in the construction industry. Bahamid, and Doh, (2017) mentioned that by examining the adoption of enterprise risk management (ERM) and standardized risk

management tools and practices, the research seeks to identify effective strategies for enhancing risk management capabilities within organizations and projects.

2.4.1 Macro Perspective

The Macro Perspective in risk management for construction project success involves a holistic view of external factors and global trends that impact project outcomes. It encompasses understanding macroeconomic conditions, geopolitical risks, climate change, technological advancements, and societal factors. Emphasizing long-term sustainability, it considers the project's alignment with global risk reports and industry best practices (Flyvbjerg, et al., 2018).

2.4.1.1 Climate Change, DE- carbonization, and Greenhouse Gases

Climate change, decarbonization, and greenhouse gases are critical elements of this perspective. As construction projects operate within a changing environment, understanding and managing risks related to these factors are essential for ensuring project success and sustainability.

Climate change presents significant risks to construction projects, including extreme weather events, rising sea levels, and temperature fluctuations. The global push towards decarbonization, driven by international agreements and regulations, impacts construction practices (Flyvbjerg, 2017). Transitioning to low-carbon materials, energy-efficient technologies, and sustainable construction methods presents both challenges and opportunities (Safapour, E. and Kermanshachi, 2019). Risk management should account for the potential disruptions and benefits of decarbonization efforts. Risk management should assess the project's carbon footprint and explore strategies to minimize emissions (Midler, Killen, and Kock, 2016.).

Governments and regulatory bodies are increasingly imposing stricter environmental standards on construction projects. Failure to comply with these regulations can result in fines, legal consequences, and reputational damage. Effective risk management should ensure adherence to environmental laws and guidelines. Climate change and decarbonization efforts can disrupt supply chains, affecting the availability and cost of

construction materials and resources (Andersen, 2016). Managing supply chain risks is vital for project continuity and cost control. ESG (Environmental, Social, and Governance) considerations are becoming integral to investment decisions. Construction projects that align with sustainable practices and demonstrate environmental responsibility are more attractive to investors and stakeholders (Hwang, Zhao, and Toh, 2015). Risk management should address these expectations to secure funding and support. Building resilience into construction projects is critical, considering the potential long-term impacts of climate change (Safapour, and Kermanshachi, 2019). Risk management strategies should account for future climate scenarios and incorporate adaptive measures to protect infrastructure and ensure project longevity.

The Macro Perspective in Risk Management for construction projects success necessitates a forward-looking approach that acknowledges the challenges and opportunities posed by climate change, decarbonization, and greenhouse gas emissions. Integrating these macro-level considerations into risk management practices enhances project resilience, sustainability, and overall success in a rapidly evolving global context.

2.4.1.2 Economic Risk

Economic risks play a crucial role in determining the feasibility and success of construction projects. Understanding and effectively managing economic risks are essential to ensure project viability and profitability. To address economic risks at the macro level, risk management strategies must incorporate scenario planning, sensitivity analysis, and financial modeling (Midler et al., 2016). Robust risk management practices enable construction projects to adapt to economic challenges, optimize financial planning, and enhance overall project success.

Construction projects are susceptible to market fluctuations, including changes in interest rates, currency exchange rates, and commodity prices. Economic uncertainty can affect project financing, material costs, and revenue streams, potentially leading to cost overruns and financial instability (Safapour, and Kermanshachi, 2019). Economic conditions can

influence the availability and cost of skilled labor in the construction industry. Economic downturns may result in labor shortages, higher wages, and increased competition for resources, impacting project timelines and costs (Love, and Ahiaga-Dagbui, 2018). Construction projects often rely on financing from banks and investors. Economic factors such as credit market conditions, lending rates, and investor sentiment can impact the availability and cost of funding, affecting project feasibility (Safapour, and Kermanshachi, 2019). Changes in tax laws, trade policies, or environmental regulations may introduce new risks or opportunities for construction projects (Hwang, Zhao, and Toh, 2015). Construction projects involving international transactions are exposed to currency exchange rate risks. Fluctuations in exchange rates can impact project costs, revenues, and profitability. Construction projects are part of the larger business cycle, which goes through periods of expansion, peak, contraction, and trough. Understanding where the economy is within this cycle can help project teams anticipate potential risks and opportunities (Flyvbjerg, 2017).

2.4.1.3 Geopolitical Risk

Geopolitical risks can significantly impact construction projects, both regionally and internationally (Hwang, Zhao, and Toh, 2015). Effectively managing these risks is essential to ensure project continuity, safety, and success. By recognizing and proactively addressing geopolitical risks in the Macro Perspective of risk management, construction projects can enhance their ability to adapt to changing global dynamics, protect stakeholders' interests, and achieve successful project outcomes in complex and uncertain geopolitical environments (Andersen, 2016). Geopolitical events, such as political unrest, regime changes, or civil conflicts, can disrupt construction projects. These events may lead to delays, resource constraints, or even project suspension, posing substantial risks to project timelines and costs (Flyvbjerg, 2017). Geopolitical events can trigger currency volatility, impacting the exchange rates for international construction projects (Midler, et al., 2016). Currency fluctuations can lead to increased project costs and financial uncertainty. Geopolitical tensions may disrupt global supply chains, affecting the availability and cost of construction materials and equipment (Safapour, and Kermanshachi, 2019).

Diversifying supply sources and having contingency plans become vital risk management strategies.

Geopolitical risks can expose construction projects to security threats, particularly in regions with heightened geopolitical tensions. Ensuring security measures and risk assessments are in place becomes crucial for personnel safety and project continuity (Andersen, 2016). Geopolitical uncertainties can affect investor confidence and access to project financing. Investors may become cautious, leading to delayed or reduced funding for construction projects (Love, and Ahiaga-Dagbui, 2018). Geopolitical events may exacerbate these risks, leading to project disruptions or reputational issues (Safapour, and Kermanshachi, 2019). To manage geopolitical risks, construction projects must conduct thorough risk assessments that consider the geopolitical landscape and engage in scenario planning to anticipate potential challenges (Flyvbjerg, 2017).

2.4.1.4 Technology (Cloud computing, AI, Internet of Things, e-commerce)

Embracing and effectively managing these technological advancements is essential for enhancing project efficiency, reducing risks, and achieving overall success. By embracing the opportunities offered by cloud computing, AI, IoT, and e-commerce while mitigating their associated risks, construction projects can achieve greater efficiency, cost-effectiveness, and competitiveness in the ever-evolving technological landscape (Love, and Ahiaga-Dagbui, 2018).

Cloud technology revolutionizes data storage, collaboration, and access in construction projects. However, adopting cloud solutions requires careful consideration of data security and privacy risks (Safapour, and Kermanshachi, 2019). Ensuring robust cybersecurity measures and selecting reputable cloud service providers are critical risk management strategies. AI applications, such as machine learning and predictive analytics, can optimize construction planning, scheduling, and risk assessment (Hwang, Zhao, and Toh, 2015). However, the implementation of AI systems requires thorough testing, validation, and continuous monitoring to mitigate potential biases and errors. IoT devices enable real-time

data collection and monitoring of construction sites, improving project visibility and efficiency (Andersen, 2016).

E-commerce platforms streamline procurement and supply chain processes, offering convenience and cost savings (Flyvbjerg, 2017). However, reliance on e-commerce introduces potential risks related to supplier reliability, payment security, and delivery delays. Diversifying suppliers and establishing clear contractual agreements can mitigate these risks. Technology-driven solutions involve the collection and processing of vast amounts of data (117. Midler, et.al 2016). Construction projects must adhere to data privacy regulations to safeguard sensitive information and avoid legal consequences. Integrating multiple technology solutions can be complex, leading to compatibility issues and potential disruptions in project workflows (Safapour, and Kermanshachi, 2019). Relying heavily on technology vendors can introduce dependency risks (Andersen, 2016). Construction projects should have contingency plans in case of service interruptions or changes in vendor support. Engaging technology experts during the planning and implementation phases ensures comprehensive risk assessment and sound technology integration (Flyvbjerg, Ansar, Budzier, Buhl, Cantarelli, Garbuio, Glenting, Holm, Lovallo, Lunn, and Molin, 2018). Investing in employee training and fostering a culture of technological literacy enhances the successful adoption of advanced technologies.

2.4.1.5 Social/Societal

The Macro Perspective in Risk Management for construction projects success encompasses crucial social and societal factors, such as community inclusivity, opportunities for enterprise development, and Operations and Maintenance (O&M) considerations (Love, and Ahiaga-Dagbui, 2018). This perspective recognizes the importance of social and community aspects in ensuring project success and sustainability. Community Inclusivity means engaging local communities and stakeholders is vital for successful construction projects. A study by Flyvbjerg (2017) highlights the significance of early and inclusive communication with communities to address concerns, foster support, and reduce the risk of social opposition.

Construction projects have the potential to stimulate economic growth and provide opportunities for local enterprise development. Engaging local businesses and entrepreneurs fosters social inclusivity and empowers the community (Safapour, E. and Kermanshachi, 2019). The International Journal of Sustainable Built Environment (2021) emphasizes the importance of incorporating O&M considerations into risk management practices for construction projects. Comprehensive O&M planning, resource allocation, and maintenance protocols are essential to ensure the long-term success and sustainability of the project.

A study by Sloan Review (2014) underscores the significance of addressing community concerns and fostering positive relationships with stakeholders to obtain a social license to operate. The International Labour Organization (ILO) sets standards and guidelines to protect workers' rights and well-being. Risk management practices in construction projects must include safety protocols, fair labor practices, and compliance with labor regulations to minimize risks associated with worker welfare (Safapour, and Kermanshachi, 2019).

2.4.1.6 Employee Morale and Organizational Performance

Employee morale plays a critical role in shaping organizational performance and outcomes in construction projects. This literature review examines the relationship between employee morale and organizational success, shedding light on the importance of fostering positive workplace environments and addressing morale-related challenges in construction contexts.

- **Impact of Employee Morale on Construction Project Success:**

Studies have consistently shown that employee morale significantly influences various aspects of construction project success, including productivity, quality of work, and overall project performance (Mills et al., 2019; Ayodeji et al., 2020). High levels of morale among construction workers are associated with greater job satisfaction, lower turnover rates, and higher levels of engagement, ultimately leading to improved project outcomes. Research by Lingard and Ruwhiu (2020) emphasizes the link between positive workplace cultures and project success in the construction industry. Organizations that prioritize employee

well-being and foster supportive work environments tend to achieve better project results, as employees are more motivated, committed, and productive.

- **Factors Influencing Employee Morale in Construction Projects:**

Various factors contribute to employee morale in construction projects, including leadership styles, communication practices, recognition and rewards, job autonomy, and opportunities for career development (Chan et al., 2018; Kim and Park, 2019). Effective leadership that provides clear direction, support, and empowerment to employees fosters a positive work environment and enhances morale. Studies have highlighted the detrimental effects of poor working conditions, safety hazards, and job-related stressors on employee morale in construction projects (Hao et al., 2017; Teo et al., 2021). Addressing these issues through proactive risk management strategies is essential for maintaining high levels of morale and ensuring positive project outcomes.

- **Organizational Performance and Employee Morale:**

Research indicates a strong correlation between employee morale and organizational performance across various industries, including construction (Ferguson et al., 2018; Teo and Loosemore, 2020). Organizations with high levels of employee morale tend to exhibit greater innovation, customer satisfaction, and financial performance. However, the construction industry faces unique challenges, such as project complexity, tight deadlines, and labor-intensive work environments, which can impact employee morale (Zhang et al., 2019). Effective risk management practices that address these challenges and prioritize employee well-being are crucial for sustaining morale and optimizing organizational performance in construction projects.

Construction projects may impact cultural heritage sites and the environment. The World Bank Group emphasizes the importance of conducting cultural and environmental impact assessments and implementing mitigation measures to safeguard sensitive areas (Hwang, Zhao, and Toh, 2015). Engaging with communities, promoting local enterprise development, addressing O&M challenges, and respecting cultural heritage and worker

welfare are integral components of risk management in construction projects (Andersen, 2016). Incorporating these social and community aspects enhances project sustainability, fosters stakeholder support, and contributes to overall project success.

2.4.2 Meso Perspective

The meso perspective in risk management for construction project success focuses on the intermediate level, examining organizational and industry-specific factors. It involves integrating risk management practices into project delivery systems, project teams, and organizational structures (Cleden, 2017). The meso perspective emphasizes standardizing risk management processes, fostering a risk-aware culture, and promoting collaboration among stakeholders (Kendrick, 2015).

2.4.2.1 The Institutionalization of the Risk Management as the Research Discipline

The institutionalization of risk management as a research discipline in construction projects' success involves the establishment and integration of systematic, evidence-based research practices to enhance risk management efficacy and project outcomes (Zinn, 2019). This process elevates risk management from a reactive approach to a proactive and strategic discipline. To institutionalize risk management research, construction organizations and academic institutions must:

- Develop comprehensive risk management frameworks that serve as the foundation for research endeavors. These frameworks should outline risk identification, assessment, response, and monitoring processes.
- Foster collaboration among risk management experts, construction professionals, and researchers from various disciplines. Interdisciplinary research enriches risk management practices by considering diverse perspectives and innovative approaches (Gunduz, and Abdi, 2020).
- Establish platforms for sharing research findings, best practices, and case studies. Conferences, workshops, and publications disseminate valuable insights and contribute to the collective understanding of risk management in construction projects (Kliem, and Ludin, 2019).

- Provide financial support and resources for research initiatives focused on risk management. Encouraging academic institutions and industry organizations to fund research projects advances risk management knowledge (Zinn, 2019).
- Standardize performance metrics to evaluate risk management effectiveness. Common metrics enable comparative analysis and continuous improvement.
- Encourage benchmarking with industry standards to assess risk management maturity (Wideman, 2022). This facilitates the identification of gaps and opportunities for improvement.
- Integrate risk management into construction-related curricula at educational institutions (Webb, 2017). Equipping future professionals with comprehensive risk management knowledge strengthens the industry's capabilities.
- Advocate for evidence-based risk management decisions, using data and research findings to inform strategies.

2.4.3 Micro Approach

The Micro Perspective in risk management for construction project success centers on project-level considerations and individual risk factors. It involves identifying, analyzing, and responding to specific risks that may arise during project execution. Micro Perspective entails engaging stakeholders, conducting detailed risk assessments, and implementing targeted risk mitigation measures (Bahamid, and Doh, 2017). It emphasizes the importance of on-site safety, quality control, and project monitoring to address risks effectively (Browning, 2019). By focusing on the granular details and tailoring risk responses, construction projects can enhance performance, minimize disruptions, and achieve successful project outcomes.

. These elements listed below play a vital role in identifying, assessing, and mitigating risks throughout the project lifecycle.

- **Guardrails:** Guardrails in risk management refer to the establishment of policies, procedures, and guidelines that provide a framework for risk identification, assessment, and response (Cagliano, Grimaldi, and Rafele, 2015). Clear risk management protocols ensure that all project stakeholders are aligned with risk objectives and follow standardized risk management practices (Kliem, and Ludin,

2019). Guardrails define risk tolerance levels, risk reporting mechanisms, and the roles and responsibilities of different individuals involved in the project.

- **Resources:** Adequate resources are essential for effective risk management in construction projects. This includes financial resources to allocate for risk mitigation measures, skilled personnel with expertise in risk analysis and response planning, access to relevant data and information, and advanced technologies for risk monitoring and analysis.
- **Strategies:** Risk management strategies involve identifying potential risks and developing plans to address them effectively. Strategies may include risk avoidance by selecting alternative approaches to project execution, risk transfer through insurance or contractual arrangements, risk reduction through safety measures and quality control, and risk acceptance where risks are deemed tolerable and manageable (Cleden, 2017). **Tactics:** Tactics refer to the specific actions and activities undertaken to implement risk management strategies (Gunduz, and Abdi, 2020). This involves conducting risk assessments at different project stages, organizing risk workshops with key stakeholders, developing risk registers, establishing contingency plans for high-impact risks, and continuously monitoring risk indicators.
- **Mitigation Factors:** In construction projects, this may involve implementing safety protocols to minimize accidents and injuries, diversifying suppliers, and contractors to reduce supply chain risks, incorporating redundancy in critical systems to enhance resilience, and using data analytics for real-time risk monitoring and decision-making (Zinn, 2019). Mitigation factors contribute to the overall risk resilience of construction projects.

2.4.3.1 Repertory Grid Analysis Technique (RGT) Methodology

Repertory Grid Analysis Technique (RGT) is a qualitative research methodology used in risk management within construction projects. It is based on the principles of personal construct psychology and is designed to elicit and analyze individuals' mental frameworks or "constructs" that shape their perceptions, judgments, and decision-making processes related to risk management (Gunduz, and Abdi, 2020). Repertory Grid Analysis Technique

offers a unique and in-depth understanding of individual stakeholders' mental constructs related to risk management in construction projects (He, Huang, and Fang, 2021). It complements quantitative risk assessment methods by providing qualitative insights into the human factors that influence risk decision-making and behaviors. RGT helps project teams develop more targeted and effective risk management strategies that align with stakeholders' perspectives and expectations (Safapour, and Kermanshachi, 2019).

The application of Repertory Grid Analysis Technique (RGT) in the context of risk management in construction projects is valuable for gaining insights into individual stakeholders' perceptions, attitudes, and decision-making processes related to risk management (Hwang, Zhao, and Toh, 2015). RGT can be utilized in several ways to enhance risk management practices within construction projects:

- **Identifying Stakeholders' Mental Constructs:** RGT allows project teams to elicit and identify stakeholders' mental constructs regarding risk management (Andersen, 2016). By understanding the underlying factors that stakeholders use to evaluate risks and risk responses, project teams can tailor risk management strategies to better align with stakeholders' perspectives (Flyvbjerg, 2017).
- **Assessing Risk Prioritization:** Through RGT, project stakeholders can compare and prioritize various risks and risk scenarios based on their constructs (Cleden, 2017).
- **Uncovering Risk Response Preferences:** RGT helps identify stakeholders' preferences for risk response strategies (Gunduz, and Abdi, 2020). It provides insights into whether stakeholders prefer risk avoidance, risk transfer, risk mitigation, or other risk response actions, allowing the project team to design response plans that resonate with stakeholders' expectations.
- **Understanding Decision-Making Processes:** RGT provides a window into stakeholders' decision-making processes regarding risk management (Webb, 2017). It allows project teams to comprehend the cognitive factors that influence risk-related decisions, helping them design risk management strategies that are more likely to be embraced and implemented.

- **Fostering Stakeholder Engagement:** By involving stakeholders in RGT sessions, project teams can foster stakeholder engagement and collaboration in risk management efforts (Gunduz, and Abdi, 2020). RGT sessions can act as a platform for open discussions, where stakeholders can voice their concerns and contribute to risk identification and response planning.
- **Enhancing Risk Communication:** RGT can aid in improving risk communication within the project team (Cagliano et al., 2015). By understanding stakeholders' constructs, the team can tailor risk communication messages to resonate with different audiences and ensure that risk-related information is conveyed effectively.
- **Supporting Risk Management Training:** The insights gained from RGT can inform the development of risk management training programs (Webb, 2017). These programs can be tailored to address specific knowledge gaps and misconceptions that stakeholders may have regarding risk management in construction projects.
- **Developing Targeted Risk Mitigation Strategies:** Based on the constructs identified through RGT, project teams can develop targeted risk mitigation strategies that align with stakeholders' perceptions and preferences (Bahamid, and Doh, 2017). This increases the likelihood of successful risk management implementation.

2.4.3.2 Barriers to Mitigating Risks

Effective risk management in construction projects can be challenging due to various barriers that hinder the successful implementation of risk management practices. Some common barriers include:

- **Limited Risk Awareness:** Lack of risk awareness among project stakeholders, including project managers, contractors, and subcontractors, can hinder effective risk management (Gunduz, and Abdi, 2020)
- **Inadequate Risk Assessment Methods:** Inaccurate or inadequate risk assessment methods can lead to the misidentification or underestimation of risks (Iqbal, Choudhry, Holschemacher, Ali, and Tamošaitienė, 2015).

- **Insufficient Resources:** Inadequate allocation of resources, both financial and human, to risk management activities can limit the effectiveness of risk mitigation efforts (Midler, 2016).
- **Time Constraints:** Construction projects often operate under tight schedules, leaving limited time for thorough risk assessment and planning (He, Huang, and Fang, 2021).
- **Communication and Collaboration Issues:** Poor communication and lack of collaboration among project teams can hinder the exchange of risk-related information and impede the implementation of risk management measures (Flyvbjerg, et al., 2018).
- **Risk Aversion and Resistance to Change:** Some stakeholders in construction projects may be risk-averse and resist change, leading to the avoidance of innovative risk management practices (Imperadeiro, 2022).
- **Inadequate Leadership Support:** The lack of strong leadership support and commitment to risk management can undermine its importance in the project's decision-making processes (Hwang, Zhao, and Toh, 2015).
- **Contractual Barriers:** Complex contractual arrangements and risk allocation can pose barriers to effective risk management (Gunduz, and Abdi, 2020).
- **Unclear Risk Ownership:** Unclear or ambiguous risk ownership can result in the neglect of certain risks, as no specific individual or entity takes responsibility for addressing them (Andersen, 2016).
- **External Factors:** Construction projects are subject to external factors such as economic fluctuations, regulatory changes, and weather conditions, which are beyond the project team's control (Hwang, Zhao, and Toh, 2015). These external factors can introduce additional uncertainties and challenges to risk management.

Overcoming these barriers requires a proactive and collaborative approach to risk management, with an emphasis on risk awareness, effective communication, adequate resource allocation, and strong leadership commitment (Flyvbjerg, 2017). By addressing these barriers, construction projects can enhance their risk management practices and

improve overall project success and resilience. The impact of barriers on project outcomes in construction projects can be significant and varied (Browning, 2019). When barriers hinder effective risk management, several negative consequences may arise, ultimately affecting the project's success and overall performance. Some of the key impacts of barriers on project outcomes include (Gunduz, and Abdi, 2020):

- Cost Overruns
- Project Delays
- Safety Incidents
- Quality Issues
- Disputes and Litigation
- Reputation Damage
- Stakeholder Dissatisfaction
- Resource Wastage
- Lack of Project Resilience
- Diminished Project Success

2.5 Theories integrating Risk Management with Literature

The literature review on theories integrating risk management with literature for construction project success explores the synergy between risk management practices and various theoretical frameworks. By examining project management, financial, engineering, sociological, and sustainability theories, this review aims to identify effective strategies that enhance risk management in construction projects (Webb, 2017). Understanding how these theories inform risk identification, assessment, and mitigation can significantly impact project outcomes in an ever evolving and complex industry landscape (Gunduz, and Abdi, 2020). The research seeks to foster a comprehensive and multidisciplinary approach to risk management, contributing valuable insights for successful construction project execution.

2.5.1 Agency Theory

The Agency Theory explores the principal-agent relationship within organizations, where the principal (client or project owner) delegates tasks to the agent (contractor or project

team) to act on their behalf (Kliem, and Ludin, 2019). This theory is particularly relevant in the context of construction projects, where clients often delegate the responsibility of project execution to contractors or project managers. In the context of risk management, the Agency Theory emphasizes the potential misalignment of interests between the client and the contractor (Wideman, 2022). The principal (client) seeks to minimize risks and achieve project success, while the agent (contractor) may have different risk preferences or incentives. This can lead to agency conflicts, where the contractor's risk appetite may not align with the client's risk tolerance. This theory offers valuable insights into how risk management practices can influence decision-making and project outcomes in the construction industry (Webb, 2017).

Applying the Agency Theory to construction projects involves understanding and managing the principal-agent relationship that exists between project owners (principals) and contractors, consultants, or project managers (agents). The Agency Theory highlights potential conflicts of interest and information asymmetry between these parties, which can impact decision-making, risk management, and project outcomes (Gunduz, and Abdi, 2020). By recognizing the influence of the Agency Theory, risk management practices in construction projects can proactively address potential agency conflicts and ensure better alignment of interests between the principal and agents.

2.5.2 Contingency Theory

The Contingency Theory proposes that there is no one-size-fits-all approach to management practices, including risk management. Instead, effective risk management strategies should be contingent upon the unique characteristics of each construction project (Iqbal, et al., 2015). This theory acknowledges that different projects have varying levels of complexity, uncertainty, and stakeholder involvement, which influence the risk management approach. In the context of construction projects, the Contingency Theory suggests that risk management practices should be tailored to suit the project's size, scope, location, regulatory environment, and stakeholder dynamics. For instance, a large-scale infrastructure project in a geopolitically unstable region may require a different risk

management approach compared to a smaller residential construction project in a stable urban area (Kliem, and Ludin, 2019).

The Contingency Theory also emphasizes the importance of considering external environmental factors when designing risk management approaches (Gunduz, and Abdi, 2020). External contingencies, such as economic conditions, regulatory changes, and technological advancements, can significantly impact construction projects' risk landscape (Iqbal, et al., 2015). One of the key implications of the Contingency Theory is the need for flexibility and adaptability in risk management. Construction projects are dynamic and subject to various uncertainties throughout their lifecycle. Risk management practices should be able to adapt to changing circumstances and unexpected events (Imperadeiro, 2022).

2.6 Knowledge on risk management

The execution of construction activities involves expert knowledge and experience-based problem-solving techniques. Knowledge is the core competency in the construction sector. As most of the knowledge in the construction industry is acquired through the different projects that the firm does, it is ideal that the lessons learnt from earlier projects be documented and applied once more in subsequent projects (Flanagan and Norman, 2019). The practice of knowledge management affects employees' know-how as well as improving the distribution of knowledge across team members, making it a discipline that is connected to risk management (Kliem, and Ludin, 2019).

As participants in earlier projects retire or take on new responsibilities, the new information that was created in each of those initiatives is frequently lost, which results in the loss of tacit knowledge and a potential source of competitive advantage. Only when actions are assessed in retrospect can one properly consider their true ramifications (Kerzner, 2017). Each project generates information and knowledge that must be stored, distributed, and shared for decisions to be made (Pinto and Slevin, 2019). Given the intrinsic characteristics of the sector, which include fragmented and transient phases, managing knowledge in the construction business may not be the easiest task (Smith and Merna, 2017). Many times, construction projects are by their very nature complex and uncertain. To effectively cope

with unforeseen circumstances and uncertainty, risk- and knowledge management are becoming a more significant part of project management for building projects (Renault, and Agumba, 2016).

2.6.1 The Concept of Knowledge

The difference between "tacit" and "explicit" knowledge is the most basic when discussing the concept of knowing. People carry around difficult-to-express tacit knowledge in their heads (Cooper et al., 2017). It is the information that is required to be successful in a task; it is not formally taught and is frequently verbally inaccessible. The opportunity exists for transferring implicit or tacit knowledge experience-based knowledge to the entire company in question or to the community at large. The idea of elucidating tacit information and then being able to make it usable by others is a key issue that is frequently brought up when defining knowledge) (Kliem, and Ludin, 2019).

2.6.2 Knowledge Management

Naturally, a methodical technique as well as a variety of skills and expertise are needed to develop effective risk management; yet, in many situations, the latter may be seen as much more crucial (Huemann, Eskerod, and Ringhofer, 2016). With the lack of a clear definition, it may be difficult to define knowledge management, yet it may be said that knowledge management is the use of collective understanding to improve responsiveness and innovation (Mohamed, 2017). It also needs a culture that encourages belief in the idea of a practice of group thinking and sharing.

Knowledge management is frequently defined as the management of experiences and tacit knowledge at the individual and organizational levels. It is the retaining, using, and sharing of learned experiences and knowledge as well as the transfer of best practices (Chapman and Ward, 2019). Capturing lessons gained from other projects is crucial since the sharing of knowledge and lessons learned is a crucial component of knowledge management (Cooper et al., 2017). When a new risk arises, the contractual parties should adopt and maintain a continuous learning method so that they can gain more experience and improve their future condition.

As a result, managing knowledge and information about building projects is crucial for effective risk management (Nawazetal., 2019). Knowledge management is an organized and methodical method for enhancing a company's capacity to mobilize knowledge, resulting in improved decision-making, enabling proactive action, and delivering outcomes in line with the business strategy (Hailu, 2018). It is important to store and organize data so that teams and individuals can easily access, analyze, share, and act on the results (Cooper et al., 2017).

2.7 Organizational Learning in the Construction Industry

Due to their ignorance, corporations have been shown to be reluctant to contribute to risk management research in the construction industry, according to earlier research by (Hillson and Murray-Webster, 2017). By encouraging the generation and use of knowledge, one can envision the connection between knowledge management and organizational learning. Hence, the quest to sustainably increase an organization's knowledge use places a premium on organizational learning (Saldaña, 2015).

2.8 The Perceptions of Risk

The study of different risk attitudes is crucial because it helps us understand the behaviors connected to risk management actions (Martinelli, and Milosevic, 2016). Hence, a thorough understanding of decision makers' risk attitudes is required to analyze their decision-making practices within the context of construction risk management (Al Mhdawi, 2020). Particularly considering that the construction sector has long had a severe issue with knowledge retention and communication (Smith and Merritt, 2020). The evidence suggests that there are three different types of risk attitudes: risk-seeking, risk-neutral, and risk-averse.

People have different attitudes towards risk and the individual’s particular attitude will determine the way that they perceive risk and how they respond to risk (Pinto and Slevin, 2019). Attitudes are valuable in enhancing the self-esteem of a person and serve to express an individual’s self-identity and guiding values. They are therefore important to managers because they determine the direction of people’s behavior in response to a particular stimulus and provide insights into motivating mechanisms. Individuals’ attitude

is based on their own positive or negative evaluation, beliefs, and knowledge about the consequences of a certain behavior (Smith and Merritt, 2020).

Considering this, people's risk attitudes reflect their individual backgrounds, traits, and management environments. This explains why various project managers render varying, and occasionally even opposing conclusions in the same decision-making circumstances (Turner, 2022). The level of risk and uncertainty that project managers are ready to accept is described by Talesh (2015) as their inclination or appetite. According to risk profiles, different decision-making criteria can be identified using Winch's model, which is based on the three main mindsets mentioned earlier:

2.9.1 Risk-averse

Individuals have varying attitudes toward risk, and that attitude will influence how they perceive danger and how they react to it (Pinto and Slevin, 2019). The expression of one's self-identity and guiding principles through one's attitudes is helpful in boosting one's sense of self-worth. Because they help managers predict how individuals will behave in response to a specific stimulus and give them insights into the factors that drive motivation, they are crucial. Each person's attitude is based on their own positive or negative assessment, beliefs, and understanding of the effects of a certain action (Flynn and Walker, 2021).

2.9.2 Risk-neutral

Those that are risk-averse choose solutions with great potential rewards in the future. When it comes to dangers and possible opportunities, the risk-neutral approach emphasizes longevity. Thus, only take actions that are anticipated to have substantial advantages (Rasheed, Yaqub, Wang, Memon, and Lucena, 2018).

2.9.3 Risk-seeking

A risk-seeking mentality tends to make individuals and groups less concerned about the existence of threats. Because of their mental model of risk, those who are searching out risks tend to recognize less threats during the risk process (Cornelissen, Durand, Fiss, Lammers, and Vaara, 2015). When considering the possible impact and likelihood that an event will occur, threats are probably underestimated. Risk-taking mindsets may

exaggerate the significance of potential possibilities and pursue them aggressively (Kerzner, 2017). There are two ways to define attitude; the first has to do with how the human mind functions internally and defines attitude as one's perspective on a truth. A group's or an individual's internal strategy for dealing with a particular issue may be compared to the second definition, which outlines the direction of lean (Pinto and Slevin, 2019).

While certain attitudes are established firmly and others are more changeable, all attitudes are a choice, therefore they are situational responses that can vary based on external factors (Smith and Merna, 2017). If the influences are recognized and acknowledged, the potential of changing the attitudes is introduced. As a result, attitudes can be changed, which is crucial for controlling and understanding risk attitudes rather than being fixed intrinsic characteristics of people or groups. According to a poll by Akintoye and Macleod in 1997, most contractors view risk as the possibility of unanticipated events that could have a negative impact on the project's performance in terms of cost, schedule, and quality (Pinto and Slevin, 2019). Only one contractor viewed risk as an opportunity rather than as a foreseeable event that will inevitably have negative consequences.

2.10 Typical Mistakes in Project Risk Management

The accomplishment of project objectives is frequently delayed or unsuccessful due to several common mistakes in project risk management. The most prevalent project risk management mistakes are as follows (Chapman and Ward, 2019; Turner, 2016):

- The biggest hazards are frequently disregarded.
- Over-emphasizing one risk at the expense of another.
- Poorly executed Risk ID, the most important phase in risk management.
- Hazards that have been identified are broad and non-specific.
- Contracts are typically approved prior to discussions of project hazards.
- There is no management or other stakeholder support for risk management; and
- No lessons learned report is produced.

2.12 Project risk management advantages

Project risk management has several advantages including (PMI, 2017):

- Rather than reactive, it's a proactive strategy.
- Lessens the likelihood of unpleasant shocks and bad effects.
- Allows the project manager to take advantage of suitable risks (opportunities)
- Gives the project manager more influence over future occurrences.
- Increases the likelihood of meeting project objectives on schedule, on budget, and according to quality standards.

2.12.1 Proactive vs. Reactive

When a project meets the envisioned risk management process obligations, it is considered proactive, whereas reactive risk response occurs when the risk management obligations are not met (Cooper et al., 2017). If impromptu answers to risk events are not recognized as risks, none of the planned remedial actions will assist the project. Planning allows for the identification of potential risks, which leads to the formulation of an effective strategy with the expectation of achieving desired corporate objectives (Kliem, and Ludin, 2019). By showing where projects require attention, providing context for project performance understanding, and contributing to any health checks, peer reviews, or audits, good project risk management reduces and, in some circumstances, eliminates losses (Huemann, Eskerod, and Ringhofer, 2016).

2.12.2 There are fewer surprises.

The team can communicate more effectively and in real time about project issues and concerns because surprises are neither pleasant nor convenient to experience throughout a project (Graziadei, 2015). Through early identification of possible issues, a situation can be mitigated by the appropriate parties before it spirals out of hand. Early risk management leads to a smoother, more productive, and more economical approach to managing a project. The project team gains a better overall perspective of events and is better equipped to deal with risk events when they arise with the help of a strong risk management effort, which also lowers the possibility of risk surprises (Gido, et al. 2018).

2.12.3 Identify Opportunities, Too

The preparation and recognition of opportunities are crucial components of risk management. Risk management detects prospective issues, some of which, if they do, can be addressed to prevent having a detrimental effect on a project (Hopkin, 2018).

2.12.4 The expectation of success is set.

Project success expectations are created when active risk management is known to be taking place. Stakeholders are encouraged to work toward anticipating the intended outcome of success using a delivery framework that aims to mitigate known risks and open discussion about the project's difficulties with top management (Graziadei, 2015). The expectation or anticipation of success alters the team's entire perspective, boosts morale, encourages productivity, and fosters a culture where success is desired. No matter how challenging they may be, project risks are viewed as reasonable and planned when stakeholders can grasp them (Graziadei, 2015).

2.12.5 More Accurate Budgets

One advantage of risk management is better data quality. By gathering and making information about potential risks available, budget accuracy can be increased. Potential hazards information enables a more precise computation of the contingency budget rather than assigning projects a set contingency fee (Hall, 2021).

For risk management to be effective, (a) stakeholders, senior management, the project steering committee, the project manager, and project team members must all be committed and ; (b) A proper project management strategy which includes a skilled project manager to oversee risk management, and he or she, along with the rest of the project team, should be aware of technical and non-technical difficulties, as well as contingency plans (Smith and Merna, 2017). In a project setting, the following risk management concepts are appropriate (Steiner, 2020):

- Understanding the project’s context
- Involvement of stakeholders
- Establishment of clear project objectives

- Development of the project risk management methodology
- Reporting of risks on a regular basis
- Definition of clear roles and responsibilities
- Creation of a risk management support structure and culture
- Monitoring of early warning signs
- Implement a review cycle and strive for continuous improvement.

2.13 Risk Management Planning

To decide how to approach and plan risk management activities for the project, Schwalbe (2020) states that risk management planning entails looking over the project scope statement, cost, schedule, and communications management plans, enterprise environmental factors, and organizational process assets. The primary outcome of the Plan Risk Management process is a risk management plan, a subset of the project management plan (Huemann, Eskerod, and Ringhofer, 2016). Roles and responsibilities are specified, budgets and schedule estimates are established for risk-related tasks, and risk categories are recognized for consideration, among other key themes that every risk management strategy should address (Figure 2.1).

TOPIC	QUESTIONS TO ANSWER
Methodology	How will risk management be performed on this project? What tools and data sources are available and applicable?
Roles and responsibilities?	Who are the individuals responsible for implementing specific tasks and providing deliverables related to risk management
Budget and schedule	What are the estimated costs and schedules for performing risk-related activities?
Risk categories	What are the main categories of risks that should be addressed on this project? Is there a risk breakdown structure for the project?
Risk probability and impact	How will the probabilities and impacts of risk items be assessed? What scoring and interpretation methods will be used for the qualitative and quantitative analysis of risks? How will the probability and impact matrix be developed?
Revised stakeholders tolerances	Have stakeholders' tolerances for risk changed? How will those changes affect the project?
Tracking	How will the team track risk management activities? How will lessons learned be documented and shared? How will risk management processes be audited?
Risk documentation	What reporting formats and processes will be used for risk management activities?

Figure 2.1: Risk Management Plan template (Source: Schwalbe, 2015:429)

2.14.1.2 Risks in the Project Life Cycle

To lay the groundwork for structured project information, some prior work must be done before risks may be detected, mitigated, or managed (Pinto and Slevin, 2019). This preliminary effort includes defining the work, developing a timeline, and identifying the resources, cost factors, and performance metrics. Project planning, budgeting, and scheduling should all be done as part of the original defining phase for any project (Smith and Merna, 2017).

The process of identifying risks begins with information gathering. The individual who will function as a facilitator for information collection must be either the project manager or another person (with technical expertise) (Smith and Merna, 2017). Identifying risks might include using a variety of strategies, including brainstorming. Members of the team occasionally speak with stakeholders. Alternatively, SWOT analysis, which is defined as "analysis of strengths, weaknesses, opportunities, and threats to a project," may be employed. Remember that risks can be opportunities to seize as well as threats that must be conquered, suggests Kloppenborg (2015). The use of expert judgement procedures, such as the Nominal Group and Delphi techniques, is another way to discover risks. The project team may even identify risks via a structured review.

2.11.1.3 Risk Identification Tools and Techniques

An institution should use a collection of risk identification methods and approaches that are appropriate for its goals, resources, and exposure to hazards. It's crucial to gather and use current, relevant information, including appropriate background information when necessary and feasible, to detect potential dangers (Hall, 2021). Involving knowledgeable, experienced persons is one of the finest strategies used to detect potential dangers.

Approaches that can be used to identify potential hazards include checklists, experience-based judgments and records, flow charts, brainstorming, systems analysis, scenario analysis, and system engineering techniques. The following are some important considerations and factors to keep in mind while identifying risks (Kimmons, and Loweree, 2017):

- The approach to be used is determined by the nature of the activities under evaluation, the types of risks, the institutional framework, and the objective of the risk management exercise.
- Facilitated workshops for team-based brainstorming are the recommended method to promote commitment, consideration of other perspectives, and incorporation of differing experiences.

- In the event of catastrophic possible effects, flowcharting, system design reviews, systems analyses, Hazard, and Operability (HAZOP) studies, and operational modeling are some of the structured methodologies to be used.
- Although risk workshops often simply serve to filter and screen potential hazards, the advanced or organized procedures can be used as a supplement.
- While scenarios are less well-defined circumstances, they may be beneficial for identifying strategic risks and general structure procedures.
- If there are constraints in available risk identification resources and analysis, structure and technique should be adapted to obtain efficient outputs.

Figure 2.2 illustrates an example of a scenario analysis for risk identification per project life cycle phase.

INITIATION	PLANNING	EXECUTION	CLOSEOUT
• Unavailable subject matter experts	• No risk management plan	• Unskilled labour	• Poor quality
• Poor definition of problem.	• Hasty planning	• Material availability	• Unacceptable to customer
• No feasibility study	• Poor specifications.	• Strikes.	• As built changes
• Unclear objectives.	• Unclear SOW	• Weather	• Cash flow problems
• Buy-in (competitive bidding) •	• No management support. • Poor role definition • Inexperienced team	• Changes in scope.	
		• Changes in schedule	
		• Regulatory requirements	
		• Osha Compliance	
		• No control systems in place.	

Figure 2.2: Risk identification per project life cycle phase (Source: Kloppenborg, 2015, :240)

a) Interviews

Choosing important stakeholders, arranging the interview, defining the exact questions, and documenting the outcomes of the interview are the four processes necessary to conduct an interview (Saldaña, 2015).

b) Brainstorming

Planning is also necessary for brainstorming; to avoid wasting time, the questions should be prepared beforehand. Project tasks - establishment of significant risks related to tasks (e.g., requirements, coding, testing, training, and implementation) are some of the questions that can be included for the brainstorming session. Project objectives - establishment of significant risks related to the project objective (e.g., schedule, budget, quality, or scope) (Hopkin, 2018).

c) Checklists

If one doesn't already exist due to experience from other projects with a similar scope, one should be made. After the project is over, a post review should be undertaken to identify the biggest risks so that future projects can benefit (Gido, et al. 2015).

d) Assumption Analysis

A factor is an assumption if it is "thought to be true, genuine, or certain without proof or demonstration," according to The Project Management Body of Knowledge (PMI, 2017). By asking project stakeholders "what assumptions" they have about the project and then documenting their answers, it is possible to identify potential hazards from these assumptions.

e) Cause and Effect Diagrams

The usage of cause-and-effect diagrams can be used to identify potential risk factors so that they can be addressed to reduce, minimize, and eliminate the hazards (Hall, 2021).

f) Nominal Group Technique (NGT)

A more enlarged level of input collection and prioritization results in a prioritized risk list using the Nominal Group Technique (NGT) technique (Kimmons, and Loweree, 2017).

g) Affinity Diagram

The participants in the affinity diagram technique divide the risks that were generated into groups or categories, and each group is given a name. The instruments used during the Risk Identification Lifecycle are shown in Figure 2.3.

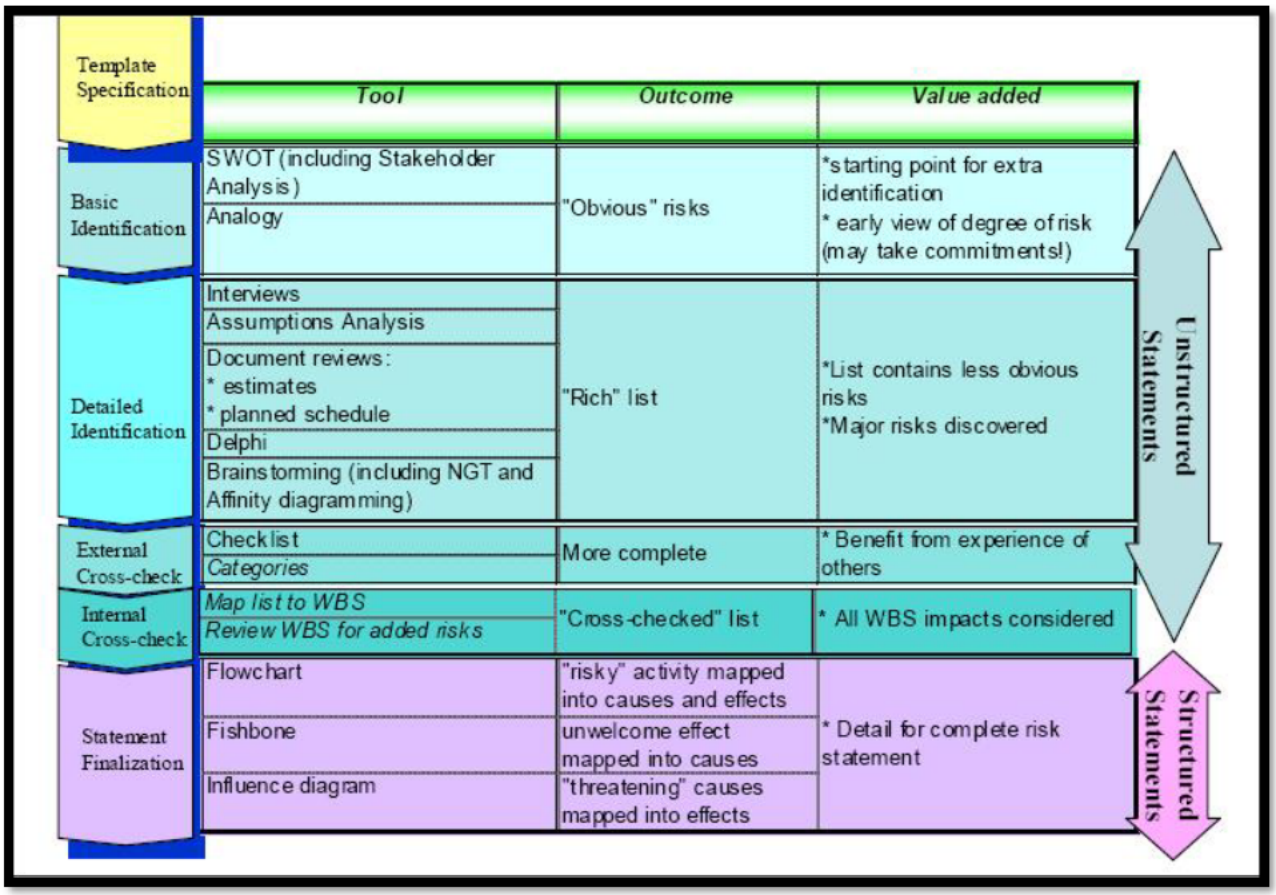

Figure 2.3: The tools and their use within the Risk Identification Lifecycle (source: Piney, 2003)

2.14.2 Risk assessment and Analysis

Calculating the likelihood that a risk event will occur and the extent to which it will affect the project aim are both part of the risk assessment process. Afterward, risks can be ranked according to their impact and likelihood of happening. The management of risks with a high possibility of occurrence and a high potential influence on the project's outcome should be given high priority (Turner, 2022). Risks that are linked with activities on the critical path should be given higher priority because, if they materialize, they will have a bigger impact on the schedule than if they were related with activities on a path that has a significant amount of total positive slack (Lock, 2017).

The method most frequently employed for analyzing risk is scenario analysis. This method evaluates each risk in terms of (a) likelihood that it will materialize and (b) implications should it (Turner, 2022). With the help of this method, the various hazards can be quantified. After that, the various dangers are graded in order of importance (and attention). As a result, the project manager can create a conventional risk assessment form (Lock, 2017). The process of risk assessment may be summed up as follows:

- Establish the probability that the risk event will occur,
- Determine the extent of the impact on the project's goal. Include the project team or experts in the risk-analysis process,
- Set priorities,
- Probability of occurrence and magnitude of the effect,
- Placement with respect to the critical path.

2.11.2.1 Risk Management Methods

Both qualitative and quantitative methods can be used to evaluate risks (Schwalbe, 2020).

- Analyzing qualitative risks - the method of ranking hazards by weighing their impact and probability before further study or action.
- Analyzing quantitative risk - the method of calculating how identified risks will affect the overall project goals.

Although both methods can be used jointly or individually, quantitative risk analysis frequently comes after qualitative risk analysis. The team may only conduct qualitative risk analysis for specific projects (Turner, 2022). The kind of risk analysis approaches employed depends on the project's nature and the time and financial resources that are available. A probability/impact matrix and the Top Ten Risk Item Tracking approach are tools for qualitative risk analysis (Smith and Merritt, 2020). Monte Carlo simulation and decision trees are tools for quantitative risk analysis. Using decision trees, expected monetary value (EMV) assesses proposed projects according to their expected worth. Sensitivity analysis shows how changing one or more factors might affect an outcome (Schwalbe, 2020).

a) Qualitative Risk Analysis

To differentiate between significant and minor risks, project teams must, according to Kloppenborg (2015) ask the question of how probable the danger is to occur and, if it does, how great of an impact would it have with details for each dimension probability and impact as illustrated in Figure 2.4.

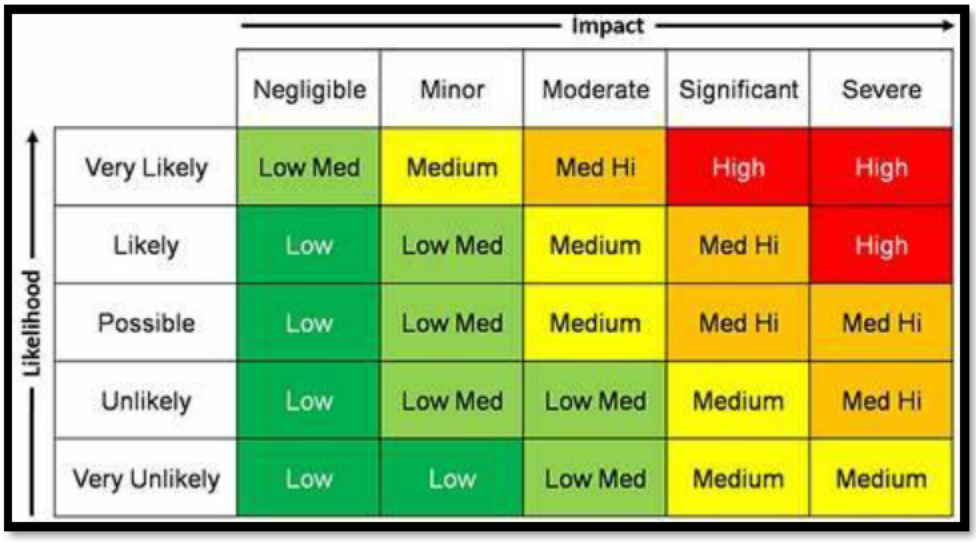

Figure 2.4: Probability and impact matrix Source: Kloppenborg, (2015:279)

(i) Probability/Impact Matrix

It is common to categorize anything as low, medium, or high risk or consequence. A project manager can use a probability/impact matrix or chart to visualize the likelihood and impact of hazards. The relative likelihood of a risk occurring is listed on one side of a matrix or axis on a chart, and the relative impact of the risk occurring is listed on the other, in a probability/impact matrix or chart (Schwalbe, 2020).

To employ this strategy, project stakeholders make a list of the risks they believe could affect their projects. In terms of likelihood of occurrence and potential consequences, they then categorize each risk as high, medium, or low. The project manager then presents a probability/impact matrix or chart, as seen in Figure 2.5, to summarize the findings. Then, the risk's magnitude is determined by adding a numerical score for probability to a numerical score for impact (Smith and Merritt, 2020).

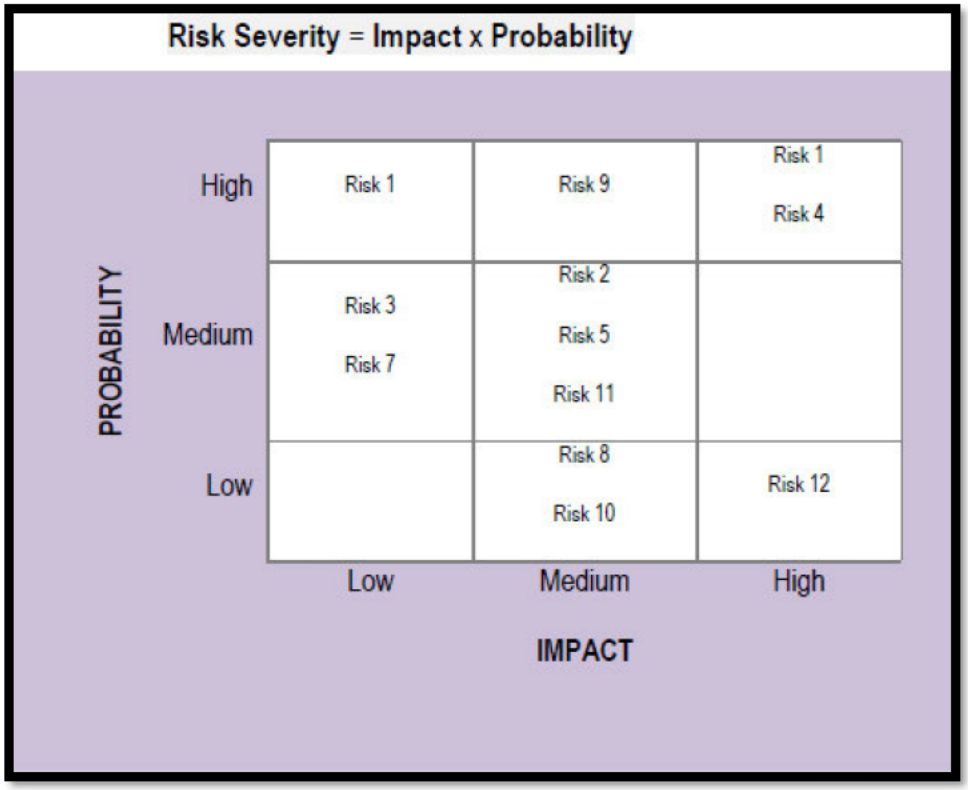

Figure 2. 5: Risk Severity Analysis Source: Schwalbe, (2015:439)

For contingency planning, risks are prioritized based on their importance and severity. The goal of this step is to narrow down a lengthy list of risks to a manageable number. The primary criterion for completing this culling is expected loss because it quantifies the harm that each risk is likely to produce to the project (Al Mhdawi, 2020). This short list may be affected by additional factors including urgency, mitigation costs, or a risk's potential for catastrophic consequences. The risk registry is then updated with the list of prioritized risks. A risk watch list is used to track less serious concerns (Smith and Merritt, 2020). The team would next debate how they would react to those risks should they materialize as the next phase.

(ii) Top Ten Risk Item Tracking

By additionally assisting in risk monitoring, this qualitative risk analysis tool helps to keep risks under constant observation throughout the course of a project. Periodically, management and/or the client examine the biggest risk factors for the project. The top ten risk sources on the project are listed, along with the risks' current and prior rankings, how

frequently they have been on the list over time, and the amount of progress they have made toward resolution since the last review (Smith and Merritt, 2020). In a meeting for a project's management review, the Top Ten Risk Item Tracking chart can be used. The list is limited to the top five adverse risk events (Turner, 2022).

(iii) Risk Register Updates

The main result of qualitative risk analysis is updating the risk registry. The ranking column on the risk register should be filled up, along with a numerical number or a high/medium/low rating for the chance and impact of the risk occurrence (Martinelli, and Milosevic, 2016). The extra information that is frequently supplied to each risk event could be risks that require more attention or those that can be put on a watch list. Risks that are low priority but nevertheless recognized as potential threats are listed on a watch list (Wideman, 2019). Risks that require quantitative evaluation can also be found through qualitative investigation.

b) Quantitative Risk Analysis

Although quantitative risk analysis is occasionally employed, qualitative risk analysis is included in all projects. These more formal methodologies' added rigor is frequently advantageous for larger, more complicated, riskier, and more expensive projects (Frame, 2015). When it is necessary to be able to confidently anticipate the likelihood that a project will be finished on time, on budget, with the agreed-upon scope, and/or with the agreed-upon quality, quantitative risk analysis is frequently utilized (Smith, 2016).

(i) Selecting a Suitable Quantitative Risk Technique

The following are some criteria to consider when choosing an appropriate quantitative risk technique (Kloppenborg, 2015).:

- The project team members' explicit expertise should be used in the technique.
- The methodology ought to enable prompt reaction.
- Project cost and schedule contingency should be determined using the technique.
- The method should promote effective communication.

- The process needs to be simple to use and comprehend.

(ii) Quantitative Risk Techniques

The following are a few of the most popular quantitative methods (Hailu, 2018):

- Decision tree analysis is a method of diagramming and computation used to calculate the effects of a series of different options when there is uncertainty. Calculating predicted financial value is a frequent use of decision tree analysis. A statistical method called expected monetary value (EVA) analysis determines the average result when the future contains scenarios that may or may not occur.
- Failure mode and effect analysis (FMEA) is a methodological process in which every component's potential failure mode is examined to ascertain its impact on reliability and for all probable failure modes. An assessment of the impact of each probable failure on the entire system is done.
- Sensitivity analysis is a quantitative risk analysis and modeling technique that aids in identifying which risks have the most potential to negatively affect the project. It investigates the degree to which each project element's level of uncertainty has an impact on the goal. A tornado diagram is the common format for the display.
- Simulation: a method that converts the indicated uncertainties into their prospective effects on objectives using a project model. Uses probability distributions of potential costs or lengths of time and frequently use Monte Carlo analysis (Kloppenborg, 2015).

(iii) Risk Register Updates

The risk register is updated with the probability of each risk occurring and the impact if it does happen. The priority for each risk is also listed. To call attention to the highest priority risks, organizations use a “Top 10” list whilst others place higher priority on risks that are likely to happen soon (Hailu, 2018). Yet other organizations focus on risks that are difficult to detect. Any of these means of calling attention to certain risks are also listed in the risk register (Rasheed, et al., 2018). Any quantitative risk analysis performed should also be documented in the risk register.

2.14.3 Risk Register

All detected risks are documented and maintained in a risk register, which is a centralized database. It functions as a thorough record of risks and all relevant information, such as descriptions, assessments, assigned owners, mitigation plans, and status updates (Kerzner, 2017). Throughout the project, the risk register should be updated often to reflect any changes to the risks or their status. The risk categories, detected dangers, potential causes, and potential remedies are included in the risk register at this stage (the conclusion of risk identification) (Pinto and Slevin, 2019). The other components are created throughout the remaining stages of risk planning. The following is a description of a risk register's contents (Schwalbe, 2020).:

- List of recognized risks - All possible outcomes discovered throughout the risk identification process, including their possible causes.
- A list of potential replies - Throughout the risk identification process, potential responses to risk may be discovered.
- Risk root causes - If at all feasible, pinpoint the causes of risks.
- Adjust Risk Categories - To more accurately reflect the risks connected with the current project, some risk categories may need to be modified or updated.
- Triggers - Precursors or signals that indicate when a risk event is about to happen.

The risk register is a dynamic record. A risk is added as it is found. As new information about a risk is found, it can be expanded upon. Risks can be eliminated as they are managed since they are no longer as serious (Smith and Merna, 2017). A spreadsheet works well as a risk register for smaller projects. Some businesses employ databases for larger, more sophisticated tasks (Pinto and Slevin, 2019).

2.14.4 Risk Tracking

Risk tracking is keeping track of and recording the development of specified hazards over time. It keeps track of changes in risk impact, likelihood, and risk response efficiency

(Saldaña, 2015). Risks are properly assessed and managed throughout the project lifecycle when the risk register is regularly reviewed and updated.

2.14.5 Risk Communication

Communication of risks to pertinent stakeholders in a clear and timely manner is another essential component of effective risk tracking and recording (Turner and Grude, 2019). Risk information should be communicated to important stakeholders, such as project sponsors, team members, and external parties as necessary by project teams. To give stakeholders the knowledge they need to make educated decisions and take the proper measures, clear and simple risk reports should be produced and distributed (Pinto, 2020).

2.14.6 Risk Response Monitoring

Tracking risks includes keeping tabs on the effectiveness and progress of risk mitigation strategies. This involves determining if the risk mitigation or contingency measures are working as intended in lowering the likelihood or impact of risks (Iqbal, et al., 2015). By detecting any gaps or deviations from the specified risk response strategies, regular monitoring enables prompt changes and corrective actions. The risk would need to be recognized, assessed, and prioritized before a risk response or risk handling plan could be created (Frame, 2015). The process of developing risk response strategies and emergency plans is known as planning risk response, and it entails taking steps to broaden opportunities and lessen risks. Also, one or more people must be designated and given responsibility for each agreed-upon and financially supported risk response (Martinelli, and Milosevic, 2016).

The project team creates a table that lists each big risk, its backup plan, and its "owner." (Al Mhdawi, 2020). Following are some planning steps for the risk response process:

- Group of deeds,
- Reduce or lessen a risk's potential incidence or effects,
- Put into action if the risk occurrence occurs,
- Determines a trigger point for taking action,
- Assigns accountability for execution, and
- Techniques for dealing with both positive and negative risks.

A risk response plan is a predetermined sequence of steps meant to mitigate or lessen the risk's impact or likelihood of occurrence. The risk event triggers the implementation of the risk response strategy (Smith and Merritt, 2020). Planning for risk response entails identifying a trigger point for when to carry out each risk's mitigation measures. It designates particular people with responsibility for carrying out the response plan.

2.11.6.1 Techniques for Dealing with Risk

There are numerous approaches for addressing both negative and positive project risks. Figure 2.6 categorizes common risk management techniques.

STRATEGY	TYPE OF RISK	EXAMPLES
Avoid	Threat	1. Change project plan and/or scope 2. Improve project communications 3. Decide not to perform project
Transfer	Threat	1. Insurance 2. Fixed-price contract 3. Hire expert
Mitigate	Threat	1. Lower probability and/or impact of threat 2. Build in redundancy 3. Use more reliable methods
Accept	Threat and opportunity	1. Deal with it if and when it happens 2. Establish triggers and update frequently 3. Establish time and/or cost contingencies
Research	Threat and opportunity	1. Get more and/or better information 2. Verify assumptions 3. Use prototype
Exploit	Opportunity	1. Assign talented resources to project 2. Give more emphasis to project
Share	Opportunity	1. Allocate partial ownership to third party 2. Form joint venture
Enhance	Opportunity	1. Increase probability and/or positive impact 2. Identify and maximize key drivers 3. Add more resources

Figure 2.6: Common Project Risk Strategies:Source: Kloppenborg, (2015: 281)

a) Strategies to Deal with Negative Risks (Threats)

Avoid, Mitigate, and Transfer are the three ways to deal with only negative risks that have an impact on the attainment of project objectives, and these should be minimized (Turner, 2022). Accept and Study are two further tactics that address both positive and negative risks.

i) Avoid Risk

The best course of action is frequently to avoid a risk if possible. Occasionally, a project design can be changed to eliminate the risk by removing the dangerous portion. When the local police inform parade organizers that certain traffic patterns on one stretch of their route are very challenging to control, Kerzner (2017) provides an example of the organizers changing their route. Decisions on the project risk response plan are based on knowledge of the importance that key stakeholders place on cost, time, scope, and quality (Pinto and Slevin, 2019). The example given might make the adjustment simple to implement if no significant stakeholder had a strong interest in the prior course of action.

Many hazards can be less complicatedly managed with timely and correct information (Kliem, and Ludin, 2019). When the hazards vastly outweigh the potential rewards, it is occasionally decided to avoid the endeavor entirely. Such a choice is made as a final resort after all other choices have been investigated and considered.

ii) Transfer Risk

For both the project manager and the owner/developer/supplier, there are numerous risk transfer techniques.

- Insurance is a popular method of risk transmission. A premium is given to a different organization that is better suited to take on a certain amount of risk (Kliem, and Ludin, 2019). The choice of contract is the subject of a second transfer tactic. A fixed-price contract, for instance, could be used by the owner to transfer risk to the developer or supplier (Hailu, 2018). The risk-accepting developer should insist on a higher price to account for the danger.
- In contrast, a developer seeking to pass risk to the owner would want a cost-plus contract that includes payment for costs as well as a cut of profits.

Because he is taking on the danger in this situation, the owner should only drive for a little fee. There are several forms of agreements that can be drafted to divide the project risk between the parties (Kloppenborg, 2015).

- Employ an authority to carry out the risk and hold them responsible.

All transfer solutions merely require someone else to take on the risk; none of them eliminate it (Akinbile, Ofuyatano, Oni, and Agboola, 2018).

iii) Mitigate Risk

Strategies for risk mitigation involve trying to reduce it. One can lessen the risk's likelihood or effect if it materializes (Cooper et al., 2017). Risk can be reduced by doing more thorough project preparation. Making less-than-ideal decisions as alternatives is what mitigation entails. To lessen the likelihood of the danger, one could create prototypes, run simulations, or use model testing.

iv) Accept Risk

For risks believed to be minor, this is frequently used. If they arise, the project team manages them. Unless one wants to take the risk, there might not be much one can do. Acceptance is a possibility when a risk has a low likelihood, a little effect, or no action that can be performed that is appropriate (Kendrick, 2015).

v) Examine Risk

According to Mohamed (2017), sometimes learning more about a risk is the best course of action.

- His initial research strategy is to gather more and/or better information so that the project team is aware of the situation. Projects are frequently carried out in an environment that is changing quickly and where decisions must be taken quickly, frequently based on faulty and partial information.
- Another research technique is to confirm presumptions. Risks result from assumptions that turn out to be wrong.
- Another study technique is to test a project's viability on a modest scale first.

These research techniques are effective at minimizing threats and maximizing opportunities.

b) Strategies to Deal with Positive Risks (Opportunities)

There are three strategies; exploit, share, and enhance to handle only positive risks that improve the attainment of project objectives (Huemann, Eskerod, and Ringhofer, 2016). They should be supported or promoted.

i) Exploit Risk

To reap the benefits of the risk event, it must be ensured that it will unquestionably occur. Identifying trigger conditions will enable the project manager to ask for the project to be given a higher priority if they are met (Lammers and Garcia, 2017). An organization must allocate more or better resources to the project, remove obstacles, and increase its visibility in management reviews to take advantage of chances (Chowdhury, 2021).

ii) Share Risk

Transference and sharing are related concepts, but the goal of sharing is to give the chance to the one who will benefit from it the most (Saldaña, 2015). For instance, the project team may create a brand-new good or service that is so ground-breaking that the parent company is unable to fully utilize it. In this situation, the parent company might (a) spin off a quick-thinking affiliate, (b) create a joint venture with a different company, or (c) offer the product's rights for sale.

iii) Enhance Risk

If actions cannot be taken to guarantee that the opportunity will occur, then responses might be taken to enhance its probability or its beneficial impact if it does transpire. The project manager should identify key drivers of these positive impacts and develop strategies to capitalize on them. Adding more or better resources is one way of enhancing opportunities (Smith and Merna, 2017).

2.11.6.2 Risk Register Updates

It is necessary to update the risk register with the outcomes of the response plans. Each danger must be noted together with the reaction plan. Each risk is given to an "owner,"

who is a specific person. It is their responsibility to comprehend the trigger and put the plan into action (Pinto and Slevin, 2019). Included should be any modifications that need to be addressed to the communications plan, resource allocations, project schedule, or budget.

2.11.6.3 Risk Response Matrix

The Risk Response Matrix is a byproduct of the risk response planning process. Gido and Clements' (2015) provides a detailed breakdown of the information contained in the risk response matrix/plan in Figure 2.7.

RISK	IMPACT	LIKELIHOOD OF OCCURRENCE (L, M, H)	DEGREE OF IMPACT (L, M, H)	ACTION ON TRIGGER	RESPONSIBILITY	RESPONSE PLAN
Rain on Day of Event	• Low attendance • Incur financial loss	M	H	Weather forecast two days before event	Laura	• Reserve indoor space now • Recruit extra volunteers to work around the clock to set up indoors • Develop detailed plan
Road Construction	• Reduced attendance • Reduced revenue	H	H	Highway Dept. publishes construction schedule	Allison	• Identify alternate routes • Have signs made • Post signs along all routes • Announce in news media

Figure 2.7:Risk Response Matrix Example (Source: Gido and Clements, 2015:89)

A tool for evaluating and handling hazards is the risk response matrix. Assisting to

- List the risk's effects,
- Assess the probability of something happening,
- Establish the extent of the effect,
- Define the catalyst for the action,
- Identify the offender,
- Design an action plan to reduce, eliminate, or accept the risk.

2.14.7 Risk Control

Implementing risk response plans, tracking recognized risks, keeping an eye on residual risks, finding new risks, and assessing the efficiency of the risk management process are all parts of project monitoring and risk control (Pinto and Slevin, 2019). During project planning, a risk management plan is created to direct risk monitoring and controlling operations. Also, a risk register is created to keep track of each danger that has been identified, its priority, potential causes, and potential remedies (Kerzner, 2017). To track and manage project risks, as well as to address them as they arise, both the risk management strategy and the risk register are employed (Kliem, and Ludin, 2019). The following questions are answered using performance data obtained during project execution (Turner, 2016):

- Risk mitigation strategies are efficient,
- Changes in the overall project risk level,
- Changes in the status of recognized specific project risks,
- There are now additional project-specific hazards,
- The approach to risk management is still applicable,
- The initial project assumptions remain true,
- Policies and procedures for risk management are being followed,
- Should contingency reserves for costs or schedules be modified,
- The project's plan is still relevant.

Results of this continuous effort include (PMI, 2017)**:**

- analyzed and planned for new hazards,
- tracked risks are recognized,
- the reanalysis of current dangers,
- monitoring of the conditions that set off contingency plans,
- Review of risk response implementation
- Change management.

The process's outputs:

- Updates to the risk register,
- Updates to organizational processes and assets (such as lessons-learned information that might help future projects),
- asks for changes, and
- modifications to other project documents and the project management plan (Kloppenborg, 2015).

2.11.7.1 Previously Unidentified Risks

For some projects, however, a lot of unanticipated risks could manifest, in part due to inadequate risk planning. Another reason could be that the likelihood of a risk was so remote that it was impossible to plan for it (Cagliano, Grimaldi, and Rafele, 2015). There might not be contingency plans in place to address these risks. The sooner new hazards are identified, the better (Akinbile, et al., 2018). Managing hazards that were not previously known can be done using two categories of project management techniques:

- The project team may be aware of potential hazards that are unknown and may establish a contingency reserve to account for these uncertainties. That seems necessary based on good project management practices (Cooper et al., 2017). Cost and budget reserves might be added in a variety of amounts. The upper limit on reserves is frequently lower than project managers would want due to competitive constraints (Kendrick, 2015).
- Project managers frequently use a variety of good practices. Classification or how these behaviors are categorized depends on the team's total command, limited authority, or no power to influence the events (Huemann, Eskerod, and Ringhofer, 2016).

While many circumstances are outside the project manager's complete control, effective leadership and ethics can help the team and stakeholders accept responsibility for managing the risks.

2.11.7.2 Tools and Methodologies for Risk Control and Monitoring

When project teams do not have contingency plans in place, they frequently must work around unanticipated reactions to risk events (Mohamed, 2017). Additional methods and instruments for risk monitoring and management include:

- flowcharts for processes
- Risk analyses,
- examination of variance and trends,
- measures of technical performance,
- reserve assessment,
- status conferences; and
- regular risk assessments using techniques like the Top Ten Risk Item Tracking method (Kloppenborg, 2015).

2.14.8 Lessons Learned

The monitoring and documentation of risks helps to build up the wealth of insightful lessons discovered throughout the project. Project teams can gather important information for upcoming projects by recording risks, their effects, and the efficiency of risk management measures (Mohamed, 2017). To enhance next risk management procedures, lessons learnt should be incorporated into organizational knowledge databases. Including lessons learned in risk tracking and recording can improve risk identification, risk assessment, and risk mitigation (Lammers and Garcia, 2017). Businesses can improve their risk management procedures and raise the probability of successful project results by utilizing the experiences and insights learned from earlier initiatives (Rasheed, et al., 2018). The importance of lessons learned in risk tracking and recording must be summed up, the value of capturing and using lessons learned for effective risk management must be emphasized, and a proactive approach to lessons learned is required to improve project success and organizational performance (Kerzner, 2017).

2.15 Institutional Theory

Institutional Theory is a prominent framework in the field of organizational sociology that examines how social structures, norms, and rules shape the behavior and practices of organizations (Furusten, 2023). Institutional Theory in risk management is an approach

that seeks to understand how social, cultural, and regulatory institutions shape the practices, processes, and outcomes of risk management within organizations (Haveman, and Gualtieri, 2017). It emphasizes that organizations are embedded in wider social systems and are influenced by institutional forces, norms, and expectations.

According to Institutional Theory, organizations adopt and conform to institutional pressures to gain legitimacy and maintain their social standing. Institutional Theory suggests that organizations are not isolated entities, but rather embedded within a broader social and cultural context (Powell, and Bromley, 2015). As such, they are subject to a range of external pressures and influences that shape their risk management practices. These pressures can come from external institutions, such as laws, regulations, and industry standards, as well as internal institutions, including organizational cultures, values, and norms (Haveman, and Gualtieri, 2017). In the field of risk management, two types of Institutional Theory are commonly applied to understand the influences on organizational risk management practices. These types are:

2.20.1 Normative Dimension

Normative Institutional Theory focuses on the social norms, values, and expectations that guide risk management practices within organizations. It examines how organizations conform to prevailing norms and standards established by professional associations, industry regulations, and societal expectations (Greenwood, Meyer, Lawrence, and Oliver, 2017). Normative pressures drive organizations to adopt risk management practices that are considered legitimate, appropriate, and responsible within their institutional context. Compliance with these norms helps organizations gain legitimacy and maintain their social standing (Haveman, and Gualtieri, 2017). This perspective emphasizes the role of moral and ethical considerations in risk management decision-making.

2.20.2 Coercive Dimension

Coercive Institutional Theory emphasizes the role of external forces, such as laws, regulations, and regulatory bodies, in shaping risk management practices within organizations (Furusten, 2023). Coercive pressures compel organizations to adopt specific

risk management practices to comply with legal requirements and regulatory frameworks. Non-compliance may result in penalties, fines, reputational damage, or loss of legitimacy (Haveman, and Gualtieri, 2017). Organizations adapt their risk management strategies and processes to align with external coercive pressures, ensuring compliance and avoiding potential sanctions. This perspective highlights the influence of legal and regulatory environments on risk management practices.

2.20.3 Cognitive Dimension

This perspective focuses on the cognitive processes and shared beliefs that underlie risk management practices. It explores how organizations' perceptions of risk, uncertainty, and potential threats are influenced by social and cultural factors (Powell, and Bromley, 2015). Cognitive institutional theorists examine how organizations' risk management decisions are shaped by shared mental models, interpretive frameworks, and collective sense-making.

Institutional Theory posits that organizations are guided by a set of shared beliefs, values, and norms that are collectively known as institutional logics (Powell, and Bromley, 2015). These institutional logics shape the way that organizations perceive and respond to risk. For example, a risk management practice that is considered legitimate and acceptable within one institutional logic may be viewed as illegitimate and unacceptable within another institutional logic (Greenwood, et al., 2017). Institutional Theory also highlights the importance of institutional pressures in shaping risk management practices. These pressures can come from a variety of sources, including regulatory bodies, professional associations, and societal norms. Institutional pressures can influence risk management practices by shaping the goals and values of organizations, as well as the resources and strategies that they use to manage risk (Haveman, and Gualtieri, 2017).

In the context of risk management, Institutional Theory focuses on how organizations perceive and respond to various institutional influences to manage risks effectively (Furusten, 2023). It explores how institutional factors shape risk management practices, decision-making processes, risk assessment frameworks, risk reporting, and risk

governance structures within organizations. Key concepts within Institutional Theory in risk management include:

- **Institutional Isomorphism**

Organizations tend to conform to prevailing institutional norms and practices to gain legitimacy and reduce uncertainty. This can lead to the adoption of similar risk management practices across organizations within an industry or sector (Ocasio, W., Thornton, and Lounsbury, 2017).

- **Institutional Logics**

Organizations operate within multiple institutional logics, which are sets of beliefs, values, and assumptions that guide their actions and decisions. Different logics may influence risk management practices, such as a logic of compliance or a logic of sustainability (Powell, and Bromley, 2015).

- **Institutional Pressures**

Organizations face external and internal pressures to conform to institutional expectations. External pressures can come from regulators, industry associations, and stakeholders, while internal pressures can arise from organizational cultures and values (Furusten, 2023).

- **Institutional Complexity**

Organizations operate in environments characterized by multiple and sometimes conflicting institutional demands (Greenwood, et al., 2017). This complexity can pose challenges for risk management, as organizations must navigate and reconcile these diverse institutional pressures.

Institutional Theory in risk management provides a lens to understand how organizations respond to external pressures and adopt risk management practices to meet institutional expectations (Ocasio, Thornton, and Lounsbury, 2017). It emphasizes the influence of institutions on risk management decisions and practices, highlighting the need to consider both internal organizational factors and external institutional factors in understanding and analyzing risk management processes and outcomes. By applying Institutional Theory to risk management, researchers and practitioners gain insights into the social and cultural aspects that shape risk management practices, as well as the dynamics of institutional change and adaptation within organizations (Kieser, 2015). This perspective highlights the

importance of understanding and addressing institutional influences to improve risk management effectiveness and ensure organizational resilience. Overall, Institutional Theory provides a valuable lens for understanding the complex interplay between institutions and risk management within organizations (Ocasio, et al., 2017).

2.16 The integration of multiple theories and literature used in Risk Management

In the field of risk management, the integration of multiple theories and literature helps provide a comprehensive understanding of the complex nature of risk and its management (Kieser, 2015). Key theories and literature that are often integrated within risk management research are as follows:

2.16.1 Decision Theory

Decision theory provides a foundation for understanding how individuals and organizations make choices under uncertainty. It explores concepts such as expected utility, risk preferences, and decision-making processes (Haveman, and Gualtieri, 2017). Integrating decision theory into risk management research helps analyze how risk-related decisions are made and evaluate the effectiveness of risk management strategies.

2.16.2 Agency Theory

Agency theory examines the relationship between principals (e.g., shareholders, stakeholders) and agents (e.g., managers) and how conflicts of interest may arise (Greenwood, et al., 2017). It helps analyze the alignment of incentives, monitoring mechanisms, and contractual arrangements in managing risks. Integrating agency theory in risk management research sheds light on the role of governance structures and control mechanisms in mitigating risk (Ocasio, et al., 2017).

2.16.3 Institutional Theory

Institutional theory explores the influence of formal and informal institutions on organizational behavior and practices (Furusten, 2023). It examines how external pressures, norms, and rules shape risk management processes. Integrating institutional theory into risk management research helps understand the institutional forces that

influence risk management practices, adoption of standards, and compliance with regulations (Haveman, and Gualtieri, 2017).

2.16.4 Stakeholder Theory

Stakeholder theory focuses on identifying and managing the interests of various stakeholders. It emphasizes the importance of considering the expectations and impacts of stakeholders in decision-making processes (Kieser, 2015). Integrating stakeholder theory in risk management research helps identify relevant stakeholders, understand their risk perceptions, and develop strategies to address their concerns.

2.16.5 Resilience Theory

Resilience theory explores the capacity of systems to absorb disturbances, adapt, and recover. It emphasizes the importance of flexibility, redundancy, and learning in managing risks and responding to unexpected events. Integrating resilience theory in risk management research helps analyze the resilience of organizations and systems to various risks and shocks (Greenwood, et al., 2017).

2.16.6 Behavioral Economics and Psychology

Integrating insights from behavioral economics and psychology helps understand how cognitive biases, heuristics, and emotions influence risk perception, decision-making, and risk management practices (Ocasio, et al., 2017). It provides a more nuanced understanding of human behavior in risk contexts.

2.16.7 Industry-specific and Contextual Literature

Risk management research often integrates industry-specific literature, such as financial risk management, operational risk management, or environmental risk management (Furusten, 2023). Additionally, contextual factors, such as organizational culture, leadership, and technological advancements, are often considered to provide a more comprehensive understanding of risk management practices within specific contexts (Haveman and Gualtieri, 2017).

Integrating these theories and literature enhances the understanding of risk management by considering individual decision-making, organizational dynamics, institutional influences, stakeholder perspectives, system resilience, and contextual factors (Kieser, 2015). Such integration contributes to a more holistic and multidimensional approach to managing risks effectively.

2.17 Chapter Summary

The literature review investigates the influence of particular risk management techniques and tactics on project success. The efficiency of risk identification, assessment, mitigation, and monitoring methods used in the construction business is examined. The usage of risk registers, risk matrices, Monte Carlo simulations, and other regularly used techniques for risk management in construction projects are also included in the debate. The chapter also emphasizes the importance of project governance, corporate culture, and leadership for the effective use of risk management techniques. It investigates the effects of organizational variables on the procedures and results of risk management in building projects. Additionally, the alignment of risk management with project objectives and stakeholder expectations is considered in the evaluation, as well as how risk management is incorporated into project management approaches. The literature review has provided a comprehensive understanding of risk management practices and their relevance to project success, drawing insights from various disciplines and theories. The following chapter of research methodology which will Research design, research philosophy, paradigms and approaches. The population and the sampling representative of participants will also be incorporated and the data management protocol.

Chapter 3 - Research Methodology

To guide this investigation, this chapter outlines the methodology employed in this study, emphasizing the research design, data collection and analysis techniques, as well as ethical considerations.

3.1 Introduction

The framework for this study is outlined in this portion of the research paper. It outlines the study's goals and objectives to guarantee that the chosen design gathers the necessary data to solve the problem. The chosen technique and processes for data gathering and analysis are described in this section. It describes the data's strengths and shortcomings and explains the chosen method of analysis. The action plan for performing the study is developed as part of the research design. It evaluates the study's objectives, determines the sources of information, chooses an appropriate design strategy, sample methodology, and considers the research's timeline and cost (Creswell, 2017). This research will be exploratory in character, which means it will seek fresh insights into a phenomenon, evaluate it in a new light, and raise questions (Renault, and Agumba, 2016).

A thorough technique is required to study contractors' risk perceptions and knowledge management, as well as the execution of risk management within the construction industry. The technique includes a thorough study of the literature on the topic as well as empirical data collecting using a questionnaire and semi-structured interviews (Bryman, 2015). The data gathering process or analysis procedure that creates non-numerical data is called a qualitative approach.

3.2 Location of the study

The study on "The Exploration of the Influence of Risk Management on the Success of Construction Projects" was conducted in Kwazulu Natal Raubex KZN project Site Office at Avoca (Durban). Raubex KZN is currently the largest construction company in South Africa, and it’s known for its numerous construction projects, making it an ideal location to investigate the relationship between risk management and project success

Raubex KZN offers a rich and varied landscape for construction projects, encompassing both small and large road developments. The company has experienced significant growth in recent years in the construction industry This diverse construction environment provided a robust foundation for investigating the influence of risk management on project success across different sectors and project types. The location also offered a conducive setting for the study due to its accessibility and infrastructure.

3.3 Methodology of the study

This section describes the methodical technique that will be taken to carry out the study and find the answers to the research's questions or hypotheses. The procedures, approaches, and methods that will be used to gather and evaluate data are explained in detail and in clear terms. This section is very important since it shows how rigorous and valid the research method was.

3.3.1 Research Philosophy

The set of beliefs, presumptions, and values that direct a researcher's approach to acquiring knowledge and comprehending reality is referred to as research philosophy (Butler-Kisber, 2018). It offers the researcher a framework for decision-making regarding research design, data collection, analysis, and interpretation. Interpretivism, positivism, and pragmatism are the three main research philosophies that are frequently applied in dissertations (Hammarberg, Kirkman, and de Lacey, 2016).

3.3.1.1 Interpretivism

Interpretivism emphasizes the individualized and contextual character of knowledge and the interpretation of constructs, concepts, assumptions and problems of the phenomenon (Butler-Kisber, 2018). It is often referred to as constructivism or social constructionism. It makes the supposition that reality is socially produced through people's interactions and judgments and the researcher is interwoven intertwined with the research. Interpretivists hold that investigating subjective meanings, cultural contexts, and the complexity of social relationships are essential to comprehending human behavior and social phenomena (Creswell, 2017; Butler-Kisber, 2018). In accordance with this idea, research frequently makes use of qualitative techniques to fully capture the variety and depth of human

experiences, such as interviews, observations, and textual analysis (Burkholder, Cox, and Crawford, 2016).

3.3.1.2Positivism

The foundation of positivism is the conviction that knowledge may be attained by empirical investigation, measurement, and experimentation (Bryman, 2015). It places a strong emphasis on objectivity, empirical data, numerical and statistical analysis and the quest for general principles or causal connections. Positivists look for generalizable patterns and consider the social environment as existing outside of people (Hammarberg, et al., 2016). For testing hypotheses and determining causal linkages, quantitative techniques, statistical analysis, and deductive reasoning are frequently used.

3.3.1.3Pragmatism

A study philosophy known as pragmatics places an emphasis on the integration of many viewpoints and the practical application of knowledge (Burkholder, Cox, and Crawford, 2016). Depending on the study issue and circumstance, it acknowledges the usefulness of both qualitative and quantitative methodologies. Pragmatists concentrate on resolving issues and producing information that is useful in practical settings (Molina-Azorin, 2016). They might employ mixed approaches, blending methodologies for gathering and analyzing both qualitative and quantitative data. For the purposes of this paper, Interpretivism, also known as constructivism or social constructionism research philosophy will be used.

3.3.1.4 Phenomenology

Hofstede et al. (2010) postulate that when phenomenon is a focus of the research specifically in a multi-disciplinary research, it is pivotal for the researcher not to be oblivious in taking the cognizance of the values and attitudinal factors in an organizational context which is the focal point of the study .In the context of this study in terms of the alignment with its objectives constructs such as risk perception, risk cognition amongst employees or management, resources and capabilities thus follow the prescripts of the phenomenology philosophical discourse.

For the purposes of this study, interpretivism research philosophy will be adopted because interpretivism offers a holistic and contextually sensitive approach to investigating the influence of risk management on the success of construction projects, emphasizing the importance of subjective interpretations, qualitative data analysis, contextual embeddedness, reflexivity, and emergent inquiry.

3.3.2 Research Approach

In dissertations, the term "research approach" describes the overarching framework or methodological viewpoint that researchers use to analyze a research issue or respond to research questions (Charmaz, 2014). The entire research process, including data collection, analysis, and interpretation, is shaped by the guiding concept and set of principles provided by it. Qualitative, quantitative, and mixed techniques are the three primary research strategies applied in dissertations.

3.3.2.1 Qualitative Approach

A research methodology known as the qualitative approach focuses on examining and comprehending complex social processes through a careful investigation and interpretation of non-numerical data (Charmaz, 2014). It seeks to elucidate the significance, subjective experiences, and social setting of certain people or groups. The study of textual or visual data is one of the qualitative research methodologies, along with focus groups, observations, and interviews (Mishra, and Alok, 2022). This strategy places a strong emphasis on adaptability, contextuality, and the creation of detailed, descriptive insights. The researcher attempts to create a theory using the qualitative approach.

3.3.2.2 Quantitative Approach

To test hypotheses, spot trends, and establish correlations between variables, the quantitative approach requires the systematic gathering, analysis, and interpretation of numerical data. It uses statistical analysis to interpret the data and seeks to generalize findings to a bigger population (Charmaz, 2014). Structured surveys, experiments, or statistical modeling methods are frequently used in quantitative research. It places a strong emphasis on objectivity, reproducibility, and deductive

reasoning. The researcher is attempting to test a hypothesis using the quantitative approach (Halcomb, and Hickman, 2015.

3.3.2.3 Mixed Methods Approach

To provide a thorough grasp of the research problem, the mixed methods approach includes aspects of both qualitative and quantitative research. It does this by integrating the advantages of both paradigms (Creswell and Poth, 2018). Both qualitative and quantitative data must be gathered, examined, and interpreted in a single study. Sequential designs (where one approach comes after the other) or concurrent designs (where both methods are utilized at the same time) can be used in mixed methods research (Charmaz, 2014). The advantages of this method in terms of data collecting and analysis are its depth and breadth (Tashakkori, Teddlie, and Johnson, 2015).

Inductive and deductive approaches, which refer to various methods for reasoning and deducing conclusions from evidence, go hand in hand with qualitative and quantitative research techniques. In a dissertation, these methods direct the process of data processing and interpretation (Mishra, and Alok, 2022). While the deductive approach is frequently connected to quantitative research techniques, the inductive approach is frequently connected to qualitative research techniques.

3.3.3 Inductive and Deductive Research Methods

Inductive and deductive research approaches are two contrasting methodologies commonly employed in research. These approaches play a fundamental role in shaping the research process, offering distinct pathways for theory development and empirical validation. Understanding the characteristics and applications of inductive and deductive methods is essential for researchers seeking to employ the most suitable approach for their research inquiries.

3.3.3.1 Inductive Approach

Moving from specific observations or data to further generalizations or ideas is part of the inductive approach (Burkholder, et al., 2016). Using a bottom-up methodology, researchers

first gather and examine data before developing theories or interpretations based on trends and themes that appear in the data (Charmaz, 2014). Researchers can develop new theories and insights based on actual data by using inductive reasoning.

3.3.3.2 Deductive Approach

In the deductive method, generic theories or hypotheses are followed by specific observations or information (Halcomb, and Hickman, 2015). Using a top-down methodology, researchers first identify pre-existing theories or hypotheses before gathering and analyzing data to verify, confirm, or deny them. In deductive reasoning, particular predictions or expectations are derived from general principles, and after that, evidence is gathered to confirm or refute those predictions (Charmaz, 2014).

3.3.4 Research Approach Selected and Reasons

A qualitative study methodology is highly suitable for this research paper due to the complexity and multi-dimensional nature of risk management in construction. Qualitative research allows for a deep exploration of the experiences, perceptions, and attitudes of key stakeholders involved in construction projects, including project managers, contractors, and clients (Tashakkori et al., 2015). Through methods such as interviews, focus groups, and observations, researchers can gain in-depth insights into how risk management practices are conceptualized, implemented, and perceived in real-world construction contexts (Butler-Kisber, 2018). Construction projects are influenced by various contextual factors, including project scope, budget constraints, regulatory requirements, and stakeholder dynamics. A qualitative approach enables the researcher to contextualize risk management practices within these unique settings, offering a nuanced understanding of the challenges and opportunities faced by construction projects (Collins, and Stockton, 2018).

By examining real-life examples and case studies, qualitative research can uncover practical strategies and lessons learned from successful and challenging projects, providing valuable recommendations for enhancing risk management in the construction industry (Patton, 2015). Furthermore, qualitative research is well-suited for exploratory studies, such as investigating the influence of risk management on project success. As the topic

may involve complex relationships and unforeseen factors, qualitative methods allow for the emergence of new themes and insights not captured by quantitative approaches (Charmaz, 2014). Cresswell, and Poth, (2017) postulated the flexibility of qualitative research also allows the researcher to adapt the data collection process as new information arises, ensuring that all relevant aspects of risk management are thoroughly explored. Overall, a qualitative study methodology empowers researchers to gain a holistic understanding of risk management's influence on construction projects, leading to practical and actionable recommendations for improving project success and risk management practices in the construction industry.

For the purposes of this paper, a qualitative (inductive) research approach will be used.

3.3.5 Research Paradigms

Epistemology, ontology, and axiology are three study paradigms that refer to core philosophical viewpoints that support the researcher's understanding of knowledge, reality, and values (Burkholder, et al., 2016). These paradigms affect a dissertation's design, techniques, and interpretations as well as the researcher's approach to knowledge creation.

3.3.5.1 Epistemology

The researcher's conception of knowledge and how it is acquired is referred to as epistemology. It investigates issues such as: What knowledge is, how does one obtain it, and how verifiable it is. The research process, including the choice of research methods and data analysis techniques, is influenced by many epistemological viewpoints.

- **Positivist Epistemology**: The importance of objectivity and applying scientific methods to learn is emphasized by positivism (Mishra, and Alok, 2022). It emphasizes a quantitative method that uses measurement and observation to find general principles and causal connections.
- **Constructivist Epistemology**: Constructivism emphasizes the importance of individuals in creating meaning and interpreting reality while acknowledging the subjective character of knowledge (Hammarberg, et al.,

2016). It is consistent with qualitative research methodologies that emphasize comprehending many viewpoints and subjective experiences.

3.3.5.2 Ontology

The researcher's conception of the nature of existence and reality is referred to as ontology (Greener, 2022). It considers issues like: What exactly the social world is like, and if reality is unbiased or biased. The researcher's perspective on what may be researched and how it might be comprehended is shaped by various ontological viewpoints.

- **Objectivist Ontology:** According to objectivism, there is an independent reality that does not depend on human perception. It is consistent with quantitative research techniques that look for generalizable trends and universal truths (Halcomb, and Hickman, 2015).
- **Constructivist Ontology:** According to constructivism, reality is a social construction that is susceptible to human perception and social context (Mark, Philip, and Adrian, 2019). It works well with qualitative research techniques that seek to comprehend the various, individualized, and subjective experiences of people.

3.3.5.3 Axiology

The axiology of a researcher is their perspective on the morals and ethics of their research. It considers issues such as: What the researcher's core principles and beliefs are, and what impact they have on the research process. The research design and interpretation of findings are influenced by the values, prejudices, and ethical considerations of the researchers, according to axiology.

- **Objectivist Axiology**: According to objectivism, research should be objective and devoid of personal biases, with a goal of neutrality (Tashakkori, et all., 2015). It places a focus on reducing biases and guaranteeing objectivity in the gathering and interpretation of data.
- **Subjectivist Axiology**: Subjectivism recognizes that researchers' values, worldviews, and subjectivity are brought to the study process (Denzin, 2017). It emphasizes the significance of reflection and openness in recognizing and dealing with the researchers' effect on the study (Butler-Kisber, 2018).

3.3.6 Research Strategy

Interviews are classified according to their formality and structure; they can be extremely organized and codified, or they can be unstructured and casual (Zhang and Wang, 2016). Semi-structured interviews, which are non-standardized and commonly referred to as qualitative research interviews, are the sort of interviews chosen in this research paper (Renault, and Agumba, 2016). This sort of interview allows for the collection of qualitative data in the form of comprehensive responses from respondents, as well as the exploration of internal knowledge sources (Molina-Azorin, 2016).

These sorts of interviews will be utilized as part of the research to confirm findings from questionnaires (Mark, Philip, and Adrian, 2019). The advantage of a semi-structured interview over a completely structured interview is that it allows for a more comprehensive knowledge of the respondents' perspective and framework, free of the researchers' assumptions (Burkholder, Cox, Crawford, and Hitchcock, 2019). A semi-structured interview may also benefit from being more attentive than an unstructured interview, while allowing the respondent to reply freely and spontaneously and keeping a high level of flexibility (Dissanayake, 2015). Twelve interviews will be done to learn about risk management attitudes and practices in the construction sector, as well as how risk knowledge is handled and dispersed (Morse, 2016).

The interview questions will be open-ended to allow for a conversation as well as further inquiries concerning the topic. The interviews will last at least 30 minutes and will be performed in person, over the phone, or electronically using Microsoft Teams or Zoom. All respondents were asked if they wanted to be videotaped during their interview, and they all said yes. The reason for recording the interviews is that it permits greater concentration on the conversation rather than taking notes, and it increases the research's trustworthiness because rapidly produced notes aren't as dependable as recordings and transcripts. The recordings also have the benefit of preserving records for future use.

3.3.7 Design and Methods

A researcher's overall strategy and organizational framework used to study a specific research problem or question thoroughly and methodically is referred to as research design (Tracy, 2019). It includes the choice and use of tools, protocols, and methods for data collection and analysis as well as the logical structure that directs the entire research process. An effective research plan makes sure the study is carried out with clarity, reliability, and validity, allowing the researcher to reach significant conclusions and add to the body of information already in existence (Hammarberg, et al., 2016).

The study is significantly shaped by the research design. It offers a precise road map for gathering, analyzing, and interpreting data and serves as the research's blueprint (Collins, and Stockton, 2018). The type of research challenge, the research questions or hypotheses, the resources available, and the disciplinary or methodological traditions of the field will all have an impact on the specific study design chosen (Hammarberg, et al., 2016).

3.3.8 Population of the Study

A population in research is the total collection of people, things, or phenomena that have something in common and are of interest to the researcher (Maxwell, 2019). It stands for the bigger target population to whom a study's results are supposed to be extrapolated. The definition of the population is essential since it aids researchers in determining the parameters of their study and guarantees that their conclusions apply to the target group (Busetto, Wick, and Gumbinger, 2020). A key component of research design is the definition of the population, which influences the choice of the sample, the data collection techniques, and the generalizability of the results (Aurini, Heath, and Howells, 2021). To guarantee that the research objectives are in line with the relevant group of interest and to improve the validity and applicability of the study's findings, it is crucial to define the population in a dissertation in detail.

The population for this study is chosen based on their industry experience, with a minimum of 3 years and an average of more than 10 years. Site engineers, foremen, site managers, site agents, health and safety officers, contracts manager, production manager, and

construction manager are among the vocations. Due to limited knowledge and expertise, any junior personnel with less than 3 years of experience will be excluded from the research, which may jeopardize the information's credibility and any conclusions taken from it.

3.3.9 Sampling Methods

A sample is a subset or a smaller representative group that has been chosen from the wider population of interest in a study. Studying a whole population is impractical and frequently impossible because of constraints on time, resources, and accessibility (Maxwell, 2016). As a result, scientists utilize samples to make assumptions and generalize about a wider population. To make sure the sample truly represents the population, the qualities and size of the sample must be carefully chosen (Busetto et al., 2020). Depending on the goals and restrictions of the research, different sampling approaches may be used. The sample should be chosen in a way that provides for accurate and reliable results, making sure that the characteristics of the sample most closely match those of the population.

In research, the two primary types of sampling techniques used to choose participants or units for a study are probability sampling and non-probability sampling.

3.3.9.1 Probability Sampling

This sampling technique gives every member of the population an equal and known chance of being chosen for the sample (Busetto et al., 2020). This strategy makes use of random selection, in which there is a quantifiable likelihood that each person or unit in the population will be selected for the sample. Statistical inference is supported by probability sampling techniques, which enable researchers to confidently estimate population parameters and generalize their findings. The following are typical probability sampling methods (Dissanayake, 2015):

- **Simple Random Sampling**: Selection is carried out at random and without bias, giving each member of the population an equal chance of being chosen.
- **Stratified Sampling**: A random sample is taken from each stratum after the population is divided into smaller groups or strata according to specific features.

- **Cluster sampling**: it involves grouping the population into clusters (such as regions or organizations) and choosing a representative sample from each cluster at random. Data is gathered from every individual within the chosen clusters.

3.3.9.2 Non-probability Sampling

Non-probability sampling refers to sampling techniques that don't use random selection and don't give a clear chance of selection for each person in the population. In non-probability sampling, participants or units are chosen based on predetermined standards or for practical reasons (Merriam, and Tisdell, 2015). Non-probability sampling can be helpful in circumstances where probability sampling is neither practicable nor viable, despite being less rigorous in terms of statistical inference and generalizability. The following are typical non-probability sampling methods (Busetto et al., 2020):

- **Convenience Sampling**: Participants are chosen based on their accessibility or convenient availability.
- **Purposive Sampling**: Participants are deliberately chosen based on traits or domain knowledge pertinent to the research project.
- **Snowball Sampling**: Following the identification and recruitment of first participants, these people refer to more people who fit the study's requirements.

In qualitative research, exploratory studies, or other circumstances where the goal is to understand cases or phenomena rather than draw general conclusions about a community, non-probability sampling techniques are frequently used (Creswell, 2014). Non-probability purposive research sampling will be employed for the purposes of this work. Twelve people will make up the sample size for this study. Based on Boddy (2016)'s recommendation that using less than 20 participants in a qualitative research study will produce better findings, this sample size was adequate. A small number of instances (less than 20), in accordance with Humble, and Radina, (2018), will enable the researcher to establish a close link with the respondents and enhance the validity of fine-grained, in-depth inquiry in realistic situations. The following are the demographics of the selected participants:

Table 3.1: Participants Demographics

Pseudonym	Position	Gender	Years of Experience
Participant 1	Contracts Manager	Male	29
Participant 2	Construction Manager	Male	21
Participant 3	Site Agent	Male	12
Participant 4	Site Agent	Male	6
Participant 5	Quality Manager	Male	5
Participant 6	Quality Manager	Male	5
Participant 7	Site Engineer	Male	10
Participant 8	Senior Health and Safety Officer	Male	22
Participant 9	Site Engineer	Male	22
Participant 10	Site Agent	Male	17
Participant 11	General Foreman	Male	16
Participant 12	Site Agent	Male	11

3.4 Data Collection

In research, the systematic process of acquiring, compiling, and logging information or data that is pertinent to the subject is known as data collection (Maxwell, 2016). It entails choosing pertinent data collection methods and strategies that are in line with the study's goals and open-ended research questions. The gathering of data is an essential part of conducting research since it offers the empirical foundation for analysis and interpretation (Busetto et al., 2020).

There are several different kinds of data collection techniques utilized in research. The nature of the study, the research objectives, the resources at hand, and the desired depth and breadth of the data all influence the choice of data gathering technique. Typical forms of data collection techniques include (Burkholder, 2019):

- **Surveys and questionnaires**: Surveys and questionnaires entail asking a sample of people a series of predefined questions. Researchers can gather information using

this strategy about attitudes, beliefs, habits, or demographics. Interviews, online platforms, and paper-based forms can all be used to conduct surveys.

- **Interviews**: Direct communication between the researcher and the participants takes place during interviews. Depending on the level of freedom in the interview guide and the breadth of information sought, it may be organized, semi-structured, or unstructured. By allowing participants to communicate their viewpoints, experiences, and insights, interviews produce valuable qualitative data.
- **Observations**: In a controlled or natural environment, observations entail routinely observing and documenting behaviors, events, or occurrences. Direct observation or the use of video or audio recordings are both acceptable methods. Depending on the research situation, observations might offer either qualitative or quantitative data.
- **Document Analysis**: Examining and interpreting written or recorded materials, such as government documents, archives, diaries, or media content, is what document analysis entails. Based on already published writings, it can offer historical background, policy analysis, or content analysis.
- **Experiments**: To examine cause-and-effect linkages, experiments entail altering variables in a regulated setting. Using comparisons between experimental and control groups, this approach enables researchers to pinpoint causal linkages. Both laboratory and real-world settings can be used to conduct experiments.

For the purposes of this paper, interview research data collection method will be used.

3.5 Time Horizon

The time horizon in research refers to the study's duration or temporal scope. It describes the time span during which data is gathered and examined to address the goals and provide answers to the research questions (Busetto et al., 2020). The time horizon aids in defining the study's parameters and gives context for comprehending the findings and their applicability (Bryman, 2015). Depending on the nature of the study and the dissertation's particular goals, the time frame may change. Cross-sectional, longitudinal, and retrospective are the three temporal periods that are most frequently utilized in research.

3.5.1 Cross-sectional Time Horizon

A cross-sectional time horizon entails gathering data at a particular moment in time or across a brief period (Dissanayake, 2015). It offers a momentary snapshot of a population or phenomenon, enabling researchers to learn more about the factors of interest at that precise time. For describing the prevalence, distribution, and relationships between variables at a specific period, cross-sectional studies are helpful (Hennink, Hutter, and Bailey, 2020).

3.5.2 Longitudinal Time Horizon

Data collection over a longitudinal time horizon often requires several data points taken at various intervals over a long period of time (Creswell, 2014). It enables researchers to look at how individuals, groups, or populations have changed, trended, or developed over time. Insights into the dynamics of events, including the causes, effects, and interrelationships of variables throughout time, are provided by longitudinal investigations (Byrne, 2016).

3.5.3 Retrospective Time Horizon

Examining earlier events or data falls under the category of a retrospective temporal horizon (Hennink et al., 2020). Researchers gather historical data and evaluate it to learn more about past trends, actions, or consequences. Retrospective studies attempt to reconstruct and comprehend occurrences that have previously occurred by using records, documentation, or people's memories of past events (Crabtree, and Miller, 2023).

The choice of time horizon depends on the research questions, objectives, and available resources and for the purposes of this paper, the cross- sectional Time Horizon will be used.

3.6 Trustworthiness of the Data

The credibility, dependability, and validity of the data gathered for a research study are referred to as the data's trustworthiness (Creswell and Creswell, 2017). It makes sure the data is precise, consistent, and understandable so that researchers can base their conclusions and assertions on solid evidence. Maintaining the rigor and quality of the research findings depends on establishing trustworthiness (Hennink et al., 2020). Several

standards are frequently employed in qualitative research to evaluate the veracity of data (Greener, 2022). Credibility, transferability, dependability, and confirmability are some of these standards, which are frequently related to qualitative data analysis.

3.6.1 Credibility

Credibility is the degree to which the findings fairly represent the opinions and experiences of the participants (Morse, 2016). By making sure that the study design, data collection techniques, and data analysis procedures are exhaustive, open-minded, and in line with the research objectives, it entails proving the reliability of the data. The legitimacy of qualitative data can be improved by methods including member checking, peer debriefing, and extended participation (Bryman, 2015).

3.6.2 Transferability

The degree to which the results can be used in or applied to different contexts or settings is referred to as transferability (Maxwell, 2019). It entails giving readers detailed and thorough descriptions of the research setting, participants, and research techniques so they may judge whether the findings can be applied in similar circumstances (Hennink et al., 2020). By providing a thorough explanation of the sampling procedure, data gathering techniques, and background information, researchers can increase transferability.

3.6.3 Dependability

Continuity and consistency of the research findings across time and among different researchers are referred to as dependability (Byrd, 2020). It entails recording the research process and giving an audit trail, including the decisions made, data gathering strategies, and analytic processes. To increase the reliability of qualitative data, triangulation, which involves using various data sources or techniques to confirm conclusions, can be used (Creswell, and Creswell, 2017).

3.6.4 Confirmability

The impartiality and neutrality of the research findings, which ensures that they are unaffected by the researcher's prejudices or preconceptions, are referred to as confirmability (Byrd, 2020). It entails keeping a record of all steps taken during the

research process so that it may be examined and assessed by other researchers (Aurini et al., 2021). The confirmability of qualitative data can be improved through strategies like reflexivity, peer review, and researcher transparency (Collins, and Stockton, 2018).

Triangulation will be employed to give a way to guarantee that the data gathered, and the interpretations produced are reliable and credible (Greener, 2022). Triangulation is the process of analyzing a research subject using several sources, approaches, or viewpoints (Byrd, 2020). It supports conclusions, reduces biases, and improves the research's overall trustworthiness. For the purposes of this paper, data triangulation which is the process of examining a research subject utilizing data from multiple sources, will be used. Interviews, observations, and document analysis from past projects will all be combined to produce a thorough understanding.

3.7 Data Analysis

In terms of research, data analysis is the process of turning raw data into relevant information, seeing patterns, correlations, and trends, and coming to conclusions based on the goals and open-ended questions of the study (Merriam, and Tisdell, 2015). To evaluate and make meaning of the gathered data, proper statistical or qualitative approaches must be applied (Creswell and Creswell, 2017). Depending on the type of data and the research strategy, many techniques and procedures are utilized for data analysis in research. Thematic research data analysis will be employed to complete this report.

3.7.1 Thematic Analysis

This study will utilize Thematic Analysis as a qualitative research method to explore the influence of risk management on construction project success. Thematic Analysis is chosen due to its ability to provide in-depth insights into the experiences, perceptions, and attitudes of stakeholders involved in construction projects. By identifying and analyzing patterns and themes in the data, this approach allows for a comprehensive exploration of the complexities of risk management practices and their impact on project outcomes. Through this in-depth understanding, the study aims to offer valuable recommendations and strategies for enhancing risk management in construction projects, contributing to successful project execution in a dynamic and challenging industry landscape.

Thematic analysis is a method for studying qualitative data that focuses on finding and examining themes or patterns in the data. To create themes that accurately represent significant concepts or phenomena, the data must be properly coded and categorize (Byrd, 2020). Thematic analysis offers a rich and comprehensive knowledge of the experiences, viewpoints, and beliefs of participants. Braun and Clarke (2021) state that there are six (6) phases in a thematic analysis undertaking namely:

- **Familiarization**: During this stage, the researcher reads the materials they have gathered repeatedly to become comfortable with the data. This process aids the researcher in being fully immersed in the information, absorbing it thoroughly, and seeing emerging concepts or patterns.
- **Generating Initial Codes**: The researcher starts coding the data in this step by locating and marking significant units or segments. These first codes, which capture the substance of the data, can be either interpretive or descriptive. Line-by-line coding is used by the researcher to give codes to pertinent areas of the data.
- **Searching for Themes**: In this step, the researcher looks through the dataset to find prospective themes. The patterns or ideas that repeat in the coded data are called themes. The researcher examines the codes for similarities, distinctions, and variations before beginning to group them into probable themes.
- **Reviewing Themes**: In this step, the researcher examines the themes to make sure they appropriately reflect the main points of the data. The researcher analyzes the connections between themes, considers various theories, and then clarifies or modifies the topics as necessary. Comparing codes and themes across the dataset is what this stage entails.
- **Naming and Defining Themes**: In this section, the researcher names and characterizes each topic that has been found. The definitions the researcher comes up with encapsulate the essence of the theme and set it apart from other themes in a clear and succinct manner (Creswell and Creswell, 2017). The names of the topics are appropriate and pertinent, reflecting their meaning and content.
- **Writing up**: In this last step, the researcher combines the topics into a well-organized story or report. Using pertinent data extracts, the researcher presents a

thorough description and interpretation of the results. To help readers comprehend the ideas and the scope of the research, the report may incorporate quotes, examples, or illustrations.

3.7.1.1 The Coding Process

The coding process begins with familiarization, where the researcher becomes immersed in the data collected from interviews, documents, and archival records related to risk management in construction projects. This step is followed by generating initial codes, wherein segments of data relevant to risk management practices and project success are assigned descriptive labels or codes. These codes are then organized into potential themes, involving collating similar codes that capture specific aspects of risk management's influence on project outcomes.

The subsequent step, named theme searching, involves refining and reviewing potential themes to ensure they accurately capture meaningful patterns in the data. Themes are then named and defined, creating a coherent narrative that elucidates the relationship between risk management and project success. Throughout this process, constant comparison and back-and-forth movement between data segments, codes, and emerging themes ensure the depth and validity of the analysis (Terry, and Hayfield, 2021).

The final stage of the coding process involves mapping and defining themes, where the relationships between themes and subthemes are elucidated, highlighting their connections and hierarchies. This results in a comprehensive and structured representation of the data that underpins the exploration of risk management's impact on construction project success. By following this systematic coding process, the study aims to offer nuanced insights into the intricate interplay between risk management strategies and project outcomes in the construction industry. In this qualitative study, the data analysis employs the thematic analysis approach, encompassing open, axial, and specialized coding stages, as inspired by Strauss and Corbin's (1998) grounded theory methodology. By employing these three coding phases, this study not only captures the intricate dynamics of risk management but also elucidates its role in shaping project outcomes. The coding process helps uncover the

multifaceted relationship between risk management strategies and construction project success, contributing to both scholarly discussions and practical implications.

3.7.1.1.1 Open Coding

The open coding phase initiates the analysis process, involving the researcher's immersion in the data to identify significant concepts, ideas, and patterns associated with risk management and project success. Data segments related to risk identification, assessment, mitigation, and stakeholder collaboration are systematically labeled with descriptive codes. This phase aims to generate a comprehensive set of initial codes that capture the diverse dimensions of risk management practices within construction projects.

3.7.1.1.2 Axial Coding

The axial coding phase follows, wherein the researcher identifies connections between the initial codes, grouping them into categories or subthemes that reflect overarching concepts. Themes such as "Proactive Risk Identification" or "Stakeholder Engagement for Risk Mitigation" may emerge, highlighting the complex relationships and interactions between various risk management aspects. This phase adds structure and organization to the analysis, allowing for a deeper understanding of how different facets of risk management interrelate.

3.7.1.1.3 Specialized Coding

The specialized coding phase, akin to selective coding, focuses on refining and solidifying the themes identified during axial coding. The researcher delves into the selected themes, scrutinizing data excerpts and codes within each theme to capture their essence accurately. This stage involves linking subthemes, supporting them with illustrative data, and constructing a coherent narrative that underscores the influence of risk management practices on construction project success.

3.7.2 Data Themes

The data theme identification and analysis involve a systematic approach to derive insights from semi-structured interviews, aligning with the research objectives. The aim is to uncover the impact of risk management on construction project success through the

perspectives of interview participants. Semi-structured interviews were conducted with diverse stakeholders involved in construction projects, and the interviews were designed to gather a range of insights and experiences related to risk management strategies and their effects on project outcomes. Interview recordings were transcribed verbatim, ensuring accuracy in capturing participants' words and expressions.

The initial coding of open coding was used where the transcripts were reviewed line by line to identify significant words, phrases, and concepts that pertain to risk management and project success. These segments were then assigned descriptive codes to capture the essence of each idea. For the theme generation, the codes were grouped into preliminary themes based on their similarities and associations. These themes align with the research objectives. In the axial coding phase, relationships between the initial themes were explored. The data was re-examined to identify patterns and connections that provide a more holistic understanding of how risk management practices interact with each other and contribute to project success.

The identified themes were refined and defined more precisely. This involved revisiting the coded data segments and identifying sub-themes or variations within each main theme. Data excerpts from the interview transcripts were selected to exemplify each theme. These excerpts serve as illustrative examples that showcase participants' viewpoints and experiences. Using the refined themes and selected data excerpts, a coherent narrative was constructed that aligns with the research objectives. These narrative paints a comprehensive picture of the intricate relationship between risk management and project success, as perceived by the interview participants. The constructed narrative was then validated by comparing it back to the original interview data, ensuring that the interpretation remains faithful to participants' perspectives.

From the data analysis theme formulation, four dominant themes were prevalent from the participant’s statements each in line with a specific research objective in the study. The themes include a) the general perception and attitude of risk and risk management in the construction industry, b) the level of risk management knowledge exists within the

construction industry, c) the practical implementation tools and techniques adopted in relation to risk management, and d) how effective are the tools and techniques that exist in relation to risk management. As illustrated in Table 4.1, the dominant themes were further broken down into emergent sub-themes.

3.8 Research Instrument

In this qualitative research study, semi-structured interviews were chosen as the primary data collection method to gain deep insights into the influence of risk management practices on the success of construction projects. The development of the research instrument, comprising open-ended questions and prompts, as well as the thematic analysis approach employed. Data was collected through the semi-structured interviews with key stakeholders involved in construction projects within Kwazulu Natal and South Africa at large. The interviews took place at the participants' workplace where they are responsible for overseeing construction activities. The selected participants represented a diverse range of roles within the construction industry. They were chosen purposively based on their expertise and experience in managing construction projects and their involvement in risk management practices. The research instruments used in this study are described below:

- **Semi-Structured Interview Questions:**

The semi-structured interview guide serves as a framework for conducting interviews with key stakeholders involved in construction projects, including project managers, contractors, engineers, and risk management professionals. The guide consists of open-ended questions designed to elicit detailed responses and insights on various aspects of risk management and project success. Questions are organized around key themes, such as:
Perceptions of risk management practices: Participants are asked to describe their experiences with identifying, assessing, mitigating, and monitoring risks in construction projects. They are encouraged to discuss the effectiveness of existing risk management strategies and any challenges or limitations encountered.

- **Informed Consent Form:**

Participants are required to sign an informed consent form before participating in the interviews, indicating their voluntary agreement to take part in the study. The consent form outlines the purpose of the research, the interview process, data confidentiality measures, and the rights of participants. It also allows participants to provide consent for audio recording, transcription, and the use of anonymized quotes or excerpts in academic publications or presentations.

- **Audio Recording Equipment:**

Interviews are audio-recorded using digital recording devices to ensure accurate capture of participants' responses and minimize the risk of data loss or distortion. Participants are informed of the recording process and given the opportunity to decline audio recording if they prefer. Audio recordings are securely stored and transcribed verbatim for subsequent analysis.

These research instruments are designed to facilitate comprehensive data collection and analysis, enabling the exploration of risk management dynamics and their impact on the success of construction projects from multiple stakeholder perspectives.

3.8.1 Development of Interview Questions

The interview questions were crafted to explore participants' perceptions and experiences related to risk management in construction projects, ensuring a comprehensive understanding of the topic. Questions were designed to encourage participants to reflect on their roles, experiences, and observations within the context of construction project risk management.

Questions were inspired by the existing body of literature on construction project risk management, including seminal works by authors such as Kendrick, (2015) on risk and opportunities management in construction projects, and Shah, 2016 on the critical success factors for construction projects in developing countries. These sources provided a foundational understanding of risk management practices and project success criteria.

Furthermore, the interview questions were influenced by established qualitative research methods, drawing upon the work of Braun and Clarke (2021) in thematic analysis. This methodology emphasizes the identification and analysis of recurring themes and patterns within qualitative data. The questions were structured to facilitate the extraction of rich, qualitative data suitable for thematic analysis.

3.9 Ethics Protocol Adherence

Before data collection begins, the University of Kwazulu Natal (UKZN) ethical clearance protocol will be followed, which involves getting the gatekeepers letter and ethical approval from the UKZN research office. Informed consent forms will be created for the recruitment of study participants and approval from UKZN will be acquired. These forms will be read to the participants and signed as confirmation. Informed consent forms will be read to the chosen/desired participants to confirm their assent, and if they agree, they will be asked to sign the forms as a security measure.

The chosen/desired participants will first be formally asked to express an interest in participating. Prior to starting the interviews, participants will be asked for permission to record them and given the assurance that their identities would remain anonymous. The data will be securely stored on a Google OneDrive which will be password protected of which only the researcher and supervisor will have access to, a password and drive web link for the Google OneDrive will be shared with the supervisor to access as and when needed and the data will be deleted upon completion of study.

Ethical considerations were addressed throughout the study to ensure the confidentiality and anonymity of participants. Informed consent was obtained from all interviewees, and they were assured of their right to withdraw from the study at any time. The study also adhered to ethical guidelines provided by the university's research ethics committee. By conducting interviews with construction industry professionals with experience in Kwazulu Natal and other parts of South Africa, this research aims to gain insights into the perceptions, practices, and challenges associated with risk management in construction projects.

3.10 Chapter Summary

The approach used for this paper was developed to investigate how risk management affects the success of building projects. By analyzing how efficient risk management methods can help to reduce and mitigate the negative effects of risks that can occur during construction projects, the study intends to evaluate the relationship between risk management and the success of construction projects.

Using a qualitative approach, the study objectives will be met. To understand and analyze human experiences, behaviors, and social interactions, this strategy requires gathering and analyzing non-numerical data, such as words, photos, or observations. As a result of the inductive methodology used in qualitative research, theories and conclusions are created based on the data gathered and examined rather than being tested against pre-existing hypotheses. By using a qualitative approach, the study topic can be explored in greater depth and with greater detail. This methodology chapter concludes by outlining the dissertation's study design, data gathering procedures, data analysis strategies, and ethical considerations. The conclusions will be more valid and reliable because of the qualitative approach's thorough grasp of "What the influence of risk management on the success of construction projects is" This study intends to add to the body of knowledge on the exploration of the influence of risk management on the success of construction projects by using a strict and organized methodology.

Purposive sampling was used to choose the sample for this study. Site engineers, foremen, managers, agents, health and safety leaders, contracts managers, production managers, and construction managers will make up the target population. Based on the qualitative research's saturation point, the sample size was chosen. Thematic analysis will be used to identify and interpret patterns, themes, and categories in the qualitative data. Appropriate steps, such as triangulation, will be implemented to assure the validity and trustworthiness of the findings. In this study, ethical issues will also be covered. From the UKZN ethical review board or committee, approval will be requested. All participants will be asked for their informed consent, and their confidentiality and anonymity will be always maintained during the research process.

Chapter 4 – Analysis of Results

4.1 Introduction

This chapter of this dissertation delves into the illustration or demonstration of responses that have been extracted from contribution that the participants have made and shedding light on the underlying patterns, themes, and interactions within the collected data. The researcher organized the coding material which were generated from excerpts and extracts into basic, organizing and global themes that culminated into the identification of meaningful patterns thus resulting into the categorization of both main themes and sub or emergent themes.

4.2 Analysis of Results

4.2.1 Objective 1: Examine the general perception and attitude of risk and risk management in the construction industry.

Main Theme:

Pervasiveness of risk throughout out the organization in its entirety and its impact on the organizational growth, profitability and sustainability both relationally and hierarchically.

Emerging Themes:

- Risk can be both a threat and opportunity.
- Risks must be identified.
- Risks must be mitigated or avoided.
- Risk is important and must be taken seriously.
- It is everybody's job to manage risk.
- It is management's job to manage risk.

Participant 10 enunciated: *"There are certain risks that you know are going to happen given past jobs and then of course there's risk you can't foresee and with other opportunities arising from risk is basically that cloud in the silver lining that you've got to look for in a risk"* which supports the notion that factors such as personal experiences, cultural backgrounds, and cognitive biases influence risk perception. Studies by Slovic (1987) and Kahneman and Tversky (1979) elucidate the role of heuristics and biases in shaping risk perception (Walker, 2015).

Participant 1 mentioned: *"Risk means that people can get hurt or be killed and get ill."*;
Participant 2 explained: *"Risk is a situation involving exposure to danger and by identifying risks and reporting it will minimize injuries to employees";*
Participant 3 averred that *"Everything that can end up badly"*;
Participant 4 voiced that *"Safety hazards that lead to injuries, poorly defined scope or incomplete drawings"*;
Participant 5 stated that *"all the issues on site or in a workplace that could affect time, health and safety, money";*
Participant 7 expressed : *"anything that can cause financial loss or damages or sickness to health or anything like that";*
Participant 11 noted that *"risk is something that you have to take into account when you perform an activity during your program and it's the possibility of something going".*

This attitude exhibited in the above inputs is in agreement with Caglianoetal., (2015) when they stated that the construction industry is renowned for its complex and dynamic environment, characterized by numerous uncertainties and potential hazards. One of the participants (Participant 11) even mentioned that *"to me risk is the number one priority or aspect in the construction industry, whether it's project risk, external risk.* Construction equals risk so if you're a contractor you're basically a risk manager" Saaidin, Endut, Akmar, Samah, Ruslan, and Rizduan, (2016) which is in line with the perception of risk above.

The perception of risk in the construction industry is multifaceted. Stakeholders, including owners, contractors, and subcontractors, may perceive risks differently based on their roles, experiences, and the project context. Research by Zou et al. (2016) suggests that subjective judgments and biases influence how individuals perceive and prioritize risks in construction projects.

4.2.2 Objective 2: Examine the level of risk management knowledge that exists within the construction industry.

Main Theme:

Creation of a culture of proactive and comprehensive by both the leadership and employee's commitment and sensitivity on the mitigation of risk in terms of its scope and content which could be internal and external oriented.

Emerging Themes:

- Some knowledge is based on formal education of risk management.
- There are mostly average skills and knowledge to identify and handle risks.
- The best way to handle risk is to analyze its impact and mitigate.
- Risk is best handled by people with more knowledge.
- Consciously looking for risk helps identify it.
- Brainstorming sessions with team members help improve knowledge and skills in risk management.
- There are barriers to knowledge sharing and skill transfer that require attention.

To investigate what methods or strategies are employed by the participants to identify and handle risk,

Participant 2 expounded *"By doing daily inspections before work commences and then duration of the day whilst work is ongoing. When identifying risks/hazards, stop fix or mitigate. And for strategy I use near miss reports, daily inspections, visible felt leadership and plan task observations."*

Participant 3 reported *"Identifying Risk comes with experience in the construction industry, there are some common risks across all projects. Make sure risks are recorded on a Risk Register and reviewed often. There are common risks across all construction projects but obviously some more site-specific risks."*

Participant 4 indicated *"Firstly, by knowing all the requirements of the project and all the risks that comes with each task in order to prevent or limit any risk. Evaluate the risk and decide what matters the most. Having a checklist and risk monitoring register is a strategy to use."*

Participant 5 mentioned that *"well I suppose that comes from experience. You learn what things don't work. For risk handling, you analyze it and its impact."* The information above concurs with research by Ruqaishi, and Bashir, (2015) reveals that many construction

professionals possess a limited understanding of risk management concepts, leading to suboptimal decision-making.

Participant 6 outlined that *"experience and looking at production activities to see where things can go wrong. Strategize with the team how to handle risk and see what plans you can make to resolve the risk, go to site, have meetings to hear what other people see as risks."*

Participant 7 claimed *"On my own I would say I would consider every detail I come across and check whether or not it's going to cause financial loss or harm to personnel. I'll normally seek advice from a more experienced person just to get some advice on it and then of course any measures I'm gonna take I'll get Okayed by the construction manager. Careful analysis of every situation we're going into, not just simply going forward but making sure that all the paperwork is in place everything is in accordance with project specification and legislation."* Historically, risk management in construction primarily focused on safety concerns. However, as projects grew in scale and complexity, the need for a comprehensive approach to risk management became apparent. Early methodologies emphasized reactive strategies, but contemporary practices advocate for proactive identification, assessment, and mitigation of risks (Love et al., 2019).

Participant 8 commented *"by seeing what's happening on site basically going to site identifying walking through watching analyzing. so, you have to identify it first then analyze it to see what you can do to mitigate it. Either reduce the risk or how to work around the risk if there's no way to mitigate it."*

Participant 9 stipulated *"in terms of spotting risk on site, when I'm driving around you already look for what risks could potentially cause havoc within the work industry; in terms of commercial risks that's all got to do with shortness's of material so that is all tracked in the office. I look at the severity of the risk what could be caused if the risk was not mitigated or handled properly. we work with a method statement and around that method statement we know the safe working procedures and safe operating procedures off of a certain task and that's when the team will sit around the table, and they'll come up with a risk assessment based on the exact task at hand."* The initial step in risk management involves identifying potential risks. This process has become more sophisticated with the integration

of advanced technologies such as Building Information Modeling (BIM) and data analytics (Tengan, Oyewobi, Ogungbile, and Oke, 2016).

Participant 10 pointed out that *"to me its experienced based, I know where the risk is going to come from its the new risk that's a problem. the risks that are highlighted to me normally Financial and then they have their own subcategories basically when you trace where the losses come from and some are from the health and safety aspect but that's someone else's job, I look for quality risk, cashflow risk and time risks. you just have to deal with it and try to eliminate it as much as you can, some you can't eradicate but you've just have to handle."*

Participant 11 declared *"I think to spot risk, you must have a mentality of looking out for risk you must be aware of things, if you're inclined not to see risk then you wouldn't look for it and you wouldn't be able to identify it so it's a mentality that you have to see risk. Then you evaluate it obviously you must see what the consequences of the risk."*. Collaborative efforts among stakeholders are emphasized to enhance risk response effectiveness (Iqbal, et al., 2015).

Participant 12 expressed "*For me it's mostly from experience, then to handle risk id inform the right person to action it and go through the right channels."* Studies by Valipour, A., Sarvari, and Tamošaitiene, (2018) and Chen et al. (2018) highlighted the gaps in risk assessment skills and the misalignment between perceived and actual risk knowledge among industry participants which is evident at Raubex KZN.

When asked whether the participants have taken any risk management courses, participant 3, 5, 6, 8, 10, and 12 averred they have not but have average acceptable knowledge of risk management based on experience. Participant 1,2,4,7,9, and 11 expounded they have taken courses although mainly from the Occupational Health and Safety aspect, while participant 11 stated that he is currently studying risk management as a module in school. Various factors contribute to the current level of risk management knowledge in the construction sector. Educational institutions play a significant role in shaping professionals' understanding of risk management principles (Alsulaili et al., 2019). However, limited emphasis on risk management within formal education curricula often leaves professionals ill-prepared to handle complex risk scenarios (Fewings, and Henjewele, 2019).

Participant 3 when asked if the company offers risk management training voiced *"Yes and no, I suppose if it's required the company will provide, currently its only provided to certain people in management"* which shows that there is no real commitment of management to risk management training provision for the overall company. Integrating risk management education into formal construction management programs (Samarghandi, Mousavi, Taabayan, Mir Hashemi, and Willoughby, 2016), offering specialized training courses (Valipour, et al., 2018), and promoting professional certifications (Walker et al., 2015) can help enhance professionals' understanding of risk management practices.

It is important to note that in addition to no formal education training for risk management there are barriers in the construction industry itself that hinder knowledge sharing and skills transfer in relation to risk management. As stated by the participants, these barriers include (a) lack of involvement where people often leave these matters to the designated person rather than getting a whole team involved, (b) unskilled and untrained persons, (c) time factor in the form of busy schedules, difficulty in arranging meetings, because of personnel availability from other sites to discuss the risks they have encountered, (d) lack of communication, (e) personnel exclusion where training is only offered to certain individuals e.g., management and (f) lack of focus on risk management.

4.2.3 Objective 3: Explore the practical implementation tools and techniques adopted in relation to risk management.

Main Theme:

The integration and synthesis of risk mitigation diagnostic tactics and efforts through a systematic investment and risk identification control measures in a strategic and holistic manner.

Emerging Themes:

- Lack of formal education is a disadvantage.
- Lack of focus on overall risk management training is a disadvantage.
- Risk assessment reports which employ risk matrices are the most common tools.

- The planning phase of risk management is the most important.
- Risk identification is the most important process in risk management.
- There are barriers to knowledge sharing and skill transfer that require attention.

Participant 3 shared that "*Past construction experience and to engage with all levels of people on site to identify what they see as potential Risk items. This will then be discussed with management and added / updated on the project risk register*" which is in line with Aven, (2015) when he stated that brainstorming sessions, Delphi method, SWOT analysis (Kerzner, 2019), and Failure Mode and Effect Analysis (FMEA) (Aven, 2015) are commonly used methods. Additionally, risk registers, checklists, and lessons learned databases help capture past experiences and insights. Qualitative techniques such as Risk Matrix (Cagliano, et al., 2015) and Risk Scoring Systems offer simpler but effective means of prioritizing risks, this literature concurs with Participant 7's statement of saying *"here we do use the risk matrixes where we basically start off by identifying hazards and then and identify the risks that can result from that and then quantifying that risk".*

Research by Cagliano, etal., (2015) highlights the significance of allocating adequate resources, setting clear risk mitigation strategies, and aligning risk management activities with project goals during the planning stage. This supports the statement made by Participant 7 enunciating that *"I'd say the planning phase simply because that's your (First) 1st opportunity to start identifying risks and of course then you can implement preventative measures rather than reactive measures"*.

Research by Aaltonen et al., (2015) underscores the role of regular risk reviews, analyzing risk triggers, and adjusting response plans to ensure alignment with changing project dynamics. This is in agreement with Participant 7's statement voicing, *"Each step is quite important but from my experience I believe monitoring and review of the risk is often very important because it's something that often gets forgotten so we'll do a risk assessment, and it will sit in a file and often times it gets left there then it becomes forgotten, so it never gets updated".*

When asked which phase of risk management is the most important, Participant 2,3,4,6, and 7 stipulated planning, the planning phase involves considerations of risk allocation and management within contracts. Studies by Burtonshaw-Gunn, (2017) emphasize the importance of clear contractual arrangements in the construction industry to address risks effectively. Advancements in technology, such as Building Information Modeling (BIM) and data analytics, have influenced the planning phase of risk management. Participant 1,9 and 12 commented on monitoring; The risk monitoring and controlling process involves continuous evaluation, response adjustment, and managing emerging risks. Research by Cagliano, et al., (2015) highlights the need for real-time risk monitoring, feedback loops, and adapting response strategies as project conditions evolve.

Participant 5 and 8 pointed to implementation, the risk implementation process involves executing risk response strategies. Studies by Burtonshaw-Gunn, (2017) emphasize the necessity of proactive planning, clear communication, and continuous monitoring during the implementation of risk mitigation and contingency plans. and Participant 10 and 11 declared initiation, during project initiation, preliminary risk assessments lay the foundation for the project's risk management strategy. Studies by Rahimi et al. (2018) emphasize the importance of identifying project objectives and stakeholders' risk tolerances during this phase to shape risk management efforts.

When asked which process of risk management is the most crucial. Participants 1,2,3,4,5,6,8, and 11 stated that identification of risks is the most crucial. The risk identification process involves systematically identifying potential risks that could impact project objectives. Studies by Burtonshaw-Gunn, (2017) highlight the importance of involving diverse stakeholders, employing structured techniques, and leveraging historical data to comprehensively capture risks during project initiation. Effective risk management requires a seamless integration of all processes. Research by Akinbile, et al., (2018) emphasizes that each process is interdependent and contributes to a cohesive risk management framework. Continual feedback and learning from each phase enhance the overall effectiveness. Each risk management process presents its own challenges. Risk identification may miss latent risks, assessment can be subjective, and implementation may

face resource constraints. Ensuring stakeholder engagement throughout processes is crucial for successful risk management (Gardiner, 2017).

4.2.4 Objective 4: Examine how effective are the tools and techniques that exist in relation to risk management.

Main Theme:

Risk impediments and constraints identification, analysis, application and evaluation in augmenting business sustainability and prosperity.

Emerging Themes:

- Experience is the most effective tool.
- Risk registers are helpful.
- Tools can only be effective when used and shared.
- Tools can only be effective if there is effective communication.

When asked what methods they use to draw lessons from prior projects, Participants 3,5,7,10,11 and 12 expressed that experience is the most efficient method they use to draw lessons learned from previous projects in risk management.

Participants 1,2,4,6,8,9 averred that postmortem or lessons learned reports are the most efficient method they use. Participant 10 stated that *"like I said it to me its experienced based, I know where the risk is going to come from its the new risk that's a problem".*

Participant 3 outlined that *"All comes down to experience and discussing previous projects risk schedules"* and Participant 9 explained that *"so each project we draw up risk registers from the project and those risk registers are tracked on a severity level as I mentioned a couple times and then obviously as you go into your next job and your next job, those risk registers are analyzed risks to make sure that we deal with new risks on new jobs better than how we dealt with them on previous jobs"*. Akinbile, et al., (2018) concur that case studies, in this case previous projects provide valuable insights into the practical effectiveness of risk management tools and techniques. The analysis of case studies from diverse industries offers empirical evidence of successful risk management implementation, including their impact on project schedule, cost, and quality.

Participants 2,3,4,5,6,7,8, and 10 declared that the standard of risk management at Raubex KZN is good, while Participants 1,9 and 12 mentioned that it is very good and Participants 11 expounded that it is not good. Participant 11 substantiated his reason of not good as *"we are good at identifying risks on a high-level management side but resolving them not so good because if we were good then majority of our projects would be successfully completed with the projected profits but there are losses"* and Participant 9 claimed that *"we've got a massive health and safety drive in terms of risk management etc. so I'd say very good but also a risk management as a whole it's decent it's not great it's not bad it's not good it's decent there's work that could be done there".* Tools such as Risk Registers, Brainstorming, and Delphi Method are used to identify and assess risks. Research by El-Sayegh (2008) demonstrates how systematic risk identification contributes to better risk mitigation strategies. Focusing on risks that align with project objectives enhances effectiveness (Hillson and Murray-Webster, 2017).

The majority declaring that the standard is good state it is because of the experience Raubex KZN has had and its evolution over the years with a hunger to continuously improve. Participant 7 reported that *"I would say it is quite good especially now that Raubex is taking steps to even further improve although it's coming from a health and safety standpoint it is a culture that can seep into other departments with regards to risk managements"* while Participant 10 indicated that *"well if I look at the company itself, I'd say that this company has been in the fore front of risk because they are the biggest construction company in SA and you can't get to that point without seeing and dealing with the risk and going through the processes" and* Participant 12 noted that *"I think they have been around for so long and developed over the years".* Hillson and Murray-Webster, (2017) argue that the effectiveness of risk management tools and techniques is often measured by their ability to enhance decision-making, reduce negative impacts, and improve project or operational performance.

Participants 1,2,3,4,5,7, and 9 stated that their risk communication in construction projects is very effective, Participants 6,8,10 and 12 stated that it is effective, and Participant 11

expressed that his is not effective. Participant 4 stated *"It is highly effective, if something goes wrong, there will already be an action plan in place to handle it"* and Participant 7 voiced that *"I would say it is quite good especially now that Raubex is taking steps to even further improve although it's coming from a health and safety standpoint it is a culture that can seep into other departments with regards to risk managements".* Walker et al., (2018) concurs in stating that transparent communication channels encourage stakeholders to share their insights and concerns regarding potential risks.

Participant 11 disagreed expressing that *"I think it's not very effective but purely because we don't make it a priority, we should put a lot more emphasis on it. We should actually start our meetings by managing our risk, and there's enough platforms but we're not talking a lot about risk. We're always talking about health and safety, production and environment but we not talking about the risk, or sometimes we do talk about risk, but we don't highlight it as risk".* Kutsch and Hall, (2019) state that effective risk communication faces challenges related to information distortion, differing stakeholder interests, and cultural barriers.

4.3 Chapter Summary

This chapter synthesizes the rich insights gained through semi-structured interviews with industry experts and a comprehensive literature overview that the empirical contribution from the participants. The study aimed to achieve four key objectives and associated main themes as well as the emerging themes. Through in-depth interviews and a detailed literature review integration, the study explored the general perception and attitude towards risk in the construction industry. The findings revealed a spectrum of attitudes, ranging from risk aversion to a proactive embrace of risk as an inherent aspect of project dynamics. The interviews provided firsthand accounts of how stakeholders perceive and navigate risks in their respective roles, contributing nuanced perspectives to the existing body of literature. The literature review complemented these insights by contextualizing them within broader industry trends and theoretical frameworks, forming a comprehensive understanding of the industry's collective attitude towards risk management.

The investigation into the level of risk management knowledge within the construction industry drew upon insights from industry experts on the practical knowledge and competencies possessed by professionals engaged in risk management. It was found as a major theme that most knowledge stems from experience, however, literature review outlined how the existing educational frameworks, certifications, and training programs available to construction practitioners can be useful as formal education to supplement the experience currently used as the main source of knowledge. The synthesis of these sources provided a comprehensive picture of the industry's current state of risk management literacy, identifying gaps and areas for improvement.

The exploration of practical implementation tools and techniques blended insights from industry experts who shared their experiences, detailing the tools and techniques they have found effective in managing risks throughout construction projects. With experience and brainstorming being the main themes, the literature review validated and enriched these practical insights, providing a broader context highlighting that by incorporating global best practices and emerging trends the implementation would be more effective. The chapter showcased a diverse array of tools, from traditional risk registers to risk assessment reports, highlighting the need for adaptable strategies in response to the unique demands of each project.

Building on the identified tools and techniques, the study examined their real-world effectiveness within the construction industry and illustrated the accounts of success stories and challenges faced by professionals in implementing these strategies. The literature review augmented these insights. The chapter synthesized findings on the effectiveness of risk management tools and emphasized the dynamic nature of their application, underlining the importance of continual evaluation and adaptation.

Chapter 5 – Conclusion and Recommendations

5.1 Introduction

In conclusion, this dissertation has sought to explore the intricate relationship between risk management practices and the success of construction projects. Through qualitative semi-structured interviews with key stakeholders in the construction industry, a nuanced understanding of the multifaceted nature of risk management has been unravelled. The findings presented in this study shed light on both the macro and micro perspectives of risk management, providing valuable insights that contribute to the existing body of knowledge in construction project management.

5.2 Conclusion of Findings

5.2.1 Conclusion on Objective One

In essence, the conclusion on Objective One illuminates a multifaceted understanding of how the construction industry perceives and approaches risk. It provides a foundation for the subsequent objectives by laying bare the complexities that underlie risk management practices within organizations.

The exploration of the general perception and attitude of risk and risk management in the construction industry, conducted through semi-structured interviews, has provided invaluable insights into the nuanced perspectives of key stakeholders within the sector. Through a micro-level lens, the qualitative interviews have uncovered rich narratives that offer a deeper understanding of how individuals actively engaged in construction projects perceive, approach, and manage risk.

The semi-structured interviews facilitated a comprehensive examination of the intricacies of risk management practices within the industry. One recurring theme that emerged was the significance of early risk identification. Participants consistently underscored the pivotal role of identifying potential risks at the project's inception, emphasizing its impact on subsequent phases. This aligns with existing literature on the transformative potential of proactive risk management in enhancing project outcomes.

Project managers, in particular, emerged as central figures in navigating the uncertainties inherent in construction projects. Their narratives emphasized not only the technical aspects of risk management but also the critical need to foster a risk-aware culture within project teams. This aligns with the broader understanding that effective risk management extends beyond procedural frameworks to encompass organizational culture and leadership.

5.2.2 Conclusion on Objective Two

The in-depth interviews provided a platform for stakeholders to share their experiences with the implementation of risk response strategies, demonstrating the practical implications of proactive risk management as advocated by Burtonshaw-Gunn, (2017). The project managers' narratives highlighted the importance of continuous monitoring and adaptation of risk management strategies during the project lifecycle, aligning with the principles of real-time risk management outlined by Cleden, (2017). The study, grounded in the lived experiences and perceptions of those actively involved in construction projects, contributes a valuable qualitative dimension to the existing body of literature on risk management in construction.

The role of leadership in fostering a risk-aware culture was a recurrent concept throughout the interviews. Effective risk management requires not only robust processes but also a cultural shift that encourages proactive risk identification and collaborative problem-solving. Leadership, therefore, emerges as a linchpin in steering construction projects towards success amidst the inherent uncertainties.

While the interviews highlighted the strides made in recent years in integrating risk management principles into construction practices, challenges and gaps persist. Some participants noted the need for enhanced training programs and a greater awareness of emerging risks, emphasizing the importance of continuous learning and adaptation. Investing in ongoing education for project teams, fostering a culture of openness and accountability, and leveraging technological advancements for risk assessment and monitoring are essential steps towards fortifying the industry against potential setbacks.

Interviewees pointed to issues such as inadequate communication channels, resource constraints, and the complexity of risk interactions. The study suggests that addressing these challenges requires a holistic organizational commitment to a risk-aware culture and the integration of risk management practices into project planning and execution.

5.2.3 Conclusion on Objective Three

The interviews shed light on the evolving nature of risk management strategies. Traditional approaches, such as risk identification, assessment, and mitigation, remain integral components, but the need for agility and adaptability became apparent. In an era marked by rapid technological advancements and global uncertainties, risk management strategies must be flexible, responsive, and anticipatory. Participants consistently emphasized the importance of a proactive and integrated risk management approach. Successful projects were often characterized by robust risk identification processes at the project inception, followed by systematic assessment and the implementation of well-defined mitigation strategies. The impact of these strategies on cost control, timely delivery, and stakeholder satisfaction emerged as significant determinants of overall project success.

According to the findings, the most prevalent strategies for risk identification among respondents were checklists, previous project experience, and brainstorming during scheduled meetings. Qualitative risk assessment methods were utilized more frequently than quantitative approaches, and the findings show that a simplified assessment strategy was better for work environment hazards, while data-driven methodologies were judged superfluous except for financial threats. In terms of work environment risk, the most popular risk response and monitoring tactics are avoidance, mitigation, and finally acceptance, whereas risk transfer is more typical. As a result of the research, it was discovered that the practical application of risk management was equal to notions in literature about risk identification, reaction, and monitoring. However, the risk assessment differed significantly from the literature. The conclusion is that, while firms conduct processes and concepts similar to theory, they do not share definitions and conceptions. Construction organizations can profit greatly from combining risk and knowledge management. However, this concept is currently underutilized. A solution could be to

segregate and distinguish certain risk repositories, such as the risk register, from the knowledge database, allowing for simpler access to risk information for related projects.

5.2.4 Conclusion on Objective Four

Theoretical models and techniques for risk management are relatively unknown in Raubex KZN, and while equivalent methods are used, risk management adoption is not as structured as outlined in theory. As a result, actors indirectly participate in risk management, comparable to the principles articulated in the literature. However, the most important cause for insufficient risk management implementation and knowledge capture is a lack of time, skill, and corporate culture. Organizational learning in risk management is primarily accomplished via the use of knowledge repositories and communities of practice. Still, the most difficult challenge was establishing an effective method for transferring tacit individual knowledge and disseminating that information throughout the business. Furthermore, the findings of this study demonstrated that risk management was not documented separately in knowledge repositories and that communities of practice did not include risk management as an independent segment, yet risk was always present during these gatherings.

One prominent matter that emerged is the pivotal role of communication and collaboration in effective risk management. Stakeholders emphasized the significance of transparent communication channels, not only within project teams but also across various entities involved in the project. The construction industry's success is inherently tied to the ability of stakeholders to engage in open dialogues, share insights, and collectively navigate the uncertain terrain of risks.

While challenges and complexities abound, the interviews and the postmortem reports also illuminated instances where effective risk management directly contributed to project success. Timely identification and mitigation of risks were associated with smoother project execution, improved stakeholder satisfaction, and, ultimately, project success. These success stories serve as beacons, guiding future endeavors toward a landscape where risk is not merely a hurdle but an opportunity for strategic advantage.

5.3 Synthesis of the Study results

From the macro perspective, it is evident that the success of construction projects is deeply intertwined with the broader industry context. Factors such as project financing, procurement strategies, and industry regulations play pivotal roles in shaping the risk landscape. The literature on megaprojects and the challenges associated with their management underscores the need for a comprehensive and adaptive approach to risk management at the industry level (Flyvbjerg, 2017). Moreover, the examination of project success criteria and client perceptions highlights the dynamic nature of success and the importance of aligning project goals with stakeholder expectations (Gunduz, and Abdi, 2020; He, et al., 2021).

On the micro level, the qualitative interviews have delved into the specific practices and challenges within construction projects. The significance of early risk identification and the integration of risk management into project planning processes (Cagliano, et al., 2015) emerged as critical themes. The role of project managers in navigating uncertainty and fostering a risk-aware culture within project teams has been underscored by the participants. This resonates with the literature on the transformative potential of project managers in converting risk management into a proactive and value-enhancing process (Cleden, 2017).

The meso perspective has illuminated the organizational dynamics that influence risk management practices. The principles of process management and the impact of soft skills, as discussed by Burtonshaw-Gunn, (2017) and Carvalho, and Rabechini Jr, (2017), have been echoed in the interviews. Organizational culture, resource allocation, and the interplay between different stakeholders within the construction ecosystem have been identified as crucial determinants of effective risk management.

5.4 Recommendations

The study recommends a holistic and integrated approach to risk management, including the development of standardized frameworks, technological solutions for real-time monitoring, and the recognition of risk management as a fundamental part of project

development. Leadership, communication, collaboration, and industry-wide initiatives for knowledge sharing are emphasized.

5.4.1 Objective 1 Recommendations

The findings from semi-structured interviews provide valuable insights into the general perception and attitudes toward risk and risk management within the construction industry. To address the identified areas for improvement, targeted recommendations are proposed. Firstly, there is a need for enhanced training programs that specifically focus on shaping a more positive and proactive attitude toward risk. These programs should not only emphasize the technical aspects of risk management but also foster a deeper understanding of the cultural and leadership dimensions. By equipping construction professionals, particularly project managers, with the skills to instill a risk-aware culture within their teams, organizations can create an environment where risks are perceived not just as challenges but as opportunities for strategic advantage.

Furthermore, promoting cross-functional collaboration is essential to cultivate a holistic understanding of risk throughout the industry. This involves breaking down silos and encouraging communication and collaboration between different functional areas within construction projects. Establishing interdisciplinary teams and collaborative risk workshops can facilitate a shared understanding of project risks and encourage a collective approach to risk response strategies. By fostering an environment where insights are openly shared and collective wisdom is harnessed, the construction industry can shift toward a more collaborative and proactive stance in managing risks. These recommendations aim to reshape the overarching perception and attitude toward risk within the construction industry, emphasizing a proactive, collaborative, and value-enhancing approach to risk management.

5.4.1 Objective 2 Recommendations

The insights gleaned from semi-structured interviews provide a roadmap for enhancing the level of risk management knowledge within the construction industry. To address identified gaps, targeted recommendations are proposed. Firstly, there is a critical need to implement focused training programs tailored to address specific deficiencies in risk

management knowledge. These programs should cover fundamental risk concepts, methodologies, and the practical application of risk management tools. By investing in the continuous education of construction professionals, organizations can ensure that their teams are well-equipped to navigate the complexities of risk in the dynamic construction environment.

Moreover, the establishment of knowledge repositories within construction organizations is essential. These repositories should serve as centralized hubs for storing and disseminating information related to risk management, including case studies, best practices, and lessons learned from past projects. Encouraging a culture of knowledge sharing through regular contributions to these repositories will foster a collaborative learning environment. Additionally, the integration of risk management principles into academic curricula is crucial for preparing the next generation of construction professionals. Collaborating with educational institutions to embed risk management concepts into relevant courses ensures that future industry leaders enter the workforce with a strong foundation in risk management.

Furthermore, mentorship programs should be implemented to facilitate knowledge transfer from experienced professionals to junior staff. This mentorship approach provides a practical bridge between theoretical knowledge and its real-world application within construction projects. By harnessing the expertise of seasoned professionals, organizations can accelerate the development of risk management skills among newer team members. These multi-faceted recommendations collectively aim to elevate the overall level of risk management knowledge within the construction industry, fostering a culture of continuous learning and proficiency across all organizational levels. Collaboration and communication across stakeholders should be prioritized. The findings suggest that success in construction projects is not solely dependent on technical expertise but also on the ability to navigate the complex web of relationships within and outside the project team. Industry-wide initiatives for knowledge sharing and capacity building in risk management could enhance the collective resilience of the construction sector.

The role of risk management should also be highlighted as not only meant for managers but for the whole project team. Great clear emphasis must also be given to the entirety of risk management and not only on occupational health and safety risk management. Management should also emphasize the importance of postmortem reports and knowledge sharing which can also be conducted through technology repositories in order to alleviate the issue of unavailability of knowledge sharing sessions on previous projects and lessons learnt. In light of the findings, it is imperative for practitioners and decision-makers in the construction industry to recognize the significance of integrating risk management practices seamlessly across all project phases. The recommendations provided in this study align with the call for a holistic approach to risk management that transcends isolated processes and promotes a continuous learning and adaptation culture within project teams (Akinbile, et al., 2018).

5.4.1 Objective 3 Recommendations

The practical insights derived from semi-structured interviews shed light on the current landscape of practical implementation tools and techniques in risk management within the construction industry. In response to these findings, several targeted recommendations emerge to enhance the efficacy of these tools. Firstly, there is a pressing need for the customization of risk management tools to align with the unique characteristics of each construction project. This involves tailoring strategies and methodologies to suit the specific complexities, size, and nature of individual endeavors. Additionally, the integration of advanced technologies, such as predictive analytics and simulation techniques, can substantially improve the accuracy and efficiency of risk assessments. By leveraging these technologies, construction professionals can gain a more comprehensive understanding of potential risks, enabling more informed decision-making throughout project lifecycles.

Furthermore, the establishment of collaborative risk workshops among key project stakeholders is recommended. These workshops provide a platform for collective brainstorming, assessment, and prioritization of risks, fostering a shared understanding and commitment to risk management. Additionally, the creation of centralized repositories for

documenting and sharing best practices ensures that successful risk mitigation strategies and lessons learned are readily available for future reference. By promoting a culture of continuous improvement, construction professionals can refine and adapt their approach to risk management tools based on practical experiences, creating a dynamic and adaptive framework for addressing challenges and uncertainties within the industry.

5.4.1 Objective 4 Recommendations

In this exploration, several recommendations for practitioners and policymakers emerge. First and foremost, the need for a holistic and integrated approach to risk management is paramount. It is recommended that companies such as Raubex KZN establish a systematic process for regular assessments of the effectiveness of existing risk management tools and techniques. This should include feedback loops from project teams, project managers, and relevant stakeholders to gauge the practical impact of these tools in real-world project scenarios. Ongoing training programs should also be developed and implemented to ensure that project teams are proficient in the use of risk management tools. Regular training sessions can enhance the understanding of the tools' functionalities and promote their effective application in diverse project situations.

A structured feedback mechanism should also be implemented that allows project teams to provide insights on the strengths and weaknesses of existing risk management tools. This feedback loop can inform iterative improvements and adjustments to enhance overall effectiveness. Benchmarking the effectiveness of existing tools against industry standards and best practices can also be conducted. This comparative analysis can identify areas for improvement and guide the adoption of tools that have demonstrated success in similar construction contexts. Fostering a culture of innovation and experimentation by adopting new risk management tools can also be helpful. Project teams be encouraged to explore innovative solutions and technologies that have the potential to enhance the effectiveness of risk management practices.

In moving forward, this research suggests avenues for future exploration, including the development of standardized risk management frameworks tailored to the construction domain and the integration of technological solutions for real-time risk monitoring and

decision support. The industry should move beyond a reactive stance and embrace risk management as an intrinsic part of project development and execution. Project managers, as leaders, should be equipped not only with technical skills but also with the ability to foster a risk-aware culture within their teams. The works of Browning, (2019) emphasize the importance of a robust risk management plan during project initiation, setting the tone for subsequent phases. Furthermore, the research aligns with the studies of Walker et al. (2018), highlighting that effective risk communication and stakeholder engagement throughout the project life cycle are pivotal in ensuring a comprehensive understanding of risks and fostering collaborative risk response strategies.

5.5 Contribution to the Body of Knowledge

The culmination of insights derived from study in the exploration of the influence of risk management on the success of construction projects significantly contributes to the body of knowledge within the construction industry. The qualitative depth provided by the interviews offers a nuanced understanding of how risk management practices impact project outcomes. Firstly, the interviews revealed the multifaceted nature of risk management, emphasizing not only its procedural aspects but also the critical role of leadership, organizational culture, and collaborative efforts in fostering a risk-aware environment.

Moreover, the findings contribute a valuable qualitative dimension to existing literature by delving into the lived experiences and perceptions of individuals actively engaged in construction projects. The narratives shared by project managers and stakeholders provide real-world context, enriching theoretical frameworks with practical insights. The exploration highlights the evolving nature of risk management strategies, showcasing the industry's responsiveness to rapid technological advancements and global uncertainties. The emphasis on early risk identification, integration into project planning, and the adaptability of risk management approaches adds a layer of sophistication to the understanding of effective risk mitigation.

In conclusion, the contribution to the body of knowledge from the study underscores the dynamic interplay between risk management practices and project success within the construction industry. The qualitative insights garnered pave the way for a more holistic and adaptive approach to risk management, recognizing its transformative potential beyond conventional methodologies. This exploration not only informs the current understanding of risk management but also sets a foundation for future research and practical applications, ultimately advancing the collective knowledge within the realm of construction project success.

5.6 Managerial Implications

The study underscores the pivotal role of leadership in fostering a risk-aware culture within construction project teams. The qualitative data highlights that effective risk management extends beyond procedural frameworks to encompass organizational culture and leadership. This places a significant responsibility on project managers to not only possess technical risk management skills but also to champion a cultural shift that encourages proactive risk identification and collaborative problem-solving. Managers should prioritize leadership development programs that equip project leaders with the necessary skills to navigate uncertainty and instill a sense of collective responsibility for risk management within their teams.

The study emphasizes the importance of continuous learning and adaptation in the face of evolving project dynamics. The industry's success in managing risks is inherently tied to the ability of stakeholders, particularly project managers, to engage in open dialogues, share insights, and collaboratively navigate the uncertain terrain of risks. The qualitative findings recommend establishing regular knowledge-sharing mechanisms, such as forums and communities of practice, to facilitate the dissemination of experiences and lessons learned. Managers should also encourage the integration of technological solutions for real-time risk monitoring and decision support, aligning with the transformative potential of technology in enhancing risk management practices. These managerial implications underscore the need for a proactive and adaptive approach to risk management, positioning

it as an intrinsic and dynamic aspect of project development and execution in the construction industry.

5.7 Limitations of the study

This dissertation contributes to the academic discourse by providing qualitative insights into the lived experiences and perspectives of individuals engaged in construction projects. However, it is essential to acknowledge the limitations of this study. The unique contextual factors and industry-specific challenges identified resonate with the notion that effective risk management is not a one-size-fits-all endeavor (Walker, 2015). Rather, it necessitates a tailored approach that considers the intricacies of each project and the diverse perspectives of stakeholders involved.

The qualitative nature of the research provides in-depth insights but may not capture the full spectrum of experiences. Context-specific findings may not be universally applicable, highlighting the need for a tailored approach to risk management in different cultural or regional settings. While the qualitative approach provides depth, it may not capture the full diversity of experiences in the construction industry. Context-specific findings may not be universally applicable, emphasizing the need for a tailored approach to risk management.

In conclusion, the exploration of the influence of risk management on the success of construction projects has unraveled a complex tapestry of interconnected factors. As the industry continues to evolve, embracing a proactive, collaborative, and adaptive approach to risk management will be imperative for ensuring the success and sustainability of construction projects.

References

1. Aaltonen, K., Kujala, J., Havela, L. and Savage, G., 2015. Stakeholder dynamics during the project front-end: the case of nuclear waste repository projects. *Project management journal*, *46*(6), pp.15-41.
2. Ahiaga-Dagbui, Dominic and Smith, Simon. 2018. Rethinking Construction Cost Overruns: Accepted Manuscript.
3. Akinbile, B.F., Ofuyatano, M., Oni, O.Z. and Agboola, O.D., 2018. Risk management and its influence on construction project in Nigeria. *Annals of the faculty of engineering hunedoara*, *16*(3), pp.169-174.
4. Al Mhdawi, M.K., 2020. Proposed risk management decision support methodology for oil and gas construction projects. In *The 10th International Conference on Engineering, Project, and Production Management* (pp. 407-420). Springer Singapore.
5. Alsulaili, A. A., Kartam, N., and Al-Subaih, A., 2019. Evaluation of risk management education in civil engineering curricula. International Journal of Project Management, 37(5), 698-712.
6. Andersen, E.S., 2016. Do project managers have different perspectives on project management? *International Journal of Project Management*, *34*(1), pp.58-65.
7. Aurini, J.D., Heath, M. and Howells, S., 2021. *The how to of qualitative research*. Sage.
8. Aven, T., 2015. *Risk analysis*. John Wiley and Sons.
9. Ayodeji, A., Oluwaseun, A. A., and Oyelami, I. B. 2020. Impact of employee morale on organizational performance: Evidence from selected manufacturing companies in Lagos State. European Journal of Business and Innovation Research, 8(3), 31-40.
10. Bahamid, R.A. and Doh, S.I., 2017. November. A review of risk management process in construction projects of developing countries. In *IOP Conference Series: Materials Science and Engineering* (Vol. 271, No. 1, p. 012042). IOP Publishing.

11. Banna, S., 2018. Business Research Methods.

12. Bao, C., Wu, D. and Li, J., 2018. A knowledge-based risk measure from the fuzzy multicriteria decision-making perspective. *IEEE Transactions on Fuzzy Systems*, *27*(5), pp.1126-1138.

13. Berthod, O., 2018. Institutional Theory of Organizations. 10.1007/978-3-319-20928-9_63.

14. Blaskovics, B., 2016. The impact of project manager on project success—The case of ICT sector. Society and Economy. In Central and Eastern Europe | Journal of the Corvinus University of Budapest, 38(2), pp.261-281.

15. Boddy, C.R., 2016. "Sample size for qualitative research", Qualitative Market Research, Vol. 19 No. 4, pp. 426-432. https://doi.org/10.1108/QMR-06-2016-0053

16. Browning, T.R., 2019. Planning, tracking, and reducing a complex project's value at risk. *Project Management Journal*, *50*(1), pp.71-85.

17. Burkholder, G.J., Cox, K. and Crawford, L., 2016. The Scholar-Practitioner's Guide to Research Design.

18. Burkholder, G.J., Cox, K.A., Crawford, L.M. and Hitchcock, J.H. eds., 2019. *Research design and methods: An applied guide for the scholar-practitioner*. Sage Publications.

19. Burtonshaw-Gunn, S.A., 2017. *Risk and financial management in construction*. Routledge.

20. Busetto, L., Wick, W. and Gumbinger, C., 2020. How to use and assess qualitative research methods. *Neurological Research and practice*, *2*, pp.1-10.

21. Butler-Kisber, L., 2018. *Qualitative inquiry: Thematic, narrative and arts-based perspectives*. Sage.

22. Byrd, R., 2020. Qualitative research methods. *Virtual Class, Memphis. Recuperado em*, *17*.

23. Cagliano, A.C., Grimaldi, S. and Rafele, C., 2015. Choosing project risk management techniques. A theoretical framework. *Journal of risk research*, *18*(2), pp.232-248.

24. Cagliano, A.C., Grimaldi, S. and Rafele, C., 2015. Choosing project risk management techniques. A theoretical framework. *Journal of risk research*, *18*(2), pp.232-248.
25. Carvalho, M.M. and Rabechini Jr, R., 2017. Can project sustainability management impact project success? An empirical study applying a contingent approach. *International Journal of Project Management*, *35*(6), pp.1120-1132.
26. Chan, A. P., Javed, A. A., and Qazi, A. B. 2018. Job satisfaction, organizational commitment, and turnover intention: A case study on employees of a retail company in Hong Kong. International Journal of Organizational Analysis, 26(4), 714-731.
27. Chapman, C., and Ward, S., 2019. How to Manage Project Opportunity and Risk: Why Uncertainty Management Can Be a Much Better Approach Than Risk Management. Wiley.
28. Chen, Y. C., Nguyen, T. A., and Yip, T. L., 2018. Investigating construction professionals' risk perception and attitude toward construction risk management. Journal of Construction Engineering and Management, 144(8), 04018058.
29. Choudhry, R. M., and Fang, D. 2018. Safety management in construction projects: A comparative study of the importance of the PM and workers' perspectives. International Journal of Environmental Research and Public Health, 15(3), 542.
30. Chowdhury, D., 2021. Institutional Theory. https://www.researchgate.net/publication/350751384_Institutional_Theory
31. Cleden, D., (2017). *Managing project uncertainty*. Routledge.
32. Collins, C.S. and Stockton, C.M., 2018. The central role of theory in qualitative research. *International journal of qualitative methods*, *17*(1), p.1609406918797475.
33. Cooper, D. F., Grey, S., Raymond, G., and Walker, P., 2017. Project Risk Management Guidelines: Managing Risk with ISO 31000 and IEC 62198 (2nd ed.). John Wiley and Sons.

34. Cornelissen, J.P., Durand, R., Fiss, P.C., Lammers, J.C. and Vaara, E., 2015. Putting communication front and center in institutional theory and analysis. *Academy of Management Review*, *40*(1), pp.10-27.

35. Crabtree, B.F. and Miller, W.L., 2023. *Doing qualitative research*. Sage publications.

36. Creswell, J., 2017. Research Desing: Qualitative, Quantitative and Mixed Methods Approaches (Vol. 4th Edition). Los Angeles, London, New Dehli, Singapore, Washington DC: SAGE Publications, Inc.

37. Dissanayake, K., 2015. Essentials of business research: A guide to doing your research project. *South Asian Journal of Management*, *22*(4), p.193.

38. Donaldson, L. 2015. The contingency theory of organizations. Sage.

39. Enshassi, A., Mohamed, S., and Abushammala, M. F. 2017. Factors affecting the performance of construction projects in the Gaza Strip. Journal of Engineering, Design and Technology, 15(4), 514-532.

40. Ferguson, M., Carlson, D., Boswell, W., and Whitten, D. 2018. The good, the bad, and the unknown about telecommuting: Meta-analysis of psychological mediators and individual consequences. Journal of Applied Psychology, 103(9), 891-921.

41. Fewings, P. and Henjewele, C., 2019. *Construction project management: an integrated approach*. Routledge.

42. Flanagan, R., and Norman, G., 2019. Risk Management and Construction (4th ed.). Routledge.

43. Flynn, A. and Walker, H., 2021. Corporate responses to modern slavery risks: an institutional theory perspective. European Business Review, 33(2), pp.295-315.

44. Flyvbjerg, B., 2017. Introduction: The iron law of megaproject management. Bent Flyvbjerg, pp.1-18.

45. Flyvbjerg, B., Ansar, A., Budzier, A., Buhl, S., Cantarelli, C., Garbuio, M., Glenting, C., Holm, M.S., Lovallo, D., Lunn, D. and Molin, E., 2018. Five

things you should know about cost overrun. Transportation Research Part A: Policy and Practice, 118, pp.174-190.

46. Frame, J. D., 2015. Managing Risk in Organizations: A Guide for Managers. Wiley.

47. Furusten, S., 2023. *Institutional theory and organizational change*. Edward Elgar Publishing.

48. Gardiner, P., 2017. *Project management: A strategic planning approach*. Bloomsbury Publishing.

49. Gido, J. and Clements, J., 2015. Successful Project Management. 6th Edition. Stamford. Cengage Learning.

50. Gido, J. Baker, R. and Clements, J., 2018. Successful Project Management. 7th Edition. Stamford. Cengage Learning.

51. Graziadei, T., 2015. Implementation of a Sustainable Project Management Methodology for Cal Poly SAE Baja.

52. Greener, S., 2022. An introduction to business research methods.

53. Greenwood, R., Meyer, R.E., Lawrence, T.B. and Oliver, C., 2017. The Sage handbook of organizational institutionalism. *The Sage handbook of organizational institutionalism*, pp.1-928.

54. Gunduz, M. and Abdi, E.A., 2020. Motivational factors and challenges of cooperative partnerships between contractors in the construction industry. *Journal of Management in Engineering*, *36*(4), p.04020018.

55. Hailu, E., 2018. *Risks and Risk management in building construction projects from contractors' perspective* (Doctoral dissertation, Addis Ababa Science And Technology University).

56. Halcomb, E.J. and Hickman, L., 2015. Mixed methods research.

57. Hall, H.,2021. 7 Ways to Identify Risk. Project Risk Coach. [online] Available at: 7 Ways to Identify Risks (projectriskcoach.com) [Accessed 24 May 2022]

58. Hammarberg, K., Kirkman, M. and de Lacey, S., 2016. Qualitative research methods: when to use them and how to judge them. *Human reproduction*, *31*(3), pp.498-501.
59. Hao, H., Lu, W., and Wang, J. 2017. Exploring job stress, turnover intention, and turnover behavior among Chinese blue-collar employees: A cross-sectional study. International Journal of Environmental Research and Public Health, 14(5), 486.
60. Haveman, H.A. and Gualtieri, G., 2017. Institutional logics. In *Oxford research encyclopedia of business and management*.
61. Haveman, H.A. and Gualtieri, G., 2017. Institutional logics. In *Oxford research encyclopedia of business and management*.
62. He, Z., Huang, D. and Fang, J., 2021. Social stability risk diffusion of large complex engineering projects based on an improved SIR model: a simulation research on complex networks. Complexity, 2021., pp.1-17.
63. Hennink, M., Hutter, I. and Bailey, A., 2020. *Qualitative research methods*. Sage.
64. Hillson, D., 2017. *Managing risk in projects*. Routledge.
65. Hillson, D., and Murray-Webster, R., 2017. Understanding and Managing Risk Attitude (2nd ed.). Gower Publishing.
66. Hillson, D., and Simon, P., 2020. Practical Project Risk Management: The ATOM Methodology (3rd ed.). Management Concepts.
67. Hofstede, G., Hofstede, J. G., and Minkov, M. 2010. Cultures and Organizations: Software of the Mind: Intercultural cooperation and its importance for survival (3rd ed.). United States: McGraw Hill.
68. Hopkin, P., 2018. *Fundamentals of risk management: understanding, evaluating and implementing effective risk management*. Kogan Page Publishers.
69. Huemann, M., Eskerod, P. and Ringhofer, C., 2016. *Rethink!: Project stakeholder management*. Project Management Institute, Incorporated.
70. Humble, Á. and Radina, E. eds., 2018. *How qualitative data analysis happens: Moving beyond" themes emerged"*. Routledge.

71. Ilyas, Z., Memon, A. H., and Díaz-Fernández, M. C. 2018. Impact of risk management on construction project performance in Pakistan. Journal of Construction Engineering and Management, 144(6), 04018042.
72. Imperadeiro, C.M.P., 2022. Project management: Shaping dimensions and criteria to achieve success (Master's thesis).
73. Iqbal, S., Choudhry, R.M., Holschemacher, K., Ali, A. and Tamošaitienė, J., 2015. Risk management in construction projects. *Technological and economic development of economy*, *21*(1), pp.65-78.
74. ISO 31000., 2018. Risk management – Guidelines. International Organization for Standardization.
75. Johnson, C., Smith, A., and Brown, R. 2020. Risk management in construction projects: A contemporary perspective. Construction Management and Economics, 38(1), 23-37.
76. Kendrick, T., 2015. *Identifying and managing project risk: essential tools for failure-proofing your project*. Amacom.
77. Kerzner, H., 2017. Project Management: A Systems Approach to Planning, Scheduling, and Controlling (12th ed.). Wiley.
78. Kerzner, H., 2019. *Using the project management maturity model: strategic planning for project management*. John Wiley and Sons.
79. Khanzadi, M., and Tamošaitienė, J. 2019. Risk management practices in construction projects: A resource-based view. Sustainability, 11(5), 1410.
80. Kieser, A., 2015. Why organization theory needs historical analyses–and how this should be performed. In *The Routledge Companion to Management and Organizational History* (pp. 31-46). Routledge.
81. Kim, S. H., and Park, Y. K. 2019. The relationship between job satisfaction and job performance among midwives in South Korea: A cross-sectional study. International Journal of Environmental Research and Public Health, 16(1), 73.
82. Kimmons, R.L. and Loweree, J.H., 2017. *Project management: A reference for professionals*. Routledge.
83. Kliem, R.L. and Ludin, I.S., 2019. *Reducing project risk*. Routledge.

84. Kloppenborg, T.,2015. Contemporary Project Management. 3rd Edition. Stamford. Cengage Learning.

85. Kutsch, E., and Hall, M., 2019. Towards understanding barriers to risk communication in the construction industry. International Journal of Construction Management, 19(5), 365-378.

86. Lammers, J.C and Garcia, A. M., 2017. Institutional Theory Approaches. 10.1002/9781118955567.wbieoc113.

87. Lee, K. 2021. Emerging trends in risk management practices in construction projects. International Journal of Project Management, 39(4), 573-586.

88. Lingard, H., and Ruwhiu, D. 2020. In pursuit of a positive safety culture: A case study of a major construction project in Australia. Construction Management and Economics, 38(10), 929-946.

89. Lock, D., 2017. *The essentials of project management*. Routledge.

90. Love, P.E. and Ahiaga-Dagbui, D.D., 2018. Debunking fake news in a post-truth era: The plausible untruths of cost underestimation in transport infrastructure projects. Transportation research part A: policy and practice, 113, pp.357-368.

91. Luu, V. T., Kim, S., and Cho, Y. K. 2018. Understanding risk management in mega-construction projects: A case study of the Korean high-speed railway project. Sustainability, 10(8), 2860.

92. Management Study Guide., 2021. Principles of Project Management. [online] Available at: Principles of Risk Management (managementstudyguide.com) [Accessed 24 May 2022]

93. Mark, S., Philip, L. and Adrian, T., 2019. Research Methods for Business Studies.

94. Markiewicz, A. and Patrick, I., 2015. Developing monitoring and evaluation frameworks. Sage Publications.

95. Martinelli, R.J. and Milosevic, D.Z., 2016. *Project management toolbox: tools and techniques for the practicing project manager*. John Wiley and Sons.

96. Maxwell, J.A., 2016. Expanding the history and range of mixed methods research. *Journal of mixed methods research*, *10*(1), pp.12-27.

97. Maxwell, J.A., 2019. Distinguishing between quantitative and qualitative research: A response to Morgan. *Journal of mixed methods research*, *13*(2), pp.132-137.

98. McNeil, D., Frey, R., and Embrechts, P., 2016. Quantitative risk management: Concepts, techniques, and tools (2nd ed.). Princeton University Press.

99. Merriam, S.B. and Tisdell, E.J., 2015. *Qualitative research: A guide to design and implementation*. John Wiley and Sons.

100. Midler, C., Killen, C.P. and Kock, A., 2016. Project and innovation management: Bridging contemporary trends in theory and practice. Project Management Journal, 47(2), pp.3-7.

101. Mills, K. A., and Sisodia, R. S. 2019. The effects of perceived value congruence and self-concept clarity on job satisfaction and turnover intent. Journal of Business Research, 104, 34-43.

102. Mishra, S.B. and Alok, S., 2022. Handbook of research methodology.

103. Mohamed I. A.H., 2017. Some Issues in The Institutional Theory: A Critical Analysis. International Journal of Scientific and Technology Research Vol 6, Issue 09.

104. Molina-Azorin, J.F., 2016. Mixed methods research: An opportunity to improve our studies and our research skills.

105. Morse, J.M., 2016. *Mixed method design: Principles and procedures* (Vol. 4). Routledge.

106. Nawaz, A., Waqar, A., Shah, S.A.R., Sajid, M. and Khalid, M.I., 2019. An innovative framework for risk management in construction projects in developing countries: evidence from Pakistan. *Risks*, *7*(1), p.24.

107. Nowell, L. S., Norris, J. M., White, D. E., and Moules, N. J., 2017. Thematic Analysis: Striving to Meet the Trustworthiness Criteria. International Journal of Qualitative Methods, 16(1). https://doi.org/10.1177/1609406917733847

108. Ocasio, W., Thornton, P.H. and Lounsbury, M., 2017. Advances to the institutional logics perspective. *The Sage handbook of organizational institutionalism*, *2*, pp.509-531.

109. Piney, C. 2003. Risk identification: combining the tools to deliver the goods. Paper presented at PMI® Global Congress 2003—EMEA, The Hague, South Holland, The Netherlands. Newtown Square, PA: Project Management Institute.

110. Pinto, J. K., 2020. Project management: Achieving competitive advantage. Pearson.

111. Pinto, J. K., and Slevin, D. P., 2019. Project Management: Achieving Competitive Advantage (5th ed.). Pearson.

112. PMBOK Guide., 2021. A Guide to the Project Management Body of Knowledge (PMBOK Guide). Project Management Institute.

113. PMI., 2017. A Guide to the Project Management Body of Knowledge (PMBOK). 3rd Edition. Pennsylvania: Project Management Institute.

114. Powell, W.W. and Bromley, P., 2015. New institutionalism in the analysis of complex organizations. *International encyclopedia of the social and behavioral sciences*, *16*, pp.764-769.

115. Press Books., 2021. The Project Life Cycle (Phases). [online] Available at: https://opentextbc.ca/projectmanagement/chapter/chapter-3-the-project-life-cycle-phases-project-management/ [Accessed 24 May 2022]

116. Rahimi, M., Khorshidi, J., and Smith, N. J., 2018. A comprehensive framework for project risk management using fuzzy logic. International Journal of Project Management, 36(5), 775-787.

117. Rasheed, S., Yaqub, F., Wang, C.F., Memon, S. and Lucena, B.R.D.D., 2018. Risk Leveling–an organised risk management approach. *International Journal of Risk Assessment and Management*, *21*(1-2), pp.135-153.

118. Renault, B.Y. and Agumba, J.N., 2016. Risk management in the construction industry: A new literature review. In *MATEC web of conferences* (Vol. 66, p. 00008). EDP Sciences.

119. Ruqaishi, M. and Bashir, H.A., 2015. Causes of delay in construction projects in the oil and gas industry in the gulf cooperation council countries: a case study. *Journal of management in engineering*, *31*(3), p.05014017.

120. Saaidin, S., Endut, I.R., Akmar, S., Samah, A., Ruslan, A. and Rizduan, M., 2016. Analysis of Risk Probability in Design and Build Projects in Malaysian Construction Industry. *International Academic Research Journal of Business and Technology*, *2*(2), pp.51-56.

121. Safapour, E. and Kermanshachi, S., 2019. Identifying early indicators of manageable rework causes and selecting mitigating best practices for construction. Journal of management in Engineering, 35(2), p.04018060.

122. Saldaña, J., 2015. The coding manual for qualitative researchers (3rd ed.). Sage Publications.

123. Samarghandi, H., Mousavi, S., Taabayan, P., Mir Hashemi, A. and Willoughby, K., 2016. Studying the Reasons for Delay and Cost Overrun in Construction Projects: The Case of Iran.

124. Schwalbe, K., 2020. Information Technology Project Management (9th ed.). Cengage Learning.

125. Shah, R.K., 2016. An exploration of causes for delay and cost overrun in construction projects: A case study of Australia, Malaysia and Ghana. Journal of Advanced College of Engineering and Management, 2(1), pp.41-55.

126. Smith, J.,2016. The Basics of Project Evaluation and Lessons Learned (2nd ed.). Project Management Institute.

127. Smith, N. J., and Merna, T., 2017. Managing Risk in Construction Projects (3rd ed.). Routledge.

128. Smith, P.G. and Merritt, G.M., 2020. *Proactive risk management: Controlling uncertainty in product development*. CRC Press.

129. Smith, T. 2018. The role of risk management in construction projects: An empirical analysis. Journal of Construction Engineering and Management, 144(3), 04018011.

130. Steiner, F., 2020. Risk Treating in Early Life Cycle Phases. [online] Available at: https://www.academia.edu/23547948/Risk_Treating_in_Early_Lifecycle_Phases [Accessed 24 May 2022]

131. Talesh, S., 2015. A new institutional theory of insurance. UC Irvine L. Rev., 5, p.617.

132. Tashakkori, A., Teddlie, C. and Johnson, B., 2015. Mixed methods.

133. Tengan, C., Oyewobi, L., Ogungbile, A. and Oke, A., 2016. Economic development as a function of construction project performance. *Journal of Construction Project Management and Innovation*, *6*(2), pp.1447-1459.

134. Teo, E. A., Lingard, H., and Tilley, P. 2021. Mental health in the construction industry: A scoping review. Construction Management and Economics, 39(5), 465-486.

135. Teo, M. M., and Loosemore, M. 2020. The relationship between organizational culture, leadership behavior, and job satisfaction: A case study on the construction industry. Construction Economics and Building, 20(1), 43-57.

136. Terry, G. and Hayfield, N., 2021. *Essentials of thematic analysis*. American Psychological Association.

137. Tracy, S.J., 2019. *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact*. John Wiley and Sons.

138. Turner, J. R., and Grude, K. V. 2019. Gower handbook of project management (5th ed.). Routledge.

139. Turner, J.R., 2022. *The handbook of project-based management*. Prentice Hall.

140. Turner, R., 2016. *Gower handbook of project management*. Routledge.

141. Valipour, A., Sarvari, H. and Tamošaitiene, J., 2018. Risk assessment in PPP projects by applying different MCDM methods and comparative results analysis. *Administrative Sciences*, *8*(4), p.80.

142. Walker, A., 2015. *Project management in construction*. John Wiley and Sons.

143. Walker, A., Dimov, S., and Revay, R.,2015. Risk management practices in the Canadian construction industry. International Journal of Project Management, 33(4), 735-746.

144. Walker, A., Dimov, S., and Revay, R.,2018. Risk management practices in the Canadian construction industry. International Journal of Project Management, 33(4), 735-746.

145. Wang, J., and Zhang, G. 2019. Exploring the influence of risk management on construction project outcomes: A meta-analysis. International Journal of Project Management, 37(5), 813-827.

146. Webb, A., 2017. *The project manager's guide to handling risk*. Routledge.

147. Wideman, R. M., 2019. Project Management Institute Practice Standard for Project Risk Management (2nd ed.). Project Management Institute.

148. Wideman, R.M., 2022. *Project and program risk management a guide to managing project risks and opportunities*. Project Management Institute, Inc..

149. Willumsen, P., Oehmen, J., Stingl, V. and Geraldi, J., 2019. Value creation through project risk management. *International Journal of Project Management*, *37*(5), pp.731-749.

150. Wu, G., and Low, S. P. (2019). Identifying, assessing, and managing risks in global construction projects: Insights from a literature review. International Journal of Construction Management, 19(5), 418-432.

151. Zavadskas, E. K., Antuchevičienė, J., and Tamošaitienė, J. 2017. Risk assessment of construction projects by using the SWARA and WASPAS methods. Journal of Civil Engineering and Management, 23(2), 252-262.

152. Zhang, W. and Wang, N., 2016. Resilience-based risk mitigation for road networks. *Structural Safety*, *62*, pp.57-65.

153. Zinn, J.O., 2019. The meaning of risk-taking–key concepts and dimensions. *Journal of Risk Research*, *22*(1), pp.1-15.

154. Zou, P. X. W., Zhang, G., and Wang, J. 2018. Identification and assessment of risks in construction projects using the AHP-based fuzzy comprehensive evaluation method. International Journal of Environmental Research and Public Health, 15(1), 48.

APPENDICES

APPENDIX A – INFORMED CONSENT

APPENDIX B – ETHICAL CLEARANCE

APPENDIX C – INTERVAL SCHEDULE

APPENDIX D – TURNITIN SIMILARY REPORT

APPENDIX A

(INFORMED CONSENT)

UKZN HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE (HSSREC)

APPLICATION FOR ETHICS APPROVAL
For research with human participants

INFORMED CONSENT RESOURCE TEMPLATE

Note to researchers: Notwithstanding the need for scientific and legal accuracy, every effort should be made to produce a consent document that is as linguistically clear and simple as possible, without omitting important details as outlined below. Certified translated versions will be required once the original version is approved.

There are specific circumstances where witnessed verbal consent might be acceptable, and circumstances where individual informed consent may be waived by HSSREC.

Information Sheet and Consent to Participate in Research

Date: 11 April 2023

Greeting:

Dear candidate

My name is Bokang Sithole, an MBA student at the University of Kwazulu Natal employed at Raubex KZN. I am aiming at conducting research in my professional field that may result in major cost implications if neglected in hopes of creating awareness from the outcome of the investigation. I can be contacted by cellphone on 0840154422 or by email on bokangsithole@gmail.com should you have any questions or concerns.

You are being invited to consider participating in a study that involves research to explore the influence of proper risk management in construction projects. The aim and purpose of this research is to investigate how much influence risk management has on construction projects. The study is expected to enroll 20 participants in total including contracts manager, construction manager, site agents, general foreman, safety officers, environmental officer, engineers and foremen from Kwazulu Natal Roadworks projects. It will involve the semi-structured interviews with the participants either in person, virtual through Zoom or Microsoft Teams until data saturation is reached. The interviews will have the option of recording but strictly with the permission of the participant. The duration of your participation if you choose to enroll and remain in the study is expected to be 30 minutes. The study is funded by my employer Raubex KZN.

The study will not involve any risks and/or discomforts. We hope that the study will create awareness on the importance of risk management throughout construction projects and

motivate more active involvement and if the influence is found to have cost implications, risk management may result in cost savings.

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number: HSSREC/00005442/2023).

In the event of any problems or concerns/questions you may contact the researcher by cellphone on 0840154422 or by email on bokangsithole@gmail.com or the UKZN Humanities and Social Sciences Research Ethics Committee, contact details as follows:

HUMANITIES and SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION
Research Office, Westville Campus
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Private Bag X 54001
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4000
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Tel: 27 31 2604557- Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

Participation in this research is voluntary and participants may withdraw participation at any point, and in the event of refusal/withdrawal of participation the participants will not incur penalty or loss of treatment or other benefit to which they are normally entitled. There are no potential consequences to the participant for withdrawal from the study and the there is no formal procedure/s required from the participants for withdrawal except for communication through the contact details provided above. The researcher may terminate the participant from the study if the language consists of vulgar words.

No costs might be incurred by participants as a result of participation in the study and there are no incentives or reimbursements for participation in the study.

To protect confidentiality of personal/clinical information of the participants, the POPI Act will be adhered to with regards to personal information and data collected shall only be used for this research project and may not be shared or distributed with outside parties.

CONSENT

I _____(Name) have been informed about the study entitled "The exploration of the influence of risk management on the success of construction projects" by Bokang Sithole.

I understand the purpose and procedures of the study.

I have been given an opportunity to answer questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without affecting any of the benefits that I usually am entitled to.

If I have any further questions/concerns or queries related to the study, I understand that I may contact the researcher 0840154422 or bokangsithole@gmail.com.

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers then I may contact:

HUMANITIES and SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION
Research Office, Westville Campus
Govan Mbeki Building
Private Bag X 54001
Durban
4000
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557 - Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

I hereby provide consent to:

Audio-record my interview YES / NO

_____ _____
Signature of Participant **Date**

_____ _____
Signature of Witness **Date**
(Where applicable)

_____ _____
Signature of Translator **Date**
(Where applicable)

APPENDIX B

(ETHICAL CLEARANCE)

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

20 April 2023

Bokang Sithole (210535585)
Grad School of Bus & Leadership
Westville Campus

Dear B Sithole,

Protocol reference number: HSSREC/00005442/2023
Project title: The exploration of the influence of risk management on the success of construction projects
Degree: Masters

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 24 March 2023 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

This approval is valid until 20 April 2024.
To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

HSSREC is registered with the South African National Health Research Ethics Council (REC-040414-040).

Yours sincerely,

[redacted]

Professor Dipane Hlalele (Chair)

/dd

APPENDIX C

(INTERVIEW SCHEDULE)

1) What is the meaning of risk to you?

2) What is your attitude toward risk in the construction industry?

3) Whose job is it to deal with risk management in construction projects?

4) How do you spot risks on your own?

5) How do you handle risk?

6) What strategy do you use to identify risks?

7) Which technique of risk assessment do you employ?

8) Which level or phase of risk management do you think is most important?

9) Have you taken any risk management courses?

10) If you have risk management courses, how skilled are you in this field?

11) If you do not have risk management courses, how skilled are you in this field?

12) Do you provide risk management training at your company?

13) Which of the risk management processes is the most crucial?

14) What methods do you use to draw lessons from prior projects?

15) How is the standard of risk management in your company, good or bad?

16) What is the root cause of your company's standard of risk management?

17) How effective is your risk communication in your construction projects?

18) Is risk management a topic worth exploring in knowledge sharing/transfer and organizational learning?

19) What are the barriers to knowledge transfer and organizational learning in construction projects?

APPENDIX D

(TURNITIN SIMILARY REPORT)

B Sithole 210535585 MBA Dissertation

ORIGINALITY REPORT

1%	0%	0%	1%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to CTI Education Group Student Paper	<1%
2	Submitted to Midlands State University Student Paper	<1%
3	Submitted to The University of the West of Scotland Student Paper	<1%
4	Submitted to Stadio Holdings Student Paper	<1%
5	Submitted to University of Johannsburg Student Paper	<1%
6	Submitted to Asia Pacific International College Student Paper	<1%
7	Submitted to Mancosa Student Paper	<1%
8	Submitted to Westlake High School Student Paper	<1%
9	Submitted to Colorado State University, Global Campus	<1%

	Student Paper	
10	Submitted to Manipal University Student Paper	<1%
11	Submitted to Regenesys Business School Student Paper	<1%
12	Submitted to University of KwaZulu-Natal Student Paper	<1%
13	Submitted to Zambia Centre for Accountancy Studies Student Paper	<1%
14	Submitted to Cavendish University Zambia Student Paper	<1%
15	Submitted to University of Witwatersrand Student Paper	<1%
16	Submitted to University of the West Indies Student Paper	<1%
17	Submitted to Postgraduate Schools - Limkokwing University of Creative Technology Student Paper	<1%

Exclude quotes	On	Exclude matches	< 10 words
Exclude bibliography	On		