

عنوان البحث

Risk Management in Mega Engineering Projects: A Strategic Model to Minimize
Losses and Enhance Investment Efficiency

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Mega engineering projects are at the heart of modern development, shaping infrastructure, driving industrial growth, and supporting economic progress. From massive bridges and highways to energy plants and industrial hubs, these projects promise transformation. But with their scale and complexity comes significant risk—financial challenges, technical hurdles, environmental impacts, and operational setbacks that can derail even the most well-planned efforts.

Managing these risks effectively is more important than ever in today's fast-paced world. Projects can face spiraling costs, delays, or even failure when risks go unmanaged, leaving stakeholders with major financial and reputational losses. That's why it's critical to have a clear, strategic approach to risk management, one that not only minimizes potential losses but also helps make the most of the resources and investments poured into these initiatives.

This research dives into the challenges and opportunities of managing risks in mega engineering projects. It proposes a practical, strategic model designed to tackle risks head-on while improving the overall efficiency of investments. By combining proven strategies with innovative tools, this study aims to provide a roadmap for organizations to deliver successful, sustainable engineering projects that make a lasting impact.

Mega engineering projects are often plagued by unexpected challenges—ranging from financial uncertainties to technical and environmental issues—that can lead to delays, cost overruns, and wasted resources. Despite their importance in driving economic and industrial progress, many of these projects fail to manage risks effectively, leaving stakeholders vulnerable to significant losses.

Current approaches to risk management often fall short in addressing the unique complexities of large-scale projects. With rising global challenges like climate change and geopolitical uncertainties, there's an urgent need for a smarter, more strategic approach to managing risks.

This study focuses on bridging that gap by developing a practical, strategic model designed to help mega projects handle risks better, reduce losses, and make the most of their investments.

Mega engineering projects are critical to economic and industrial growth, but they often face risks that lead to delays, cost overruns, and wasted resources. This study is important because it offers a practical approach to managing these risks, helping to minimize losses and improve the efficiency of investments.

By focusing on sustainable practices and proactive strategies, the research addresses modern challenges like climate change and global uncertainties. It also fills a gap in current risk management practices, providing a tailored framework that bridges theory and real-world application. Ultimately, this study aims to empower project managers and stakeholders to deliver successful, efficient, and resilient projects.

أهداف الدراسة:

Develop a strategic model for risk management in mega engineering projects.

Analyze the most common types of risks and their impact on project efficiency.

Provide practical solutions to minimize losses and enhance investment effectiveness.

Examine the role of modern technologies in improving risk management.

Promote the sustainability of mega engineering projects through effective risk management practices.

What are the most significant risks affecting mega engineering projects?

How can a strategic model for risk management be applied to these projects?

What tools and techniques contribute to improving risk management?

How does risk management influence investment efficiency and resource utilization?

What is the relationship between risk management and the sustainability of engineering projects?

Implementing a strategic risk management model reduces the likelihood of disruptions in mega engineering projects.

There is a positive correlation between risk management and investment efficiency in engineering projects.

Modern technologies significantly enhance the effectiveness of risk management practices.

The sustainability of mega engineering projects is directly linked to effective risk management.

1. Research on the impact of risk management on the success of mega engineering projects.
2. Evaluation of risk management models in engineering projects and their efficiency.
3. The role of technology in enhancing risk management processes.
4. Analysis of challenges in risk management for large-scale infrastructure projects.
5. Review of international experiences in managing risks in engineering projects.

المنطلقات النظرية للدراسة:

1. Risk management theory based on ISO 31000 standards.
2. Theoretical foundations for risk assessment and analysis.
3. Decision-making models under risk conditions.
4. Theories on the sustainability of engineering projects.
5. The relationship between technology and risk management.

1. **Methodology:**

- A descriptive and analytical approach, focusing on data collection and analysis.

2. **Data Sources:**

- Surveys and interviews with industry experts.
- Case studies of mega engineering projects.
- Review of reports and literature on risk management practices.

أدوات الدراسة:

1. Structured questionnaires.
2. Interviews with project managers and engineers.
3. Data analysis tools such as SPSS and Excel for quantitative insights.

حدود الدراسة:

1. Time Boundaries: Focus on projects initiated between 2015 and 2025.
2. Geographical Boundaries: Mega engineering projects in Saudi Arabia and the GCC region.
3. Subject Boundaries: The study is limited to risk management and its influence on efficiency and sustainability in engineering projects.

المراجع:

