

العنوان:

دور إدارة المخاطر في نجاح المشاريع في الشركة السعودية للكهرباء

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الفصل الدراسي - 2025

Acknowledgement

I would like to express my sincere gratitude to everyone who contributed to the completion of this research study. First and foremost, I extend my deepest appreciation to my academic advisors and mentors for their invaluable guidance, constructive feedback, and unwavering support throughout the research process. I am also immensely grateful to the employees and project management professionals at the Saudi Electricity Company who participated in this study. Their willingness to share insights and experiences provided essential data that shaped the findings of this research.

Special thanks go to my colleagues and peers who offered encouragement and insightful discussions that enriched the study. Their perspectives and support played a crucial role in refining the research framework and methodology.

I would also like to acknowledge my family and friends for their patience, motivation, and emotional support during the research journey. Their belief in my abilities gave me the strength and determination to persevere. Finally, I extend my appreciation to the institutions and organizations that provided resources, academic references, and technological support, which greatly facilitated the research process. This study would not have been possible without the collective efforts of all those involved, and I am truly grateful for their contributions.

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Abstract

This study examines the role of risk management in ensuring project success within the Saudi Electricity Company. The research aims to determine the impact of risk management practices on key project performance indicators, including cost control, timely completion, and quality assurance. To achieve this, a quantitative research approach was adopted, utilizing a random sampling method to collect data from employees involved in project execution and management. A structured electronic questionnaire was distributed via social networking platforms, resulting in a study sample of 120 participants representing diverse roles and experiences within the organization. The findings indicate that organizations with structured risk management frameworks, proactive monitoring mechanisms, and effective mitigation strategies tend to achieve higher project success rates. Specifically, risk response strategies such as avoidance, transfer, and reduction play a crucial role in preventing cost overruns and ensuring adherence to project schedules. However, areas such as early risk identification, financial contingency planning, and regulatory compliance were identified as requiring further improvement. Additionally, the study highlights the increasing reliance on technology-driven risk management tools, such as predictive analytics and specialized software, to enhance decision-making and risk mitigation efforts. A comparative analysis with previous studies reinforces the necessity of institutionalizing risk management practices within Project Management Offices (PMOs) to drive efficiency and sustainability. The study concludes that organizations should focus on strengthening risk identification processes, enhancing training programs, investing in advanced risk assessment technologies, and aligning risk strategies with government regulations. These recommendations provide a foundation for improving risk resilience and optimizing project performance in dynamic and high-risk environments

Chapter 1: Introduction

1.1. Introduction

The Saudi Electricity Company (SEC) operates as the Kingdom of Saudi Arabia's largest electricity service provider to support its major developmental plans especially Vision 2030. The objective of this vision involves diversifying the economy through improved infrastructure development while pursuing sustainable expansion. The Saudi Electricity Company leads the energy sector through multiple intricate projects that satisfy present energy requirements and establish bases for national economic expansion in the future. These projects achieve success through multiple factors, where risk management stands as the essential factor that directly controls project achievement (Alsulaiman et al., 2016).

Risk management serves as a systematic practice of identifying and analyzing along with responding to project risks to stabilize and keep projects running smoothly in the widely unstable energy sector. SEC achieves strategic development and operational cost efficiency through its established risk management methods which also ensure continuous project operation stability and encourage innovative solutions. Risk management at SEC requires continuous adjustment to manage various sector challenges, which include energy sector technological evolution together with regulatory variations and changing environmental and geopolitical political conditions. SEC's ability to adjust projects enables them to maintain operational stability combined with company and national strategic objectives (Alsulaiman,2015).

Saudi Arabia's economy derives its base strength from its energy industry, which exists thanks to substantial natural resources and strategic infrastructure development investments. The large-scale nature of this sector makes it vulnerable to substantial business threats. These project-

related risks exist in multiple forms, which include operational, financial, regulatory, and environmental aspects. SEC's infrastructure programs, such as power facility building and grid system technological developments, as well as renewable energy implementation have distinct risk profiles that need specific management strategies. The complex nature of the energy sector requires SEC to establish a thorough strategic risk management system that takes initiative (Alattiyh et al.,2020).

SEC's expansion for Vision 2030 achievement through renewable energy integration and smart grid implementation has amplified the number of operational risks the organization faces. The emerging technologies create diverse factors including system uptime reliability and security threats together with supply chain susceptibilities that demand regulation to function effectively. Risk management at SEC now needs to move beyond established practices because the organization must create advanced risk evaluation techniques that follow industry best practices and worldwide standards (Rehman & Ishak,2023).

1.2. Problem Statement

The Saudi Electricity Company's (SEC) large-scale project execution encounters substantial difficulties because of complex energy sector dynamics while they invest in and strategically support Saudi Arabia's energy infrastructure and Vision 2030 alignment efforts. Multiple rapid technologies together with variable regulatory demands alongside environmental constraints and geopolitical forces create an expanded risky environment. The current situation lacks clarity regarding how well risk management practices are performed within the project management processes at SEC. The essential role of risk management for project success remains widely recognized, but SEC faces challenges from inconsistent implementation together with

dynamic risks that hinder the accomplishment of projects on target schedules and budget requirements and quality objectives. Renewable energy and smart grid technologies implementation adds new unpredictable risks to the existing challenges of this issue. SEC must be evaluated for its risk management methodology effectiveness to enhance project success while identifying existing weaknesses that allow us to develop better vulnerability reduction strategies. By managing these problems SEC can enhance project performance and achieve strategic targets alongside advancing the sustainable growth of Saudi Arabia's power sector.

1.3. Research Significance

This research holds essential importance for both theory and implementation in project management specifically for the Saudi Electricity Company (SEC) sector of energy management. The investigation brings together understanding about risk management practices together with their relation to project success outcomes.

1.3.1. Theoretical Significance

From a theoretical standpoint, this research contributes to the body of knowledge on risk management and project success by examining the specific context of SEC and the unique challenges within the energy sector. While risk management is a well-explored area, there is limited literature that specifically addresses its role in large-scale energy projects in Saudi Arabia, especially in the context of the transformative Vision 2030 agenda. By studying the SEC's risk management practices, this research will:

1. **Expand Existing Literature:** Add to the scholarly understanding of how risk management strategies can be adapted and applied effectively in complex and dynamic sectors like energy.

2. Provide a Framework: Develop a theoretical framework that integrates risk management practices with project performance metrics, providing a model that other organizations in similar sectors can study and adapt.
3. Highlight Sector-Specific Challenges: Shed light on the unique risk factors faced by energy projects, such as regulatory compliance, technological innovation, and environmental sustainability, enriching the academic discourse with a focused analysis.

1.3.2. Practical Significance

This research holds meaningful practical applications because it provides guidance to enhance risk management practices at SEC as well as other sector organizations in the energy industry. Research outcomes will demonstrate the relationship between risk management techniques and project completion results at SEC and in other energy sector organizations.

1. SEC project managers together with stakeholders will acquire data-based risk assessment capabilities that enhance their capacity to forecast upcoming risks and act as informed leaders and perform better in project management.
2. The analysis provides operational best practices along with specific recommendations that boost project achievements and time-to-completion and budget control as well as quality standards, which support SEC's operational achievements.
3. The initiative must back Vision 2030 through sustainable practices that enable project resilience and support Saudi Arabia's economic transformation and infrastructure expansion.
4. Provide effective solutions to enhance the SEC's risk management systems through practical approaches that identify adaptation procedures for managing risks related to renewable energy and smart grid systems.

5. The development of training sessions and policy refinements should identify areas requiring additional training for SEC staff to strengthen their project risk management capabilities thus building a risk-conscious organizational culture.

1.4. Research Objectives

1. To explore the role of risk management practices in enhancing the success of projects within the Saudi Electricity Company (SEC).
2. To analyze the impact of risk management implementation on key project outcomes, including project timelines, budget adherence, and quality standards at SEC.
3. I would like to identify and evaluate the most effective risk management strategies that contribute to the successful execution of projects at SEC.
4. To assess the impact of risk management practices on SEC's ability to manage challenges associated with technological advancements, regulatory compliance, and environmental sustainability in project execution.

1.5. Research Questions

1. What is the role of risk management practices in ensuring the success of projects within the Saudi Electricity Company (SEC)?
2. How does the implementation of risk management impact project outcomes, such as timelines, budgets, and quality, in SEC's energy projects?
3. What specific risk management strategies contribute most significantly to the successful execution of projects at SEC?
4. What is the impact of risk management on SEC's ability to navigate challenges related to modern technologies, regulatory changes, and environmental sustainability in project execution?

1.6. Research Hypotheses

It is clear to us from the earlier figure that the current research attempts to determine The role of risk management on the success of projects in the Saudi Electricity Company.

Independent Variable: Risk Management (**Effective risk, risk monitoring and control processes, risk mitigation strategies**)

Dependent Variables: Success of projects

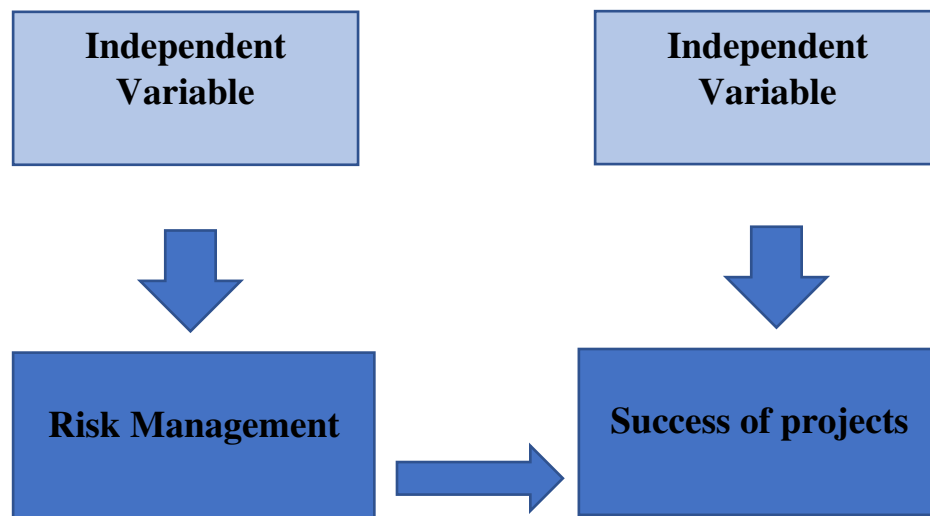


Figure 1: Variables of studies

- H1: There is a statistically significant positive impact of risk management practices on the success of projects in the Saudi Electricity Company (SEC).
- H2: There is a statistically significant relationship between effective risk identification and assessment and the timely completion of projects at SEC.
- H3: There is a statistically significant association between initiative-taking risk mitigation strategies and budget adherence in SEC projects.

- H4: There is a statistically significant impact of comprehensive risk monitoring and control processes on the quality and outcomes of projects at SEC.

1.7. Study limitations

1. During 2024 the research will observe the Saudi Electricity Company (SEC) practices for risk management and project execution throughout this specified period of study. This study gathers information about 2024 specifically; therefore, the results may not include changes in practices or external developments after that period.
2. The study purely examines Saudi Electricity Company operations and projects as its spatial boundary. This analysis examines risk management practices at Saudi Electricity Company along with their relationship to project success across different SEC departments but excludes similar evaluations in the energy industry beyond Saudi national boundaries.
3. This study investigates the influence of risk management practices at SEC regarding project achievement by studying their current strategies and evaluation outcomes. The analysis will not thoroughly investigate all aspects that influence project success, and it does not study general areas outside of risk management in project management.
4. This project will specifically study employees from SEC by collecting data from project managers together with risk management specialists and engineers as well as other appropriate staff members. Embedded staff members from SEC will supply key information regarding real-world utilization and operational results of risk management systems within their organization. The research findings might face limitations because they depend solely on the selected participants' viewpoints, which may differ from the perspectives of other SEC staff members or external interests.

Chapter 2: Literature Review

2.1. Introduction

Project success heavily depends on risk management in sectors that operate under conditions of high uncertainty and complexity together with substantial financial investment particularly among energy and construction industries. The strategic application of risk management allows projects to finish their timelines and maintain budget limitations in addition to achieving quality standards through reduced disturbances. The study examines published research about project success and risk management and its fundamental components, such as risk detection excellence and systems for risk oversight and reduction strategies. The initial part of the chapter analyzes risk management theoretical constructs and popular implementable frameworks using PMBOK (Project Management Body of Knowledge), ISO 31000, and enterprise risk management (ERM) principles. The discussion identifies project-related risks, which include financial, operational and environmental and technological elements, while demonstrating the techniques implemented by organizations to manage uncertainty. The review of best practices within risk management demonstrates various techniques including risk assessments as well as digital monitoring tools and contingency plans which improve project success.

2.2. Literature review

The doctoral dissertation by (Alsulaiman, 2015) studied ways to enhance risk management approaches for Independent Water and Power Plant (IWPP) projects within Saudi Arabia. Successful IWPP projects that fulfill the energy and water requirements of Saudi Arabia require potent risk management strategies for their accomplishment. The study examined existing risk management approaches in order to discover implementation problems that develop new methods that enhance their operational effectiveness. The study filled an essential knowledge gap because it united theoretical risk management guidelines with IWPP project stakeholder and project manager operational experiences. The research utilized grounded theory methodology as it follows qualitative and inductive approaches to collect extensive details from IWPP project professionals. Project managers along with engineers and key stakeholders shared their experiences about risk identification methods together with assessment and management processes through in-depth interviews. The research design enabled researchers to thoroughly study the hands-on strategies and field practices of personnel who worked on these major projects. Formal risk management processes existed but did not achieve their intended practical outcomes effectively. The project faced essential obstacles because risk assessment systems were insufficient, and educational initiatives needed improvement, and numerous key stakeholders failed to actively take part. A major influence on risk management perception and implementation came from cultural factors together with regulatory environments according to the research findings. Effective communication together with stakeholder collaboration demonstrated itself as an essential element

to enhance risk management practices. The study showed that proper risk management success demanded its integration within the larger framework of project management instead of being managed separately from other project activities. The author Alsulaiman presented various methods to boost risk management performance within Integrated Water Production Project projects. The dissertation analyzed risk management practices of IWPP Saudi Arabian projects by presenting four key strategies, which included specialized training for risk assessment competence development as well as new technology implementation for analysis enhancement and full stakeholder involvement with local and international standard compliance. The study seeks to enhance IWPP project effectiveness and resilience through integrated and initiative-based management strategies backed by improved stakeholder partnership and modern tools and better training practices. The research-based grounded theory develops a model that leads to enhanced risk management capabilities for upcoming projects.

Rehman and Ishak (2023) analyzed the impact of governmental regulations on the relationship between economic variables to risk management practices for Saudi Arabian contract companies. This research examined how legal structures affect risk management capabilities that contractors possess when they function in conditions of economic uncertainty. The authors establish that Saudi Arabian economic growth depends on construction activities yet needs effective risk management strategies to maintain project progress. Through its case study design the research obtained quantitative and qualitative data from Saudi Arabian construction

contractors. The study analyzed how economic condition changes affecting both inflation rates and currency rates interact with government oversight to affect contractors' risk detection capabilities. Both research evidence and experimental data demonstrate how government policies backed by legislation aid in minimizing contractor risks by maintaining controlled operating procedures. The introduction of government rules acted as stability measures to control economic volatility and maintain project consistency. The study demonstrates that government agencies need to take regulatory actions to develop effective risk management systems. The process of connecting contractor operations to modern policies requires better collaboration between regulations and contractors as business partners. Enhancing project performance results when economic risk management cooperates with project compliance measures. The government needs to adjust its policies to create suitable conditions that offer financial support to contractors who need help managing economic obstacles.

The power supply industry in Saudi Arabia underwent thorough examination of its project challenges by Alhoweish (Alhoweish, 2011). The doctoral analysis focused on critical delivery issues that occurred during projects in order to develop efficient solutions that optimized sector execution. The booming Saudi Arabian economy demands effective power supply project execution because it guarantees steady energy availability, therefore supporting the country's economic growth. Alhoweish implemented mixed methods in his research by performing expert interviews, which included stakeholders from industry and project managers and subject matter

experts who work on power supply projects. Project implementation encountered fundamental hindrances per research evidence, which included bureaucratic obstacles together with resource shortages, technical problems, and delayed decision-making processes. Controlling project timelines proved difficult because different stakeholders found it difficult to coordinate and failed to properly handle project risks. The dissertation advocates for delivering projects better through improved mechanisms because regulated streamlining and advanced risk management processes increase project performance. Alhoweish identified solutions for the majority of problems that arose when he implemented improved communication with stakeholders and advanced project management technology. The research members discovered that stronger strategic planning should receive greater emphasis in project execution success because unpredicted obstacles appear frequently. The researchers argued for enhanced training for project managers as well as improved strategic planning to lessen such problems. The research by Alhoweish proves how necessary it is for Saudi Arabia's power supply industry to transform and optimize its project implementation practices. Problem resolution throughout the industry leads to shorter project durations together with improved resource management and superior project completion results. Policy makers and project managers used the study recommendations to create a basis for improving industry project execution standards.

2.3. Theoretical foundations of the study

2.3.1. Overview of risk management in project success.

Project management requires risk management as its fundamental element because this practice directly influences both project achievement and project longevity. The risk management process requires examining potential threats that oppose the successful completion of project goals. Two key benefits of proper risk management enable projects to stay on schedule and within budget together with the achievement of expected quality and results. Through proactive risk management project managers can identify upcoming challenges so they can develop strategies to prevent and decrease adverse impacts, which enhances project resistance. Risk management approaches go further than problem response because they follow a complete method of predicting difficulties before they emerge. The project planning stage must start with risk assessments that assist teams to recognize threats and create emergency response strategies. The comprehension of foreseeable hazards allows project managers to make intelligent decisions leading to minimized project disturbances and a controlled predictable environment. Proper execution of risk management planning leads to better team interactions while facilitating cooperation between team members and stakeholders. When risk potential becomes clearly identified and communicated through the organization, it ensures all participating parties gain awareness about existing challenges and understand which responsibilities they must take to minimize them. Stakeholders feel more confident about supporting the project because they see that the team possesses capabilities to manage unexpected situations, thus strengthening their trust (Alhoweish, 2011).

The implementation of risk management leads to resource optimization throughout projects. Project managers who understand their expected risks and their probable effects can use this knowledge to distribute their resources effectively with minimal waste or postponement of tasks. The initiative-taking method helps projects maintain continuous flow and optimize time usage as well as budget and personnel distribution. Due to effective risk management teams gain a flexible project strategy that helps them quickly adjust their approach to handle uncertainties while continuing project development. Implementing risk management through the progression of project stages enhances project success possibilities. Projects that allocate resources for risk management achieve better control of uncertainties while maintaining their goal progress. The implementation of risk management produces teams that show greater resilience because it supplies them with crucial tools and forward-thinking assessment power to overcome difficulties successfully. This initiative-taking framework creates objective protection by showcasing organizational value and demonstrates the capability to overcome complex tasks in unpredictable situations (Alsulaiman,2015).

2.3.2. Importance of risk management in project success

The fundamental application of risk management inside project management produces substantial project stability that results in achievement goals. The predictive capabilities of risk management generate initiative-linked responses to minimize disruption effects, which drive its success factor. Project delivery success emerges from strategic foresight gained in risk

management because it supports leadership in uncertainty response and continuous project operation to maximize resource utilization (Oke et al.,2023).

Risk management stands as the fundamental element for project success because it enables maintenance of project timelines alongside budget performance. Execution of projects becomes challenging because project obstacles such as scope alterations and staffing constraints alongside unexpected outside factors can strike these initiatives. Formation of project timelines and budget targets suffers risks whenever teams abstain from developing a structured system to analyze and remove potential threats. Strong financial governance and smooth project operations result from effective risk management since organizations can find challenges in advance to develop protection strategies. Risk management implementation leads projects to achieve better decision-making conditions. Project teams that conduct in-depth risk assessments create essential understanding about probable difficulties while discovering potential growth opportunities. Managers can create optimal risk-weighted strategies by analyzing the project data they obtain. Accurate definitions within risk management plans enable decision-makers to pick between options by applying benefit versus impact assessments (Alsulaiman, 2015).

Project success depends heavily on stakeholder confidence, which risk management establishes as an essential mechanism for keeping this level of trust. Investors seek security knowing that their funding stays protected while the project workforce demonstrates skillful handling of difficulties. Constructive and direct exchange of both risk information and protective

action methods helps stakeholders stay confident with the project. By demonstrating their risk management capabilities, the project team preserves stakeholder support throughout the entire project duration. Risk management success enables projects to strengthen their ability to adapt during execution phases. Risk management systems create projects that deal with unknown changes alongside unexpected incidents in a more effective manner. Project teams maintain progress through continued forward motion by adapting to unexpected challenges because of their adaptability. Strong response systems provide projects with fast recovery capabilities that lead projects to become sustainable in the long run. Risk management enables better resource usage because it focuses project efforts on essential areas. Through analyzing current hazards project managers learn improved methods of distributing resources to minimize waste of funds without affecting schedule deadlines. Strategic resource management protects organizations from waste while it makes operations more practical and vital duties obtain the highest priority. Risk management stands essential for projects to achieve regulatory compliance. Each project serving regulated industries should meet specific requirements that exist in their respective guidelines. Through risk management project teams find compliance risks to develop minimization strategies that preserve the adherence to legal requirements during project execution. Project reliability and professionalism improve through regulatory risk monitoring because it shields the project from legal threats (Ikediashi et al.,2015).

2.3.3. The most important principles essential for managing risks

Every project in order to succeed needs effective risk management practices for its sustainability. The structured method improves risk spotting capabilities by letting teams evaluate individual risks which enables the implementation of reduction approaches that limit negative outcomes on project results. The main principles described by Alragabah & Ahmed,2024 guide strategic risk management operations.

As the base of sound risk management risk identification works as the fundamental step to discover all potential threats that might affect the project. A deep examination must occur which combines internal conditions with external conditions to determine what puts project success at risk. The identification of potential project risks occurs through standard methodologies including brainstorming, expert consultation, historical data assessment, and SWOT analytical processes. Project teams will prepare for upcoming challenges when they identify all potential risks early in the planning phase.

1. Projects require officials to carry out risk assessments by establishing their probability of occurrence and the level of project damage they could create. The risk assessment helps project managers establish which threats need urgent attention first. The evaluation of risks relies on risk matrices and probability-impact charts and Monte Carlo simulations and other quantitative techniques for effective risk management practices. The project team manages risks best by first identifying their most critical threats which allows them to allocate resources efficiently to control these risks.

2. Having initiative in risk management means developing plans that address potential threats before they happen. The development of risk response plans should specify the exact actions required to reduce or eliminate risks. The degree of risk severity determines which management strategy should be applied between avoidance, reduction, transfer, or acceptance. The project team maintains a high level of project momentum through quick and effective decision-making when risks actually occur because proper risk-response plans exist beforehand.
3. Risk management activity consists of continuous assessment and monitoring, which transforms into risk management practice instead of existing as an individual process. Defined risks must be tracked together with new risk detection across the entire project life cycle. Periodic risk assessments and plan improvements in risk management systems foster operational efficiency during the entire project duration as the conditions evolve. Real-time system changes enabled by this method produce better methods of risk control.
4. Elementary Risk Management Depends on Open Communication Systems Combined with Stakeholder Involvement. Each project stakeholder from the team members to the clients to external partners requires complete knowledge regarding present risks together with current risk management approaches. The inclusion of stakeholders in risk management processes leads to enhanced outcomes because they gain mutual knowledge about their responsibilities in risk minimization. Communicating openly helps staff teams

build trust with stakeholders so these stakeholders fulfill their duties when support is needed.

2.3.4. Risk Mitigation Strategies

Project success planning requires risk mitigation because it functions as an essential managerial approach to create protective measures for stopping project success interruptions. Leaders who use these methods during project execution can protect their initiatives from unpredictable changes by maintaining the base project framework. Every organization must deploy specific risk management methods to successfully control risks as stated by Alsulaiman et al.,2014.

1. Risk Identification and Prioritization

A risk mitigation system demands organizations to discover possible risks followed by strategic organization of these elements. Systematic project analysis helps organizations detect upcoming problem zones because this method reveals how weaknesses from resources and timelines and technology and external elements affect operations. Project documentation that displays risk severity together with SWOT analysis results comes from risk registers, and these combined elements provide organizations with project risk monitoring capabilities. Risk priority determination gives managers the means to detect critical situations that need urgent protective steps.

2. Developing Contingency Plans

Organizations need to develop complete backup procedures for risk protection in order to succeed with contingency planning. The project reduction measures along with solution strategies appear within documented written instructions contained in the plans. When critical supplier delays occur, organizations need to activate backup procedures that enable new supplier sourcing alongside immediate procurement systems. Fast reactions that prevent delays and minimize reactive decision costs stem from project teams that draft contingency plans.

3. Risk Avoidance

In project management risk avoidance strategy works through plan modifications that achieve this goal to minimize potential risks. Project prevention of understood risks demands various changes, which begin with changing objectives followed by rearranging work scope and then choosing alternative project approaches. Project risk avoidance as a strategic approach reduces creativity along with adaptation capacity because it requires identifying and stopping potential security issues. Following the assessment of unfavorable aspects of risk avoidance managers must determine its beneficial features before making required modifications to project plans.

4. Risk Transfer

When project management delivers a defined risk management assignment to another organization, it is known as risk transfer. Directorates can reduce risks through four main risk transfer techniques, which unite project outsourcing with insurance acquisition and supply chain management. The protection of project teams from property destruction risks comes from liability

insurance products, which enable them to start working with third parties to handle supply chain interruption duties.

5. Risk Reduction and Control Measures

Risk reduction methods establish control systems with the dual purpose of preventing risks and their associated effects. Ordinary organizations should implement control systems that unite contemporary project management methods and funding allocation for improved supplies and worker training systems to achieve better performance results. Organizations operate modern technological tools for automatic project task handling to minimize the probability of human errors appearing. Organizations need continuous project performance assessment from beginning to end for their risk-based control measures under evaluation.

6. Risk Sharing

Possible project risks can be divided amongst project partners through the risk sharing principle. Stakeholders engage in strategic alliances to perform risk distribution procedures during multi-party partnerships for risk management operations. The sharing of project risks across multiple stakeholders under strategic partnerships allows all parties to combine forces and solve project problems together, thus relieving any risk burden on a single entity.

7. Regular Monitoring and Reassessment

Project-based risk mitigation requires regular assessment through periodic rhythmic evaluations to determine effectiveness during the continuous advancement of projects. Project managers must

schedule periodic assessments to identify active risk procedures and detect fresh security risks. Regular reviews of risk plans allow project leaders to rapidly adapt their project through changes in the environment. Real-time risk monitoring depends on systems that connect key risk indicators with performance dashboards as well as performance metrics.

8. Building a Risk-Aware Culture

Risk-conscious cultures both advance project team risk control measures and strengthen risk security protocols across the whole organization. The risk mitigation approach developed by staff members results in initiative-based risk management practice frameworks because they actively identify risks through their risk mitigation input. The combination of team training along with solid communication pathways helps members develop risk awareness, which leads them to success through uniting their responses on implemented strategies.

9. Leveraging Technology and Tools

Business optimization occurs when risk mitigation processes integrate systems for detecting risks with detection capabilities. Efficient discovery tools for locating risks become possible through the use of risk management software and predictive analytics and project management platforms, which improve assessment results and response abilities. The precise risk predictions from technological system data lead to both well-informed decision making and fast response capabilities.

2.3.5. Tools and Techniques for Risk Management

Organizations apply defined risk assessment tools that decrease hazards to maximize accomplishment of business targets. Organizational managers should adopt existing risk management tools that enable precise prediction of future obstacles for successful execution. The accepted risk management tools and techniques identified by Areiqat et al.,2018 appear in the following list.

1. At the core of the Risk Register lies complete documentation, which accounts for every risk connected to organizational procedures and projects. The risk register maintains descriptions of risks together with probability evaluations and outcome predictions and specific assignment of responsibilities for risk response execution and monitoring duties. A risk register maintains its function as an active project document from one stage to the next to track new risks and evaluate risk response actions during project development. The tool enables project members to monitor all risks clearly by ensuring every potential unwanted occurrence remains under observation.
2. Standard SWOT analysis projects enable managers to evaluate elements using internal and external aspects through strength and weaknesses as well as opportunity and threat reviews. Managers can identify threats together with opportunities through SWOT evaluation because it helps them understand their organizational weaknesses and internal strengths to develop strategies for utilizing their capabilities against their weaknesses and seizing both opportunities and fending off threats. Project managers succeed in

performing strategic decision-making and building risk management strategies through complete risk assessment.

3. Through Probability and Impact Matrix project managers can establish risk positions according to predicted outcomes and probability assessments. Risk positioning takes place on a systematic chart that uses probability estimation on one axis with impact level estimation on the other. Managers focus on their most critical urgent risks by viewing this representation to optimize their resource allocation for suitable response preparation.
4. Failure Mode and Effect Analysis (FMEA) serves as a method to assess systems and processes systematically so failure possibilities with their consequences can be identified. Research results based on failure severity and probability and detection ability enable calculation of Risk Priority Numbers through this method. Operations face more serious threats from projects that have elevated RPN ratings. The FMEA assessment method enables organizations to establish project threat criticality rankings for generating precise mitigation strategies.
5. Project managers use the Probability and Impact Matrix to develop risk positions, which depend on forecasts and probability analyses. Risk positioning occurs on a systematic chart where managers use probability estimation for one axis while impact level estimation marks the other axis. Managers identify their supreme urgent risks through

this tracking system to choose appropriate response preparations by maximizing their resource usage.

6. The system evaluation method Failure Mode and Effect Analysis (FMEA) enables systematic process and system assessment to find potential failures together with their associated consequences. The application of research data involving failure severity as well as probability and detection ability allows organizations to generate Risk Priority Numbers. Operations need to address projects raising their RPN ratings because they present major operational threats. The assessment methodology of FMEA helps organizations establish threat rankings of projects to develop specific mitigation strategies.
7. Visible team risks become evident because of the joint impact of workshop activities and the collective brainstorming between team members and stakeholders. When different risk assessments are performed simultaneously the method reveals dangers that cannot be discovered through solitary evaluation. Staff-led workshops allow team members to discuss risks which results in better risk management plans through developed response strategies.
8. Multiple decision routes are depicted in Decision Tree Analysis diagrams that present both their possible results together with associated benefits and risks. Managers employ this assessment method to examine and understand the anticipated outcome values from

different possible decisions. Decision tree analysis serves organizations to handle complex risks and strategic selection processes because it reveals methods to reduce damaging consequences alongside the utilization of advantageous situations.

9. The combination of risk management systems with programming code creates automated tracking systems through Risk Management Software which analyzes data to generate reports available to project management tools. Management performs better risk tracking thanks to risk management software because the system tracks precise data acquisition and offers live feed updates that help identify successful risk mitigation solutions.

2.3.6. Types of Risks in Electricity and Energy Projects

Every electric and energy project needs extra funding together with contemporary technological systems supported by strong management strategies for operational success. Multiple environmental threats exist that endanger financial targets together with project deadline requirements. Risk detection must be integrated with safety reduction methods to ensure durable operations of energy systems. Two primary risk factors and one secondary risk cause instability throughout energy projects and electricity operations.

1. Technical Risks

The convergence of design-based issues with equipment failures and technological breakdowns and engineering process failures produces several technical risks. Modern electricity projects struggle to function since they assume flawless execution of contemporary connecting

devices, which link power capabilities to network systems. Project delays and higher costs emerge from operational failures as well as defective systems that produce failures during operation. Operational facilities of oil and gas fields together with hydroelectric plants produce less power than projected amounts after initiation. Power infrastructure scenarios have become challenging for new technology implementation in electrical distribution networks because most existing equipment remains old-fashioned. Excellent standards of equipment engineering solutions and extensive testing programs combined with continuous monitoring implementations decrease technical system risks.

2. Operational Risks

Every business development phase faces poverty-related challenges from the initial project launch until complete project management responsibilities are met. Project completion schedules must function during development times since they manage risks and protect workers by using correct material handling procedures across all sites. The poor link between regulatory organizations and both government departments and their contractor operations creates their main operational risk through inadequate communication networks. Project scheduling extends due to organizations requiring necessary permits together with formal implementation authorizations. The market performance standards experience major implementation challenges because of insufficient talent for solar rooftop installation and wind turbine operation. For effective operational risk

management system development, organizations need highly detailed project preparation and thorough training of all performing personnel who communicate regularly with stakeholders.

3. Regulatory and Compliance Risks

The energy sector maintains its need for regulatory requirements because environmental protection and defense readiness form the foundation of its necessary purposes. During the execution of all electricity projects National authorities together with power organizations and environmental institutions must exactly follow regulations that the government has endorsed. Businesses that disregard authorized regulations face severe financial consequences while their construction timelines expand, and their facilities must shut down permanently. The rising limitations that governments impose on coal power facility emissions prompt companies to investigate clean energy technologies or construct renewable platforms. Projects related to electricity operations continue to generate profit until official authorities modify energy price policies through privatization and subsidy measures. Companies in the energy sector need to keep track of new compliance standards when creating predictive methods to stop possible court actions.

2.3.7. The energy sector ought to implement various risk management procedures as a defensive measure.

The economic advancement originates from power distribution because it drives technological progress through essential energy sector technology. Security threats make the energy sector the most vulnerable target due to the extensive implementation of external network

interfaces. Organizations can sustain continuous power distribution through analysis of sector-specific dangers to maintain operational stability in their facilities. Specially designed risk management tools for the energy sector help businesses to operate continuously and simultaneously boost performance levels and regulatory compliance standards.

A risk management technology launch in the energy sector must involve accomplishing operational threat evaluation and consequence assessment processes by all organizations. Advanced power development projects experience complex challenges because unstable financial results generate operational problems stemming from environmental restrictions and regulatory policy changes. The considered operational predictions for risk-review purposes result from running modeling systems through historical data by employing data analysis tools. Strategic planning developed through systematic risk identification brings organizations to operational stability while reducing financial costs.

IGN Energy faces significant challenges when it comes to implementing new regulatory requirements and essential operational laws the organization needs to follow. The successful implementation requires organizations to implement power production standards developed by international agencies in combination with established security measures across all nations. Environmental security requirements together with workforce security standards derive from the entire regulatory system that regulates both energy pricing procedures and staff requirements. Failed adherence to mandatory regulations results in damaging public feedback and monetary

losses as well as operational service interruptions. Secure and affordable power requires three core risk management procedures starting from official regulatory assessments and regular contact and employee training about systematic regulatory changes.

Startup companies experience substantial risks because they must face large startup financing expenses while energy project values remain unpredictable. The financial stability of Energie companies remains at risk due to fuel price changes that produce unplanned expenses, which cause damage to their supply chain systems as well as business stability. Organizations require systematic risk management policies to minimize fuel expenses, but businesses need to create budget forecasts that incorporate emergency preparedness strategies. Price market uncertainties cannot disrupt energy business stability since their financial protection systems keep the operations secure.

Organizations now identify sustainability together with climate risk management as their top operational focus to handle deterioration from energy operations on the environment. The increased environmental developments and worsening disaster frequency along with tightened limits on carbon emissions force energetic businesses to change their procedures to meet new demands. Companies construct renewable power systems through financial schemes that involve partnership development for solar power systems wind energy projects and hydroelectric plant installations to combat environmental harm. The adherence to corporate environmental

compliance targets depends on operational sustainability, which implements carbon offset programs that follow international energy efficiency standards.

Modern energy sector digitalization processes pose the most significant security threat because they introduce essential security points of failure. Digital networking produces two security challenges by creating security risks that desire protection because of the connections between industrial control systems and the smart meter devices of the energy grid. The entire energy infrastructure becomes vulnerable to computer attacks that produce power failures together with financial losses and unauthorized access to information assets. The development of encryption methods combined with real-time security systems must be implemented by energy companies, who also need to organize employee cybersecurity instruction programs for security prevention measures against cyber threats. Infrastructure field-level security stands as the most important element to support energy services operations because it protects basic operational requirements. A continuous electrical power distribution depends on this requirement.

Energy project investments generate substantial uncertainty through the high costs of initial capital expenditures, which match market price volatility. The operational stability of energy organizations declines due to a combination of unexpected costs together with supply chain breakdowns and unpredictable fuel costs. Organizations must develop comprehensive risk management solutions that integrate diverse investment techniques to manage fuel expenses together with established contingency funds within budgets because of monetary threats. Market

transformations require energy companies to implement financial safeguard systems that protect their monetary stability.

Facility operators experience safer working environments through power generation operations connected to industrial utility, thus triggering operational failures. The failure of energy supply occurs because integrated systems and supply chain staff networks do not achieve their desired performance targets. Through their partnership AI with IoT enables companies to detect equipment failure warning signs ahead of equipment breakdown. Two central methods exist for Organizations to build adaptive energy operational capabilities: supply chain network connections and running standing emergency response centers.

Energy organizations select operational sustainability as their main priority to handle urgent environmental effects from their energy-related activities. Energy business operations receive direct interference from environmental disruptions along with regulations controlling carbon emissions. The funds from various organizations go toward building renewable power facilities that integrate solar power systems with wind energy systems along with hydroelectric plants to safeguard the environment. The companies utilize two environmental compliance frameworks to link the carbon offsetting operations with efficiency enhancements that meet their commitments to international standards.

The digitalization of the modern energy sector generates severe security challenges, which constitute the most demanding digital protection threat for this sector. Engineers face combined

cyber threats toward the energy grid from digital networking due to the numerous unauthorized access points that industrial control systems together with power systems and smart meters present. Attacks against infrastructure systems result in power outages alongside financial losses combined with leaks of sensitive data that affect operation control at energy installations. Preventing cybersecurity attacks on the energy sector requires business implementation of encryption systems together with real-time security monitoring solutions as well as employee training focusing exclusively on cybersecurity issues. Energy services need maintenance of secure digital infrastructure because stable operational bases are essential for their functionality.

2.3.8. Challenges in Implementing Risk Management

A business requires risk management systems for project protection that also uphold efficient operation. Organizations find it difficult to implement risk management practices for operational processes, while risk management plays a crucial role in their operations. The obstacles resulting from these challenges make it difficult to succeed with risk management program delivery along with future threat assessment. The implementation of internal risk management faces major difficulties according to (Alsulaiman, 2015).

1. As the primary organizational barriers, organizations fight with limited resources including short deadlines and minimal financial support and minimal workforce. Danger assessment operations need extensive resources combined with firm employees who utilize complicated monitoring requirements and specialized tools. Small organizations and many

other entities encounter problems when they need to spend enough funds on developing full risk management systems and sustaining them. A lack of proper resources for protecting against unexpected events through assessments and strategies amplifies organizational exposure.

2. For organizations to achieve risk management success all team units must receive active leadership engagement throughout every unit. Risk management initiatives require substantial support from top leadership positions to obtain enough authority for carrying out their programs. Risk management programs reach only limited organizational achievements since executives choose to prioritize alternative work tasks over implementing risk management strategies. An organization cannot overcome the barrier until its leaders provide total backing throughout the organization.
3. Several challenges occur when employees show limited risk awareness following extra educational efforts from their employer making it hard for them to maintain proper risk management procedures. Staff members who have inadequate risk understanding as well as hazard reduction abilities create weak risk management systems. Every workplace team member needs regular training due to educational risk awareness that equips the team for effective risk management.
4. Workers in companies do not accept new workflows because they consider rare bureaucratic requirements and unnecessary threats to disrupt their established methods.

Staff members fail to achieve effective risk management when they expect operational delays while doubting the approach validity which compels them to rely on previous traditional methods. Team members need risk management support, which both planning process inclusion and direct information transfer provide them with.

5. Industrial programs that involve numerous complexities make risk assessment more complex as organizations execute large-scale projects. Team groups conducting risk assessments need to carry out comprehensive examinations of various possible scenarios that need assessment. Project groups face a decision point where they prioritize quick risk checking as an item eliminator or opt to pass up required risk assessment in challenging risk management cases. The use of structured breakdown systems for complicated risk evaluations enables teams to implement simplified risk management methods which prevent this issue.
6. Organizations need standard risk procedures because they use different identification methods which generate diverse evaluation criteria. Standardized protection from risk management consolidation programs enables departments to receive the same level of protection through standardized approaches. Organizational departments use standardized risk management systems with industry best practices to establish standardization rules.
7. Modern risk management depends heavily on appropriate technological implementation for the continuous data collection process and analysis of information. Most organizations

are unable to find appropriate technological solutions that would enhance their risk management procedure. The implementation of technological strategies faces hindrances from organizations that must choose between paying insufficient technology expenses while training insufficient personnel and implementing new operational methods. The practice of regular human-based risk assessments coupled with environmental and behavioral mistakes results in major difficulties for operational real-time monitoring systems. The solution for this issue will emerge from organizations that develop improved risk management software alongside proper staff member training.

8. The assessment of market changes and legal requirements represents an external risk challenge because organizations face difficulties in determining severity levels and measuring accuracy correctly. The assessment of risk consequences proves difficult for organizations during their process of determining risk priority levels. Using qualitative risk assessments creates subjective interpretations among staff members who apply different risk assessment methods to their management approach. Risk evaluations need both qualitative and quantitative assessment methods for organizations to develop features that combine abstract and concrete risk analysis techniques.
9. Both risk management and strategic planning function at different operational levels although they should unite into one collaborative system. The majority of organizations maintain independent operations for their strategic planning functions together with their

business activities. Risk unmanaged strategic planning leads organizations to face difficulties because it becomes challenging for them to link their risk reduction tactics to their organizational targets. When risk management unites with business strategies, it produces beneficial outcomes since critical plans aid decision-making to evaluate risks from different angles leading to protected future organizational goals.

10. Follow-up processes and monitoring activities that fail to function properly render all developed safety plans ineffective. Organizations that do not track risks consistently will miss new emerging threats while potentially seeing previously identified risks transform in critical ways or degree of severity. Organizations that conduct systematic reviews through automated monitoring tools remain informed about their evolving risk environment to make necessary strategic adjustments.

2.3.9. Aspects to Evaluate When Assessing the Success of Project Risk Management Implementation

Organizations and project teams use risk management success evaluation to determine their capabilities regarding threat identification and assessment and threat minimization. The evaluation of project risk management success combines both qualitative and quantitative assessment and allows stakeholders to provide verbal feedback and perform post-project assessments. Stakeholders and project managers use this assessment procedure to establish effective strategies, thus enhancing project performance while making them more resilient for future work. The

upcoming part discusses essential risk management success factors in project execution per Muhammad et al.,2024.

For effective risk management to occur a project must achieve all three critical elements: its timeline, financial plan, and project scope requirements. Amid the project development lifecycle successful completion of targets indicates proper risk management practices since budget constraints and timeline requirements are preserved alongside high quality deliverables. Risk management performance evaluation performs an assessment by measuring actual results and their expected counterparts for identifying variations and establishing risk effectiveness levels.

The implementation of strategic risk management reduces both the risk severity level and the occurrence frequency of risks in the organization. The rate of risk management success can be evaluated by comparing team-identified versus actual risks as well as rating risk severity after they materialize. Risk management strategies that work effectively produce fewer major risks during the project while simultaneously decreasing the number of project-threatening risks. A successful method to determine compliance involves measuring risk management plan execution. The evaluation process confirms that all procedures mentioned in the risk management plan were properly followed by the team, particularly concerning risk identification, assessment, response, and monitoring activities. Teams achieving project success when they carry out risk management practices with strong compliance achieve superior results. The achievement of Project success within risk management depends on feedback received from stakeholders and team members.

Project stakeholders use quality evaluations about risk communication and efficiency scores for response execution and member support assessment across project operations. Risk management practices collected positive feedback because they delivered transparent collaboration, which led to successful outcomes.

Financial cost variance analysis through CV delivers precise measures about how risks compare to the planned budget values. Project managers perform analysis on budgeted cost of work performed (BCWP) by checking it against actual cost of work performed (ACWP). The successful management of risks through financial effects becomes clear by achieving budget targets or surpassing them. Any major budget increase indicates that the project lacks effective risk identification capabilities and risk management techniques. Schedule variance (SV) stands as an essential management tool for project team leaders, since it demonstrates how risk management tactics adapt planned scheduling. This metric compares the planned timeline with the actual progress of the project. Management paid adequate attention to forecasted schedule threats because planned project durations were almost identical to actual delivery times. The primary reason behind project delays running longer than their original estimates is poor risk assessment alongside ineffective risk response strategies. Risk management performance assessment relies on tracking the instances where risk plans must be executed within project periods. Positive risk management occurs when risk-based planned activities perform successfully following the realization of

authentic threats. Performance reviews of risk management plans occur through frequency rates of response activation, which demonstrate effective risk monitoring systems.

Financial returns from risk management expenses come from proper implementation of risk management frameworks that result in cost savings. Positive investment returns from risk management activities indicate value addition to projects because they prevent bigger cost explosions. The measurement tool enables project managers together with stakeholders to demonstrate the value of risk management funding decisions during the project planning phase. Project objective achievements can be evaluated because of the collective power of lessons learned sessions and post-project reviews. The project assessment process should evaluate risks both those that received active management and those unexpected events that unexpectedly affected the project outcomes. The gathered information goes through organization to enhance risk management techniques that improve future projects. The various project assessment procedures combine quality assessment with risk management delivery assessment. The achievement of superior quality performance enables project requirements to survive through risk management success. The evaluation of this outcome depends on satisfaction ratings together with rework needs and defect numbers. Risk management tactics generate success through effective performance of organizational personnel during critical situations. Teams achieved a new advantageous phase within risk management performance by implementing ready culture and ready stance systems

during unpredictable and immediate challenges. Received feedback enables measurement of this measure through essential learnings and observations.

2.3.10. Risk Management Strategies applies within

1. Regulatory Compliance and Legal Risk Management

Business operations need a fundamental integration document for combining supply chain risk management solutions with procurement risk management strategies. International commercial suppliers provide all essential critical components and turbines along with fuel equipment and spare parts to the Saudi Electric Company. The chain from cost hikes leads directly to project extension because both geopolitical tensions and trade restrictions with supply network management issues together create supply chain breakdowns. The company decreases supplier risks by obtaining essential materials from different vendors through all stages of procurement. Through its designation as a key business asset the strategic equipment inventory allows the company to defend itself against supply chain interruptions. Decentralized blockchain procedures implemented by the SEC generate supply chains that preserve complete security and deliver superior inventory tracking capabilities.

2. Crisis Management and Disaster Recovery Planning

SEC developed an all-inclusive disaster management plan to guide disaster processing methods and system maintenance for cyber events and business stoppages. System maintenance operations start after the power grid disconnects through activation of backup power systems by

SEC emergency teams. The commission executes preparedness readiness assessment protocols to merge employee disaster management exercises with system assessment conducted in recovery practice drills.

3. Workforce Safety and Risk Management

SEC utilizes operational equipment as a protective measure for its staff members according to essential workforce protection protocols established to handle electrical dangers combined with stormy weather and hazardous equipment hazards that exist in the hazardous energy sector. SEC upholds its commitment to workplace safety by providing essential gear under distribution plans, and it requires safety procedures for regular use and emergency preparedness testing for all employees. The organization attains complete workplace safety success combined with global standard compliance by sustaining its safety culture.

4. Future Trends in Risk Management for SEC

The Saudi Electric Company uses their investments in artificial intelligence solutions and big data analytics technology systems with automation to enhance their risk management capabilities. SEC operates risk monitoring systems that trigger automatic alerts while executing previously defined response processes. The Saudi Electric Company executes its development strategy through smart grid development along with energy storage systems to generate sustainable power thus supporting Saudi Vision 2030 sustainability targets. The protective security framework

at SEC emerges from security partner collaboration efforts, which enhance digital defense systems for critical infrastructure networks.

5. Environmental and Sustainability Risk Management

All business operations at the company run environmental risk management systems as part of continuous processes due to its understanding that the global energy sector will shift towards renewable energy expansion. The subsidiary Energy Development Company operated by Saudi Electricity Company (SEC) designs renewable facilities that generate power from wind and solar sources to reduce traditional fossil fuel dependency. SEC uses Environmental Impact Assessments (EIA) to evaluate new projects based on all sustainability requirements established by SEC. The SEC-developed risk-mitigation plans received organizational approval for increasing the reliability of power infrastructure during storm response procedures.

6. The essential implementation technique requires organizations to unite supply chain risk management strategies with procurement-related risk reduction systems.

The Saudi Electric Company purchases essential power transformer elements from its international vendors together with turbines and fuel materials as well as substitute components. The duration of projects gets extended because of higher costs that occur because supply chain disruptions emerge from geopolitical conflicts and trade restrictions as well as below-average supply network collaboration. The company reduces supplier risks through its strategic decision to procure materials from various providers. The business maintains strategic equipment inventory

as its core operational resource for supply chain disruption management. Blockchain technology applied to procurement network operations at SEC achieves the most secure supply chain status together with the best standards of inventory tracking.

7. Crisis Management and Disaster Recovery Planning

SEC established a broad disaster management plan to efficiently handle system breakdowns together with natural incidents and cybersecurity events. The SEC conducts maintenance activities through backup power systems after the electrical grid defines its service termination time. The commission carries out disaster recovery practice sessions to evaluate response systems and determine employee ability in crisis management processes during emergency preparedness readiness checks...

8. Workforce Safety and Risk Management

The safety resources at SEC defend employees because maintaining worker safety remains the key to dealing with electric hazards, extreme temperatures, and heavy machinery operations in hazardous energy facilities. Workers receive protective gear from the SEC and undergo safety training at regular intervals and must pass emergency readiness tests as part of their required standards plus their staff OHS regulations enforcement. SEC's safety culture enables the company to maintain fewer workplace accidents while following all international safety requirements for work areas.

9. Future Trends in Risk Management for SEC

Security Control and Defense Company drives risk management development through technological investments in artificial intelligence systems combined with big data analytics technologies and automated solutions. SEC utilizes modern systems to monitor running risks which enables these systems to trigger automatic alert functions and initiate preprogrammed protective actions. The Saudi Electric Company implements a development plan that combines smart grid solutions and carbon-neutral power generation and energy storage systems to support Vision 2030 sustainability targets.

Chapter 3: Research Methodology

3.1. Introduction

This chapter, the methodology of the study that was followed during the research will be presented by presenting the methodology used as well as a description of the sample that was applied to it, in addition to a comprehensive and accurate description of the tool that was used and the method used in its preparation and displaying the extent of its validity and reliability, in addition to clarifying the statistical methods and treatments used. It was mainly relied upon in analyzing the hypotheses of the study in order to reach reliable scientific results.

3.2. Methodology

The Study was conducted to answer the questions that were raised, and therefore the study relied on the quantitative approach in order to study the role of risk management on the success of projects in the Saudi Electricity Company.

3.3. Research Sample

The random sampling method was used to select the study sample. Where the questionnaire was applied electronically via social networking sites to obtain the study sample, and the study sample consisted of (120) individuals

Table 1 Showing the Characteristics of the Research Sample

Characteristics	Sub Characteristics	N	%
Age Group	Under 30 years old.	40	33.3%
	30–40 years old.	36	30%
	40-50 years old	34	28.3%
	50 or more	10	8.4%

Gender	Male	67	55.8%
	Female	53	44.2%
Educational Level	Bachelor's degree	49	40.8%
	Master's degree	41	34.2%
	Doctorate degree	30	25%
Years of experience	less than 5 years	51	42.5%
	From 6 to 10 years	45	37.5%
	From 11 to 15 years	19	15.8%
	16 or more years.	5	4.2%
Total		120	100%

3.4. Study Tools

The study tool consisted of a questionnaire applied electronically, and the questionnaire consisted of two main parts:

- The first part: contains the basic data of the study sample.
- The second part: related to the items of the questionnaire, and it was divided into one sub-axes, as follows:
 - ✓ First Axis: Procurement systems, It consists of 5 items.
 - ✓ The Second Axis: Competitiveness (Quality, Market Share, Flexibility) It consists of 15 items.

The questionnaire will be used in order to collect data through the Three-point Likert scale, which can be expressed through the following table:

Table 2 The Three- Point Likert Scale

Term	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Answer degree	5	4	3	2	1

3.5. The Validity

Internal consistency was used to measure the validity of the tool by assessing the extent to which each item of the questionnaire is consistent with its corresponding construct. The Pearson correlation coefficient was used to measure the correlation between each item and the total score of the construct it belongs to, as shown in the following table:

Table 3 shows the results of the correlation coefficient for the validity of the tool

Effective Risk Management			Risk Monitoring and Control Processes			Risk Mitigation Strategies			Success of Projects		
N	R	Sig	N	R	Sig	N	R	Sig	N	R	Sig
1	0.455	0.000	1	0.716	0.000	1	0.683	0.000	1	0.675	0.675
2	0.561	0.000	2	0.426	0.000	2	0.391	0.000	2	0.682	0.682
3	0.536	0.000	3	0.660	0.000	3	0.675	0.000	3	0.540	0.540
4	0.695	0.000	4	0.675	0.000	4	0.717	0.000	4	0.634	0.634
5	0.678	0.000	5	0.682	0.000	5	0.738	0.000	5	0.544	0.544

Through this table, it is evident that all items have correlation coefficients ranging from 0.391 to 0.783, and all of them were significant at a significance level of (0.000), indicating that the questionnaire has a high level of reliability.

3.6. The Reliability

To calculate the questionnaire's reliability coefficient, we used Cronbach's alpha coefficient to determine the degree of stability of the tool. The following table shows the reliability coefficient.

Table 4 shows the results of Cronbach's alpha coefficient for the reliability of the tool.

The dimension	Number of phrases	Cronbach's alpha
Effective Risk Management	6	0.78
Risk Monitoring and Control Processes	5	0.74
Risk Mitigation Strategies	5	0.76
Success of Projects	5	0.78
Total	42	0.73

The previous table shows that the questionnaire has a high level of reliability, as the questionnaire as a whole obtained a reliability score of 0.76, with Cronbach's alpha coefficient values for the questionnaire's axes ranging from 0.74 to 0.78. This indicates that the scale has a high degree of reliability, meaning that the results are consistent every time the scale is applied. Therefore, this questionnaire can be relied upon to generalize the results.

3.7. Study Procedures

In the beginning, the questionnaire was designed by looking at the previous studies on the subject of the research and through the theoretical frameworks that were collected. After designing the

questionnaire, it was presented to a number of arbitrators, and the necessary amendments were made through deletion and addition.

Then both the validity and reliability criteria of the tool were calculated. After that, the questionnaire was prepared electronically and distributed for the use of social networking sites such as Facebook and WhatsApp, and after application, data were collected in order to reach reliable scientific results.

3.8. The Statistical Methods Used

The data collected from the sample were entered using the program (SPSS-V.22). The statistical methods that were used to process the data varied, including:

- Cronbach's Alpha coefficient to ensure consistent performance.
- Use frequencies and percentages to determine the significance of the sample's responses to the questionnaire items.
- Correlation coefficient for the calculation of honesty.
- Regression analysis

Chapter 4. Results and Findings

This chapter discusses the statistical analysis of the collected data. It consists of a set of analytical processes that are followed to obtain clear and meaningful scientific information and results that meet the objectives of the study and answer its research questions.

4.1. Statistical Analysis and Results Interpretation

4.2. Risk Management (Independent Variable)

4.2.1. Effective Risk Management

Table 5 Show The result of Effective Risk Management

No	phrases	Mean	SD	Order
1	Our organization has a well-structured risk management framework in place for projects.	3.85	0.799	1
2	Risk identification is conducted at the early stages of project planning.	3.63	1.069	4
3	Our project teams are well-trained in identifying and assessing project risks.	3.85	0.881	2
4	Risk assessment tools and techniques (e.g., SWOT analysis, risk matrices) are used effectively in our projects.	3.62	0.976	5
5	There is a clear process for prioritizing risks based on their impact and likelihood.	3.63	1.069	3

The analysis of Effective Risk Management as an independent variable is presented in Table 5, which highlights key aspects of risk management within organizations. The table provides the

mean scores and standard deviations for five critical statements related to risk management practices, allowing for a deeper understanding of how organizations implement risk management frameworks, identify risks, and utilize assessment tools. The highest-rated statement, with a mean score of 3.85 and a standard deviation of 0.799, indicates that organizations generally have a well-structured risk management framework in place for projects. This suggests that risk management is institutionalized and forms an integral part of organizational project planning and execution. Similarly, another statement with an equal mean score of 3.85 but a slightly higher standard deviation (0.881) emphasizes that project teams are well-trained in identifying and assessing risks. This reflects a strong emphasis on capacity building to ensure risk awareness and proactive mitigation. On the other hand, risk identification at the early stages of project planning holds a mean of 3.63 with a standard deviation of 1.069, ranking fourth in order of importance. This implies that while organizations acknowledge the significance of early risk identification, its implementation may vary, potentially due to inconsistent methodologies or project-specific factors. Additionally, the process for prioritizing risks based on their impact and likelihood holds the same mean score (3.63) but ranks slightly higher (third) due to its practical importance in decision-making. Interestingly, the lowest-ranked statement relates to the use of risk assessment tools and techniques such as SWOT analysis and risk matrices, with a mean of 3.62 and a standard deviation of 0.976. This suggests that while organizations recognize the importance of structured risk assessment tools, they may not always be fully utilized or consistently applied across projects. Overall, these findings indicate that organizations have a strong foundation for risk management, particularly in terms of structured frameworks and team training. However, there is room for improvement in the early identification of risks and the effective application of risk assessment tools to enhance decision-making and minimize potential project uncertainties.

4.2.2. Risk Monitoring and Control Processes

Table 6 Show Results of Risk Monitoring and Control Processes

No	phrases	Mean	SD	Order
1	Risks are continuously monitored throughout the project lifecycle.	3.82	0.866	3
2	Our organization has a structured system for tracking and updating risks as the project progresses.	3.76	0.929	4
3	Risk reports and analysis are regularly shared with project stakeholders.	3.75	0.931	5
4	Corrective actions are implemented promptly when risks are identified.	3.93	0.929	1
5	Our project teams use technology (e.g., risk management software, predictive analytics) to monitor and control risks effectively.	3.89	0.838	2

The effectiveness of risk monitoring and control processes is assessed in Table 6, where five key aspects of risk tracking, reporting, and mitigation are analyzed. The results highlight how organizations manage risks throughout the project lifecycle and the extent to which structured systems and technological tools support these efforts. The highest-rated statement, with a mean of 3.93 and a standard deviation of 0.929, suggests that organizations implement corrective actions promptly when risks are identified. This indicates a strong commitment to risk response and mitigation, ensuring that risks do not escalate into major project disruptions. Closely following this, the second highest-rated statement (mean = 3.89, SD = 0.838) emphasizes the use of

technology, such as risk management software and predictive analytics, to monitor and control risks. This suggests that organizations are leveraging digital tools to enhance risk visibility and proactive management. In contrast, the statement regarding continuous risk monitoring throughout the project lifecycle ranks third (mean = 3.82, SD = 0.866), implying that while organizations acknowledge the importance of ongoing risk monitoring, there may be some inconsistencies in its application across different projects. Similarly, the presence of a structured system for tracking and updating risks as the project progresses holds a slightly lower mean of 3.76 with a standard deviation of 0.929, indicating that while organizations have systems in place, improvements may be needed in their effectiveness or consistency. The lowest-rated statement (mean = 3.75, SD = 0.931) pertains to regular sharing of risk reports and analysis with project stakeholders. This suggests that while organizations do communicate risk-related insights, there might be gaps in transparency, frequency, or engagement with key stakeholders regarding risk management updates. The findings suggest that organizations prioritize prompt corrective actions and leverage technology for risk monitoring and control. However, there is room for improvement in ensuring continuous risk tracking, effective stakeholder communication, and structured risk update processes throughout the project lifecycle. By addressing these gaps, organizations can strengthen their overall risk management framework and enhance decision-making efficiency in project execution.

4.2.3. Risk Mitigation Strategies

Table 7 Show Results Risk Mitigation Strategies

No	phrases	Mean	SD	Order
1	Risk mitigation strategies are clearly defined for all major risks in our projects.	3.69	0.753	4

2	Contingency plans are in place to handle unexpected risks.	3.78	0.827	2
3	Our organization allocates sufficient resources for risk mitigation activities.	3.66	0.959	5
4	Lessons learned from past projects are used to improve risk mitigation strategies.	3.72	0.947	3
5	Risk response strategies (e.g., avoidance, transfer, acceptance, reduction) are effectively applied in our projects.	3.78	0.956	1

Table 7 presents an analysis of Risk Mitigation Strategies, evaluating how organizations define, implement, and refine their approaches to handling project risks. The results highlight the extent to which contingency planning, resource allocation, and past project learnings contribute to effective risk mitigation. The highest-rated statement, with a mean score of 3.78 and a standard deviation of 0.956, indicates that organizations effectively apply risk response strategies such as avoidance, transfer, acceptance, and reduction. This suggests that risk response is well-integrated into project management, allowing teams to handle risks proactively and adaptively. The same mean score (3.78) is observed for the statement regarding the presence of contingency plans to handle unexpected risks ($SD = 0.827$), highlighting that organizations recognize the importance of preparing for unforeseen challenges and disruptions. The third-ranked statement (mean = 3.72, $SD = 0.947$) emphasizes the use of lessons learned from past projects to improve risk mitigation strategies. This indicates that while organizations leverage historical data to refine their approaches, there may still be room for better documentation and application of past insights. The definition of clear risk mitigation strategies for all major risks ranks fourth, with a mean of 3.69 and a standard deviation of 0.753. This suggests that while organizations generally establish mitigation strategies, there might be inconsistencies in their clarity, implementation, or project-

specific tailoring. The lowest-rated statement (mean = 3.66, SD = 0.959) pertains to the allocation of sufficient resources for risk mitigation activities. This implies that while organizations acknowledge the importance of mitigation efforts, there may be financial, human, or technical resource constraints that hinder full implementation. The findings indicate that organizations effectively apply risk response strategies and contingency planning, demonstrating a proactive approach to managing project risks. However, challenges exist in ensuring clear mitigation strategy definitions, effective utilization of past project lessons, and adequate resource allocation for risk management activities. Addressing these areas can further enhance the robustness of risk mitigation frameworks and improve project resilience.

4.3. Success of Projects (Dependent Variable)

Table 8 Success of Projects (Dependent Variable)

N	items	Mean	S.D	Rank
1	Our projects are completed within the scheduled timeframe due to effective risk management.	3.58	0.799	1
2	Project goals and milestones are consistently met with minimal disruptions.	3.49	0.862	4
3	Risk management plays a key role in preventing cost overruns in projects.	3.58	0.852	2
4	Budget forecasting and financial contingency plans help in managing risks effectively.	3.44	1.011	5
5	Effective risk control processes lead to fewer defects or rework in projects.	3.50	0.917	3

Table 8 presents an evaluation of the Success of Projects, which serves as the dependent variable in this analysis. The table measures how different aspects of project success are influenced

by risk management, focusing on factors such as timely completion, cost control, goal achievement, financial planning, and quality assurance. The highest-rated statements both have a mean score of 3.58, indicating that effective risk management contributes to project completion within the scheduled timeframe ($SD = 0.799$) and plays a key role in preventing cost overruns ($SD = 0.852$). These findings highlight the strong impact of structured risk management processes in ensuring that projects remain on track and within budget, two critical factors for overall project success. The third-ranked statement (mean = 3.50, $SD = 0.917$) suggests that effective risk control processes lead to fewer defects or rework in projects. This indicates that organizations with robust risk management practices can enhance project quality by minimizing errors and the need for costly revisions. Conversely, meeting project goals and milestones with minimal disruptions ranks slightly lower (mean = 3.49, $SD = 0.862$). This suggests that while risk management contributes to smoother project execution, unforeseen challenges may still arise, occasionally affecting milestone achievement. The lowest-rated statement (mean = 3.44, $SD = 1.011$) relates to budget forecasting and financial contingency planning in managing risks effectively. This suggests that while financial risk management is recognized as important, organizations may experience challenges in accurately forecasting costs and ensuring sufficient financial buffers to handle unexpected expenses. The results emphasize the significant role of risk management in ensuring timely project completion and cost control, two fundamental indicators of project success. Additionally, effective risk control measures contribute to higher project quality by reducing defects and rework. However, there is room for improvement in ensuring consistent milestone achievement and strengthening financial contingency planning, which could further enhance overall project outcomes. By refining these areas, organizations can maximize the impact of risk management on project success and long-term sustainability.

Chapter 5. Discussion and conclusion

5.1. Discussion

The findings of this study highlight the significance of risk management in ensuring project success, particularly in terms of effective risk identification, monitoring, mitigation strategies, and their impact on key project performance indicators. The results align with previous studies that have investigated risk management practices in the GCC and Saudi Arabia, providing a broader perspective on how organizations manage risks in complex project environments.

Areiqat, Alali, and Arikat (2018) emphasized that risk management is a crucial determinant of project success in the GCC construction industry. Their study found that organizations with a structured risk management framework experienced lower project failure rates. This finding is consistent with our results, where a well-structured risk management framework received the highest rating (mean = 3.85) under the Effective Risk Management category. It suggests that organizations that institutionalize risk management practices can enhance their ability to mitigate uncertainties effectively. Similarly, the study by Ikediashi, Ogunlana, and Alotaibi (2014) highlighted the impact of inadequate risk identification and mitigation strategies on infrastructure project failures in Saudi Arabia. They identified poor early-stage risk identification as a major issue, which aligns with our findings, where risk identification at the early stages of project planning was rated relatively lower (mean = 3.63). This suggests a need for organizations to strengthen their early-stage risk assessment to minimize disruptions later in the project lifecycle. Furthermore, Muhammad et al. (2024) explored the role of the Project Management Office (PMO) in enhancing project success factors in Saudi Arabia, particularly in the Jazan region. Their research indicated that organizations with strong PMO support had better risk management practices, leading to improved project timelines and cost control. This finding resonates with our

study, where the ability of risk management to prevent cost overruns received a high ranking (mean = 3.58). It reinforces the importance of structured governance and institutionalized risk management processes to maintain financial stability in projects. The study by Oke et al. (2023) examined risk management practices in Saudi Arabia, emphasizing the adoption of technological tools to monitor and control risks. Their findings align with our study, where organizations effectively using technology for risk monitoring ranked highly (mean = 3.89). This suggests a growing trend toward digital transformation in risk management, enhancing the accuracy and efficiency of risk tracking processes. Additionally, Rehman and Ishak (2023) explored the moderating role of government regulations and policies in risk management practices. They found that organizations that align their risk strategies with government policies experience higher project success rates. Our study, which identified budget forecasting and financial contingency planning as the lowest-rated factor in project success (mean = 3.44), suggests that organizations may need to strengthen their compliance with regulatory frameworks to enhance financial risk management.

The comparative analysis with previous studies underscores several areas for improvement in risk management practices:

1. **Strengthening Early Risk Identification:** Organizations should place greater emphasis on early-stage risk identification, as inconsistencies in this area can lead to unforeseen project challenges (Ikediashi et al., 2014).
2. **Enhancing Technology Adoption:** While organizations are increasingly using technology for risk monitoring, continuous investment in predictive analytics and AI-driven risk assessment tools can further improve project outcomes (Oke et al., 2023).

3. Institutionalizing Risk Management within the PMO: Organizations should integrate risk management frameworks within their PMOs to enhance project governance and success (Muhammad et al., 2024).
4. Aligning Risk Strategies with Government Policies: Organizations should ensure compliance with evolving government regulations to strengthen financial risk planning and avoid budget overruns (Rehman & Ishak, 2023).

Overall, the study findings align with existing literature, reinforcing the notion that structured and proactive risk management practices are vital for project success. By addressing key gaps such as early-stage risk identification, effective utilization of technology, and compliance with regulatory frameworks, organizations can further enhance their ability to mitigate project risks, leading to improved performance, cost efficiency, and timely project completion. Future research may explore sector-specific risk management approaches and assess the evolving role of digital transformation in risk mitigation strategies.

5.2. Recommendation

Based on the findings and comparisons with previous studies, the following recommendations are proposed to enhance risk management effectiveness and improve project success rates:

1. Develop a Standardized Risk Management Framework: Organizations should implement a comprehensive and standardized risk management framework to ensure consistency in identifying, assessing, and mitigating risks across all projects.
2. Enhance Training and Capacity Building: Regular training programs should be conducted for project teams to improve their risk assessment skills and enhance their ability to respond proactively to emerging risks.

3. **Invest in Advanced Risk Management Technologies:** Organizations should leverage AI-driven predictive analytics, risk management software, and real-time monitoring tools to improve the accuracy and efficiency of risk tracking and mitigation strategies.
4. **Improve Early Risk Identification Processes:** A structured approach should be adopted for early-stage risk identification, including stakeholder involvement, scenario analysis, and historical data reviews to anticipate potential project risks.
5. **Strengthen Financial Contingency Planning:** Budget forecasting should be integrated with robust financial contingency measures to enhance preparedness for unexpected cost overruns and economic fluctuations.
6. **Encourage Knowledge Sharing and Lessons Learned Practices:** Organizations should establish a structured mechanism for documenting and sharing lessons learned from past projects to refine future risk management strategies.
7. **Ensure Compliance with Regulatory Requirements:** Companies should stay updated with government regulations and integrate compliance measures into their risk management plans to align with industry best practices and legal frameworks.

5.3. Conclusion

This study underscores the critical role of risk management in ensuring project success. The findings highlight that organizations with structured risk management frameworks, proactive monitoring systems, and effective mitigation strategies experience improved project performance in terms of cost control, timely completion, and quality outcomes. However, areas such as early risk identification, financial contingency planning, and compliance with government regulations require further improvement to optimize risk management effectiveness. Comparative analysis with previous studies further confirms that organizations that prioritize technology adoption,

institutionalize risk management within PMOs, and leverage historical project learnings can enhance their ability to mitigate risks effectively. By implementing the recommended improvements, organizations can strengthen their risk management practices, ensuring greater project stability and long-term sustainability. Future research may explore sector-specific risk management approaches and assess the evolving role of digital transformation in risk mitigation strategies.

References

- Alattiyh, W., Haider, H., & Boussabaine, H. (2020). Risk factors impacting the project value created by green buildings in Saudi Arabia. *Applied Sciences*, 10(21), 7388.
- Alhoweish, B. (2011). Addressing the project implementation challenges in the Saudi Arabian power supply industry: an investigative approach towards improving project delivery (Doctoral dissertation, Aston University).
- Alragabah, Y. A., & Ahmed, M. (2024). Impact assessment of critical success factors (CSFs) in public construction projects of Saudi Arabia. *Frontiers in Engineering and Built Environment*.
- Alsulaiman, Y. S. (2015). Devising an Organized Procedure for Effective Risk Management in Independent Water and Power Plant Projects in Saudi Arabia. *Journal of Civil Engineering and Architecture*, 9, 1399-1405.
- Alsulaiman, Y. S. (2015). Devising an Organized Procedure for Effective Risk Management in Independent Water and Power Plant Projects in Saudi Arabia. *Journal of Civil Engineering and Architecture*, 9, 1399-1405.
- Alsulaiman, Y. S. (2015). Risk management in independent Water and Power Plant (IWPP) projects in Saudi Arabia: a grounded theory study to improve effectiveness (Doctoral dissertation, Heriot-Watt University).
- Alsulaiman, Y., Bowles, G., & Ogunlana, S. (2014, January). Evaluating risk management in independent water and power plant projects in Saudi Arabia. In Taiden, AB & Aboagye, E. (Eds.) *Procs 30th Annual ARCOM Conference*.
- Alsulaiman, Y., Bowles, G., & Ogunlana, S. (2016). A Study of the Elements that Lead to an Ineffectiveness of Risk Management Implementation in Independent Water and Power

- Plant Projects in Saudi Arabia. In Proceedings of the Eighth Saudi Students Conference in the UK (pp. 719-729).
- Areiqat, A. Y., Alali, A., & Arikat, Y. (2018). Risk management to avoid project failure: a comparison study of construction projects in the GCC. *International Journal of Business Continuity and Risk Management*, 8(2), 87-105.
- Ikediashi, D. I., Ogunlana, S. O., & Alotaibi, A. (2014). Analysis of project failure factors for infrastructure projects in Saudi Arabia: A multivariate approach. *Journal of Construction in Developing Countries*, 19(1).
- Muhammad, K. M. A., Kariri, E. I. D. A., Dhayhi, E. A. S., Alkhathami, E. S. A., Alqarni, E. T. A. M., & Alzawawi, E. H. H. (2024). Role of the Project Management Office (PMO) in Enhancing Project Success Factors in Saudi Arabia: A Case Study of the Jazan Region. *International Research Journal of Innovations in Engineering and Technology*, 8(3), 111.
- Oke, A. E., Adetoro, P. E., Stephen, S. S., Aigbavboa, C. O., Oyewobi, L. O., & Aghimien, D. O. (2023). Risk Management Practice in Saudi Arabia. In *Risk Management Practices in Construction: A Global View* (pp. 45-58). Cham: Springer Nature Switzerland.
- Rehman, M., & Ishak, M. (2023). Moderation role of government acts, laws and policies between economic factors and risk management: A case study of Saudi Arabia contractors. *Journal of Project Management*, 8(4), 213-226.

SURVEY INSTRUMENT

Dear Employee,

This questionnaire is designed to assess the impact of risk management practices on the success of projects, with a specific focus on three key dimensions: effective risk management, risk monitoring and control processes, and risk mitigation strategies. In an increasingly complex and uncertain business environment, effective risk management plays a critical role in ensuring project efficiency, cost control, and stakeholder satisfaction. By systematically identifying, monitoring, and mitigating risks, organizations can minimize disruptions, improve decision-making, and enhance overall project performance. This study aims to gather insights from professionals involved in project management to evaluate how well risk management frameworks contribute to timely project delivery, budget adherence, and quality assurance. The responses collected will help in understanding the strengths and challenges of current risk management practices, providing valuable recommendations for improving project outcomes. All responses will be treated with strict confidentiality and used solely for research purposes. Your participation is highly appreciated

Thank you.

1. Demographic data

Please answer the following questions

+ Gender:

Male

Female

+ Age group:

- ✓ Under 30 years old.
- ✓ 30–40 years old.
- ✓ 40–50 years old.
- ✓ 50 or more.

+ Educational level:

- ✓ Bachelor's degree
- ✓ Master's degree
- ✓ Doctorate degree

+ Years of experience:

- ✓ 1–5 years.
- ✓ 6–10 years.
- ✓ 11–15 years.
- ✓ 16 or more years.

2. Questionnaire terms

Please, mark with (✓) on your selection.

Risk Management (Independent Variable)						
A. Effective Risk Management						
No	Term	Strongly agree	Agree	Neutral	disagree	Strongly disagree
1	Our organization has a well-structured risk management framework in place for projects					
2	Risk identification is conducted at the early stages of project planning.					

3	Our project teams are well-trained in identifying and assessing project risks.					
4	Risk assessment tools and techniques (e.g., SWOT analysis, risk matrices) are used effectively in our projects.					
5	There is a clear process for prioritizing risks based on their impact and likelihood.					
B. Risk Monitoring and Control Processes						
1	Risks are continuously monitored throughout the project lifecycle.					
2	Our organization has a structured system for tracking and updating risks as the project progresses.					
3	Risk reports and analysis are regularly shared with project stakeholders.					
4	Corrective actions are implemented promptly when risks are identified.					
5	Our project teams use technology (e.g., risk management software, predictive analytics) to monitor and control risks effectively.					
C. Risk Mitigation Strategies						
1	Risk mitigation strategies are clearly defined for all major risks in our projects.					
2	Contingency plans are in place to handle unexpected risks.					

3	Our organization allocates sufficient resources for risk mitigation activities.					
4	Lessons learned from past projects are used to improve risk mitigation strategies.					
5	Risk response strategies (e.g., avoidance, transfer, acceptance, reduction) are effectively applied in our projects.					
Success of Projects (Dependent Variable)						
1	Our projects are completed within the scheduled timeframe due to effective risk management.					
2	Project goals and milestones are consistently met with minimal disruptions.					
3	Risk management plays a key role in preventing cost overruns in projects.					
4	Budget forecasting and financial contingency plans help in managing risks effectively.					
5	Effective risk control processes lead to fewer defects or rework in projects.					

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Title:

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