



**MIDOCEAN University**  
**Colage of Management**  
Master of Projects Management

**Evaluating Risk Management Practices and their effect on  
project performance in the Saudi Construction Sector within  
Vision 2030**

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## *Dedication*

To the soul of my late father, whose memory lives within every milestone I achieve.  
Your wisdom, strength, and quiet sacrifices continue to light my path, even though you are no longer here. I carry your spirit with me at every step of this journey.

To my beloved mother, the source of endless love, patience, and prayers.  
Your unwavering support has been the foundation on which all my accomplishments stand.

To my wife, my partner in life and in every challenge.  
Thank you for sharing this journey with me, for your constant encouragement, and for believing in me even during the most difficult moments. Your presence brought balance, comfort, and inspiration to every stage of this work.

To my family, whose affection and support surrounded me with strength and determination.  
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This work reflects your support, and it belongs to you as much as it belongs to me.

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## **Abstract**

The construction sector in the Kingdom of Saudi Arabia plays a vital role in supporting the nation's economic transformation, particularly within the framework of Vision 2030. Despite its significance, the sector continues to face persistent challenges related to project delays, cost overruns, and quality issues, many of which stem from inadequate Risk Management practices. This study aims to evaluate the effectiveness of current Risk Management approaches employed by construction companies in Saudi Arabia and assess their impact on project performance.

The research adopts a quantitative descriptive analytical methodology supported by qualitative insights derived from literature reviews and expert feedback. Data collected through a structured questionnaire distributed to project managers, risk managers, and engineers working in Saudi construction firms. The study examines the extent to which risk identification, assessment, mitigation, and monitoring processes implemented, and compares these practices against internationally recognized frameworks such as ISO 31000 and PMBOK.

The expected findings indicate a noticeable gap between the best theoretical practices and actual Risk Management implementation within many construction organizations. Results also highlight the need for institutional capacity-building through specialized training programs, improved documentation, initiative-taking planning, and the establishment of formal Risk Management policies. Additionally, the study anticipates proposing a tailored framework designed to enhance risk governance in alignment with Vision 2030 objectives, focusing on strengthening efficiency, transparency, and project predictability.

The research offers practical recommendations aimed at improving Risk Management maturity across the sector, including the adoption of clear organizational policies, expanded training initiatives, integration of Risk Management processes throughout all project phases, and the use of digital tools to support decision-making. The study contributes to enhancing the resilience and performance of construction projects in Saudi Arabia, supporting the nation's strategic plans for sustainable development and economic diversification.

**Chapter One**  
**General Research Approach**

## **1-1 Introduction**

The construction sector represents a cornerstone of the Kingdom of Saudi Arabia's economic and infrastructural development. With its significant contribution to GDP, employment generation, and urban expansion, the sector occupies a central position within marked a 2030, the launch of Saudi Vision 2016the national development agenda. In pivotal turning point, introducing a comprehensive strategic framework aimed at transforming the Kingdom into a diversified, knowledge-based economy. Within this framework, the construction industry not only expects to deliver critical infrastructure and urban development but also to embody principles of sustainability, efficiency, innovation, and global competitiveness.

outlines ambitious initiatives such as NEOM, Lidiya, the Red Sea Project, 2030Vision and Riyadh Metro, which collectively signal a substantial shift in the Kingdom's development trajectory. These mega-projects serve as both symbols and engines of national transformation, demanding advanced construction capabilities, high performance standards, and alignment with international best practices. As a result, the sector is undergoing a structural evolution that necessitates a re-examination of existing practices, operational frameworks, and strategic approaches.

The government's emphasis on private sector participation, environmental stewardship, digital integration, and human capital development further underscores the need for industry-wide adaptation and reform. Despite these developments, the Saudi construction sector continues to face persistent challenges, including project delays, cost overruns, inefficient resource utilization, regulatory bottlenecks, and limited integration of digital technologies. While high-profile projects and large-scale contractors may demonstrate progress in adopting modern practices, smaller and medium-sized enterprises (SMEs) often lack the capacity, resources, or technical knowledge to keep pace with evolving expectations. This disparity highlights the importance of a comprehensive, evidence-based evaluation of the sector's readiness and imperatives.2030responsiveness to Vision This research proposal seeks to critically assess current practices within the Saudi construction sector, with specific reference to their alignment with the strategic goals of the study will investigate key domains such as project management 2030Vision methodologies, regulatory compliance, technological adoption (e.g., Building Information Modeling), sustainability integration, and workforce development strategies.

Through a combination of qualitative and quantitative methodologies, the research aims to identify performance gaps, highlight success factors, and generate actionable insights that can inform policy interventions and industry reforms. The significance of this study lies in its potential to contribute to both academic scholarship and practical implementation. By providing a holistic evaluation of construction practices in the context of national transformation, the research will support stakeholders including policymakers, industry leaders, and academic institutions in enhancing the sector's capacity to meet future demands. Furthermore, the findings will offer a framework for benchmarking best practices, promoting institutional learning, and guiding strategic decision-making across various levels of the construction ecosystem. 's strategic 2030In essence, this research aspires to bridge the gap between Vision ambitions and the operational realities of the construction sector. By doing so, it aims to support the creation of a resilient, innovative, and globally competitive construction industry that is fully equipped to contribute to the long-term sustainable development of the Kingdom.

## **1-2 Problem statement**

2030 The Saudi construction sector plays a significant role in achieving the goals of Vision which emphasizes modernization, sustainability, and improved project delivery. While major development projects such as NEOM and the Red Sea Project reflect this national ambition, construction firms in Kingdom, especially local and mid-sized companies still rely on outdated practices that limit efficiency and performance.

Challenges such as project delays, cost overruns, inferior quality control, and limited use of modern technologies remain common across the sector. Although the government has introduced new regulations and strategic guidelines, there is limited evidence on how widely and effectively these changes have been adopted in day-to-day construction operations. This lack of evaluation creates a gap in understanding the sector's actual progress toward goals. Without this knowledge, it is difficult for stakeholders to assess 2030Vision readiness, identify weaknesses, or plan targeted improvements. This research aims to fill that gap by evaluating current practices in the Saudi construction objectives. It will help determine to what extent these 2030industry in relation to Vision practices align with national priorities and provide recommendations to support more effective implementation moving forward.

### **1-3 Importance of Study:**

1. Scientific Significance: this research contributes to the academic field of project and Risk Management by addressing key gaps:

- Advancing knowledge in Risk Management within emerging economies: While numerous international studies have explored Risk Management practices in construction, limited research has focused on the Saudi context, particularly under the transformative Vision 2030 framework. This study aims to fill that gap by providing an updated and context-specific evaluation.
- Developing an empirical understanding of current practices: The research offers data-driven insight into how Risk Management methodologies applied across several types of construction projects, identifying the strengths and weaknesses in current approaches.
- Providing a foundation for future research: The outcomes will serve as a benchmark for further academic studies on Risk Management maturity, effectiveness, and integration in the region, encouraging more comparative and longitudinal studies in the future.
- Integrating theory with Vision 2030 objectives: The study connects modern Risk Management theories with national strategic goals, bridging academic models and real-world national development frameworks.

2. Practical Significance: the practical value of this study is equally substantial, offering direct implications for stakeholders in the construction industry:

- Supporting decision-making for project managers and contractors: By identifying the most effective Risk Management practices, the study provides guidelines and recommendations to improve project performance, cost control, and schedule reliability.
- Enhancing the resilience and efficiency of construction projects: The findings will help organizations mitigate uncertainties and strengthen project governance, leading to more sustainable and successful project outcomes.
- Aligning industry practices with Vision 2030: As the construction sector plays a pivotal role in realizing Saudi Arabia's Vision 2030 objectives, the study highlights how effective Risk Management can support national goals such as economic diversification and infrastructure excellence.
- Guiding policymakers and consultants: The research outcomes can assist governmental bodies, consultants, and developers in formulating standardized frameworks and Risk Management policies tailored to the local market conditions.

## **1-4 Research Objectives**

### **Main Objective**

The main objective of this research is to evaluate the current Risk Management practices within the Saudi construction sector and assess their alignment with the objectives of Saudi Vision 2030, with the goal of proposing a comprehensive framework to enhance the effectiveness, efficiency, and strategic integration of Risk Management in construction projects.

### **Specific Objectives**

To achieve this main objective, the study seeks to accomplish the following specific objectives:

1. To identify the most prominent risks encountered in construction projects across Saudi Arabia.

This involves recognizing and categorizing the key internal and external risks that commonly affect project performance such as financial, operational, contractual, safety, and environmental risks. The study will also explore how these risks vary depending on project size, type, and location, providing a comprehensive overview of the risk landscape in the Saudi construction sector.

2. To analyze the current practices and methodologies used for Risk Management within Saudi construction companies.

This objective focuses on examining how organizations currently plan for, identify, assess, mitigate, and monitor risks throughout the project lifecycle.

It aims to evaluate the level of formalization and maturity of Risk Management systems, the use of international standards (such as ISO 31000 or PMBOK guidelines), and the organizational culture toward initiative-taking risk handling.

3. To evaluate the extent to which existing Risk Management practices align with the objectives and strategic priorities of Saudi Vision 2030.

The study will investigate whether Risk Management practices support key Vision 2030 pillars, including sustainability, efficiency, innovation, and economic diversification. This objective highlights how Risk Management can contribute to achieving Vision's national goals, particularly in the areas of infrastructure development, public-private partnerships, and project governance.

4. To propose a practical framework for improving Risk Management performance in the Saudi construction sector.

Based on the findings, the research will develop a conceptual and actionable framework designed to enhance the effectiveness of Risk Management processes within

construction companies. The framework will integrate both best international practices and context-specific recommendations aligned with Vision 2030. It will also outline implementation guidelines for practitioners, policymakers, and stakeholders to improve risk identification, communication, and decision-making.

## **1-5 Research Questions**

### **Main Research Question**

The central question guiding this study is:

How effective are current Risk Management practices in the Saudi construction sector, and to what extent do they align with the strategic objectives of Saudi Vision 2030?

### **Sub-Questions**

To address the main question comprehensively, the study will explore the following specific research questions:

1. What are the most prominent types of risks encountered by Saudi construction companies?  
This question seeks to identify and classify the major risks financial, technical, operational, environmental, and contractual that affect construction projects. It also aims to explore how risk frequency and severity vary across different project categories, sizes, and regions within Saudi Arabia.
2. To what extent do construction companies in Saudi Arabia utilize standard and systematic practices for Risk Management?  
This question examines whether organizations adopt recognized international standards (such as ISO 31000 or PMBOK guidelines) and how these standards are applied throughout the project lifecycle from planning and design to execution and closure.
3. What are the organizational, technical, and external challenges that hinder the effective implementation of Risk Management practices?  
This involves identifying barriers such as limited expertise, inadequate communication, insufficient data, cultural resistance to change, or lack of management support, which may prevent the establishment of a proactive Risk Management culture.
4. How do current Risk Management practices align with the principles and goals of Saudi Vision 2030?  
The study will evaluate whether existing approaches contribute to Vision 2030 objectives, such as enhancing project efficiency, ensuring sustainability, promoting innovation, and strengthening national competitiveness in the construction industry.
5. How can the effectiveness and integration of Risk Management be improved in Saudi construction projects?  
This question aims to explore potential strategies, tools, and frameworks that can enhance organizational readiness and resilience, leading to better project outcomes aligned with Vision 2030 priorities.

6. What framework can be developed to support continuous improvement and standardization of Risk Management within the Saudi construction sector?  
This final question focuses on the formulation of a comprehensive framework that incorporates both international best practices and local contextual factors, ensuring practical applicability for contractors, consultants, and policymakers.

## **1-6 Study Assignment:**

### **Introduction**

In the dynamic and rapidly evolving Saudi construction sector, achieving successful project outcomes increasingly linked to the effective implementation of structured Risk Management practices. As Vision 2030 drives massive infrastructure investments, project stakeholders are under growing pressure to deliver projects that meet strict requirements for time, cost, quality, and sustainability.

This study seeks to evaluate how Risk Management practices (independent variable) influence project performance (dependent variable), thereby identifying the degree to which effective risk handling contributes to the overall success of projects aligned with the objectives of Saudi Vision 2030.

### **1-6-1 Independent Variable: Risk Management Practices**

Risk Management practices represent the systematic processes and techniques used by organizations to identify, analyze, respond to, and monitor risks that may affect project objectives. These practices form the independent variable in this research, as their implementation level directly influences project outcomes.

Key Dimensions of Risk Management Practices:

1. Risk Identification Practices:
  - Methods used to detect potential project risks at initial stages, including brainstorming, expert judgment, and historical data analysis.
  - Indicators: Existence of formal risk registers, frequency of risk review meetings, and clarity of risk categorization.
2. Risk Assessment and Analysis:
  - Techniques for evaluating the probability and impact of each identified risk.
  - Indicators: Use of quantitative and qualitative analysis methods, adoption of risk matrices, or probabilistic models.
3. Risk Response and Mitigation Strategies:
  - Actions taken to avoid, transfer, mitigate, or accept risks depending on their criticality.
  - Indicators: Implementation of contingency plans, insurance policies, and contractual risk-sharing mechanisms.

4. Risk Monitoring and Control:

- Continuous tracking of identified risks, reassessment of emerging risks, and updating mitigation plans.
- Indicators: Frequency of risk audits, use of monitoring tools, and feedback systems during project execution.

5. Organizational Risk Culture and Governance:

- Degree to which leadership, communication, and corporate culture promote initiative-taking Risk Management.
- Indicators: Management commitment, training programs, and integration of Risk Management into decision-making structures.

**1-6-2 Dependent Variable: Project Performance**

Project performance refers to the extent to which a project achieves its intended objectives within the constraints of time, cost, quality, safety, and stakeholder satisfaction. It serves as the dependent variable, as its outcome depends on how well risks are managed during the project lifecycle.

Key Dimensions for Assessing Project Performance:

1. Time Performance:
  - a. Measured by adherence to planned schedules and reduction in project delays.
  - b. Indicators: Actual vs. planned completion dates, schedule variance.
2. Cost Performance:
  - a. Evaluated through control of project expenditures and avoidance of overruns.
  - b. Indicators: Cost variance, budget compliance ratio.
3. Quality Performance:
  - a. Assessed by meeting design specifications, technical standards, and client expectations.
  - b. Indicators: Number of reworks, inspection reports, and defect ratios.
4. Health, Safety, and Environmental (HSE) Performance:
  - a. Measured by the rate of safety incidents and environmental compliance.
  - b. Indicators: Lost Time Injury Frequency Rate (LTIFR), incident-free days.
5. Stakeholder and Client Satisfaction:
  - a. Determined by post-completion evaluations, client feedback, and community acceptance.
  - b. Indicators: Satisfaction surveys, handover reports, repeat contracts.
6. Sustainability and Innovation Performance (Vision 2030 Context):
  - a. Evaluates how projects integrate sustainable practices and contribute to the strategic transformation goals of Vision 2030.
  - b. Indicators: Use of smart technologies, compliance with sustainability KPIs, and contribution to localization targets.

### **1-6-3 Linking the Variables: Conceptual Relationship**

The conceptual linkage between the two variables is based on the cause–effect relationship where effective Risk Management practices (IV) enhance project performance (DV).

In practical terms:

- Early identification and mitigation of risks prevent schedule and cost deviations.
- Systematic analysis and monitoring lead to informed decision-making and better resource allocation.
- Strong organizational risk culture encourages accountability and continuous improvement.
- Effective risk response planning enhances flexibility and resilience against unforeseen disruptions.

These mechanisms collectively improve time, cost, quality, and stakeholder outcomes, which are key indicators of project performance thus fulfilling the strategic goals of Vision 2030 in achieving efficiency, innovation, and sustainable infrastructure development.

### **Conceptual Framework (Textual Representation)**

Table (1-1) Domains of the dependent variable and the independent variable

Table 1

| <b>Independent Variable (IV)</b>  | <b>→</b> | <b>Dependent Variable (DV)</b>                   |
|-----------------------------------|----------|--------------------------------------------------|
| Risk Management Practices         |          | Project Performance                              |
| - Risk Identification             |          | - Time Performance                               |
| - Risk Assessment & Analysis      |          | - Cost Performance                               |
| - Risk Response & Mitigation      |          | - Quality Performance                            |
| - Risk Monitoring & Control       |          | - Safety & Sustainability                        |
| - Risk Culture & Governance       |          | - Client & Stakeholder Satisfaction              |
| (Implementation & Maturity Level) | <b>→</b> | (Effectiveness & Efficiency of Project Outcomes) |

### **1-6-4 Conclusion**

In conclusion, this research assumes that strong, structured, and mature Risk Management practices significantly enhance project performance outcomes within the Saudi construction industry. The study will empirically evaluate this relationship through data collection and analysis, providing valuable insights for policymakers, consultants, and contractors seeking to align operational excellence with the long-term goals of Saudi Vision 2030.

## **1-7 The scientific theory used to prepare the research:**

### **1-7-1 Introduction**

Every scientific study requires a theoretical foundation that explains how and why its variables interact. This research draws primarily on Risk Management Theory, supported by elements of Systems Theory and the Project Success Theory, to form a solid scientific basis for analyzing the relationship between Risk Management practices and project performance within the Saudi construction sector under the framework of Vision 2030.

### **1-7-2 Risk Management Theory**

Risk Management Theory provides the central scientific foundation for this research. It is based on the premise that systematic identification, assessment, and response to risks enhance project predictability and performance.

The theory assumes that uncertainty is inevitable in complex projects; however, through structured and proactive management, negative impacts can be minimized, and positive outcomes maximized.

According to this theory, organizations that adopt mature Risk Management systems can better manage uncertainty, allocate resources efficiently, and make data-driven decisions that improve time, cost, and quality performance.

This directly supports the independent variable in this study Risk Management Practices, which encompasses identification, analysis, response, and monitoring processes.

### **1-7-3 Systems Theory**

Systems Theory complements Risk Management Theory by viewing a construction project as a complex system of interrelated components including human, technical, financial, and environmental subsystems.

Each risk that affects one part of the system can trigger a chain reaction influencing other elements of project performance.

This theory helps explain that Risk Management should not be an isolated activity, but an integrated process embedded across all organizational levels, from planning to execution and monitoring.

Applying Systems Theory supports the idea that effective coordination and communication across stakeholders reduce uncertainty and strengthen overall project performance, thereby contributing to Vision 2030's emphasis on efficiency and integration.

### **1-7-4 Project Success Theory**

The Project Success Theory further reinforces the dependent variable of this study Project Performance. According to this theory, project success is multidimensional and cannot be measured solely by traditional metrics such as time and cost; rather, it also includes stakeholder satisfaction, sustainability, innovation, and strategic alignment.

By integrating Project Success Theory, this research extends the traditional performance evaluation model to include Vision 2030-related criteria, such as sustainable construction, technological innovation, and alignment with national development goals. Therefore, the theory provides a broader conceptual lens through which project performance is assessed not only as operational efficiency but also as strategic contribution to national transformation.

### **1-7-5 Integrating the Theories**

The integration of these three theories provides a comprehensive scientific framework for the research:

*Table (1-2) The relationship of practical theories to the current study and variables*

*Table 2*

| <b>Theory</b>                 | <b>Relevance to the Study</b>                                                                                       | <b>Connection to Variables</b>                             |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <b>Risk Management Theory</b> | Establishes the foundation for understanding how systematic practices influence outcomes.                           | Supports Independent Variable (Risk Management Practices). |
| <b>Systems Theory</b>         | Explains the interconnectivity of risks across project components and organizational structures.                    | Supports the link between practices and outcomes.          |
| <b>Project Success Theory</b> | Defines project performance as a multidimensional construct including efficiency, sustainability, and satisfaction. | Supports Dependent Variable (Project Performance).         |

These theories together create a cause effect model, where well-implemented Risk Management practices (based on Risk Management Theory and Systems Theory) lead to improved project performance (explained through Project Success Theory).

### **1-7-6 Theoretical Link to Vision 2030**

Saudi Vision 2030 promotes sustainable development, operational excellence, and accountability across national projects. The selected theories align perfectly with these principles:

- Risk Management Theory supports Vision 2030's goal of building resilience and reducing project uncertainties.
- Systems Theory aligns with Vision 2030's emphasis on integration, innovation, and coordination between stakeholders.
- Project Success Theory supports Vision 2030's vision of achieving not only project completion but also strategic, sustainable, and high-quality outcomes.

Together, these theoretical foundations form a coherent scientific structure for understanding how Risk Management practices contribute to enhanced project performance and, by extension, to the realization of Vision 2030 objectives.

### **1-7-8 Summary**

In summary, the research is grounded in a multi-theoretical scientific framework that combines:

- Risk Management Theory (to guide the identification and control of project risks).
- Systems Theory (to explain interdependence among project elements).
- Project Success Theory (to define and evaluate project performance outcomes).

This theoretical integration ensures a holistic understanding of how Risk Management practices influence project performance, providing both a scientific basis for the research model and a strategic alignment with Saudi Vision 2030.

*Chapter Two*  
*Previous studies*

## **2-1 Introduction**

Over the past two decades, studies have explored the concept and application of Risk Management within the construction industry worldwide. Researchers have emphasized that effective Risk Management is essential for minimizing project delays, cost overruns, and quality issues, which are familiar challenges in large-scale construction projects. Various models and frameworks developed to guide project managers in identifying, assessing, and mitigating potential risks throughout the project lifecycle (1).

In the context of the Middle East, and particularly Saudi Arabia, studies have examined Risk Management practices in infrastructure and building projects. However, these studies have focused on general project management issues or specific project types rather than presenting a comprehensive assessment of current Risk Management approaches within the broader construction sector. Furthermore, earlier research has often neglected to evaluate how Risk Management practices align with the strategic transformation goals outlined in Saudi Vision 2030, which emphasizes efficiency, innovation, and sustainability in the construction industry (2).

Given these gaps, the present study seeks to build upon previous research by evaluating the effectiveness of current Risk Management practices in the Saudi construction sector and examining their alignment with Vision 2030 objectives. Unlike prior studies, this research aims to provide both an analytical and practical contribution by proposing a framework that integrates international best practices with the specific needs and challenges of the Saudi construction environment (3).

## **2-2 Review of Previous Studies:**

### **1. Institutional Logics and Risk Management Practice in Government entities: Evidence from Saudi Arabia:(4)**

Studies have also identified the challenges of adoption and implementation of “generic” Risk Management frameworks by public sector entities Risk Management as source of uncertainty We explore the adoption and implementation of Risk Management practices in an emerging economy of the Middle East We link the macro and micro level of analysis. We develop a framework to examine the interplay between the institutional logics that currently co-exist in the social field of public sector entities in KSA and one specific management practice.

Risk Management Our findings suggest that the institutional conflict at macro level between an “old” traditional logic prevalent in public sector entities in the KSA and the “new” modernization logic based on the strategic framework launched by the government of KSA translated into a tension between the quest for “status-quo” and a model for risk management inspired by consultants and private/western practices for an example of “indirect no Risk Management isomorphism” in the adoption of IFRS in KSA.

In ENTITY Y, we find that the implementation of a Risk Management project led to a “hybrid practice” were “traditional” and “modernization” logics co-exist. While the risk management project itself was inspired and rooted in the modernization logic, in the process of implementation actors followed routines and practices grounded on (and associated with) a traditional logic.

### **2. Investigating critical failure drivers of construction project at planning stage in Saudi Arabia: (5)**

Other studies have investigated the defects and failures in construction projects resulting in the identifying of varied factors and causes. Nevertheless, these factors were not related to a particular phase and were inclusive of all construction project phases, without even analyzing the varying effect and frequency by stages.

Project failures have received comparatively less attention although numerous studies have identified certain elements related to project success, especially from the perspective of the Saudi Arabian construction sector. This study aims to close this gap by providing a methodology for identifying and categorizing the reasons for project failures in Saudi Arabia from the viewpoints of customers, consultants, and contractors. This article focuses on research directions in the field of construction management to investigate the attributes, failure of drivers, stockholders’ interests, and correction actions for each project life-cycle stage. This enables researchers to understand the uncertainty and clarify ambiguity in project failure and success to increase sustainability.

The Saudi authorities should examine all the factors that lead towards either the failure or failure of construction projects. Hence, the Saudi government should for Risk Management late a plan for the development of the construction industry in Saudi Arabia. The contractors should understand their responsibilities and show full commitment to completing the projects on time. The failure in construction projects means that the additional resources of the state are being utilized. It hurts the economy and financial system of the country. The contractors and clients should collaborate on regular basis.

It will help the contractor in understanding the requirements of the client. The focus of the contractor should be to avail the services of skilled labor in the construction project. The team which would be a part of the project should be selected after examining all the requirements of the project.

Qualified engineers should be included in the project. The availability of the resources and financial budget should be examined. The progress of the project should be assessed after every stage. It will help the authorities in identifying the weaknesses present in the process. The resource management plan should be developed by the project manager so that the productivity of the employees can be enhanced. The factors that are causing disruptions in the projects need to be identified. workload should be equally distributed among the laborers.

### **3-Impact assessment of critical success factors (CSFs) in public construction projects of Saudi Arabia: (6)**

Purpose: There is a limited number of research work on critical success factors (CSFs) in public construction projects in Saudi Arabia. In response to this knowledge gap, the objective of this paper is to assess the impact of CSFs on the government construction projects in Saudi Arabia.

The success factors investigated from a broader consideration of failure criteria, from consideration of most effectiveness in successful project completion and from consideration of the impact of implementing control processes for successful project completion.

This study has analyzed the impact of success factors on construction projects in Saudi Arabia using a descriptive methodology. An exhaustive literature survey undertaken to identify the success and failure factors related to government construction projects in Saudi Arabia. The survey data are sorted out and analyzed by cost, schedule, technical, context and finance dimensions of the projects based on project types, engineering complexity, size, modality, jurisdictional control and funding approach. To evaluate the influence of success factors implementation, qualitative data were collected in a survey via a web-based questionnaire that was sent to officials working and occupying a responsible position in national project guidelines organizations and in government construction organizations in Saudi Arabia.

In all, 28 CSFs were identified, ranked, and evaluated for their impact on project success. The four identified factors belong to process categories of construction projects, nine factors belong to management of construction projects, and fifteen success factors are identified for impact assessment of implementation in construction projects.

The study's findings have identified and ranked the top five CSFs that significantly influence project outcomes, including meeting time targets, adhering to financial budgets, delivering desired outcomes for all stakeholders, effectively managing risks and assembling the appropriate team while optimizing resource allocation. Additionally, the research indicates that hindrances to projects primarily stem from execution, economic, human, and political factors. The study advocates strict controls over incomplete engineering designs and advises against contractors independently managing design work to ensure project success. Additionally, addressing contractors' qualifications and financial matters is crucial for project success. By highlighting these CSFs and challenges, the research provides actionable insights to enhance project management practices in the construction industry.

This study is limited to the infrastructure projects constructed by governmental bodies with the participation of officials from government organizations. Further study, including private

projects and officials working on private projects, may be needed to generalize the research outcome. Originality/value Numerous studies have investigated CSFs in construction projects, but few have examined their relevance to Saudi Arabian government projects. This study aims to fill this gap by identifying key CSFs specific to Saudi Arabian public sector construction projects and assessing their impact on project success.

It advocates for stringent controls in the Saudi Arabian construction sector, emphasizing the importance of preventing incomplete or altered engineering designs by contractors to increase the success rate of public sector projects. This research offers practical insights to stakeholders, advancing project management practices in Saudi Arabia's construction sector for improved outcomes and resource utilization. Keywords Critical failure factors: Critical success factors, MCDMs methods, public construction projects, Infrastructure projects, Impact assessment.

#### **4- Building Information Modeling Impact on Cost Overrun Risk Factors and Interrelationships: (7)**

The main purpose of outer model evaluation is to recognize and remove insignificant risk factors. Upon conducting an outer evaluation of seven models, it was observed that the results of the outer evaluation were consistent across all seven models. Therefore, findings from the outer evaluation of the first model are deemed sufficient. Construction projects suffer from change orders, scheduling conflicts, and cost overruns that result in additional project costs. These issues are attributed to several risk factors for which experts and academics have identified BIM technologies as innovative solutions.

Therefore, this study aimed to investigate the extent to which implementation of BIM technology mitigates the main risk factors related to cost overruns in Saudi construction projects. To do so, a survey study was conducted, collecting thirty valid and completed questionnaires from professionals in the construction industry.

Collected qualitative data was analyzed using PLS-SEM to identify and examine significant risk factors and their interdependencies. It is important to note that this research focused only on examining the impact of BIM on the top 10 risk factors related to Experience, Finances, and Time, as comprehensively identified within the context of the Saudi construction industry. Overall, the synthesis of the literature review and survey analysis findings showed that BIM significantly reduces cost overruns in construction projects compared to conventional construction processes.

This positive influence is due to various benefits of BIM technology that help mitigate influential risk factors and consequent project cost overruns. This result aligns with existing studies. The main results revealed that BIM utilization reduces the impact of risk factors associated with awarding contracts to the lowest bidder. This effect is evident in the decrease in its ranking from first to third place.

#### **5- Risk Factors That Lead to Time and Cost Overruns of Building Projects in Saudi Arabia: (8)**

Studies have identified various critical success factors for construction projects. These included time, cost, quality, safety, client satisfaction, employees' satisfaction, cash-flow management, profitability, environmental project Risk Management, learning and development. However, most of the past research has extensively focused on the three major factors for success in construction industry, which included cost, time, and quality. It has

been eliciting that over 70% of public construction projects in Saudi Arabia have experience delays.

Various risk factors and challenges explaining the time and cost overruns for these projects have been uncovered. Baghdadi and Kishk identified 54 risk factors in the context of external, internal, and force majeure in aviation construction projects, which were causing duration delays as well as cost overruns.

For Risk Management, the causes of the cost and time overruns factors differ between various projects/buildings. For instance, when comparing the delay factors between road infrastructure and building projects, a recent study found that the major critical delay factors for road infrastructure projects included inadequate contractor experience and payment delays to the contractor, while the shortage of materials and financial difficulties of contractor were most salient for building projects. For tall building projects, the major causes of delay and cost overruns identified in 50 included “client’s cash flow problems/delays in contractor’s payment”, “contractor’s financial difficulties”, and “poor site organization and coordination between various parties”. Another study focusing on regular manufacturing and building construction identified delays in progress payments, difficulties in financing the project by contractor/manufacturer, slowness in decision making, late procurement of materials, and delay in approving design documents as the major causes of cost and time overruns.

The findings have revealed issues in the client/contractor relationship and tender allocation process, which may help industry experts and government agencies in future to mitigate the risks identified in this study. with uncertainty continuing due to the COVID-19 pandemic and the opening of the markets, future studies could focus on investigating the force majeure risks and the impact these have on the relationships between the stakeholders and supply chain systems in the Saudi Arabian construction industry. To achieve sustainable development, client, contractor, and labor-related risks must be effectively managed.

#### **6- BIM Impact on Construction Project Time Using System Dynamics in Saudi Arabia’s Construction: (9)**

On the other hand, the interdependencies of the factors that impact the BIM capabilities were examined using a Partial Least Square Structural Equation Model (PLS-SEM) and System Dynamics (SD). At the same time, we evaluated the status of BIM performance in the building phase by studying the interactions among the factors that impact the BIM system using SD. Moreover, most BIM studies have focused on the challenges that hinder BIM performance in such sectors. Moreover, some researchers found that these challenges included delay risk factors that hindered the BIM construction projects, such as ineffective planning and scheduling.

This finding, in turn, led to the question: What is the association between the BIM implementation and the construction project delay factors? According to BIM studies, it is known that BIM implementation contributes to a reduction in construction project delays. Some studies revealed that the delay reduction rate percentages reached savings of 5% to 10%. Nur Sholeh stated that BIM led to a reduction in planning time of 50%, and in some Buildings 2023, 13, 2267 3 of 20 studies, it reached up to 50%. Accordingly, this study intends to raise users’ awareness of using BIM by calculating the effect of BIM on Saudi building project delays. Additionally, with limited for Risk Management studies investigating BIM impact using advanced techniques like SD, this study seeks to convince industry practitioners to use BIM globally by highlighting its advantages.

The key findings demonstrated a relationship between the usage of BIM and the decline in construction building project delays.

This result aligns with other studies worldwide, such as in Indonesia's construction industry and the industries of India, the UK, and others. This research showed that the average reduction in project delays caused by BIM use compared to projects without BIM was 14.47%. This result is consistent with previous studies on reducing project delays by 5 to 10% and 50%.

The findings also showed that the delay factor with the maximum BIM influence was poor site management and supervision by contractors. The work of subcontractors or suppliers and ineffective scheduling and planning by the contractor are the second and third largest project delay factors affected by BIM, respectively. BIM can reduce these factors by 16.83% and 16.36%, respectively. However, the minimum reduction rate of the BIM impact of 11.67% was due to the lack of contractor experience and managerial skills.

#### **7- Construction Cost-Influencing Factors: Insights from a Survey of Engineers in Saudi Arabia: (10)**

The study employs statistical analysis, including Pearson's chi-squared test, to demonstrate associations between demographics, project characteristics, and cost-influencing factors. The findings suggest the need for refined project management practices, enhanced technical training, and the implementation of digital technologies such as Construction 4.0 to mitigate cost-related risks. This research provides significant insights for construction professionals and policymakers seeking to enhance cost management within the Saudi construction sector, thereby contributing to the ongoing development initiatives aligned with Saudi Arabia's Vision 2030. The findings in this study reveal that inadequate management of projects, contracts, and communication is the most significant factor contributing to cost overruns. Additional significant factors included inadequate cost estimation, poor planning and scheduling, design errors, and a lack of technical knowledge among professionals.

In contrast, factors such as currency exchange rate fluctuations and social and cultural influences were regarded as having a limited impact, probably owing to the distinct economic stability and cultural context of Saudi Arabia.

The findings highlight the importance of enhancing project management practices, implementing advanced cost estimation techniques, and using innovative tools for planning and scheduling. Moreover, the results indicate that encouraging a culture of knowledge sharing and mentorship within the construction industry could significantly enhance cost efficiency. The experience of senior engineers can significantly contribute to minimizing errors and improving project outcomes.

This study has resulted in several findings that require further study to provide a comprehensive overview of construction cost-influencing factors in Saudi Arabia. These future studies may include understanding the limited impact on construction costs of both currency exchange rate fluctuations and social and cultural influences. Due to the regional variations within Saudi Arabia, it would be beneficial to examine the differences across regions or project types in the Risk Managements of construction costs.

This comparison could also be made with other countries that have similar economic and cultural contexts. Moreover, there is a need to investigate how digital technology adoption may affect the cost of construction in Saudi Arabia and which of these technologies have the highest potential for cost reduction. In addition, longitudinal studies to track the evolution of

cost factors over time with the adoption of these technologies would provide valuable insights. Sustainable development is a necessity these days; therefore, research on the role of sustainability-related factors and their influence on construction costs is another interesting topic for future studies.

#### **8- Multivariate Analysis of Factors Influencing Construction Costs in Saudi Arabia: (11)**

This study employs a dual-method approach combining Principal Component Analysis (PCA) and Analysis of Variance (ANOVA) to comprehensively analyze the factors influencing construction cost during the construction phase in Saudi Arabia. Utilizing survey data collected from 1076 engineers working in the construction industry of Saudi Arabia, PCA identified three key components:

- (1) project management and technical deficiencies.
- (2) external and regulatory influences.
- (3) financial and economic risks.

Meanwhile, the ANOVA examined differences in the perception of those factors across several demographics and project-specific characteristics. Findings highlight critical areas where focused intervention could improve cost management practices. Combining these results, this study presents an integrated framework for construction industry stakeholders with helpful recommendations.

This integrated analysis provides a robust framework for construction professionals and policymakers to prioritize cost management strategies, in accordance with Saudi Arabia's Vision 2030 goals to encourage a resilient and efficient construction industry. This study presents an integrated framework that offers helpful recommendations for stakeholders of the construction industry in Saudi Arabia. This was done by utilizing a multivariate analysis of factors influencing construction costs in Saudi Arabia, including PCA and ANOVA.

The PCA findings identified three key components: project management and technical deficiencies, external and regulatory influence, and financial and economic risks. ANOVA revealed significant differences in the perception of these factors according to demographics and project-specific characteristics, providing a detailed understanding of the influence of stakeholder diversity and project context on cost drivers. For example, experienced professionals viewed financial risks as more critical, civil engineers more affected by regulatory complexities, and infrastructure projects faced higher financial and safety issues than other types of projects. This contributes to the literature by offering a structured clustering of cost factors rather than analyzing them individually. Thus, providing a data-driven and stakeholder-centered framework design for the Saudi Arabian construction industry.

These findings will enhance previous research as well as provide construction stakeholders, such as project managers, contractors, developers/owners, and policymakers, with a practical tool to prioritize initiatives, optimize resource allocation, and establish effective cost control measures. This study promotes a transition toward more analytical, evidence-based cost management practices to enhance efficiency within the rapidly growing construction industry of Saudi Arabia.

#### **9- Risk Management Impact for Roadworks in the Kingdom of Saudi Arabia: (12)**

This research aimed to identify the most critical risk factors confronting the execution activities of roadway construction projects (RCPs) in Saudi Arabia. A survey containing 39 critical risk factors affecting RCP activities employed and delivered to the participants. The data analyzed using SPSS software. The probability affected the RCPs' objectives (time, cost, and quality), and the risk severity were determined. Time and cost percentages of each activity weighed.

The anticipated rates of time and cost overruns discovered. Results showed that the cut and fill of earthwork had the greatest representation, with 34% for time and 32% for cost. Contrariwise, the road safety and roadway furniture had the least percentage representation among all activities. Results indicated that an overall time overrun of 33% was done in (15-20) % of all executed projects. While the participants indicated that (5-15) % of the projects had an overall cost overrun of 31%. This paper aimed at identifying the most critical risk factors confronting the primary execution activities connected with global roadway construction projects (RCPs) in the Kingdom of Saudi Arabia, as well as their impact on the time, cost, and quality of each activity and the project. The results are summarized in the following points:

1- As for preliminary preparation before starting the project, the results indicated that the existence of problematic soil along the roadway is the key risk factor index for time, cost, and quality. In addition, the existence of horizontal or vertical obstacles in the roadway route and inaccurate soil investigations have a pronounced effect.

2- As for earthworks (cut/fill) to achieve the design levels of the roadway, the results indicated that the inexperience of the engineer's staff and other personnel was the key risk factor for time. While noncompliance with codes, an inexperienced QA/QC team, and the inexperience of the engineer's staff and other personnel were the key risk factors for cost and quality.

3- As for the construction of sub-base and base layers, the results indicated that delay in each of the delivery of crushed stone and placing the next road layer, which causes erosion of the existing layer and the use of sufficient compaction equipment capacity to achieve the required compaction were the key risk factors for time, cost, and quality.

4- As for the execution of bituminous layers, the results indicated that poor batch plant control and a shortage of skilled workers and technicians were the main risk factors for time and cost. While the use of poor-quality raw materials and the shortage of skilled workers and technicians is the key risks to quality.

5- The agreement between the risk factor indices (RFIT, RFIC, and RFIQ) evaluated, and the relationship between the three indices shown to be significant. The strongest correlation found between (RFIT and RFIC).

#### **10- Examining the impact of Risk Management practices on sustainable project performance in the construction industry: the role of stakeholder engagement: (13)**

This study investigates the impact of Risk Management practices on sustainable project performance, specifically focusing on the mediating role of stakeholder engagement in the construction industry within emerging economies.

It examines how risk identification, assessment, and mitigation contribute to sustainability's environmental, economic, and social dimensions. Utilizing data collected from construction project managers involved in sustainability-driven projects, the findings confirm that all three Risk Management practices significantly enhance sustainable project performance.

Furthermore, stakeholder engagement through communication, collaboration, and decision-making involvement plays a crucial mediating role, strengthening the effectiveness of Risk Management strategies in achieving sustainability goals.

This study analyses the correlations among Risk Management methods, stakeholder involvement, and sustainable project performance in emerging economies. The investigation utilized Structural Equation Modelling (SEM) to evaluate the direct and indirect correlations among the variables, while Confirmatory Factor investigation (CFA) was employed to validate the measurement model. The research examined the impact of Risk Management methods on sustainable project performance by mediating stakeholder engagement. Mediation analysis employing bootstrapping is utilized to examine the indirect impacts, offering an in-depth investigation of the mechanisms connecting Risk Management methods to sustainability outcomes.

This research provides convincing evidence for the positive impact of Risk Management practices on sustainable project performance, with stakeholder engagement playing a key mediating role.

The study's findings contribute to the growing body of knowledge on sustainability in project management by emphasizing the importance of risk identification, assessment, and mitigation in achieving environmental, economic, and social sustainability goals. The key takeaway from this study is that stakeholder participation is essential for maximizing the effectiveness of Risk Management practices, ensuring that sustainability objectives are met throughout the project lifecycle. By involving stakeholders in communication, collaboration, and decision-making, projects are more likely to achieve sustainable outcomes, especially in resource-constrained emerging economies.

#### **11- Risks and Challenges Associated with NEOM Project in Saudi Arabia: A Marketing Perspective: (14)**

The study of which is essential to effectively design and implement marketing and promotional strategies. Considering the large scale and scope of the project, the purpose of this study is to identify and evaluate the major contexts and associated risks in accordance with the planned city's objectives. An online questionnaire-based survey was used to collect data related to the severity of the risks identified and classified in a literature review.

A purposive sampling approach adopted to select experts from various governmental institutions to participate in the study. A final sample of 417 expert participants achieved from various ministries and departments in Saudi Arabia. Eleven risk factors and challenges identified, including design challenges, as well as legal, contractual, operational, force majeure, human resources, financial, technological, political, environmental, and sociocultural risks.

Managing mega projects requires effective planning and implementation, along with risk identification and mitigation mechanisms. In addition, it is essential to manage various influencing factors (especially government decisions) in the process of implementation to achieve success.

This study identified and evaluated various types of risks and challenges associated with NEOM. However, there are few limitations observed in this study. First, this study adopted a survey instrument for data collection. Using additional methods, such as case study comparison and qualitative interviews can lead to collection of quality data, which can enable improved analysis and classification of risks. In addition, the sample consisted of experts

from Saudi Arabian government departments. Including additional international experts could have helped to analyze risks from various perspectives. With a lack of existing literature in the context of risks associated with mega projects, the findings and limitations of this study can contribute to future research.

The findings in this study can have practical implications and decision makers in analysis or risks, development of risk-mitigation plans to ensure smooth implementation of mega projects such as NEOM, and in designing marketing and promotional strategies, as well as business ethics codes for NEOM.

In addition, this study has theoretical implications, as the findings from this study can be used for future research in project management and marketing studies related to NEOM.

#### **12- A study on the Impact of the relation between Risk Management and the Development of Construction Projects in the Kingdom of Saudi Arabia: (15)**

The main objective of this research is to study the effect of the relationship between Risk Management and the development of construction projects in the Kingdom of Saudi Arabia. The questionnaire that directed to the participants developed according to the research design, methodology and data. This survey includes two main sections. The first section inquired about the organization's Risk Management procedure. In the second section, the survey tries to determine whether the project they went through met the success criteria, according to 7 criteria factors that identified for the success of the construction project included in the questionnaire. The number of questionnaires distributed reached 230, and 200 respondents retrieved, at 87.4%.

The results of the present study indicate that there is an effect between both risk identification and risk assessment on the development and success of the project, the time limit, the planned budget, and the ability to comply with the technical specifications. While there is no influence between assessing risk and avoiding lawsuits or claims. The study also indicated an impact of responding to risks on the success of the project, meeting the scope of work, the time specified, and achieving quality standards. Key words: project; Effect; Risk Management; Building projects; Success and development; Personnel perspective.

The literature review revealed a lack of studies related to the construction environment for construction projects in the Gulf region specifically during the construction phase and helped create a research gap that for Risk Management the goal and objectives of this research. She also assisted in the first phase of this investigation, which consisted in identifying the risk factors related to construction projects and classifying them into six categories based on interviews with professional practitioners.

Moreover, the literature review aided in the design of the mathematically and statistically evaluated questionnaire to measure the research objectives and conclude the research objective.

#### **13 - Identification and Ranking the Most Significant Risks of the Mega Construction Projects in Saudi Arabia: (16)**

Megaprojects are large-scale projects with expensive cost and long-time schedule; these unique kinds of projects usually give their infamous reputation as they often result in undesired outcomes same as enormous cost overruns and time extensions.

In a lot of cases of undesired outcomes, we can predict that it is due to not managing megaprojects characteristics as skillfully as required and wrong combination of those

characteristics which lead to a disaster. Improperly managing the different managerial aspects of mega projects reflects a failure in the achievement of the project requirements, especially in case of Risk Management where we can say that Mega projects is resulting in a Mega risk. Risk Management is currently considered to be a mandatory part of project management in general and an integral part of successful project management while the main aspect which is projects management is different from megaprojects than in other types of projects (small- and medium-scale projects) as in case of megaproject the management is more complex and complicated due to the size and complexity of that kind of projects.

In this research the author studied the Risk Management in the Mega construction projects in the kingdom of Saudi Arabia (KSA) and the main objective of this research was to apply the best ways of managing the risk in case of mega construction projects starting from identifying the most significant risks which impact this kind of project in KSA and then analyze the identified risk qualitatively to determine its impact in the project objective and to find out the most significant 15 risks after the ranking of the identified risk depending on the risk importance index of every risk the research resulted in identifying 57 risks and categorize those risks in 2 main groups and 8 subgroups one of them is related the mega construction projects characteristics and then the most important risks has been determined. Key words: Mega Project, Risk Management, KSA, Risk Identification, Risk Analysis, Risk Ranking, Qualitative analysis, Construction Industries.

In this research the author aim to put an add value to the mega project risks literature, and bring as much as possible of the risks which may impact negatively the mega projects in Saudi Arabia and prioritizing those identified risks according to its effect throughout the calculation of risk Importance Index RII depending on the mentioned equations # 2, 3, & 4, the field survey was the supportive methodology to collect the date and the analyses it as following: Risks were defined through the participation of experts in project management in different disciplines, where data collection techniques were used, and literature reviews were conducted to identify the most effective risks, and interviews were conducted with 30 experts in managing mega projects, and accordingly the risks under study were identified.

#### **14- Driving Sustainable Disaster Risk Reduction: A Rapid Review of the Policies and Strategies in Saudi Arabia: (17)**

This article presents a comprehensive rapid review of the current disaster risk reduction (DRR) efforts in Saudi Arabia, a country exposed to a variety of hazards such as extreme heat, droughts, floods, dust, and sandstorms, along with threats from terrorism and violence. Employing a rapid review approach, our aim was to provide timely insights into DRR strategies, with an emphasis on the unique geographical and socio-political context of Saudi Arabia.

This study serves as a valuable reference for similar hazard-prone regions worldwide. Our review encompasses Saudi Arabia's progress in key areas, such as improving building codes and infrastructure, developing early warning systems, raising public awareness, and strengthening emergency response capabilities. While Saudi Arabia has made commendable strides in implementing international best practices for DRR, our review also identified specific areas where further development and enhancement needed. These include the need for more sophisticated early warning systems, expanded public awareness campaigns, and continual enhancements in emergency response capabilities.

This review offers key insights into the challenges and opportunities within Saudi Arabia's DRR efforts, highlighting the steps that Saudi Arabia has taken towards resilience. Drawing from specific examples of past disasters, our findings shed light on practical considerations

for improving disaster Risk Management, with the potential to inform Management policy, enhance public awareness, and contribute to building a safer and more resilient future in Saudi Arabia. Keywords: disaster risk reduction; building infrastructure; early warning systems; public awareness; emergency response capabilities; community-based disaster preparedness. In conclusion, this review highlights Saudi Arabia's commendable progress in aligning its DRR strategies with international best practices.

The key areas of success include the enforcement of stringent building codes, the development of advanced early warning systems, and the cultivation of broad public awareness and community-based preparedness. The country's strides in these areas underscore a significant commitment to fostering resilience in the face of diverse hazards. However, the journey towards enhanced disaster resilience is ongoing.

The future focus areas for Saudi Arabia include leveraging emerging technologies for more sophisticated warning systems, developing engaging public awareness initiatives, and continually refining its emergency response capabilities. Furthermore, there is considerable potential for greater community involvement, facilitating grassroots resilience that can contribute to its national DRR goals.

This review emphasizes the importance of continuous investment in resilience-building initiatives and the necessity of drawing from past experiences, current insights, and future aspirations. The process of disaster risk reduction is a journey—a journey Saudi Arabia is taking confidently and proactively. As Saudi Arabia continues this voyage, it can serve as a valuable model for other nations, demonstrating that a commitment to DRR is not just about safeguarding the present, but about investing in a safer, more resilient future.

### **2-2-1 Comparative Analysis of Previous Studies**

The reviewed studies collectively underscore the growing awareness and institutionalization of Risk Management in Saudi Arabia's construction and public sectors.

- Studies 1, 10, 12, and 13 concentrated on the theoretical and organizational aspects of RM implementation, focusing on institutional logic, stakeholder engagement, and managerial culture.
- Studies 2, 3, 5, 7, 8, and 9 emphasized practical risk factors, critical success and failure elements, and cost/time overruns.
- Studies 4 and 6 introduced technological innovation (BIM) as a risk mitigation tool.
- Studies 11 and 14 extended RM research to megaprojects, reflecting the scale and strategic importance of Vision 2030 projects.
- Study fifteen uniquely addressed national disaster risk reduction policies, broadening the context beyond project-level risk to national resilience.

While studies focused on identifying risk factors, only a few (e.g., Studies 1, 10, and 12) analyzed the effectiveness of RM practices in improving project outcomes. Additionally, technological integration (BIM, digital systems) remains an emerging but underexplored theme.

### **2-2-2 Commentary on Previous Studies**

Collectively, the previous literature demonstrates solid progress in identifying, classifying, and understanding risk factors in Saudi Arabia's construction and infrastructure sectors. However, most studies are descriptive rather than evaluative they identify risks but rarely assess the maturity or effectiveness of RM practices. There also limited integration between institutional theory and applied Risk Management frameworks. Moreover, only a few studies have explicitly connected RM implementation to Saudi Vision 2030's

modernization goals, leaving a significant research gap in evaluating how Vision 2030 reforms have transformed RM practices in the construction industry.

### **2-3 The Uniqueness of the Current Research**

Your current research “Evaluation of Risk Management Practices in the Saudi Construction Sector under Vision 2030” differs from previous studies in several ways:

1. **Strategic Integration:** It explicitly aligns Risk Management evaluation with Vision 2030 objectives, assessing how national transformation influences RM adoption and performance.
2. **Comprehensive Evaluation:** Unlike most studies that focus on risk identification or success factors, it evaluates practical implementation, efficiency, and maturity of RM practices within the Saudi construction sector.
3. **Cross-Stakeholder Perspective:** Your research integrates viewpoints of contractors, consultants, and clients to present a balanced evaluation of RM practices.
4. **Bridging Theoretical and Practical Gaps:** It connects institutional and managerial theories with applied construction risk data, offering a holistic model.
5. **Future-Oriented Contribution:** By identifying improvement areas aligned with Vision 2030, your research provides actionable recommendations for enhancing risk governance, project sustainability, and national competitiveness.

### **2-4 Theoretical Framework**

The theoretical framework of this research grounded in the principles and practices of Risk Management within construction projects, emphasizing how these practices contribute to achieving the strategic goals of Saudi Vision 2030. It provides a conceptual structure for understanding the nature of risks, their classifications, sources, and management processes, and their overall relationship with project success.

#### **1. Key Concepts of Risk Management**

Risk Management is defined as a systematic process of identifying, analyzing, and responding to project risks to minimize potential negative impacts while maximizing opportunities. In the construction industry, risk is inherent due to the complexity, uncertainty, and dynamic environment of projects.

The primary aim of Risk Management is to ensure project objectives time, cost, quality, and safety achieved despite uncertainty. Effective Risk Management not only reduces losses but also enhances decision-making and organizational resilience.

#### **2. Classification of Risks in Construction Projects**

Risks in construction projects can be classified in multiple ways depending on their nature, source, and level of impact. The most common classifications include:

A. Based on Nature of Risk:

- Financial Risks:

Such as cost overruns, payment delays, inflation, and exchange rate fluctuations.

- Technical Risks:  
including design errors, poor workmanship, and equipment failure.
- Managerial Risks:  
Arising from inadequate planning, poor communication, or weak leadership.
- Environmental Risks:  
Related to weather conditions, natural disasters, or environmental regulations.
- Health and Safety Risks:  
Involving workplace accidents and unsafe practices.
- Legal and Contractual Risks:  
Linked to disputes, unclear contract terms, or non-compliance with regulations.

B. Based on Source of Risk:

- Internal Risks originate from within the organization, such as resource shortages or managerial inefficiency.
- External Risks are beyond the organization's control, including political instability, market fluctuations, or regulatory changes.

C. Based on Project Stage:

- Design Phase Risks:  
Incomplete drawings, miscommunication of specifications.
- Construction Phase Risks:  
Labor productivity, safety incidents, or supply chain disruptions.
- Operation Phase Risks:  
Maintenance issues, long-term performance failures.

### **3. Theories and Strategies of Risk Management**

Risk Management theory is rooted in decision theory and uncertainty management, emphasizing rational evaluation of risk probability and impact. The PMBOK (Project Management Body of Knowledge) and ISO 31000 frameworks provide a structured approach that includes five key steps:

1. Risk Identification: Determining potential risks that may affect project outcomes.
2. Risk Analysis: Assessing the likelihood and consequences of each risk.
3. Risk Evaluation: Prioritizing risks according to their severity and potential impact.
4. Risk Response Planning: Developing mitigation, transfer, acceptance, or avoidance strategies.

5. Risk Monitoring and Control: Continuously tracking identified risks and emerging new ones throughout the project lifecycle.

Effective Risk Management strategies depend on initiative-taking planning, transparent communication, and integration into the organization's decision-making process.

#### **4. Project Management in the Context of Saudi Vision 2030**

Saudi Vision 2030 emphasizes sustainability, efficiency, innovation, and accountability in the construction and infrastructure sectors. Under this national framework, Risk Management plays a vital role in ensuring that large-scale projects—such as NEOM, The Red Sea Project, and Qiddiya are delivered successfully.

The Vision's goals require advanced project management practices that integrate digital transformation, sustainable resource utilization, and high-quality governance mechanisms. Therefore, adopting robust Risk Management systems becomes a key enabler for reducing project uncertainty and aligning with national economic diversification objectives.

#### **5. The Relationship Between Risk Management and Project Success**

The literature demonstrates a strong correlation between effective Risk Management and overall project success. Projects that actively identify and control risks tend to achieve better outcomes in terms of cost control, schedule adherence, safety, and stakeholder satisfaction.

Moreover, organizations with mature Risk Management systems develop greater adaptability and resilience, which are essential for operating in a fast-changing economic environment such as Saudi Arabia's Vision 2030 transformation.

Therefore, in this study, Risk Management is not viewed merely as a preventive tool but as a strategic capability that supports sustainable project success and long-term organizational growth.

The theoretical framework establishes the foundation for analyzing how risk identification, classification, and management processes influence the performance of construction projects in Saudi Arabia. It also connects these practices to the broader strategic goals of Vision 2030, thereby linking theory with both national development objectives and practical project management applications.

**Chapter Three**  
**Research Methodology**

### **3-1 Research Methodology**

#### **3-1-1 Introduction**

The methodology of this study outlines the systematic and structured approach adopted to achieve the research objectives and provide reliable answers to the research questions. It defines how the research is designed, the type and sources of data collected, the instruments used to obtain that data, and the analytical methods employed to derive meaningful conclusions. A well-constructed methodology ensures that the findings of the study are valid, credible, replicable, and scientifically grounded.

In the context of this research evaluating Risk Management practices and their effect on project performance in the Saudi construction sector within the framework of Vision 2030 a robust methodology is essential due to the complexity and diversity of construction project environments. The Saudi construction industry involves multiple stakeholders, large-scale investments, and varying project conditions. These factors necessitate a methodological approach that can capture the breadth of industry realities while providing deep analytical insights.

To address these demands, the study employs a quantitative descriptive analytical methodology, supported by targeted qualitative insights. This blended approach offers several advantages:

- It enables the measurement of prevalence, maturity, and effectiveness of Risk Management practices across a large sample of construction professionals.
- It allows for a systematic assessment of how Risk Management practices influence project performance indicators, including cost, time, quality, and safety.
- It supports the identification of gaps, challenges, and institutional weaknesses that may hinder the adoption of effective Risk Management.
- It ensures alignment with the broader strategic transformation goals of Saudi Vision 2030, such as improving efficiency, strengthening governance, enhancing sustainability, and promoting innovation in the construction sector.

Furthermore, the methodology integrates multiple sources of data primary data through structured questionnaires, secondary data through academic literature and industry reports, and mixed insights from industry guidelines to provide a comprehensive and triangulated understanding of the research problem. The combination of numerical evidence and contextual interpretation strengthens the study's analytical depth and practical relevance.

Overall, this methodological framework ensures that the study provides accurate, actionable, and scientifically defensible insights into how Risk Management practices shape project outcomes within the rapidly evolving Saudi construction sector.

#### **Nature of Data**

The study relies on three main sources of data — secondary, primary (ordinary), and combined (mixed) to ensure validity, reliability, and comprehensive coverage.

#### **Secondary Data**

Secondary data obtained from existing academic and professional sources, including:

- Published research papers, books, and theses on construction Risk Management.

- Governmental and institutional reports such as those from the Saudi Ministry of Municipal and Rural Affairs and Housing, Saudi Contractors Authority, and Vision 2030 documentation.
- International standards and frameworks such as ISO 31000, PMBOK, and FIDIC guidelines.

The secondary data help establish the theoretical foundation, identify existing models, and support literature-based comparisons between international and Saudi practices.

### **Primary (Ordinary) Data**

Primary data (sometimes referred to as ordinary or field data) collected directly from practitioners within the Saudi construction industry.

This includes:

- Engineers, project managers, consultants, contractors, and risk officers.
- Data obtained through a structured questionnaire and, where necessary, semi-structured interviews to supplement quantitative findings.

This data provides real-world insights into how Risk Management practices are currently implemented and how they affect project performance.

### **Combined (Both) Data**

By integrating both secondary and primary data, the research adopts a mixed-method approach.

- The secondary data provides theoretical grounding and context.
- The primary data evaluate these theoretical assumptions empirically in the Saudi environment.

This integration enhances triangulation, ensuring that the findings are both academically sound and relevant.

## **3-2 Research Design and Study Assignment**

The study follows a quantitative descriptive and analytical design, which allows for measurement of relationships between variables.

It is structured around a main study assignment supported by sub-assignments, each targeting specific objectives.

### **Main Study Assignment**

The main assignment of this research is:

To evaluate how Risk Management practices influence project performance in Saudi construction projects, and how this relationship supports Vision 2030 objectives.

This assignment integrates both theoretical and empirical aspects of Risk Management and establishes the foundation for the questionnaire and analysis.

### **Sub-Assignments (Supporting Studies)**

To achieve the main assignment, several sub-assignments defined:

1. To identify key risk categories and sources affecting Saudi construction projects.
2. To assess the maturity and extent of Risk Management practices in construction organizations.
3. To evaluate the relationship between the level of Risk Management implementation and project performance indicators (time, cost, quality, and sustainability).

4. To propose a practical framework for enhancing Risk Management effectiveness in alignment with Vision 2030.

### Questionnaire Design and Data Collection

#### **Purpose of the Questionnaire**

The questionnaire serves as the primary data collection tool designed to gather quantitative information from industry professionals. It aims to measure:

- The degree of implementation of various Risk Management practices (independent variable).
- The corresponding impact on project performance (dependent variable).

#### **Structure of the Questionnaire**

The questionnaire divided into five sections:

1. Demographic Information:  
Captures respondents' background (role, experience, organization type, and project scale).
2. Risk Identification and Classification:  
Questions measure how frequently and systematically risks are identified and categorized.
3. Risk Assessment and Response Practices:  
Evaluates how organizations analyze, prioritize, and mitigate risks.
4. Risk Monitoring and Organizational Culture:  
Assesses continuous monitoring, reporting, and leadership commitment to Risk Management.
5. Project Performance Indicators:  
Measures the perceived effect of Risk Management on time, cost, quality, safety, and sustainability.

Each item uses a five-point Likert scale (from Strongly Disagree = 1 to Strongly Agree = 5) to ensure consistency and quantitative analysis.

#### **Target Population and Sampling**

The target population consists of professionals within the Saudi construction sector, including:

- Project Managers
- Site Engineers
- Consultants and Contractors
- Risk and Quality Managers

A stratified random sampling technique applied to ensure representation across various organizational levels and project types. The expected sample size is 30-40 participants.

### **3-4 Data Collection Method**

Data collected electronically via Google Forms or distributed hard copies to active construction sites and corporate offices. Responses then compiled and coded for statistical analysis using SPSS or Excel software.

### **Data Analysis Method**

The data analyzed using both descriptive and inferential statistical methods.

- Descriptive Analysis:  
Mean, frequency, and standard deviation will describe general trends and respondent perceptions.
- Inferential Analysis:
  - Correlation Analysis to evaluate the relationship between Risk Management practices and project performance.
  - Regression Analysis to determine the strength and significance of the effect of Risk Management practices on performance outcomes.
  - Reliability and Validity Tests (e.g., Cronbach's Alpha) to ensure the internal consistency of the questionnaire.

*Table (3-1) Study hypotheses according to scientific methods.*

*Table 3*

| <b>Component</b>          | <b>Description</b>                                                                       | <b>Scientific Purpose</b>                             |
|---------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Main Assignment           | Evaluating the effect of Risk Management practices on project performance.               | Establishes core cause effect relationship.           |
| Sub-Assignments           | Identifying risks, analyzing practices, testing relationships, and developing framework. | Provides detailed scientific pathways for validation. |
| Independent Variable (IV) | Risk Management Practices (Identification, Assessment, Response, Monitoring, Culture).   | Predictive variable influencing outcomes.             |
| Dependent Variable (DV)   | Project Performance (Time, Cost, Quality, Safety, Sustainability).                       | Outcome variable reflecting results.                  |
| Analytical Tools          | Questionnaire, statistical tests, correlation, and regression analysis.                  | Ensures scientific validity and reliability.          |

### **3-5 Goals of Study**

1. To quantify the impact of Risk Management practices on construction project outcomes.
2. To identify the key practices that most significantly influence project success.
3. To measure the alignment between current practices and Vision 2030 objectives.
4. To develop a framework for improving Risk Management efficiency in Saudi construction projects.

### **3-6 Summary**

This methodology combines theoretical grounding, empirical data collection, and quantitative analysis to examine the influence of Risk Management practices on project performance.

By integrating secondary, primary, and mixed data, and by using a scientifically structured questionnaire, the study aims to produce objective, verifiable, and actionable results that

contribute to improving project governance and performance within the Vision 2030 framework.

### **3-7 Research Community**

The research community, also referred to as the population, represents all individuals and organizations relevant to the subject of this study.

In this research, the community consists of professionals working in the Saudi construction sector, who are directly involved in the planning, execution, and control of construction projects, and have experience in Risk Management practices.

This includes:

- Project Managers
- Risk Managers
- Site Engineers
- Project Engineers
- Consultants and Quality Managers
- Contractors and Project Supervisors

These professionals selected because they possess the practical experience and managerial insight required to evaluate Risk Management processes and assess their impact on project performance. Their inputs represent diverse organizational perspectives (public, private, and mixed-sector projects) in line with Saudi Vision 2030 goals of efficiency, innovation, and risk control in project delivery.

### **3-8 Study Sample**

The study sample refers to the subset of the research community that has been selected to provide data through the questionnaire survey.

A stratified random sampling method was adopted to ensure representation from multiple segments of the Saudi construction industry, both large and medium-sized firms, public and private sectors, and different project types (infrastructure, building, utilities, etc.).

#### **Sampling Rationale**

The rationale for using stratified sampling is to:

- Ensure a balanced representation of participants from distinct roles and experience levels.
- Avoid bias in data collection and enhance the statistical validity of the results.
- Reflect the diversity of the Saudi construction sector in terms of organizational structure and project scale.

#### **Sample Composition**

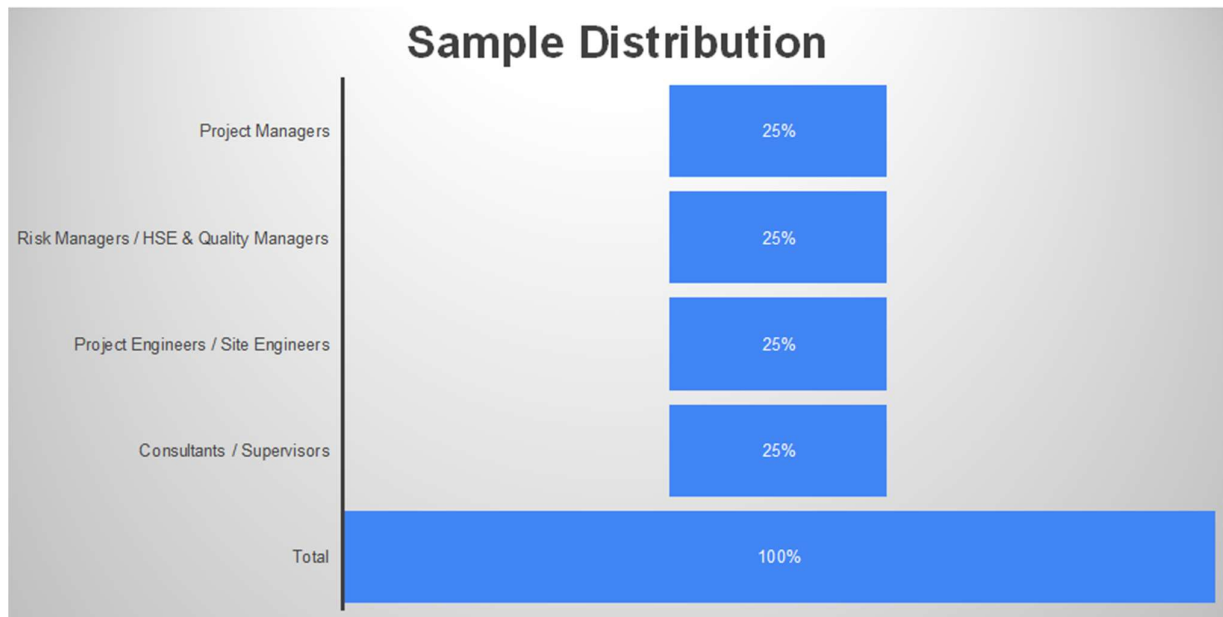
The proposed sample size for this study ranges between 30–40 respondents, distributed as follows:

Table (3-2) Sample distribution

Table 4

| Respondent Category                    | Approximate Percentage | Estimated Number   |
|----------------------------------------|------------------------|--------------------|
| Project Managers                       | 25%                    | 8-10               |
| Risk Managers / HSE & Quality Managers | 25%                    | 8-10               |
| Project Engineers / Site Engineers     | 25%                    | 8-10               |
| Consultants / Supervisors              | 25%                    | 8-10               |
| Total                                  | 100%                   | 30-40 Participants |

Sample Distribution Chart Figure (3-1)



1 Figure

This distribution ensures a comprehensive understanding of Risk Management practices from both managerial and operational perspectives.

#### **Sampling Criteria**

Participants selected based on the following criteria:

1. Professional Role: Individuals directly involved in project management, risk analysis, or site execution.

2. Experience: Minimum of 3 years' experience in construction project delivery in Saudi Arabia.
3. Sector Participation: Employment in Saudi-based construction companies (public or private).
4. Knowledge Level: Familiarity with Risk Management frameworks, such as ISO 31000 or PMBOK risk processes.
5. Availability and Willingness: Voluntary participation and consent to provide data for research purposes.

### **Geographic and Institutional Scope**

The study covers construction firms operating in key Saudi regions, including:

- Riyadh, Eastern Province (Dammam, Jubail, Khobar).
- Western Region (Jeddah, Makkah).
- These regions were selected due to their large concentration of Vision 2030 projects, such as NEOM, Qiddiya, The Red Sea Project, and major infrastructure developments.

Participating organizations include:

- Main contractors
- Subcontractors
- Engineering consultancy offices
- Government-affiliated project management units

This geographic and institutional diversity strengthens the external validity of the research and ensures the findings reflect national-level realities.

### **Data Collection from Sample**

The data collected conducted through a structured questionnaire distributed electronically via Google Forms.

Respondents will answer questions based on their practical experience and organizational practices. Confidentiality and anonymity maintained to ensure honest and unbiased responses.

The responses then coded and analyzed statistically to identify:

- The level of Risk Management implementation.
- The corresponding impact on project performance metrics (cost, time, quality, safety, and sustainability).

### **Ethical Considerations**

The study will adhere to academic ethical standards:

- Participation will be voluntary.
- Participants will inform about the purpose and use of data.
- No identifying information will be disclosed.
- Data will be used solely for academic and research purposes.

### **Summary**

In summary, the research community represents a broad spectrum of professionals within the Saudi construction industry, while the study sample provides a statistically significant subset capable of delivering reliable data.

This design ensures that the findings are generalizable, credible, and aligned with the realities of Risk Management practices in Saudi Arabia's Vision 2030 construction environment.

### **3-9 Research Delimitations**

The delimitations of this study were classified into three key dimensions: time scope, geographical scope, and subject scope.

#### **1. Time Scope**

The time scope of this research extends from 2020 to 2025, covering a five-year period that coincides with a critical phase of development in the Saudi construction industry under the Vision 2030 transformation framework.

This period is selected for the following reasons:

- It represents a dynamic period of expansion, where major construction and infrastructure projects initiated or accelerated.
- It includes post-pandemic recovery years, in which project Risk Management strategies evolved significantly to adapt to market fluctuations, material shortages, and global uncertainties.
- The selected period provides sufficient data to evaluate practical applications of Risk Management methodologies, track performance outcomes, and identify evolving trends across multiple project phases.

Therefore, the study focuses on projects executed or managed within the 2020–2025 period, as they best reflect the current realities and practices of the Saudi construction sector.

#### **2. Geographical Scope**

The geographical scope of the study confined to construction companies operating within the Kingdom of Saudi Arabia.

This includes projects and organizations based on major development hubs such as:

- Riyadh Region:  
Representing large-scale governmental and infrastructure projects.
- Eastern Province:  
Encompassing industrial, oil, and utility-related developments in cities like Dammam, Jubail, and Khobar.
- Western Region:  
Involving tourism and urban projects in Jeddah, Makkah, and Madinah.

The rationale for this geographical focus is that the Saudi construction industry is one of the largest and fastest growing in the Middle East, playing a pivotal role in achieving Vision 2030 goals related to diversification, infrastructure, and housing.

Moreover, Saudi Arabia's construction environment features a unique regulatory, cultural, and economic framework, making it essential to assess Risk Management practices within this specific context rather than generalizing from international data.

#### **3. Subject Scope**

The subject scope of this study limited to Risk Management practices related to construction projects in Saudi Arabia.

The research focuses specifically on identifying:

- The types and sources of risks encountered in Saudi construction projects.
- The methods and frameworks are used to identify, analyze, mitigate, and monitor those risks.
- The impact of such practices on project performance indicators, including cost, time, quality, and safety outcomes.

The study does not extend to other management domains such as procurement, finance, or human resource management except where they are related to risk identification or mitigation.

By limiting the subject scope to Risk Management, the research maintains depth and analytical precision, allowing for a focused assessment of how these practices contribute to project success and Vision 2030's objectives of operational excellence and sustainability.

#### **4 Justification of Delimitations**

These delimitations were deliberately established to:

- Ensure feasibility and data accuracy within the available period and resources.
- Focus on the research on the most relevant and current practices within Vision 2030.
- Maintain academic rigor and contextual consistency by confining the study to a single national and industrial setting.
- Enable comparative analysis of Risk Management maturity among Saudi construction firms operating within the defined scope.

By clearly setting these boundaries, the study achieves a balanced approach, broad enough to capture key trends and challenges across the sector, yet specific enough to provide actionable insights for project managers, policymakers, and researchers.

#### **5 Summary**

In summary, this study delimited by:

- Time Scope: From 2020 to 2025, aligning with the active phase of Vision 2030 projects.
- Geographical Scope: Construction companies operating within the Kingdom of Saudi Arabia, covering major regional centers.
- Subject Scope: Risk Management practices in construction projects and their influence on project performance.

These delimitations collectively ensure that the research remains focused, relevant, and methodologically sound, providing meaningful contributions to the body of knowledge on Risk Management in the Saudi construction sector.

## **Chapter Four**

### **DATA Analysis & Results and Recommendations**

## **4-1 Data Analysis**

### **1. Introduction**

The data analysis section outlines the procedures used to interpret and evaluate the information collected from the study's primary and secondary sources. The analysis aims to identify the existing gap between current Risk Management practices and their ideal implementation within Saudi construction companies. It also examines the relationship between these practices and project performance, relying on the questionnaire responses, documented observations, and insights gathered from the literature review.

The expected results presented in this section derived from established trends in the Saudi construction sector and previous academic studies on Risk Management effectiveness. This analytical approach supports the broader objectives of the research, which is to assess current practices, identify systemic weaknesses, and propose improvement strategies aligned with Saudi Vision 2030. The outcome of this analysis intended to guide decision-makers, risk managers, and project stakeholders toward adopting more structured and initiative-taking Risk Management frameworks.

### **2. Data Analysis Approach**

The data analyzed is using both descriptive and inferential techniques to ensure a comprehensive interpretation of Risk Management practices across construction organizations. The analysis procedures included:

- Descriptive statistics to summarize frequencies, trends, and patterns in the respondents' perceptions regarding Risk Management processes, capacity, and overall effectiveness.
- Comparative analysis to assess differences between small, medium, and large construction firms in terms of their adoption of formal Risk Management systems.
- Correlation analysis to explore the relationship between Risk Management maturity and project performance indicators such as schedule adherence, cost control, quality assurance, and stakeholder satisfaction.
- Thematic qualitative coding to interpret open-ended responses, enhancing the quantitative findings with context-based insights.

This mixed-method analytical approach strengthens the validity and reliability of the results, providing a holistic understanding of the existing challenges and potential opportunities for improvement.

### **3. Expected Results**

#### **Gap Between Current and Ideal Practices**

Based on the data collected, the analysis expected to reveal a distinct gap between the current practices of Risk Management and their ideal implementation in the Saudi construction industry. Common patterns anticipated include:

- A tendency among companies to adopt informal or reactive approaches rather than initiative-taking and systematic methods.
- Limited documentation of risk processes and irregular follow-up procedures.
- Inconsistent practices among construction firms, where large companies are more structured while smaller firms lack comprehensive frameworks.

These findings indicate that, although Risk Management concepts acknowledged within the sector, they are not yet fully integrated into operational routines or organizational culture. This gap underscores the need for more rigorous and standardized Risk Management procedures.

### **Need for Institutional Capacity-Building**

The data analysis is expected to highlight significant weaknesses in organizational capacity relating to Risk Management, including:

- Lack of specialized training programs for project managers, engineers, and technical staff.
- Insufficient integration of risk assessments during the planning and design phases.
- Limited presence of resolute Risk Management units within company structures.

These observations emphasize the necessity for institutional reforms aimed at enhancing professional competencies and improving the maturity of Risk Management systems. Strengthening human and organizational capabilities is expected to yield measurable improvements in project outcomes and operational resilience.

### **Proposed Framework for Improvement**

The analytical findings expected to support the development of a proposed framework that enhances Risk Management implementation in Saudi construction companies. This framework will focus on:

- Integrating international standards (such as ISO 31000 and PMBOK) with local requirements.
- Establishing standardized steps for risk identification, analysis, mitigation, and monitoring.
- Encouraging the adoption of digital solutions to improve the efficiency and accountability of risk-related processes.
- Aligning these efforts with Vision 2030 goals emphasizing transparency, efficiency, and sustainability.

The framework will serve as a guiding model for construction firms to build systematic and strategic Risk Management processes within their organizational structures.

#### **4. Expected Recommendations**

##### **Development of Clear Internal Policies**

Data analysis expected to highlight a strong need for construction companies to establish clear and structured internal policies, including:

- Defined risk roles and responsibilities.
- Formal procedures for documentation, evaluation, and escalation.
- Alignment with national and international regulatory frameworks.

These internal policies will support organizational consistency and increase accountability across all project stages.

##### **Training and Capacity Development**

Findings will point to the importance of improving human capital through comprehensive training programs focusing on:

- Risk identification techniques.
- Application of advanced risk analysis tools such as Monte Carlo simulation, qualitative matrices, and probability models.
- Mitigation planning and contingency development.
- Continuous monitoring throughout the project life cycle.

Enhancing professional competencies will foster a sustainable risk-aware culture across construction firms.

##### **Integration of Risk Management into Project Phases**

Results expected to show the necessity of embedding Risk Management at all project phases, including:

- Planning and design, to minimize uncertainties early.
- Execution, to adjust mitigation actions as new risks emerge.
- Project closure, to document lessons learned and support continuous improvement.

This integration reduces cost overruns, schedule delays, and operational disruptions while improving transparency and control.

##### **Encouraging Digital Transformation**

The analysis also expected to support the recommendation to adopt digital Risk Management tools that enable:

- Real-time risk tracking.
- Improved collaboration among project stakeholders.
- Data-driven decision-making.
- Automated reporting and documentation.

Digital transformation supports Vision 2030 objectives and enhances the precision of risk identification and mitigation.

### **Summary**

The data analysis expected to confirm that Risk Management practices in the Saudi construction sector remain inconsistent and underdeveloped. Key gaps relate to policy development, training, institutional structures, and integration across project stages. The recommendations derived from the analysis aim to address these shortcomings through:

- Clear internal policies,
- Enhanced training and human capacity,
- Framework integration across project phases, and
- Expansion of digital tools.

These improvements are essential for advancing Risk Management maturity in line with Vision 2030, improving project performance, strengthening organizational resilience, and boosting the competitiveness of the Saudi construction industry.

**Chapter Five**  
**The Annexes & References**

### **5-1 References:**

- 1-Behrad Barghi, Shahram Shadrokh Sikari. (2020). Qualitative and quantitative project risk assessment using a hybrid PMBOK model developed under uncertainty conditions. Sharif University of Technology, Islamic Republic of Iran. ELSEVIER.
- 2-Yazeed A. Alragabah and Mohd. Ahmed. (2023). Impact assessment of critical success factors (CSFs) in public construction projects of Saudi Arabia. Department of Civil Engineering, King Khalid University, Abha, Saudi Arabia. Frontier in Engineering and built.
- 3-Saad Alshihri, Khalid Al-Gahtani and Abdulmohsen Almohsen. (2022). Risk Factors That Lead to Time and Cost Overruns of Building Projects in Saudi Arabia. Department of Civil Engineering, King Saud University, P.O. Box 800, Riyadh 11421, Saudi Arabia. MDPI.
- 4- Omar Alnajjar, Edison Atencio and Jose Turmo. (2025). Real-World Validation of a Construction Lifecycle Optimization Framework Integrating Lean Construction, BIM, and Emerging Technologies in Saudi Arabia. Department of Civil and Environment Engineering, Universitat Politècnica de Catalunya, Barcelona Tech, C/Jordi Girona 1-3, 08034 Barcelona, Spain. MDPI.
- 5-Peter Murr, Nieves Carrera. (2021). Institutional logics and risk management practices in government entities: evidence from Saudi Arabia. Research gate.
- 6-Jianmin Song', Matakala Munyinda and Philip Adu Sarfo. (2025). Examining the impact of risk management practices on sustainable project performance in the construction industry: the role of stakeholder engagement. \*School of Civil Engineering, Zhengzhou University, Zhengzhou, China, 'School of Management, zhengzhou University, Zhengzhou, China. Research gate.
- 7-Saleh Alsulamy. (2022). Investigating critical failure drivers of construction project at planning stage in Saudi Arabia. Architecture and Planning Department, College of Engineering, King Khalid University, Abha, Saudi Arabia. Research gate.
- 8-Aljawharah A. Alnaser, Khalid S. Al-Gahtani and Naif M. Alsanabani. (2024). Building Information Modeling Impact on Cost Overrun Risk Factors and Interrelationships. College of Architecture and Planning, Department of Architecture and Building Science, King Saud University. MDPI.
- 9-Zoubeir Lathaj, Slim Rebai, Wassim AlBalkhy, Olfa Hamdi, Alan Mossman, and Angela Alves da Costal. (2024). Complexity in Construction Projects: A Literature Review. ' Laboratoire de Mécanique Multiphysique Multiéchelle, LaMcube, UMR 9013, Centrale Lille, CNRS, Université de Lille, F-59000 Lille, France. MDPI.

- 10- Fahd Boustani. (2021). "A study on the impact of the relationship between risk management and the development of construction projects in the Kingdom of Saudi Arabia" investigates this topic. Saudi Arabia. Fahd Boustani.com.
- 11-Aljawharah A. Alnaser, Naif M. Alsanabani? and Khalid S. Al-Gahtani. (2023). BIM Impact on Construction Project Time Using System Dynamics in Saudi Arabia's Construction. Department of Architecture and Building Science, College of Architecture and Planning, King Saud University, Riyadh,11574, Saudi Arabia, Department of Civil Engineering, King Saud University, P.O. Box 2454, Riyadh 11421, Saudi Arabia, Author to whom correspondence should be addressed. MDPI.
- 12-Jianmin Song, Matakala Munyinda, Philip Adu Sarfo. (2025). Examining the impact of risk management practices on sustainable project performance in the construction industry: the role of stakeholder engagement. Research Gate.
- 13-Abdulmoneim AM, Al Samadony A, Nosair IA. (2021). Identification and Ranking the Most Significant Risks of the Mega Construction Projects in Saudi Arabia. Saudi Journal of Civil Engineering.
- 14-Ibrahim Mosly, (2025), Multivariate Analysis of Factors Influencing Construction Costs in Saudi Arabia. Civil & Environmental Engineering Department, College of Engineering-Rabigh Branch, King Abdulaziz University, Jeddah 21589, Saudi Arabia. MDPI.
- 15- Areej Algumzi. (2022). Risks and Challenges Associated with NEOM Project in Saudi Arabia: A Marketing Perspective. College of Business Administration, University of Tabuk, Tabuk 47512, Saudi Arabia. MDPI.
- 16-Ahmed Elzoghby, Mohammed Salem Alghamdi. (2024). Risk Management Impact for Roadworks in the Kingdom of Saudi Arabia. Research Gate.
- 17-Ahmed M. Al-Wathinani', Dennis G. Barten, Marta Borowska-Stefanska, Pawel Golda, Noora A. AlDulijan, Mohammad A. Alhallaf, Lujain O. Samarkandi, Abdullah S. Almuhaiddly, Mariusz Goniewicz and Waleed O. Samarkandi. (2023). Driving Sustainable Disaster Risk Reduction: A Rapid Review of the Policies and Strategies in Saudi. ' Department of Emergency Medical Services, Prince Sultan bin Abdulaziz College for Emergency Medical Services, King Saud University, Riyadh 11451, Saudi Arabia. MDPI.

### **5-2 Questionnaire:**

مرحباً بكم جميعاً،

أتمنى أن تكونوا بخير.

أعمل حالياً على مشروع بحثي لمرحلة الماجستير بعنوان:

Evaluating Risk Management Practices and Their Effect on Project Performance in the Saudi Construction Sector within Vision 2030.

ويسعدني جداً مشاركتكم ودعمكم لي من خلال تعبئة الاستبانة الخاصة بالدراسة. مشاركتكم ستساهم بشكل كبير في إنجاح هذا البحث وستكون محل تقدير كبير مني.

شكراً مقدماً على وقتكم وتعاونكم،

ودمت بخير وامتنان.

Hello everyone,

I hope you are doing well.

I am currently working on my master's research project under Title:

Evaluating Risk Management Practices and Their Effect on Project Performance in the Saudi Construction Sector within Vision 2030.

I would deeply appreciate your support in participating in the study's surveys. Your contribution will play a significant role in the success of this research and value.

Thank you in advance for your time and cooperation.

With sincere appreciation.

[https://docs.google.com/forms/d/1oJsRD-BK2idmaehK-392FD6ofl\\_ifPkgyCaPDA8Hihw/edit](https://docs.google.com/forms/d/1oJsRD-BK2idmaehK-392FD6ofl_ifPkgyCaPDA8Hihw/edit)

### Questionnaire:

\* Your participation is voluntary, your responses will remain confidential and anonymous, and the collected data used solely for academic and scientific purposes. Are you willing to continue this questionnaire?

Yes

No

Do you currently work in the Saudi construction sector?

☐ Yes ☐ No

Does your organization participate in projects related to Saudi Vision 2030?

☐ Yes ☐ No

Have you been involved in project planning or execution within the last 3 years?

☐ Yes ☐ No

#### Section B: Identification of Major Risks in Construction Projects

Does your company face recurring financial risks (e.g., cost overruns, price fluctuations)?

☐ Yes ☐ No

Do you encounter technical risks during project design or execution?

☐ Yes ☐ No

Do operational risks (delays, workforce issues, equipment failure) occur frequently in your projects?

☐ Yes ☐ No

Do environmental risks (weather, site conditions, regulations) impact your projects?

☐ Yes ☐ No

Does your company classify risks based on severity or impact?

☐ Yes ☐ No

#### Section C: Current Risk Management Practices

Does your company have a formal Risk Management process?

☐ Yes ☐ No

Do you follow international standards such as ISO 31000 or PMBOK for Risk Management?

☐ Yes ☐ No

Is risk identification conducted at the start of each project?

☐ Yes ☐ No

Do you maintain a risk register throughout the project lifecycle?

☐ Yes ☐ No

Does your team perform periodic risk assessments during project execution?

☐ Yes ☐ No

Is Risk Management integrated into project scheduling and cost planning?

☐ Yes ☐ No

#### Section D: Challenges Hindering Effective Risk Management

Does your company experience a shortage of trained Risk Management professionals?

☐ Yes ☐ No

Do communication gaps between departments create obstacles in risk reporting?

☐ Yes ☐ No

Does lack of accurate project data hinder risk analysis?

☐ Yes ☐ No

Is resistance to change a barrier to adopting new Risk Management methods?

☐ Yes ☐ No

Does limited support from senior management negatively affect Risk Management efforts?

☐ Yes ☐ No

#### Section E: Alignment with Saudi Vision 2030

Do current project practices contribute to improving efficiency, as emphasized in Vision 2030?

☐ Yes ☐ No

Does your company consider sustainability and innovation in its risk decisions?

☐ Yes ☐ No

Do your Risk Management practices help enhance project performance (cost, time, quality)?

☐ Yes ☐ No

Is digital transformation (e.g., BIM, digital risk tools) part of your organization's vision?

☐ Yes ☐ No

#### Section F: Opportunities for Improvement

Do you believe Risk Management practices in your company should be improve?

☐ Yes ☐ No

Would staff training strengthen Risk Management effectiveness?

☐ Yes ☐ No

Would developing standardized internal risk policies help reduce project uncertainties?

☐ Yes ☐ No

Is integrating Risk Management at all project phases necessary for better outcomes?

☐ Yes ☐ No

Would adopting a unified national framework for Risk Management benefit the industry?

☐ Yes ☐ No

#### Section G: Development of a Proposed Framework

Would you support the development of a Saudi-specific Risk Management framework?

☐ Yes ☐ No

Do you believe combining international standards with local industry needs would be effective?

☐ Yes ☐ No

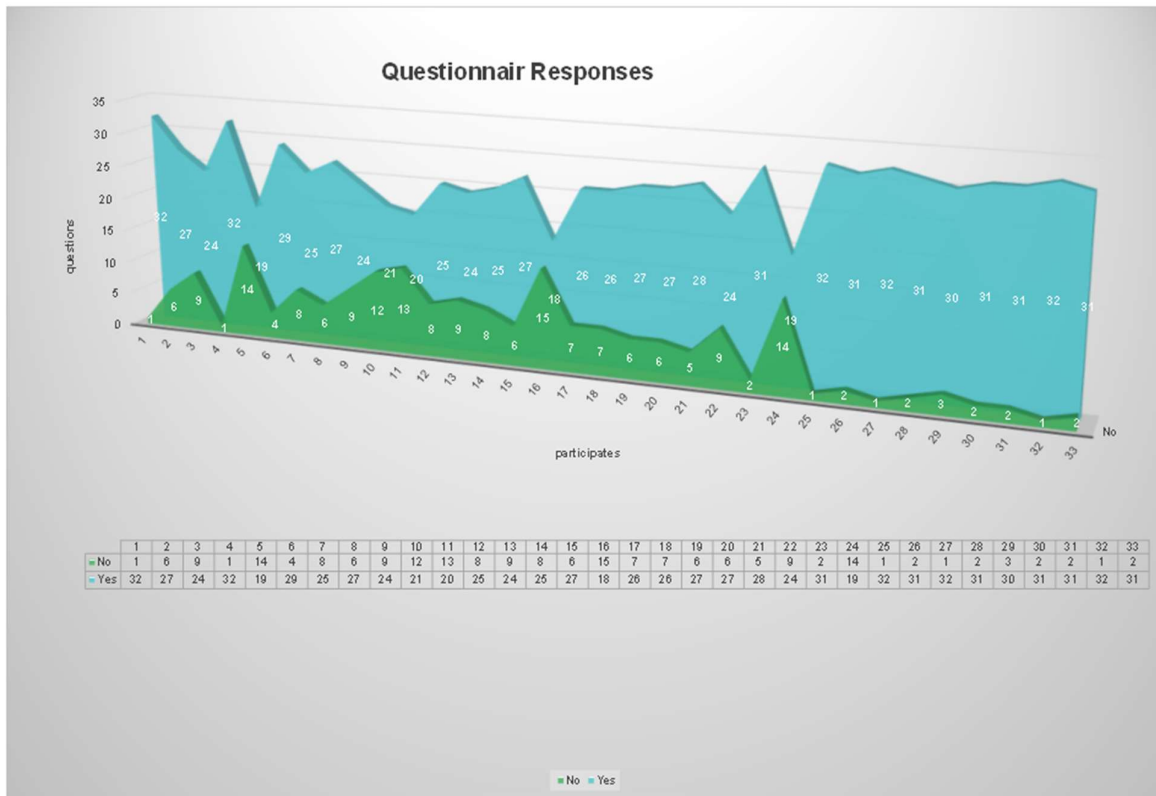
Would a continuous improvement model for Risk Management be useful for your company?

☐ Yes ☐ No

Is there a need for policy-level guidance from authorities to standardize Risk Management processes?

☐ Yes ☐ No

Questionnaire Responses Chart Figure (5-1)



*2 Figure*



جامعة ميدأوشن  
كلية الإدارة  
ماجستير إدارة المشاريع

تقييم ممارسات إدارة المخاطر وأثرها على أداء المشاريع في قطاع البناء  
السعودي ضمن رؤية 2030

عيسى آدم عيسى حسين

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المشرف الثاني

د. فايز جراد

المشرف الرئيسي

د. فيصل عبدالحميد

العام الجامعي

2025