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Impact of Risk Management on Project Performance at NEOM Company in Tabuk, Saudi Arabia

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1.Introduction

Project management has evolved from basic task scheduling into a complex discipline essential for global development and organizational success (Kerzner, 2022). Risk management within these projects has transformed from a reactive, secondary process into a proactive, strategic necessity (Hillson, 2021). Today, addressing potential uncertainties before they occur is a cornerstone of modern management science (Project Management Institute, 2024).

Humanity relies on the successful execution of infrastructure and technological megaprojects to advance well-being and drive innovation (Flyvbjerg, 2021). The need to systematically mitigate project risks has never been more vital, as the failure of such massive endeavors can lead to catastrophic financial losses and hinder sustainable development (Zwikaël & Smyrk, 2019). The rationale for this topic stems from the urgent global need to optimize outcomes by minimizing threats and maximizing opportunities (Bowers & Khorakian, 2024).

Moving to a specific context, Saudi Arabia has initiated unprecedented megaprojects under Vision 2030, transforming the region into a global investment hub (Alghamdi, 2023). Among these, NEOM Company stands out as a prime example of futuristic urban development operating in a highly dynamic environment (Saudi Vision 2030 Realization Programs, 2023). While literature covers traditional sectors, a gap remains in evaluating risk impact within hyper-accelerated megaprojects like NEOM (El-Sayegh et al., 2021). This research links established theories to this novel environment to identify the practical benefits of robust risk strategies at NEOM (Smith & Jones, 2023).

2.Research Problem

Despite the extensive literature on risk management in standard construction projects, there is a significant knowledge and practical gap concerning the implementation and effectiveness of these strategies in unprecedented, hyper-accelerated megaprojects. The immense scale, high technological integration, and rapid execution demands of NEOM Company in Tabuk introduce complex, multifaceted risks that traditional risk management frameworks may not adequately address. When risks are not properly mitigated in such a dynamic environment, it directly threatens project performance in terms of cost overruns, schedule delays, and compromised quality.

Therefore, the core research problem lies in understanding how current risk management practices influence overall project performance within this unique, futuristic environment. The research problem can be summarized in the following clear statement: There is a critical need to evaluate whether the existing risk management strategies applied at NEOM Company are sufficient and effective enough to optimize project performance and mitigate the unique vulnerabilities associated with such visionary megaprojects.

3. Research Significance

The significance of this study is demonstrated at both the theoretical and empirical levels.

At the theoretical level: This research contributes to the existing body of knowledge in project management by exploring the dynamics of risk management within hyper-accelerated, visionary megaprojects. It aims to bridge the gap in current literature by providing a foundational understanding of how traditional risk management frameworks adapt to the unique and futuristic environment of NEOM Company.

At the empirical level: The findings of this study will offer highly practical and valuable insights for project managers, decision-makers, and stakeholders at NEOM. By evaluating the direct impact of risk mitigation strategies on project outcomes, the research provides actionable recommendations to minimize cost overruns, prevent schedule delays, and enhance the overall success rate of complex projects aligned with Saudi Vision 2030.

4. Research Questions

To address the research problem comprehensively, this study aims to answer the following main question:

- What is the impact of risk management on project performance at NEOM Company in Tabuk?

From this main question, the following sub-questions are derived:

1. What are the current risk management practices and frameworks implemented within NEOM Company's megaprojects?
2. What are the most critical risks and challenges (e.g., financial, operational, environmental) facing the accelerated development of NEOM?
3. How does the effective application of risk identification and mitigation strategies influence the cost, schedule, and quality outcomes of these projects?

5.Research Objectives

The primary objective of this study is to evaluate the impact of risk management on project performance at NEOM Company in Tabuk. To achieve this, the following measurable sub-objectives have been formulated:

1. To identify and assess the current risk management practices and frameworks utilized in NEOM's megaprojects.
2. To determine the most critical risks (such as financial, operational, and environmental challenges) that affect the accelerated development of NEOM.
3. To measure the relationship between the effective application of risk mitigation strategies and key project outcomes, specifically regarding cost, schedule, and quality.
4. To provide actionable recommendations that contribute to the field of project management by enhancing risk management frameworks for hyperaccelerated megaprojects.

6. Research Hypotheses

Based on the research problem and objectives, this study proposes the following hypotheses to test the relationship between the research variables:

- Main Hypothesis (H1): There is a significant positive relationship between the implementation of effective risk management practices and overall project performance at NEOM Company.
- Sub-Hypothesis 1 (H1a): The systematic identification of risks significantly reduces cost overruns and schedule delays in NEOM's megaprojects.
- Sub-Hypothesis 2 (H1b): Proactive risk mitigation strategies have a direct, positive influence on the quality outcomes and deliverables of NEOM projects.

7. Research Model

The research model for this study provides a visual representation of the relationships between the main variables. It illustrates how the independent variable (Risk Management Practices) directly influences the dependent variable (Project Performance) within the context of NEOM Company.

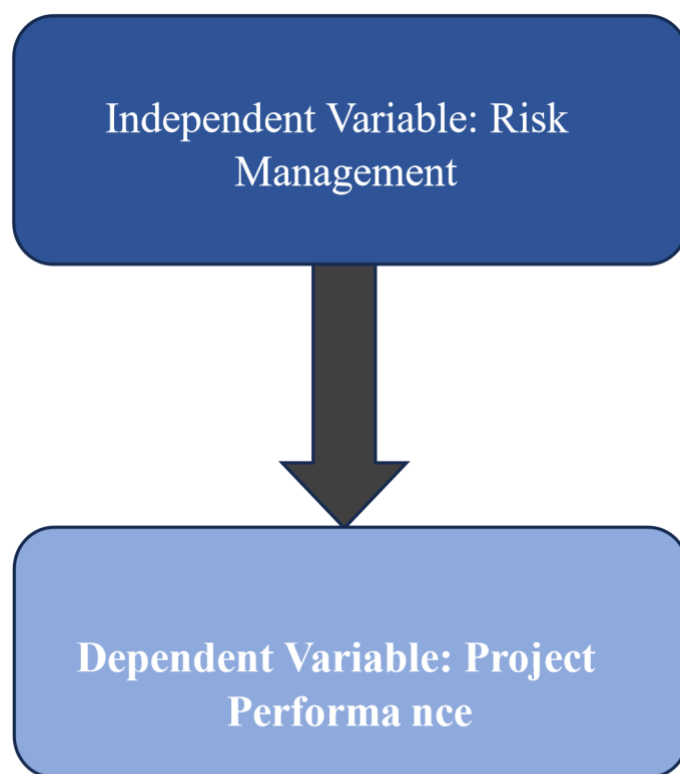


Figure 1: Conceptual Research Model

Source: Developed by the researcher

8. Research Methodology

This section outlines the methods and procedures used to conduct the research, ensuring a robust approach to addressing the research problem and objectives.

THE RESEARCH ONION

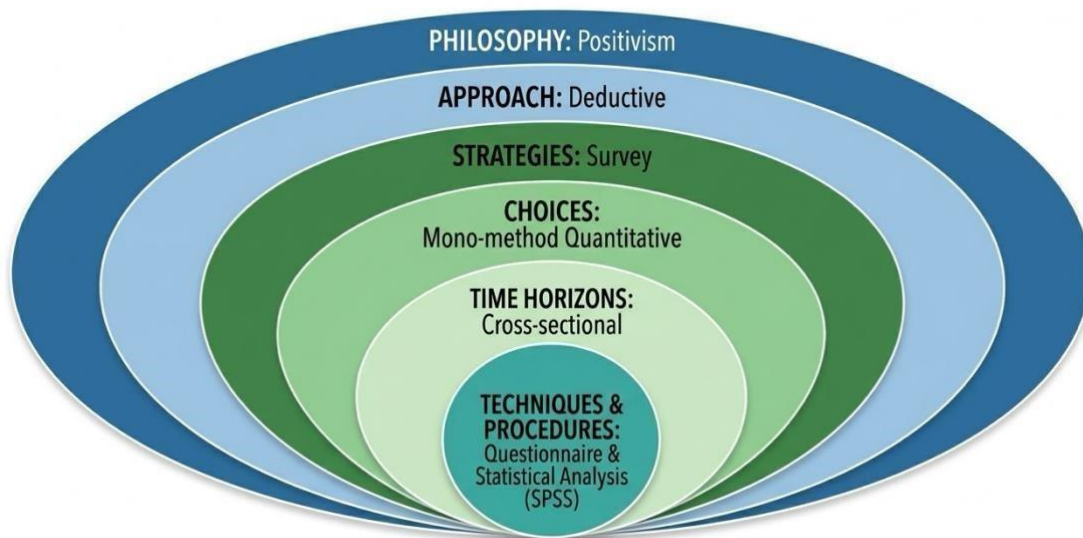


Figure 2: The Research Onion

Source: Adapted from Saunders et al.

- **Research Design:** This study adopts a quantitative, descriptive, and analytical research design. This approach is appropriate for measuring the relationship between risk management practices and project performance objectively.
- **Data Collection Methods:** Primary data will be collected through structured online questionnaires distributed to project managers, engineers, and risk specialists working at NEOM Company. Secondary data will be gathered from existing literature, academic journals, and company reports.

- Sample Selection: A purposive sampling technique will be utilized to select participants who have direct involvement and adequate experience in managing or executing megaprojects within NEOM.
- Data Analysis Techniques: The collected quantitative data will be analyzed using statistical software (such as SPSS). Techniques will include descriptive statistics to summarize the data, and inferential statistics (such as correlation and regression analysis) to test the research hypotheses.
- Ethical Considerations: Participation in the survey will be strictly voluntary. Informed consent will be obtained from all respondents, and their data will be kept strictly confidential and used solely for academic research purposes.

9. Scope of the Empirical Study

The empirical investigation for this research will be exclusively conducted within NEOM Company, situated in the Tabuk province of Saudi Arabia. As a central pillar of Saudi Vision 2030, NEOM represents a futuristic, multi-sectoral megaproject that aims to redefine urban living, sustainability, and economic diversification. The scale of NEOM is unprecedented, encompassing diverse regions and industries ranging from advanced manufacturing and biotechnology to tourism and renewable energy. This visionary context provides a highly dynamic and innovative environment, making it an ideal setting for academic research in modern project management.

The rationale for selecting NEOM as the focal organization lies in its classification as a hyper-accelerated megaproject. Unlike traditional construction or developmental initiatives, NEOM operates under aggressive timelines, immense financial investments, and strict requirements for cutting-edge technological integration. These characteristics inherently generate a highly complex risk landscape. The organization faces unique, multifaceted vulnerabilities—spanning operational bottlenecks, financial uncertainties, supply chain disruptions, and technological implementation hurdles—that standard or traditional risk management frameworks may struggle to fully accommodate.

By grounding the empirical study in this specific organization, the research bridges the gap between theoretical risk management principles and their practical application in high-stakes environments. Measuring the independent variable (risk management practices) against the dependent variable (project performance) within NEOM will yield highly relevant insights. It allows the study to evaluate how proactive risk identification and mitigation strategies directly

influence critical project outcomes, specifically regarding cost adherence, schedule maintenance, and quality assurance, in a real-world scenario where optimizing performance is critical.

Furthermore, the scope of this empirical study will specifically target the professionals actively engaged in the execution and oversight of NEOM's various projects. The target population will encompass project managers, risk management specialists, site engineers, and strategic decision-makers operating within the company and its primary contracting partners. By focusing on these key stakeholders, the research ensures that the data collected is deeply rooted in practical, on-the-ground experience, thereby enhancing the validity and reliability of the findings regarding how risk management ultimately drives project success at NEOM.

Chapter 2: Literature Review

2.1. Introduction

A comprehensive literature review is a foundational component of any empirical research, serving to contextualize the study within the broader academic discourse. In this chapter, an extensive review of existing scholarly articles, books, and reports is presented to explore the dynamics of risk management and its subsequent impact on project performance. The complexity of modern megaprojects, particularly those aligned with transformative national initiatives like Saudi Vision 2030, requires a profound understanding of how traditional project management theories adapt to hyper-accelerated environments. This chapter systematically dissects the two primary research variables: Risk Management (the independent variable) and Project Performance (the dependent variable). By reviewing the theoretical backgrounds, dimensions, and the interplay between these variables, this section highlights the current state of knowledge and explicitly identifies the empirical gaps that this study aims to bridge, specifically within the novel context of NEOM Company.

2.2. Research Variable 1: Risk Management

2.2.1. Background and Evolution of Risk Management

The concept of risk management has evolved significantly over the past few decades. Initially viewed as a secondary, reactive task primarily concerned with financial auditing and insurance, risk management has transformed into a proactive, strategic necessity central to organizational success. Historically, project managers treated risks as negative events to be avoided at all costs. However, Kerzner (2022) notes that the modern paradigm views risk as an inherent component of any innovative endeavor, encompassing both threats that must be mitigated and opportunities that can be exploited. This shift represents a transition from traditional risk avoidance to holistic Enterprise Risk Management (ERM).

2.2.2. Definitions and Dimensions

The Project Management Institute (PMI, 2024) defines project risk as an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives. Hillson (2021) expands on this, categorizing risk management into four critical dimensions or phases:

1.Risk Identification: The systematic process of determining which risks might affect the project and documenting their characteristics. In megaprojects, this involves environmental, technological, and socio-economic scanning.

2.Risk Assessment and Analysis: Evaluating the probability of occurrence and the potential impact of identified risks. This involves both qualitative assessments (prioritizing risks) and quantitative analysis (estimating numerical impacts).

3.Risk Response Strategy: Developing options and actions to enhance opportunities and reduce threats to project objectives. Strategies include risk avoidance, mitigation, transfer, and acceptance.

4.Risk Monitoring and Control: The continuous tracking of identified risks, monitoring residual risks, identifying new risks, and evaluating the effectiveness of risk processes throughout the project lifecycle.

2.2.3. Theories Underlying Risk Management

Several theories underpin the discipline of risk management. The Stakeholder Theory, for instance, suggests that risk management must account for the diverse and often conflicting interests of all project stakeholders (Chapman & Ward, 2011). In the context of megaprojects, stakeholders range from government entities and investors to local communities and environmental agencies. Another vital framework is the Contingency Theory, which posits that there is no optimal way to manage project risks; rather, the most effective strategy is contingent upon the internal and external situation of the project. This is particularly relevant to hyper-accelerated megaprojects, where traditional frameworks may fall short if not customized to the project's unique environmental and technological demands (Thamhain, 2013).

2.2.4. Standard Frameworks for Risk Management

To standardize the approach to managing uncertainties, several global frameworks have been developed. The International Organization for Standardization provides the ISO 31000:2018 guidelines, which emphasize that risk management must be integrated into all organizational activities and tailored to the specific context of the project (ISO, 2018). Similarly, the COSO Enterprise Risk Management framework highlights the importance of aligning risk appetite with project strategy. In the context of megaprojects, relying solely

on qualitative matrices is often insufficient. Advanced quantitative frameworks, incorporating Monte Carlo simulations and decision tree analysis, are increasingly required to model the cascading effects of risks in highly interconnected project environments (Aven, 2016).

2.2.5. Behavioral and Cultural Aspects of Risk

Beyond processes and tools, the human element plays a pivotal role in risk management. The concept of "Risk Culture" refers to the shared values, beliefs, and behaviors regarding risk awareness within an organization. Taleb (2007), in his "Black Swan" theory, highlights that human cognitive biases often lead project managers to underestimate the probability of highly impactful, rare events. In hyper-accelerated megaprojects, a strong risk culture is required to prevent the normalization of deviance, where warning signs are ignored due to immense schedule pressures. Creating an environment where team members feel psychologically safe to report potential risks without fear of retribution is as critical as any mathematical risk model.

2.3. Research Variable 2: Project Performance

2.3.1. Background and Definitions

Project performance is the ultimate metric by which the success or failure of a project is judged. While historically equated simply with delivering a project within the constraints of the "Iron Triangle", modern definitions are much broader. Zwikaël and Smyrk (2019) distinguish between project management success (efficiency during the execution phase) and project investment success (the realization of long-term benefits and strategic goals). In the context of megaprojects, performance cannot be measured solely at the handover stage; it must be evaluated against its long-term socio-economic impact.

2.3.2. Dimensions of Project Performance

The evaluation of project performance conventionally revolves around three primary dimensions:

1. Cost Performance: The ability to complete the project within the approved budget. Megaprojects are notoriously susceptible to cost overruns due to their massive scale, technological complexities, and long durations (Flyvbjerg, 2021).

2. Schedule Performance: Delivering the project within the agreed-upon timeframe. Schedule delays in hyper-accelerated environments like NEOM can have cascading effects on regional economic strategies and investor confidence.

3. Quality and Scope Performance: Meeting the functional and technical specifications while fulfilling the stakeholders' expectations. In futuristic developments, quality encompasses sustainability, technological integration, and operational efficiency (Pinto, 2020).

2.3.3. Project Performance in Hyper-Accelerated Megaprojects

Megaprojects are not merely magnified versions of standard projects; they are a completely different organizational species. Baccarini (1996) highlighted that structural and technological complexities in large-scale projects introduce a high degree of unpredictability. Saudi Arabia's Vision 2030 represents a paradigm shift, utilizing megaprojects as engines for economic diversification (Alghamdi, 2023). Among these, NEOM stands out as a pioneering initiative aiming to build a cognitive city from scratch (Saudi Vision 2030 Realization Programs, 2023). The performance of NEOM's projects is measured not just by physical construction, but by integrating artificial intelligence, zero-carbon sustainability, and unprecedented architectural concepts. Such hyper-accelerated environments demand an exceptionally agile approach to project performance tracking.

2.3.4. Measurement Mechanisms and Key Performance Indicators (KPIs)

To empirically evaluate project performance, reliance on traditional lagging indicators (such as final cost and completion date) is inadequate for megaprojects. Shenhar and Dvir (2007) argue for a multidimensional approach to KPIs that includes leading indicators, which predict future performance. Earned Value Management (EVM) is a widely adopted technique that integrates scope, schedule, and resources to measure project performance and progress objectively. In complex initiatives like NEOM, KPIs must also encompass sustainability metrics, stakeholder satisfaction, and innovation adoption rates. Evaluating performance therefore requires a dashboard of metrics that balance immediate execution efficiency with long-term strategic value realization.

2.4. The Saudi Context: Megaprojects under Vision 2030

The economic transformation occurring in Saudi Arabia introduces a unique academic and practical context for project management. Vision 2030 aims to shift the nation's reliance from hydrocarbons to a diversified, knowledge-based economy. This transition is heavily dependent on the successful delivery of unprecedented "Giga-projects." Merrow (2011) notes that industrial megaprojects inherently suffer from a high failure rate globally due to their scale and complexity. However, the Saudi context amplifies these challenges due to the simultaneous execution of multiple massive initiatives, creating resource bottlenecks, supply chain constraints, and an intense demand for specialized human capital.

NEOM, positioned as the flagship of these initiatives, operates in a greenfield environment, meaning it is being built entirely from scratch without existing infrastructure. This introduces logistical, environmental, and technological risks that are largely unprecedented. Consequently, analyzing risk management in this context is not merely an exercise in applying global standards, but rather understanding how these standards are stress-tested and adapted in one of the most ambitious developmental environments in modern history.

2.5. Relationship Between Risk Management and Project Performance

The intersection of risk management and project performance is heavily documented in traditional sectors like construction and IT, yet remains underexplored in visionary megaprojects. Systematic risk identification and mitigation have been empirically proven to be essential for completing projects on time and within budget (Al-Bahar & Crandall, 1990).

El-Sayegh et al. (2021) emphasized that proactive risk management improves quality and reduces operational disruptions. When risks are not adequately forecasted, projects suffer from the "planning fallacy," a concept popularized by Flyvbjerg (2021), where optimism bias leads to underestimated costs and overestimated benefits. Bowers and Khorakian (2024) argue that balancing threats and opportunities through robust risk strategies directly correlates with enhanced innovation and project success.

However, a significant gap exists in the literature regarding the application of these frameworks to advanced, hyper-accelerated megaprojects like NEOM. Smith and Jones (2023) observed that traditional risk management tools often lack the agility required for environments characterized by rapid technological shifts and massive scale. While existing literature covers standard infrastructure, there is a critical need for empirical data evaluating how localized, adapted risk strategies impact cost, schedule, and quality specifically within the Saudi Vision 2030 context. This research addresses that exact empirical gap by measuring this relationship directly at NEOM Company.

2.6. Conclusion

The literature reviewed in this chapter establishes a clear consensus: robust risk management is not an optional administrative task, but a critical driver of project performance. While the theoretical foundations of identifying, assessing, and mitigating risks are well-established, their practical implementation in hyper-accelerated, unprecedented megaprojects remains a complex challenge. The review highlights that failure to manage risks in such environments inevitably leads to cost overruns, schedule delays, and compromised quality. More importantly, the literature reveals a distinct gap concerning empirical studies focused on visionary initiatives like NEOM. By synthesizing these theories and identifying this gap, this chapter provides the theoretical justification for the current study, setting the stage for the empirical methodology designed to evaluate the real-world impact of risk management strategies at NEOM Company.

11. Suggested Project Structure

To comprehensively cover the research objectives and address the problem statement, the final graduation project will be organized into the following proposed chapters:

- Chapter 1: Introduction: This chapter will provide the background of the study, outline the research problem, specify the objectives and questions, and detail the research significance and hypotheses.
- Chapter 2: Literature Review: This chapter will critically review existing academic literature related to project management, risk mitigation strategies, and their application within megaprojects, highlighting the research gap.
- Chapter 3: Research Methodology: This chapter will describe the research design, data collection methods, target population, sampling technique, and the statistical tools used for data analysis.
- Chapter 4: Data Analysis and Findings: This chapter will present the empirical results gathered from the questionnaires, testing the hypotheses and interpreting the data in the context of NEOM Company.
- Chapter 5: Conclusion and Recommendations: The final chapter will summarize the key findings, discuss their implications, and provide actionable recommendations for improving risk management practices, along with suggesting areas for future research.

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