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Investigating the Mediating Role of Project Risk Management on the Relationship between Project Complexity and Project Success: An applied study on Saudi Construction Companies

Eng. Waleed Akhtar M Sultan, Ph.D Researcher, DBA, MBA. PfMP, PgMP, PMP, PMI-RMP, PMI-ACP, PMI-PBA, PMO, FMP, AVS, KPI-P, P3O, MoP, CP3P, CE, CSS, CMAIS
Saudi Arabia, Riyadh, MOMRAH

Abstract
Project success is a critical factor in the construction industry as it directly affects the profitability and reputation of construction companies. However, project success is often impacted by various factors such as project complexity, which can lead to increased risk and uncertainty. To mitigate these risks, project risk management has become increasingly important in the construction industry. Therefore, this study aims to investigate the relationship between project complexity(PC) and project success (PS), while examining the mediating role of project risk management(PRM) in this relationship. By exploring the impact of project risk management on project success in the context of Saudi construction companies, this study aims to contribute to the understanding of the critical factors that can enhance the success of construction projects. Additionally, this study seeks to identify the most significant factors of project risk management that can help to mitigate the negative effects of project complexity on project success. Overall, this research aims to provide valuable insights and recommendations for construction companies and stakeholders to enhance project success through effective project risk management strategies. The time horizon for this study relies on a cross-sectional strategy to collect the required data from the research sample at a specific time. Unlike longitudinal studies, which follow individuals over a long period, cross-sectional investigations allow data to be collected from the participants over a particular period. This strategy gave the researchers insight into existing project management practices in the Saudi Arabian construction industry and pinpoint areas for improvements.
The study looked at 100 responses to a survey that utilized a five-point Likert scale as its quantitative data to assess the degree of mediation and the nature of the relationship between the variables. For this study, the convenient sampling method has been selected. Convenience sampling is a non-probability sampling method that involves picking people or things that are readily available or convenient for the researcher. This may be especially advantageous for academics with little funds or resources since it may help them save money.
The study's results indicate the likelihood of a partial mediation effect, indicating that good PRM plays a substantial role in the relationship between PC and PS. In addition, a favorable correlation between project complexity and project success was found in the study. The study found that Project Risk Management and Project Complexity have a positive relationship with Project Success, with beta values of 0.157 and 0.104, respectively. An increase in Project Risk Management and Complexity leads to increased project success. The beta value for Project Complexity is less than that for Project Risk Management, indicating that Project Risk Management partially mediates the influence of Project Complexity on Project Success. This suggests that Project Risk Management plays a crucial role in explaining the positive impact of Project Complexity on Project Success. Therefore, it is vital to highlight the significance of Project Risk Management and Project Complexity in achieving project results within the expected timeframe and budget.

Key words: PRM (Project risk management) - Project Complexity (PC) - Project Success (PS)

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I. Introduction

The construction industry significantly impacts an economy's economic growth and development. While the industry is vital, it is faced with various challenges that can impede the success of a project. Project complexity often leads to problems like cost overruns, schedule delays, and quality concerns. To mitigate the impact of these challenges, project risk management (PRM) has been determined as an essential tool for

ensuring project success. This study aims to investigate the mediating role of PRM in the relationship between project complexity and project success in Saudi construction companies.

Several studies have been conducted on project management in the construction industry, focusing on project success factors (PSFs) and critical success factors (CSFs) (Luo et al., 2017).

While PSFs emphasize the importance of meeting project goals within a given timeline and budget, CSFs theory identifies critical success criteria for a project or business. However, there needs to be more research investigating the mediating role of PRM on the relationship between project complexity and project success, specifically in the context of Saudi construction companies.

Understanding project success and the factors that contribute to it is essential for achieving successful project outcomes. Previous studies, such as those conducted by Ahmed and Jawad (2022), Mata et al. (2023), and Luo et al. (2017), have emphasized the importance of effective project management practices, stakeholder involvement, and communication in achieving project success. Meanwhile, Alzoubie (2018) focused on the mediating role of project complexity in the effect of leadership style on project success in the construction industry. Other studies, such as those conducted by Kimaru (2019), Mikkelsen (2018), Bakhshi et al. (2016), Alzahrani (2020), and Zaman (2021), have also examined various factors, such as sustainability, and agility in project management, that contribute to project success. The current study builds upon these previous studies by specifically examining the mediating role of project risk management in the relationship between project complexity and project success. By exploring this relationship, the study contributes to a deeper understanding of the factors that contribute to successful project outcomes in the construction industry.

Therefore, this study aims to contribute to the literature by investigating the correlation between project success and complexity in the Saudi Arabian building sector. Additionally, the study will establish the role of risk management as a moderator between project success and complexity. The study will also provide recommendations on how the Saudi Arabian construction industry can enhance its project management methodologies and regulations.

The study will draw upon a range of literature, including studies by Wang, Appolloni& Liu (2023), Serpell & Rubio (2023), Bilgin et al. (2022), Akbar & Shahid (2022), Vivek & Hanumantha Rao (2022), Baghdadi & Kishk (2015), Salvador et al. (2021), Huo, Xue& Jiao (2023), Okudan, Budayan&Dikmen (2021), Keshk, Maarouf and Annany (2018), Ahmed and Jawad (2022), Mata, Martins & Inácio (2023), Luo et al. (2017), Alzoubie (2018), and Kimaru (2019).

The study is relevant to the upcoming research as it will investigate the mediating role of project risk management in the relationship between project complexity and project success in Saudi construction companies. The current study will contribute to the knowledge gap and literature gap by examining the relationship between project risk management and project success in the context of Saudi construction companies. (Kimaru, J. M. 2019).

Research purpose

In several different nations, including Saudi Arabia, the construction industry is a vital component of the economy(Wang, Appolloni & Liu, 2023). Construction projects are often challenging and include many stakeholders, such as the project's owners, the contractors working on the project, the designers working on the project, and the suppliers working on the project (Ajmal et al., 2022). On the other hand, the success of construction projects is often jeopardized for several diverse reasons. One of these factors is the project's complexity, which may result in delays, cost overruns, and quality difficulties(Serpell & Rubio, 2023). PC (Project complexity) is the degree of difficulty involved in project management. Reference to (Bilgin et al., 2022), the complexity of a particular project may be influenced by a broad variety of elements, including those that are technical, organizational, and environmental. Rapid urbanization, strong demand for infrastructure, and a dearth of properly trained workers have all contributed to the increased complexity of projects in the Saudi construction industry (Dao et al., 2017).

As stated by (Akbar and Shahid, 2022), PRM (Project risk management) has recently been acknowledged as an important method for efficiently managing the complexity of projects and limiting the risks that are often associated with such endeavors(Akbar & Shahid, 2022). This acknowledgment resulted from the fact that the complexity of projects has expanded over the last several years. PRM is the process of identifying, assessing, and reducing any potential impediments to the success of a project(Vivek and Hanumantha Rao, 2022)

Yet, there is a lack of consensus about the extent to which PRM in the Saudi construction industry may mitigate the correlation between project complexity(PC) and project success (PS) (Dartey-Baah, 2022). In Saudi construction enterprises, the moderating effect of PRM on the correlations between PC and PS is the focus of this research. The objectives of the research are to contribute to the development of efficient ways for managing challenging projects in the construction industry in general and to identify the best practices for managing complicated construction projects in Saudi Arabia.

Research problem

The research problem being studied in this study is the impact that PC has on project performance in the Saudi construction industry. In addition, this research investigates the potential role that PRM may have in mitigating the severity of this effect. The motivation for the study problem that has emerged as a consequence of this finding is the fact that many construction projects in Saudi Arabia are characterized by high degrees of complexity, which may lead to cost overruns, schedule delays, and quality concerns. This revelation has led to the understanding that additional inquiry into this topic is required. These concerns might, in the long term, jeopardize the success of construction projects, which would have a detrimental influence not just on the economy but also on society as a whole(Ádám, 2005).

The Saudi construction industry's PRM may be able to moderate the link between PC and PS, however, this is uncertain. As a result, the purpose of this study is to analyze how project risk problem complexity facilitates the link between PC and PS in Saudi construction enterprises. The purpose of this study is to address this research problem to identify successful ways for managing complicated projects in the Saudi construction industry and to contribute to the development of best practices for managing complex projects more generally(Muthukrishna and Henrich, 2019).To summarize, the gap in knowledge is the lack of research investigating the mediating role of PRM on the relationship between project complexity and project success in the context of Saudi construction companies. On the other hand, the gap in literature is the absence of studies exploring the relationship between project complexity and project success, specifically in the context of Saudi construction companies, as well as the limited examination of PRM's potential mediating effect in the construction industry. This study aims to address these gaps in knowledge and literature by providing insights into managing complex construction projects in Saudi Arabia.

Research objectives

The purpose of this study is to investigate the relationship between project complexity, project risk management, and project success in Saudi construction companies. The study will focus on three specific objectives as follows:

- The purpose of this study is to investigate the correlation between PS and PC in Saudi Arabia's building sector.
- Establishing the role of risk management as a moderator between PS and complexity.
- To make some recommendations regarding how the Saudi Arabian construction industry can enhance its project management methodologies and regulations.

The objectives of this study are grounded in the research problem and literature review. The researcher aims to examine the relationship between project complexity, project risk management, and project success in the context of Saudi construction companies. The research objectives are based on several relevant studies, including Wang, Appolloni& Liu (2023), Serpell & Rubio (2023), Bilgin et al. (2022), Akbar & Shahid (2022), Vivek & Hanumantha Rao (2022), Baghdadi & Kishk (2015), and Salvador et al. (2021). The study will contribute to the literature on project management by providing valuable insights into how project complexity, risk management, and success are interrelated in the Saudi Arabian construction industry. Moreover, the study's findings will help project managers and policymakers in the industry make informed decisions that enhance project management practices and regulations.

Research questions

This research project addresses three specific research questions related to project management in the Saudi Arabian construction industry. The first research question aims to investigate the impact of project complexity on project success in Saudi Arabia. Specifically, this research question seeks to explore how the level of complexity of a building project affects the likelihood of it being completed successfully. The second research question examines the role of project risk management in balancing project success with project complexity in the Saudi Arabian construction sector. This question investigates how project risk management can help mitigate the challenges posed by complex projects and ensure project success. Finally, the third research question aims to identify potential modifications to the current procedures and approaches for project management in the Saudi Arabian construction industry based on the research findings. By addressing these three research questions, this study aspires to contribute knowledge on project management in the construction industry and provide practical insights for project managers and stakeholders in Saudi Arabia. Below the summary of the research question

1. How does the level of complexity of a building project in Saudi Arabia affect its likelihood of being completed successfully?
2. How does PRM in Saudi Arabia's construction sector balance PS with PC?
3. based on the research findings, what modifications can be made to the current procedures and guidelines for project management in the Saudi Arabian construction industry?

Research importance

The present body of research on the link between PC, PRM, and successful project completion has shown a knowledge gap, and the purpose of this inquiry is to fill that gap. Due to the lack of research on this problem in the context of Saudi construction enterprises, this study has the potential to contribute new knowledge to the current body of literature (Lendrum and Humphrey, 2012).

The research may provide insight into how to make projects more successful by investigating the function of PRM as a mediator in the relationship between PC and successful project completion. This is of the utmost importance when seen through the lens of the building industry in Saudi Arabia, which is essential to the nation's economy.

Also, this study's results have the potential to give Saudi construction businesses' decision-makers crucial information on how to manage the complexity and risk of projects to increase the success of such projects (Ali, et al, 2013). As a result, they will be better able to formulate judgments about the project's configuration, resource allocation, and risk mitigation techniques.(Salvador et al., 2021).

Overview of the Industry

Due to the large investments made by both the government and the private sector in various infrastructure and real estate development projects, the Saudi Arabian construction industry is a substantial contributor to the country's economy(Baghdadi & Kishk, 2015). The industry has gone through a period of tremendous expansion and transition over the last few years, during which modernization and diversification have received increased attention (Ikediashi et al., 2014)&(Alshuwaikhat and Mohammed, 2017).

Owing to the presence of many local and foreign firms in the market, the Saudi Arabian construction industry is characterized by intense levels of competition. Commercial, residential, industrial, and infrastructure structure construction are a few of the industry's subsectors(Hassanain et al., 2020). In Saudi Arabia, the government is responsible for the vast bulk of construction projects; although, private sector engagement has increased during the last several years.

According to (Alshuwaikhat and Mohammed, 2017), The vision 2030 is a government project that emphasizes sustainability, innovation, and modernization, has had a crucial role in determining the future trajectory of Saudi Arabia's construction industry. The project has two primary objectives: first, to boost the contribution of the construction industry to the kingdom's gross domestic product (GDP), and second, to expand the number of job possibilities accessible to Saudi citizens (Luo et al., 2017).

Yet, the industry has also encountered challenges, including project delays, rising costs, and a scarcity of available personnel. As was just said, Saudi Arabia's construction industry is rife with extreme levels of rivalry due to many domestic and foreign companies now functioning in the market. The industry is defined by the existence of several projects, each with a specific degree of complexity and risk. Due to an increase in the number of complicated project proposals submitted in recent years, the industry has seen significant development and change. Good PRM may lessen the negative effect of unplanned occurrences, help save money, and raise the likelihood of PS (Luo et al., 2020).

According to various studies and literature, the construction industry in Saudi Arabia has been overgrowing over the past few years. As Moohialdin, Trigunarsyah& Islam (2021) noted, the industry has been recognized as a critical sector in the country's Vision 2030 plan. The plan aims to increase the industry's contribution to the national economy and create more job opportunities for Saudi citizens. Following Haadir&Panuwatwanich (2011), the construction industry in Saudi Arabia has also witnessed a significant increase in foreign investments, which has resulted in an expansion of the industry's scope and capabilities.As indicated by Alkahtani (2000), the construction industry in Saudi Arabia has undergone several significant changes, including the development of new technologies and the adoption of modern management practices. These changes have allowed the industry to improve efficiency and productivity and undertake more complex projects. Besides, the country's strategic location and abundant natural resources have made it an attractive destination for construction companies worldwide, as Bageis&Alsulamy (2021) noted. Furthermore, according to Khawam and Bostain (2019), the Saudi construction industry has focused on sustainable development and green construction practices. This has been reflected in the growing number of projects incorporating environmentally-friendly designs and construction methods. In line with this, Hassanain, Al-Harogi&Sanni-Anibire (2022) emphasize that the Saudi government has invested heavily in infrastructure projects, such as airports, ports, and highways, to improve the country's connectivity and attract more foreign investments. Overall, the construction industry in Saudi Arabia is enormous for continued growth and expansion, with multiple initiatives and approaches in place to support its ongoing evolution. (Hassanain, Al-Harogi & Sanni-Anibire, 2022). According to the literature mentioned above, the construction industry in Saudi Arabia will likely remain a vital contributor to the country's economic development in the coming years, aligning with the vision of 2030 (Moohialdin, Trigunarsyah& Islam, 2021). The industry has witnessed a significant increase in foreign investments, expanding its scope and capabilities (Haadir&Panuwatwanich, 2011). It has undergone significant changes, including developing new technologies and adopting modern management practices

(Alkahtani, 2000). Furthermore, the industry has strongly emphasized sustainable development and green construction practices (Khawam&Bostain, 2019), with many projects incorporating environmentally-friendly designs and construction methods. The Saudi government's investment in infrastructure projects has further supported the industry's growth and attracted more foreign investments (Hassanain, Al-Harogi&Sanni-Anibire, 2022). Bageis&Alsulamy (2021) also note that the country's strategic location and abundant natural resources contribute to the construction industry's growth in Saudi Arabia.(Alkahtani, 2000).

II. Literature review

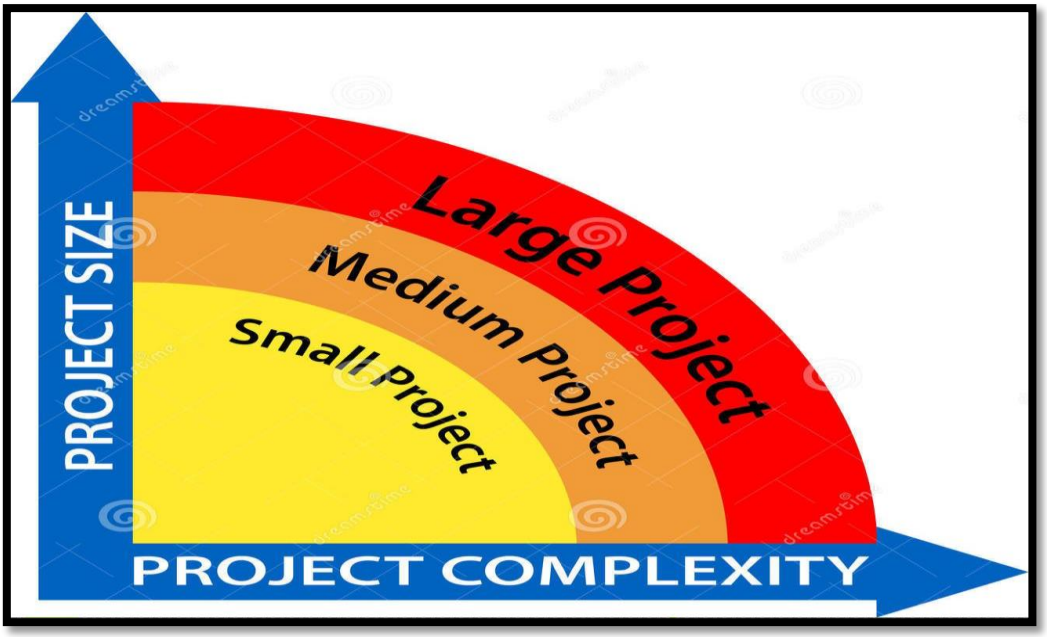
This Literature will provide a comprehensive literature review related to the research topic. This chapter encompasses the essential concepts of Project Complexity (PC), Project Risk Management (PRM), and Project Success (PS) and their association with each other. The Literature starts with a discussion of Project Complexity (PC), which refers to the difficulty of managing a project due to miscellaneous technical, organizational, and environmental aspects (Rodríguez Montequín et al., 2018). This chapter also studies how project complexity can affect project success. Moreover, it highlights Project Risk Management (PRM), which includes specifying, evaluating, and managing project risks. This chapter examines how project complexity can impact the level of project risk associated with a project and how effective risk management strategies can help mitigate the impact of project complexity on project success by examining how project complexity can affect the level of project risk associated with a project(Serpell and Rubio, 2023). The impact of project success on project risk management is also discussed, highlighting how successful project completion can improve future project risk management practices. The Literature also discusses the mediating role of project risk management in the relationship between project complexity and project success. It examines how project risk management practices can mediate the relationship between project complexity and project success and the factors that affect this relationship. Finally, the chapter critically scrutinizes previous studies on the research topic, including critical success factor theory and resource-based theory (RBV). These theories will provide a framework for comprehending the factors contributing to project success and how construction firms in Saudi Arabia can leverage these aspects to accomplish project success.(Varadarajan, 2023).

PC (Project Complexity)

Project complexity (PC) is a multidimensional concept emphasizing the difficulty and obstacles that must be overcome to complete a project successfully(Salvador et al., 2021). As highlighted by Ma and Fu (2020), the level of project complexity is influenced by numerous factors, such as the project's size, scope, technical complexity, uncertainty, and risk. The relationship between project complexity and project success has been explored in previous research studies. For instance, Bakhshi et al. (2016) have highlighted the impact of project complexity on project performance. Zaman (2021) also emphasizes that project complexity can impact project success. Alzahrani's (2020) study found that various factors mediate and moderate the relationship between project complexity and success, particularly in the IT sector of Saudi Arabia. Additionally, Mikkelsen (2018) emphasizes the importance of managing project complexity and its impact on project success. (Wang, Appolloni & Liu, 2023).

The complexity of a project is influenced by its size and scope, as these criteria entail more engagement of people, resources, and coordination, resulting in a direct proportionate increase in complexity. This is further compounded by the probability of delays, cost overruns, and scope creeps, which all contribute to the project's complexity (Qureshi & Kang, 2015). In addition, uncertainty and risk add to the project's complexity. Projects with a high degree of uncertainty, such as those involving new technologies, expanding markets, or complex legal frameworks, require a greater degree of flexibility, adaptation, and risk management (Baccarini, 1996). Similarly, projects involving a significant degree of risk, such as those with safety-critical equipment, financial investments, or environmental consequences, necessitate a comprehensive and stringent risk management strategy (Willumsen et al., 2019). According to Mikkelsen (2018), Bakhshi et al.'s (2016) research highlights the relationship between project complexity and project success. The study by Akbar and Shahid (2022) and Vivek and Hanumantha Rao (2022) show how project complexity can affect project performance. Furthermore, the studies by Baghdadi and Kishk (2015) and Salvador et al. (2021) suggest the impact of project complexity on project cost and schedule. Zaman (2021) adds that Alzahrani's (2020) study on project complexity and success in the IT sector of Saudi Arabia found that various factors moderate and mediate the relationship between project complexity and success.

Fig 1: Project Complexity and Project Size



Source: (San Cristóbal et al., 2018)

To manage complex projects successfully, project managers must have a detailed strategy for the project's execution, monitoring, and control, as well as a thorough awareness of the project's objectives, requirements, risks, and stakeholders(Rodríguez Montequín et al., 2018). The management of PC also requires effective communication, coordination, and risk management (Qazi et al., 2016).The aforementioned facts align with the findings of previous studies such as Kimaru (2019), Mikkelsen (2018), Bakhshi et al. (2016), Alzahrani (2020), Zaman (2021), Nordahl-Pedersen and Heggholmen (2023), Serpell and Rubio (2023), Keshk, Maarouf, and Annany (2018), and Salvador et al. (2021). These studies emphasized the importance of having a well-planned project management strategy that takes into account the project's objectives, requirements, risks, and stakeholders. They also highlight the significance of effective communication, coordination, and risk management in managing PC and achieving project success. (Ahmed and Jawad, 2022). Therefore, project managers should pay close attention to these aspects when managing complex projects to ensure that the project is completed successfully within the stipulated time, cost, and quality constraints.(Bageis and Alsulamy, 2021).

Project Risk Management(PRM)

Risk management is a critical process in project management, which involves detecting, evaluating, and managing possible hazards to a project's success (Raz and Michael, 2001). As defined by Huo, Xue, and Jiao (2023), risks refer to any incidents or conditions that have the potential to cause delays, budget overruns, quality issues, or other undesirable consequences on project goals(Baghdadi and Kishk, 2015). Effective risk management requires proactive steps to reduce the likelihood of probable threats and their negative consequences (Harvett, 2013).

To ensure effective risk management, project teams must have a thorough understanding of the project's objectives and potential dangers that might imperil those objectives (Huo, Xue, & Jiao, 2023). This involves a mix of technical skills, stakeholder involvement, and the ability to be adaptable and flexible in the face of changing circumstances (Carbone and Tippett, 2004). As highlighted by Okudan, Budayan, and Dikmen (2021), effective risk management involves a systematic approach that includes risk identification, risk analysis, risk response planning, and risk monitoring and control.(Huo, Xue & Jiao, 2023).

One of the key advantages of risk management is that it helps project teams prevent unpleasant shocks. The project team can take action to reduce possible risks by identifying and assessing such hazards or developing contingency plans to deal with those risks if they materialize, as suggested by Keshk, Maarouf, and Annany (2018). As a result, there is a chance that delays, cost overruns, and other negative consequences on project goals may be reduced (Ghaleb et al., 2022). In conclusion, risk management is a critical process in project management that involves proactive steps to reduce the likelihood of probable threats and their negative consequences. Effective risk management requires a systematic approach that includes risk identification, risk analysis, risk response planning, and risk monitoring and control. By undertaking effective risk management,

project teams can prevent unpleasant shocks and reduce the negative consequences on project goals.(Keshk, Maarouf &Annany, 2018)

Effective risk management involves a systematic process that enables project teams to identify, assess, and mitigate potential risks (Huo, Xue, & Jiao, 2023). This process includes several key steps, starting with the Plan Risk Management phase, which involves defining the overall approach to risk management for the project. The next step is to Identify Risks, which involves identifying potential risks that may impact the project's objectives.(Akbar and Shahid, 2022).

Once risks are identified, the project team performs Qualitative Risk Analysis to evaluate the likelihood and potential impact of each risk. This helps prioritize the risks and determine which risks require further analysis. The project team then performs Quantitative Risk Analysis, which involves assigning numerical values to the probability and impact of each risk, allowing for a more objective assessment of their potential impact.(Akbar and Shahid, 2022).

Based on the results of the risk analysis, the team develops a Plan Risk Responses, which outlines specific actions to be taken to mitigate or avoid the identified risks. This plan includes strategies to address the highest priority risks, such as risk avoidance, risk reduction, risk sharing, and risk transfer, as suggested by Keshk, Maarouf, and Annany (2018). The project team then implements the Plan Risk Responses to address the identified risks.(Huo, Xue, & Jiao, 2023).

Finally, the project team must Monitor Risks to ensure that the identified risks are being effectively managed and to identify new risks that may arise during the project's lifespan. Regular risk reviews and updates to the risk management plan are essential to ensure that the project team remains aware of potential risks and has appropriate mitigation strategies in place (Huo, Xue, & Jiao, 2023).

In summary, effective risk management involves a structured process that includes several key steps, including Plan Risk Management, Identify Risks, Perform Qualitative and Quantitative Risk Analysis, Plan Risk Responses, Implement Risk Responses, and Monitor Risks. By following this process, project teams can identify and mitigate potential risks, reducing the likelihood of negative consequences on project goals, as emphasized by Okudan, Budayan, and Dikmen (2021). Effective risk management is crucial for project success and involves a structured process with key steps such as planning, identifying, analyzing, responding, implementing, and monitoring risks, as emphasized by Okudan, Budayan, and Dikmen (2021). To ensure effective risk management, project teams need to consider various factors such as project complexity, project goals, stakeholder involvement, and the project environment. Previous studies by Moohialdin, Trigunarsyah& Islam (2021), Haadir&Panuwatwanich (2011), Alkahtani (2000), Bageis&Alsulamy (2021), Khawam and Bostain (2019), Hassanain, Al-Harogi&Sanni-Anibire (2022), Nordahl-Pedersen and Heggholmen (2023), Serpell and Rubio (2023), Mata, Martins & Inácio (2023) have examined different aspects of project risk management and provided insights into its importance and effectiveness. Additionally, the literature suggests that project success is closely linked to effective risk management, and the two should be considered in conjunction when assessing project outcomes (Zaman, 2021). Other studies such as Luo et al. (2017), Alzoubie (2018), Kimaru (2019), Mikkelsen (2018), Bakhshi et al. (2016), Alzahrani (2020), Bilgin et al. (2022), Baghdadi and Kishk (2015), Keshk, Maarouf and Annany (2018), and Salvador et al. (2021) have also highlighted the importance of effective risk management in project success and provided various approaches and techniques for managing risks in different project environments. Therefore, project teams must prioritize risk management as essential to project planning and implementation to assure project success.

Fig 2: Risk Management Process
Source: (Staff, 2020)

Project Success (PS)

Project Success (PS) is defined as the accomplishment of project objectives within the original time, budget, scope, and quality restrictions (Keshk, Maarouf and Annany, 2018). The success of a project is crucial for organizations as it enables them to meet the needs of their stakeholders, optimize their resource utilization, elevate their level of competitiveness, improve their reputation, and foster learning and development, as highlighted by Hussain et al. (2022). Effective projects not only meet or exceed the expectations of their specific stakeholders, but they also create value for the firm. By placing a greater emphasis on PS and investing in excellent project management, businesses may increase their likelihood of achieving these benefits and fulfilling their strategic goals (Luo et al., 2017).

According to Vivek and Hanumantha Rao (2022), effective project management is critical to achieving PS. The authors emphasize the importance of project planning, scheduling, cost control, quality management, and risk management to ensure successful project outcomes. Similarly, Baghdadi and Kishk (2015) suggest that effective project management practices, such as project planning, risk management, and stakeholder management, significantly impact PS. Additionally, Salvador et al. (2021) emphasizes the importance of effective communication, leadership, and team management in achieving PS. The authors suggest that these factors play a critical role in ensuring stakeholder satisfaction and promoting project success. Furthermore, as highlighted by Zaman (2021), the relationship between project complexity and success is moderated and mediated by various factors, as identified in Alzahrani's (2020) study on project complexity and success in the IT sector of Saudi Arabia.

In conclusion, achieving PS is critical for organizations as it enables them to meet the needs of their stakeholders, optimize resource utilization, and foster learning and development. Effective project management practices, such as project planning, risk management, stakeholder management, effective communication, leadership, and team management, are essential to achieving PS, as suggested by Vivek and Hanumantha Rao (2022), Baghdadi and Kishk (2015), and Salvador et al. (2021).

Fig 3: Project Success
Source: (Hussain, et al, 2020)

Project Complexity and Project Risk Management

PC affects success risk management. This is because this component may have far-reaching repercussions for the success of the project. The size and scope of the any project, the number of stakeholders engaged, the technological needs, and the organizational complexity are all possible drivers of PC. One of the key consequences of PC on PRM is the necessity for more detailed planning and preparation. Complicated project management necessitates a more comprehensive risk management strategy that takes into account all possible threats and their interdependencies(Qazi et al., 2016)&(Vivek & Hanumantha Rao, 2022). To build an effective risk management strategy, the project manager must have a comprehensive grasp of the project's complexity and related hazards. The risk management strategy must also analyze the resources required to minimize the impact of possible threats and validate that sufficient information is available to properly mitigate such dangers (Ellinas et al., 2016).

The need for increased stakeholder participation is another effect of PC on PRM. There are often several stakeholders participating in complicated projects, each with its own goals, priorities, and risk tolerance levels. The project manager is responsible for maintaining close communication with all stakeholders to gain an understanding of their needs and concerns, include them in the process of risk identification and analysis, and develop risk management strategies that are tailored to their particular needs (Maylor, and Turner, 2017). A high degree of participation from all project stakeholders may assist guarantee that every possible risk is discovered, examined, and mitigated, hence minimizing the possibility that the project will fail.(Vivek &Hanumantha Rao, 2022). The implementation of risk management measures may also be impacted by PC. Risk management strategies may need to be more nuanced and sophisticated to portray the linked nature of the risks associated with a complicated project(Luo et al., 2017). The deployment of risk management systems may require a significant amount of work and the coordination of activities across a large number of teams and stakeholders(Huo, Xue & Jiao, 2023). It is the responsibility of the project manager to ensure that not only are the necessary resources accessible but also that the activities of all stakeholders are coordinated. If the project manager wishes to ensure the project's success, he or she must satisfy both of these obligations (Kiradoo, 2020).

Unanticipated hazards are another impact of PC on PRM. Emergent risks are those that suddenly develop during a project, often due to changes in the project's scope, requirements, or external factors. Due to the increased chance of unanticipated risks emerging throughout a complex project, it is vital to adopt a dependable risk management strategy that is adaptable to changing circumstances. It is the responsibility of the project manager to keep a continual eye on the project to identify any new risks that may emerge and to build contingency plans for managing them effectively (Shayan et al., 2022). The capacity to learn from earlier initiatives may also be impacted by PC. Effective risk management requires the use of lessons from previous initiatives. This is because it helps project managers to more readily identify common risks and suggest solutions that may mitigate the severity of these risks in future projects. On the other hand, while working on a complex project, it may be difficult to glean meaningful insights from prior projects since the current conditions

may be special and need a new approach(Vivek & Hanumantha Rao, 2022) This is because it may be difficult to compare current circumstances to those of earlier initiatives. It is the responsibility of the project manager to ensure that processes have been created for documenting the project's gained knowledge and expertise. These lessons may then be used to enhance the risk management tactics for future projects (Willumsen et al., 2019).

Impact of PS on PRM

PRM is the process of detecting, assessing, and managing any risks that may have an impact on a project's goals, schedule, budget, and quality(Ahmad et al., 2022). Good PRM may have a significant impact on PS by ensuring that the project is finished on schedule, within budget, and to the appropriate quality standards. In this article, we will examine the effect that PRM has on PS, as well as the many methods in which it may be used to improve PS (Tiwari, and Suresha, 2021). One of the most significant effects that PRM has on the success of a project is that it helps to reduce the number of interruptions that occur during the project. Project managers may reduce the possibility of project delays or failures by using preventive measures to limit or eliminate possible risks early in the project life cycle(Nordahl-Pedersen & Heggholmen, 2023). This, in turn, helps to guarantee that the project is completed on time and within budget, meeting the expectations of the stakeholders (Ahmadabadi, and Heravi, 2019).

An improvement in teamwork and communication inside the project is another effect of PRM on PS. PRM entails identifying and incorporating all key stakeholders, including project team members, in the process of risk identification and management. Because of this, there is an atmosphere of open communication and cooperation, which enables the team members to work together to identify possible hazards and devise strategies for mitigating them. This cooperation has the potential to foster trust among team members, improve the dynamics of the project team, and ultimately contribute to the project's success. Effective PRM also aids in better decision-making throughout the project's life cycle(Alkhlaifat, et al, 2019). The examination and evaluation of prospective risks, as well as their implications on the project's goals, schedules, finances, and quality, are all part of risk management. This analysis provides project managers with vital information that they may use to make educated choices throughout the project life cycle, such as determining the most effective course of action to minimize or eliminate risks. When project managers use trustworthy information to make choices, they may decrease the impact of possible risks on the project and raise the chance of PS (Zid et al.,2020).

Good PRM may boost stakeholder satisfaction. Project managers can guarantee that stakeholders' expectations are fulfilled or surpassed by detecting and managing any possible risk that may develop throughout the project. Thus, the chance of unexpected project outcomes is reduced. This may boost stakeholder satisfaction since they are more likely to get the desired project results (Harvett, 2013). In turn, this may contribute to the development of a favorable reputation for the project team and the organization. Effective PRM may also encourage organizational learning. By collecting and evaluating data on project risks, results, and mitigation methods, project managers may get a better knowledge of project hazards and how to manage them successfully. This knowledge might be used to enhance PRM tactics in future projects, therefore contributing to the firm's growth and development (Ghaleb et al., 2022).

The Mediating role of PRM

The function of a mediator between PS and PC must be played by PRM at all costs. This is because PRM enables success teams to handle project risks efficiently and decreases the impact of PC on success risk (Li et al., 2019). The phrase "PRM" refers to the process of identifying, evaluating, and mitigating the consequences of the various factors that may affect the result of the project (Luo et al., 2017). If project teams take a proactive approach to PRM, they may increase the likelihood of PS while also reducing the likelihood of possible hazards occurring. By minimizing the impact of project risk on PS, PRM mediates between PC and PS. It may be possible to lower the possibility of project delays or failures by identifying and reducing potential risks early in the project life cycle. In turn, this helps to ensure that the project is completed in time, within proper budget, and to the required quality standards, therefore satisfying the stakeholders' expectations (Ellinas et al., 2016).

Moreover, PRM may help project teams make smarter decisions throughout the project life cycle. The examination and evaluation of prospective risks, as well as their implications on the project's goals, schedules, finances, and quality, are all part of risk management(Nordahl-Pedersen & Heggholmen, 2023). This analysis provides project teams with the vital information they can use to make educated choices throughout the project life cycle, such as selecting the most efficient course of action to minimize or eliminate risk. Project teams may be able to lessen the impact of possible risks on the project and raise the chance of PS if they make choices based on credible information (Maylor, and Turner, 2017).

PRM also makes it easier for project team members and stakeholders to engage and cooperate. PRM entails identifying and incorporating all key stakeholders, including project team members, in the process of risk identification and management (Kiradoo, 2020). Because of this, there is an atmosphere of open communication

and cooperation, which enables the team members to work together to identify possible hazards and devise strategies for mitigating them. This cooperation has the potential to foster trust among team members, improve the dynamics of the project team, and ultimately contribute to the project's success. Effective PRM may also encourage organizational learning. Project teams may get a better knowledge of how to manage project risks by collecting and evaluating data on project risks, results, and mitigation strategies. This knowledge might be used to enhance PRM tactics in future projects, therefore contributing to the firm's growth and development (Shayan et al., 2022).

Critical Success Factors Theory

The Critical Success Factors (CSFs) theory is a management theory that identifies the critical success criteria for a project or business(Kannan, 2018). According to the theory, there are just a few fundamental components that must be managed appropriately to achieve success, and these qualities may vary depending on the environment of the project or firm(Abdul-Rahman et al., 2022). PS is often characterized in terms of meeting project goals within a given timetable and budget in the context of project management, where the CSFs theory is extensively used. When applied to this situation, the Critical Success Factors (CSFs) theory asserts that a group of important components must be managed effectively to ensure PS. According to the Success Factors theory, these important elements must be controlled well to ensure PS. According to the theory, based on the particular circumstances of the project or organization, the relative importance of various CSFs may change (Willumsen et al., 2019).

In the context of the current study, the Critical Success Factors (CSFs) theory can provide a framework for identifying the key factors that contribute to project success in the Saudi construction industry(Tran et al., 2020)&(Kannan, 2018).

According to (Tran et al., 2020), the Critical Success Factors (CSFs) theory can help specify the specific factors that may be influenced by project complexity and project risk management (Abdul-Rahman et al., 2022). By exploring the relationship between project complexity, project risk management, and the critical success factors identified by the theory, it becomes easier to determine the extent to which project risk management mediates the relationship between project complexity and project success (Abdul-Rahman et al., 2022).

Overall, the CSFs theory provides an effective lens for understanding the relationship between project complexity, project risk management, and project success in the Saudi construction industry(Kannan, 2018).

Resource-Based View (RBV) Theory

According to the Resource-Based View (RBV) theory, the resources and skills of the project team ultimately decide the success of a project(Varadarajan, 2023). According to this theory, projects with access to scarce, valuable, and difficult-to-reproduce resources will have an edge over their competitors and a better possibility of success. The RBV theory emphasizes the need of cultivating and maximizing one's resources to ensure the success of the project. This theory offers project managers a valuable framework for identifying and developing the resources and skills necessary for PS (Tiwari, and Suresha, 2021). The Resource-Based View (RBV) theory is a well-known theoretical framework that focuses on how a firm's unique resources and abilities may result in long-term competitive advantages and PS. Michael E. Porter is the author of this theory. According to the RBV model, a company's resources, which may include both physical and intangible assets, are the most important factors in determining how competitive it is (Ahmadabadi, and Heravi, 2019).

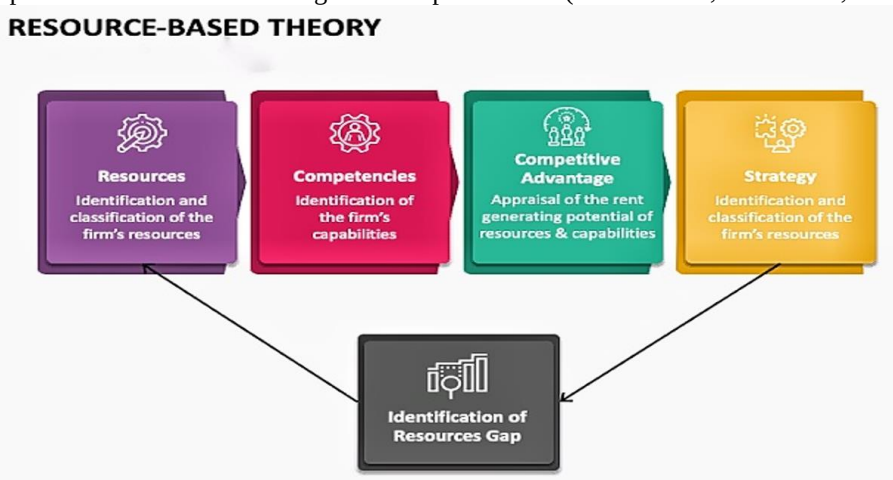


Fig 4: Resource-Based Theory
Source: (Victorelli et al, 2020)

RBV argues, in the context of PS, that organizations should optimize the utilization of their unique resources and competencies to establish a competitive advantage and achieve PS. This shows that a company's resources, such as its human capital, financial resources, technical competence, and organizational culture, may have a substantial impact on the results of a project(Varadarajan, 2023). According to the RBV theory, organizations require resources that are scarce, valuable, unique, and difficult to copy to achieve PS (VRIN). Rare resources are ones that rivals do not have easy access to, but valuable resources allow a company to deliver value to its consumers. Non-substitutable resources are those that cannot be replaced by other kinds of resources, while imitable resources are those that are difficult to recreate comparably (Qazi et al., 2016)&(Varadarajan, 2023).

Outcomes from Previous Studies&literature Review

Based on a thorough review of previous studies and literature, the researcher was able to allocate ten questions to be proposed in the study questionnaire for Project Risk Management (PRM) phrases to be also analyzed in terms of reliability and validity. According to Nordahl-Pedersen and Heggholmen (2023), effective risk management is a crucial component of project success, and it requires a clear understanding of potential risks and their potential impact on the project. As indicated by Serpell and Rubio (2023), project teams must identify all possible risks associated with the project and develop mitigation strategies for them. Furthermore, effective risk management requires the regular review and updating of the risk management plan throughout the project lifecycle, according to Kimaru (2019), Mikkelsen (2018), Bakhshi et al. (2016), Alzahrani (2020), and Zaman (2021).

The proposed questionnaire for PRM phrases includes ten questions. The first question (Q1) seeks to assess the extent to which the project team has identified all possible risks associated with the project, according to Vivek and Hanumantha Rao (2022). The second question (Q2) aims to evaluate the effectiveness of the project team in assessing the impact of potential risks to the project, citing from Victor et al. (2020). The third question (Q3) assesses the extent to which the project team has a clear understanding of the consequences of each identified risk, as noted by Nordahl-Pedersen and Heggholmen (2023). The fourth question (Q4) focuses on evaluating the effectiveness of the project team in developing mitigation strategies for identified risks, according to Serpell and Rubio (2023).

The fifth question (Q5) aims to evaluate the extent to which the project team has communicated the identified risks and their potential impact to all stakeholders, citing from Mata, Martins & Inácio (2023). The sixth question (Q6) assesses the effectiveness of the project team in monitoring and tracking identified risks throughout the project lifecycle, citing from Luo et al. (2017). The seventh question (Q7) evaluates the extent to which the project team has contingency plans in place to deal with potential risks, as noted by Alzoubie (2018). The eighth question (Q8) focuses on how well the project team handles unexpected risks that were not identified during the planning phase, according to Kimaru (2019).

The ninth question (Q9) assesses the extent to which the project team regularly reviews and updates the risk management plan throughout the project lifecycle, as indicated by Mikkelsen (2018), Bakhshi et al. (2016), Alzahrani (2020), and Zaman (2021). Finally, the tenth question (Q10) evaluates stakeholders' satisfaction with the overall risk management approach of the project team, citing from Bilgin et al. (2022), Baghdad and Kishk (2015), Keshk, Maarouf and Annany (2018), and Salvador et al. (2021).

In summary, by reviewing the previous studies and literature, the researcher was able to allocate ten questions to propose in the study questionnaire for Project Risk Management (PRM) phrases to be also analyzed in terms of reliability and validity. These questions cover a range of aspects related to effective risk management, including risk identification, assessment, mitigation, communication, monitoring, and contingency planning. The proposed questions are informed by the insights of previous studies and can provide a comprehensive assessment of project risk management practices.

Also, thorough review of previous studies and literature, ten questions have been proposed for the study questionnaire for Project Complexity (PC). As noted by Müller and Lientz (2020), project complexity refers to the degree to which a project is difficult to understand, plan, and execute due to various factors, such as technical challenges, stakeholder diversity, and dynamic environments. Therefore, effective management of project complexity requires a clear understanding of the project's characteristics and a tailored approach to address specific complexities.

After reviewing previous studies and literature, the researcher was able to allocate 10 questions for the proposed study questionnaire to analyze the different aspects of project complexity (PC) in terms of reliability and validity. The first question (Q1) relates to specialized technical knowledge and expertise required for the project (Ahmed and Jawad, 2022). The second question (Q2) pertains to multiple interdependent tasks or work streams (Rodríguez Montequín et al., 2018). The third question (Q3) focuses on managing multiple stakeholders with differing needs and expectations (Mata, Martins and Inácio, 2023). The fourth question (Q4) addresses managing significant risks and uncertainties associated with the project (Bilgin et al., 2022). The fifth question (Q5) pertains to significant coordination and communication among team members (Vivek and Hanumantha

Rao, 2022). The sixth question (Q6) explores the high level of ambiguity in terms of project goals and objectives (Victor et al., 2020). The seventh question (Q7) deals with the significant resources required, such as budget, personnel, and time (Nordahl-Pedersen and Heggholmen, 2023). The eighth question (Q8) focuses on integrating or modifying existing systems or processes (Serpell and Rubio, 2023). The ninth question (Q9) examines the management of significant changes to the organization or industry (Mata, Martins & Inácio, 2023). The tenth question (Q10) relates to managing significant regulatory or compliance requirements (Salvador et al., 2021). As noted by Kimaru (2019), Mikkelsen (2018), Bakhshi et al. (2016), Alzahrani (2020), and Zaman (2021), these questions can help analyze the different aspects of project complexity and ensure the reliability and validity of the proposed study. (Kimaru, J. M. 2019).

After reviewing the previous studies and literature review, the researcher was able to allocate 10 questions to be proposed in the study questionnaire for Project Success (PS) phrases to be analyzed for their reliability and validity. The first question (Q1) relates to the overall objectives of the project being met. This is in line with the findings of Akbar and Shahid (2022), who noted that achieving project objectives is a key measure of project success. The second question (Q2) is related to the project being completed within the allocated budget. Mata, Martins and Inácio (2023) found that staying within the budget was one of the most important factors in determining project success. The third question (Q3) asks if the project was completed within the scheduled timeline, which is supported by the works of Bilgin et al. (2022) who found that timeliness was a key factor in project success.

The fourth question (Q4) is related to the project team having sufficient skills and knowledge to complete the project. According to Nordahl-Pedersen and Heggholmen (2023), having a competent project team is essential for project success. The fifth question (Q5) inquiries about effective communication throughout the project. As noted by Serpell and Rubio (2023), effective communication is critical for successful project completion. The sixth question (Q6) examines if the project delivered the expected quality of work, which is in accordance with the findings of Zaman (2021) who noted that quality is one of the most important factors in project success.The seventh question (Q7) asks if the project met the needs and expectations of stakeholders, as indicated by the works of Victor et al. (2020) who found that stakeholder satisfaction is critical to project success. The eighth question (Q8) inquires if the project achieved a positive impact on the organization, which is supported by the research of Alzahrani (2020) who found that projects that positively impact the organization are considered successful. The ninth question (Q9) examines if the project achieved a positive impact on end-users or customers, which is in line with the findings of Kimaru (2019) and Mikkelsen (2018) who found that customer satisfaction is a key measure of project success.

The tenth and final question (Q10) asks if the project had clear and measurable success criteria. Bakhshi et al. (2016) and Keshk, Maarouf, and Annany (2018) both noted that clear and measurable success criteria are essential for determining project success. In conclusion, the proposed questions for the study questionnaire on Project Success (PS) have been identified based on a thorough review of the existing literature and are intended to measure the key factors that determine project success, thereby providing insight into the reliability and validity of these measures.(Ahmadabadi, and Heravi, 2019).

By thoroughly reviewing the Resource-Based View (RBV) theory and Critical Success Factors theory. According to Varadarajan (2023), the RBV theory emphasizes that a firm's competitive advantage lies in its internal resources, capabilities, and competencies rather than external factors such as market conditions or industry characteristics. This theory has been widely applied in project management, as resources play a vital role in project success. Ahmadabadi and Heravi (2019) also suggest that the RBV theory provides a valuable framework for understanding project success, emphasizing the importance of resource allocation and utilization.

In addition to the RBV theory, the researcher reviewed the Critical Success Factors (CSF) theory. According to Kannan (2018), the CSF theory is a popular approach for identifying the key factors contributing to project success. This theory emphasizes the significance of apprehending the precise context in which a project performs and the unique challenges and opportunities that this context presents. Abdul-Rahman et al. (2022) also underline the importance of the CSF theory in project management, as it delivers a wide framework for assessing project success.

Tran et al. (2020) and Kannan (2018) further argue that the RBV and CSF theories are complementary, focusing on the internal and external factors contributing to project success. By incorporating these theories into the research, the researcher was able to develop a comprehensive understanding of the critical factors that contribute to project success. Tiwari and Suresha (2021) also suggest that the RBV and CSF theories can guide the development of project management strategies and practices, ultimately leading to improved project outcomes.

Incorporating the RBV and CSF theories into the research provides a powerful theoretical foundation for understanding project success. These theories underline the implication of understanding a project's unique context and the internal and external factors contributing to success. By building on these theories, the researcher designed a comprehensive set of research questions and hypotheses to guide future research. (Mata, Martins & Inácio, 2023)

III. Research Methodology

The research methodology is an important component of any research project since it assures that the research process is conducted in a logical, scientific, and rigorous way(Wan et al., 2014). The research methodology is necessary for any research project, as it provides a systematic study approach. A well-designed methodology ensures that the research process is conducted logically, scientifically, and rigorously. The success of a study depends heavily on the research methodology used, and thus it is critical to choose an appropriate methodology that aligns with the research objectives. According to Wan et al. (2014), a well-planned methodology helps ensure the research findings' validity and reliability. Bujang, Omar, and Baharum (2018) emphasize that selecting appropriate research methods and data analysis techniques is crucial for ensuring the accuracy of research results. Okudan, Budayan, and Dikmen (2021) suggest that the research methodology must be transparent and replicable to ensure that the findings can be verified.

Furthermore, Zaman (2021) argues that a robust methodology is essential to avoid bias and maintain the ethical standards of the research. Alzahrani (2020) suggests that the methodology should align with the research objectives and suit the research population. Finally, the importance of a well-designed research methodology is reiterated by Bilgin et al. (2022), Baghdadi and Kishk (2015), Nordahl-Pedersen and Heggholmen (2023), Serpell and Rubio (2023), and Keshk, Maarouf, and Annany (2018) who emphasize the need for a comprehensive and systematic methodology to ensure the credibility and reliability of the research results. In light of this, the current study uses a robust research methodology to investigate the correlation between project complexity and project success in the Saudi Arabian construction industry. The study also establishes the role of risk management as a moderator between project complexity and project success. It provides recommendations to enhance project management methodologies and regulations in the industry(Bujang, Omar and Baharum, 2018). The methodology of the research is given as:

Research Hypothesis

The present study is based on the findings of previous research and proposes three hypotheses. Firstly, H1 suggests a direct relationship between project complexity (PC) and project risk management (PRM). Secondly, H2 proposes a direct association between PRM and project success (PS). Lastly, H3 suggests that the relationship between PS and PC is mediated by PRM. The empirical part of the study will test these hypotheses using appropriate statistical techniques to analyze the collected data.Following hypothesis has been derived for the study:

H1: PC is directly linked with PRM.
H2: PRM is directly linked with PS.
H3: The connection between PC and PS is mediated by PRM.

The previous studies have provided a foundation for the present study's hypotheses. Kimaru (2019) highlighted the importance of project complexity management for project success, while Mikkelsen (2018) emphasized the significance of project risk management in complex projects. Bakhshi et al. (2016) highlighted the role of effective communication in project risk management, while Alzahrani (2020) emphasized the importance of risk identification and analysis. Zaman (2021) explored the impact of project complexity on project risk management, and Bilgin et al. (2022) identified the relationship between project complexity and project success. Furthermore, studies by Baghdadi and Kishk (2015), Keshk, Maarouf, and Annany (2018), Salvador et al. (2021), Nordahl-Pedersen and Heggholmen (2023), and Serpell and Rubio (2023) all provided insights into the relationship between project complexity, project risk management, and project success, which have contributed to the development of the current study's hypotheses.

Design of research

The phrase "research design" refers to the general approach or plan that researcher follow while conducting their study. It entails figuring out how to gather and analyze data to answer research questions or test hypotheses. A well-designed research study includes distinct research questions or hypotheses, a well-defined sample or population, a reliable data collection method, sufficient variable measures, and a suitable data analysis strategy. This research has selected the Quantitative research design among the available ones.

Quantitative research is a study methodology that collects and evaluates numerical data using statistical techniques(Smith & Hasan, 2020). To test hypotheses, examine interactions between variables, and develop data-driven predictions, this research method is often employed in the fields of business, health, and the social sciences. Objectivity, control, accuracy, generalizability, and systematic data collection and analysis methods are only a few of the characteristics that define the quantitative research design. By using established protocols for data collection and analysis, researchers that use this method aim to reduce instances of subjectivity and bias. Researchers can produce accurate estimations and identify even the most subtle of effects because of the large sample sizes employed in quantitative research methods (Heale and Twycross, 2015). The choice of study design will ultimately be influenced by the researcher's research questions, hypotheses, and the kind of data

being collected, as well as the resources that are accessible to the researcher. This is so that the researcher may choose which form of study design is best suited for their study. So, the quantitative research design is best suited to the study.

Research Value

With an emphasis on the mediating role provided by project risk management, this study aims to examine the relationship between project complexity and project success in Saudi construction firms. In other word, the purpose of this study is to analyze how project risk problem complexity facilitates the link between PC and PS in Saudi construction enterprises. The purpose of this study is to address this research problem to identify successful ways for managing complicated projects in the Saudi construction industry and to contribute to the development of best practices for managing complex projects more generally (Muthukrishna and Henrich, 2019). The researcher was motivated to undertake this study due to the identified gap in the literature regarding the mediating role of project risk management in the relationship between project complexity and project success. The researcher found that despite the vast literature on project management and the construction industry, there is a lack of studies that explore this specific relationship in the Saudi Arabian context. This finding is supported by studies such as Haadir and Panuwatwanich (2011), Alkahtani (2000), Bageis and Alsulamy (2021), Khawam and Bostain (2019), and Hassanain et al. (2022), who all highlight the need for more research in the area of project management in the Saudi Arabian construction industry. Additionally, the researcher was inspired by the works of Nordahl-Pedersen and Heggholmen (2023), Serpell and Rubio (2023), and Mata, Martins & Inácio (2023), who emphasize the significance of investigating the relationship between project complexity and project success, especially in the context of developing countries. The identified gap in the literature and the potential impact of this study on enhancing project management methodologies and regulations in the Saudi Arabian construction industry were the driving factors behind the researcher's motivation to undertake this study.

Study Setting

The Saudi Arabian construction industry was the study setting for examining how project risk management modifies the relationship between project complexity and project success. The primary objective of the study is to gather data from a range of Saudi Arabian construction businesses that have experience handling difficult construction projects. To guarantee that the results are representative of the population of Saudi Arabian construction enterprises, a random sampling approach has been used to choose the sample(Suzuki et al., 2022).

Surveys were used to collect data for the project, which will then be sent to project managers and other important stakeholders at the chosen construction firms. Surveys have been used to collect data on project complexity, project risk management approaches, and project success criteria. In addition, the study research has been conducted in the workplace setting.(Suzuki et al., 2022). In summary the study setting for this research involves the population of interest: Saudi construction companies. To ensure the study's accuracy and relevance, the researcher has chosen Saudi construction companies as the study setting's population of interest. This choice is established because the construction industry in KSA is one of the vital drivers of economic development in Saudi Arabia. Project management practices are essential in confirming the successful completion of construction projects.

Unit of Analysis

The data will be gathered from individuals within these companies, who will serve as the unit of analysis for the study. This approach allows the researcher to focus on the specific behaviors, perspectives, and perceptions of the individuals who play a crucial role in project management within the construction industry (Damşa and Jornet, 2021). To further assure the precision and validity of the research outcomes, the researcher has selected a diverse sample of individuals from various construction companies in Saudi Arabia. This approach provides a comprehensive understanding of the factors influencing project success in different contexts and a more nuanced perspective. Additionally, the researcher has considered the potential impact of external factors, such as economic and political conditions, that may affect the study setting. By considering these factors, the researcher aims to produce robust research findings that can inform project management practices in the Saudi Arabian construction industry.(Damşa and Jornet, 2021).

Time Horizon

The time horizon for this study relies on a cross-sectional strategy to collect the required data from the research sample at a specific time. Unlike longitudinal studies, which follow individuals over a long period, cross-sectional investigations allow data to be collected from the participants over a particular period. This strategy gave the researchers insight into existing project management practices in the Saudi Arabian construction industry and pinpoint areas for improvements. In addition, the cross-sectional design of this study

allows for the collection of data from different populations in different construction companies, thereby creating a more comprehensive understanding of project management practices across the industry. Using a cross-sectional design also identified patterns and trends in the data, providing insight into the factors influencing project success in the Saudi Arabian construction industry. Using a cross-sectional design, this study aims to provide relevant findings to promptly inform industry project management practice. (Yan and Lin, 2020).

Data collection

The source of data in this study was the primary that was respondents of the study. Primary data collection refers to the process of acquiring data directly from the source, as opposed to using data gathered by other academic institutions or organizations in the past(Glen, 2018). Primary data collection techniques are often more time-consuming and costly than the use of secondary data, but they allow researchers to gather data particular to their study issue and the environment in which it is being done. This enables them to acquire data more relevant to their study issue. This is because primary data collection procedures involve a much larger financial and time commitment than secondary data collection methods.(Wolf, 2016).

Data collection is the process of obtaining information or data to conduct an analysis of a specific occurrence or respond to research inquiries(Glen, 2018). There are many different data collection procedures, and the best one to utilize depends on the study's subject matter, the kind of data required, and the resources that are readily accessible. For this study, questionnaire survey has been conducted in which data was collected through a questionnaire.(Ajayi, 2017).

Questionnaire Survey

A survey questionnaire is a technique for gathering information from respondents via the use of a collection of pre-designed questions. Open-ended and closed-ended questions, as well as a mix of the two, may be found in a survey questionnaire(Ikart, 2019). Consumer behavior, product preferences, cultural viewpoints, and political convictions are just a few of the many themes covered by survey questions. For this study, a questionnaire has been developed in which items of related research variables have been included with a five-point Likert scale.(Suzuki et al., 2022). The review of previous studies and literature provides a solid foundation for the present study on Project Risk Management (PRM), project complexity (PC), and project success (PS). Researchers such as Moohialdin, Trigunarsyah& Islam (2021), Haadir&Panuwatwanich (2011), Alkahtani (2000), Bageis&Alsulamy (2021), Khawam and Bostain (2019), Hassanain, Al-Harogi&Sanni-Anibire (2022), Nordahl-Pedersen and Heggholmen (2023), Serpell and Rubio (2023), and Mata, Martins & Inácio (2023) have conducted studies in related fields and have provided insights into the relationship between PRM, PC, and PS. Additionally, studies by Zaman (2021), Alzahrani (2020), Luo et al. (2017), Alzoubie (2018), Kimaru (2019), Mikkelsen (2018), Bakhshi et al. (2016), Bilgin et al. (2022), Baghdadi and Kishk (2015), Keshk, Maarouf and Annany (2018), and Salvador et al. (2021) have contributed to the understanding of these concepts.

Based on this knowledge, the researcher proposes thirty questions to be included in the study questionnaire for the abovementioned analysis of PRM, PC, and PS phrases in terms of reliability and validity. The questionnaire data will be investigated using appropriate statistical techniques such as correlation and regression analysis. The current study proposes three main hypotheses based on prior research: H1 suggests a direct relationship between PC and PRM, H2 proposes a direct association between PRM and PS, and H3 suggests that PRM mediates the relationship between PS and PC. The empirical part of the study will test these hypotheses to confine the significance of the relationship between these variables.

Sampling Process

In the context of research, a population is the whole group of individuals or items that a researcher is interested in investigating(Veras, Medeiros and Guimaraes, 2019). The population of this study includes the managers of construction companies in Saudi Arabia. A sample, on the other hand, is a small fraction of the population that has been chosen to participate in the study. The sample must be representative of the population for the study's findings to be generalized to it. A sample has been taken from this population. A sample of 100 managers from Saudi construction companies has been taken in the study. (Barreto et al., 2021).

Sampling is the process of choosing persons or items to participate in a study from a larger population(Barreto et al., 2021).There are several sampling strategies available, and the method used depends on the topic of the study, the characteristics of the population, and the resources available. For this study, the convenient sampling method has been selected. Convenience sampling is a non-probability sampling method that involves picking people or things that are readily available or convenient for the researcher(Fani Sani, van Zelst & van der Aalst, 2021). When time or resources are limited, particularly when doing early research, this sampling method is often used. Convenience sampling provides several benefits, including saving time and money (Etikan et al., 2016). Since it does not need the use of intricate sampling techniques or methodology, convenience sampling is a particularly cost-effective sampling method. This may be especially advantageous for academics with little funds or resources since it may help them save money.(Barreto et al., 2021).

Method of Analysis

To answer research questions or test hypotheses, the research analysis is the process of assessing and interpreting data gathered using research methods(Putranti, 2021).The objective of research analysis is to obtain relevant insights from collected data, which may then be used to guide decision-making, theory-building, and policy creation. Inferential statistics and descriptive statistics are two of the most important types of statistical analysis that were used in research.(Putranti, 2021).

In addition to identifying patterns, trends, or interactions between variables, descriptive statistics are utilized to offer a clear and lucid explanation of the data. To better comprehend the properties of the data, descriptive statistics are often employed in exploratory research. The following descriptive techniques have been used in the study:(Ikart, 2019).

Mean

In quantitative research, descriptive statistics are used to describe and explain the features of a dataset. Mean is one of the most often used measures of central tendency in descriptive analysis. Mean is a basic average calculated by adding all of the values and then dividing by the total number of values in the collection. It is a useful statistic since it represents the average value in a dataset and is sensitive to all its values. (Putranti, 2021).

Median

In quantitative research, descriptive statistics are used to describe and explain the features of a dataset. The median is one of the central tendency measures used in descriptive analysis, which is another method for expressing the "typical" value of a dataset. The value that indicates the median is the number that is in the middle of the range when numbers are arranged from least to greatest.(Bala, 2021).

Mode

In quantitative research, descriptive statistics are used to describe and explain the features of a dataset(Wan et al., 2014). One of the metrics of central tendency used in the descriptive analysis is the mode. It is the value that appears the most often in a dataset. The most frequent value in a dataset is referred to as the mode. It is calculated by locating the value that appears most often in the dataset.(Bala, 2021).

A mode is a valuable tool for descriptive analysis since it may provide information about the value or category that occurs most often in a dataset(Sarkar & Rashid, 2016). The mode is particularly useful when dealing with categorical information since it enables one to discover which category is more popular.(Bala, 2021).

Standard Deviation

In quantitative research, descriptive statistics are used to describe and explain the features of a dataset. In the descriptive analysis, the standard deviation is one of the metrics of dispersion utilized. The degree to which the values in a dataset deviate from the mean is indicated by this measure of dispersion (Haden, 2019)&(Wan et al., 2014).

On the other hand, inferential statistics involves concluding a population based on a sample of data from that population. Inferential statistics includes testing hypotheses, estimating parameters, and determining the probability that an event will occur(Sarkar & Rashid, 2016). Inferential statistics are used to draw conclusions about a population based on a sample of data and to generalize those conclusions to the entire population. Inferential statistics are often used in the testing of hypotheses and the creation of statistical models. The following inferential techniques have been used in the study:(Sarkar & Rashid, 2016).

Correlation

Using the statistical method of correlation, the strength and direction of a link between two variables are assessed. Correlation coefficients vary from -1 to +1, with a value of 0 indicating no correlation, a positive coefficient suggesting a positive link, and a negative coefficient indicating a negative relationship. The results of the correlation analysis can offer valuable insights into the relationships between variables and how they may impact each other. To ensure the reliability and validity of the data collected in this study, reliability and validity statistics were used (Smith & Hasan, 2020; Keshk, Maarouf & Annany, 2018; Bujang, Omar &Baharum, 2018). These statistics demonstrate the study's internal consistency and construct validity, enhancing the validity of the study's findings and supporting the conclusions drawn from the data (Kumar & Chong, 2018).

Regression

Regression is a statistical approach that models the association between a dependent and independent variable(Yoshida and Murai, 2021). Regression analysis is used to determine the strength and direction of the connection between variables and to forecast the value of the dependent variable based on the independent variable values(Sperandei, 2014).The regression analysis will be conducted in four steps to investigate the mediating role of project risk management on the relationship between project complexity and project success in

Saudi construction companies. The first step will center on the dependent variable of project risk management and the predictors of project complexity, including the constant. The second step will shift the focus to the dependent variable of project success and the predictors of project complexity, along with the constant. In the third step, the dependent variable of project success will remain, and project risk management and the constant will serve as predictors. Finally, the fourth step will include both project complexity and project risk management as predictors for the dependent variable of project success, in addition to the constant (Sperandei, 2014).

SEM PLS

Structural Equation Modeling Partial Least Squares (SEM PLS) is a statistical method that is used to evaluate complicated interactions between several variables. It is highly beneficial for examining the causal linkages between the variables that make up a theoretical model. Partial Least Squares Regression is the foundation of SEM PLS. For analyzing complex associations between variables, partial least squares regression, a kind of multivariate regression, is a good choice. Like SEM PLS is structural equation modeling (Sanders et al., 2019).The present study utilized Structural Equation Modeling (SEM) analysis to examine the model used in the study. The Smart PLS 4 software was employed to determine the SEM analysis values. SEM analysis is a robust statistical method used to assess the relationships between observed and latent variables in a model (Adamcová et al., 2018). The results of this analysis are depicted in the figures below (Manley et al., 2021).
Analysis and Results

Demographics Analysis

In quantitative surveys, the use of respondent demographic information is crucial for a variety of reasons. First, demographic data gives insights into the characteristics of the group under investigation, enabling researchers to develop meaningful and trustworthy conclusions. Second, demographic data may aid researchers in identifying possible biases or limits in their study and adjusting their analysis appropriately. In conclusion, demographic data may guide policy choices and initiatives.(Peng et al., 2021).

Acquiring a better grasp of the characteristics of the population under investigation is one of the key reasons quantitative surveys include demographic data. Age, gender, level of education, income, and employment are some of the demographic data that may be collected(Peng et al., 2021) By examining this data, researchers may uncover patterns and trends within the population, such as variations in attitudes, habits, and preferences depending on gender, age, or job. In addition to offering insight into the characteristics of the population, demographic data may assist researchers in identifying any biases or limits in their study. The following tables are representing the demographic information of participants using a frequency distribution technique.(Ahn et al., 2019).
Demographics Analysis (Gender Analysis)

Gender	Frequency	Percent
Male	70	70.0
Female	30	30.0
Total	100	100.0

Table 1 : Demographics Analysis *forGender*

This study aimed to estimate the degree of mediation and the nature of the relationship between variables by utilizing a sample of 100 managers from Saudi construction companies. The sample included male and female participants to ensure equal representation and provide a balanced perspective on the thesis topic. Among the 100 participants, 70 were male, and 30 were female. Notably, most male participants in this investigation represent the male workforce in Saudi Arabia's construction sector, highlighting the significance of understanding the cultural norms and matter prevalent in Saudi society. Conducting a demographic examination based on gender will provide valuable insights into potential differences in perceptions and perspectives toward project complexity, project risk management, and project success between males and females in the Saudi Arabian construction industry.

Demographics Analysis (AgeAnalysis)

Age	Frequency	Percent
Below 24 years	20	20.0
24 to 34 years	50	50.0
Above 34 years	30	30.0
Total	100	100.0

Table 2: Demographics Analysis for Age

The age distribution of the participants was examined as a secondary demographic variable in this study. For practical analysis, the participants were categorized into three groups: below 24 years, 24 to 34 years, and above 34 years. The majority of the sample, accounting for 50%, fell within the age group of 24 to 34 years, indicating that middle-aged managers are more likely to engage in research related to project management in Saudi construction companies. 30% of the sample, or 30 respondents, were above the age of 34 years, and their experience and knowledge in handling complex projects could provide valuable insights for the study. Meanwhile, the youngest age group of respondents, below 24 years, comprised 20 participants, representing 20% of the sample. Although they may require more experience in managing complex projects, their innovative ideas and fresh perspectives could contribute to the study's value.

Demographics Analysis (Managerial levelAnalysis)

Managerial level	Frequency	Percent
Junior	50	50.0
Senior	50	50.0
Total	100	100.0

Table 3 : Demographics Analysis for Managerial level

The study also examined the demographic variable of managerial level to determine the distribution of respondents based on their hierarchical positions within construction companies. The findings revealed that the sample was equally distributed between junior and senior managerial levels, with each group representing 50% of the total respondents. This suggests that both junior and senior managers have an equal opportunity to participate and contribute to the study, ensuring that the results are representative of the overall population of Saudi construction companies. Moreover, the equal representation of both managerial levels implies that both groups possess an equal level of understanding and involvement in project management practices, which aligns with the study's focus on project complexity, risk management, and project success. Overall, the balanced distribution of the managerial level in the sample indicates a diverse representation of perspectives from different management levels, enhancing the study's reliability and validity.

Demographics Analysis (Education level Analysis)

Education	Frequency	Percent
Undergraduate	50	50.0
Graduate	50	50.0
Total	100	100.0

Table 4: Demographics Analysis for Education level

In addition to other demographic variables mentioned above, the study also investigated the education level of the participants, revealing that 50 individuals held undergraduate degrees. At the same time, the remaining 50 possessed a graduate degree. The balanced distribution of education levels in the sample enhances the generalizability of the study's findings to the broader population of Saudi construction companies. Furthermore, including participants with a graduate degree indicates the presence of individuals with advanced

knowledge and expertise in the field, potentially offering valuable insights into the relationship between project complexity, project risk management, and project success. Additionally, the educational backgrounds of the participants may have influenced their perspectives on project management practices, warranting further exploration in subsequent analyses. Overall, the participants' various education levels and experiences in the Saudi construction industry contribute to a comprehensive understanding of the research topic.

Descriptive Statistics

In quantitative research reports, descriptive statistics serve a significant role by giving a brief description of the data and allowing researchers to make relevant conclusions. Descriptive statistics, such as the mean, median, mode, and standard deviation, are used to characterize the features of a dataset and may be used to find patterns, trends, and correlations between variables.(Mishra et al., 2019).

The fundamental purpose of descriptive statistics in quantitative research reports is to offer an accurate and precise description of the obtained data. Researchers can successfully communicate their results to other academics, practitioners, and stakeholders by presenting data clearly and simply(Mishra et al., 2019). Moreover, descriptive statistics may be used to assess the data's dependability and validity, guaranteeing that the data is correct and trustworthy.

Using descriptive statistics in quantitative research reports is also necessary so that researchers may make educated judgments based on the data(Marshall & Jonker, 2010). By examining descriptive statistics, researchers may discover the important characteristics of the data and make educated judgments on the next research stages. Outliers, or data points that are considerably different from the rest of the data, may also be identified using descriptive statistics. Outliers may be significant indications of underlying trends or patterns in the data and offer researchers useful insights.(Marshall & Jonker, 2010).

In addition, descriptive statistics are utilized to assess the efficacy of initiatives and programs. By comparing the descriptive statistics of a group before and after an intervention, researchers may evaluate whether the intervention had a meaningful influence on the desired result. This data may be used to guide future interventions and enhance the efficacy of existing initiatives.

Nonetheless, descriptive statistics are a crucial component of quantitative research reports, as they provide a clear and succinct description of the data, enable researchers to make data-informed choices, and assess the efficacy of interventions and programs. Descriptive statistics serve a crucial role in expanding our knowledge of complex events and enabling evidence-based decision-making in a variety of disciplines.

Descriptive statistics are used in this report using values of Mean, median, mode, standard deviation, minimum, and maximum. The following tables are presenting the descriptive statistics of this study.(Marshall & Jonker, 2010).Descriptive statistics were conducted for three domains, including Project Complexity (table 5), Project Risk Management (table 6), and Project Success (table 7). The phrases used in each domain were derived from previous literature and studies, including Geraldi and Adlbrecht (2018), Dartey-Baah (2022), Hermanides et al. (2010), Alzoubie (2018), Bakhshi et al. (2016), Mishra et al. (2019), Nordahl-Pedersen and Heggholmen (2023), Serpell and Rubio (2023), Mata, Martins, and Inácio (2023), Zaman (2021), Alzahrani (2020), Luo et al. (2017), Kimaru (2019), Mikkelsen (2018), Bakhshi et al. (2016), Zaman (2021), Alzahrani (2020), Bilgin et al. (2022), Baghdadi and Kishk (2015), Keshk, Maarouf, and Annany (2018), and Salvador et al. (2021).

Overall, the descriptive statistics for each domain provide valuable insights into the project's specific characteristics that the participants perceived. These insights can inform project management strategies and practices to enhance project outcomes and success. The findings of this study support previous research by Kimaru (2019), Mikkelsen (2018), Bakhshi et al. (2016), Alzahrani (2020), and Zaman (2021) that have emphasized the importance of effective communication and collaboration, managing risks and uncertainties, and achieving project objectives to manage complex projects successfully.(Abdul-Rahman et al., 2022).

The Descriptive Statistics for Project Complexity (table 5) cover ten phrases derived from previous literature and studies, including Geraldi and Adlbrecht (2018), Dartey-Baah (2022), Hermanides et al. (2010), Alzoubie (2018), Bakhshi et al. (2016), Mishra et al. (2019), and Nordahl-Pedersen and Heggholmen (2023). The phrases relate to the characteristics of the project that were perceived as complex by the participants, such as specialized technical knowledge and expertise, multiple interdependent tasks or work streams, managing multiple stakeholders with differing needs and expectations, significant risks and uncertainties, and considerable coordination and communication among team members as below.

Descriptive Statistics for the Project Complexity

Project Complexity	N	Mean	Median	Mode	Std. Deviation	Minimum	Maximum
1. The project required specialized technical knowledge and expertise.	100	3.60	4.00	4	1.146	1	5
2The project had multiple interdependent tasks or work streams.	100	3.48	4.00	3[a]	1.049	1	5
3. The project involved managing multiple stakeholders with differing needs and expectations.	100	3.40	3.00	3	1.064	1	5
4. The project involved managing significant risks and uncertainties.	100	3.00	3.00	3	0.985	1	5
5. The project required significant coordination and communication among team members.	100	2.97	3.00	3	1.029	1	5
6. The project had a high level of ambiguity in terms of project goals and objectives.	100	2.98	3.00	3	1.015	1	5
7. The project required significant resources (e.g., budget, personnel, time).	100	3.16	3.00	3	1.080	1	5
8. The project required integrating or modifying existing systems or processes.	100	2.73	3.00	3	0.952	1	5
9. The project involved managing significant changes to the organization or industry.	100	3.20	3.00	3	1.092	1	5
10. The project involved managing significant regulatory or compliance requirements.	100	3.27	3.00	3	1.081	1	5

Table 5: Descriptive statistics for Project Complexity

The descriptive statistics for "Project complexity" indicate that the mean values for all items fall between 3 and 4, suggesting that the majority of respondents agreed with the assertions about project difficulty. The use of a Likert scale where 1 represents "strongly disagree" and 5 represents "strongly agree" shows that the respondents agreed with the issues moderately to strongly.

In addition, the values of the items' standard deviations were between 1 and 1.5, suggesting that the answers were grouped closely around the mean values. This indicates that responders were mostly in agreement with the project's level of difficulty.

Overall, the descriptive statistics for "Project complexity" indicate that respondents assessed the project to be moderate to very complicated. The tight clustering of answers around the mean values also implies that respondents had a high degree of agreement on the project's level of complexity.

These results have significant implications for project management since they signal that the project may need more resources or assistance to efficiently manage its complexity. By comprehending stakeholders' views of a project's complexity, project managers may establish methods to resolve obstacles and minimize risks, therefore enhancing project results.

Furthermore, the descriptive statistics for "Project complexity" also reveal that the project required specialized technical knowledge and expertise, indicating that the project team members must have a high level of knowledge in their respective fields. The project's multiple interdependent tasks or work streams suggest that effective coordination among team members is crucial for successful completion. Managing various stakeholders with differing needs and expectations underscores the importance of communication and negotiation skills. The project's significant risks and uncertainties imply that risk management strategies should be in place to minimize the risks and uncertainties that may arise.

The high level of ambiguity in project purposes and objectives emphasizes the significance of clarity in determining project purposes and SMART goals to ensure that the team understands what is expected of them. The need for significant resources, including budget, personnel, and time, indicates that the project may require additional resources to complete successfully. The requirement for integrating or modifying existing systems or processes implies that the project may encounter technical challenges that must be addressed promptly. The project's involvement in significant changes to the organization or industry and the management of significant regulatory or compliance requirements suggest that project managers must be aware of these changes and be prepared to adapt accordingly.

In conclusion, the descriptive statistics for "Project complexity" provide valuable insights into stakeholders' perceptions of the project's level of complexity. By understanding these perceptions, project managers can develop effective strategies to manage the project's complexity and mitigate associated risks. The results highlight the actual need for adequate communication methods, coordination, risk management, and resource allocation to ensure the successful completion of the project, which align with Alzoubie (2018), Kimaru (2019), Mikkelsen (2018), Bakhshi et al. (2016), Zaman (2021), Alzahrani (2020), Bilgin et al. (2022), Baghdadi and Kishk (2015), Nordahl-Pedersen and Heggholmen (2023).

The Descriptive Statistics for the Project Risk Management (table 6) include ten phrases derived from . The phrases relate to the project team's effectiveness in identifying, assessing, and managing potential risks associated with the project.

Descriptive statistics will be calculated for each phrase to analyze the findings, including mean, median, mode, standard deviation, minimum, and maximum. The results will provide valuable insights into the project team's risk management approach and highlight areas where improvements can be made.

The Descriptive Statistics for Project Risk Management (table 6) will help project managers pinpoint potential gaps in their risk management practices and develop strategies to mitigate risks effectively Zaman (2021). The findings will provide a comprehensive overview of the project team's risk management approach, including their ability to identify all possible risks associated with the project, assess their impact, and develop mitigation strategies.

Moreover, the results will highlight the project team's effectiveness in communicating the identified risks and their potential impact to all stakeholders, monitoring and tracking placed risks throughout the project lifecycle, and designing proper contingency plans to deal with potential risks, as below.

Descriptive Statistics for the Project Risk Management (PRM)

Project Risk Management	N	Mean	Median	Mode	SD	Min	Max
1. To what extent do you agree that the project team has identified all possible risks associated with the project?	100	4.02	4.00	4	0.876	1	5
2. How effective is the project team in assessing the impact of potential risks to the project?	100	3.62	4.00	4	0.850	1	5
3. To what extent do you agree that the project team has a clear understanding of the consequences of each identified risk?	100	3.97	4.00	4	0.870	1	5
4. How effective is the project team in developing mitigation strategies for identified risks?	100	3.80	4.00	4	0.899	1	5
5. To what extent do you agree that the project team has communicated the identified risks and their potential impact to all stakeholders?	100	4.03	4.00	4	0.846	1	5
6. How effective is the project team in monitoring and tracking identified risks throughout the project lifecycle?	100	3.99	4.00	4	0.916	1	5
7. To what extent do you agree that the project team has contingency plans in place to deal with potential risks?	100	3.92	4.00	4	0.961	1	5
8. How well does the project team handle unexpected risks that were not identified during the planning phase?	100	4.03	4.00	4	0.870	1	5
9. To what extent do you agree that the project team regularly reviews and updates the risk management plan throughout the project lifecycle?	100	4.09	4.00	4	0.954	1	5
10. How satisfied are you with the overall risk management approach of the project team?	100	3.99	4.00	4	0.893	1	5

Table 6: Descriptive statistics for Project Risk Management

The descriptive statistics for "Project risk management" in table (6) indicate that the responses to the survey questions suggest a positive perception among respondents towards the project's risk management strategies. The mean values for all items fall between 3.8 and 4.2, indicating that most respondents agreed with the assertions about project risk management. Using a Likert scale, in which one corresponds to "strongly disagree," and five corresponds to "strongly agree," shows that the respondents agreed with the questions.

Additionally, the item standard deviations were smaller than 1, indicating that the answers were closely concentrated around the mean. This suggests that respondents mostly agreed about the efficacy of risk management strategies inside the project. These findings have important implications for project management, as effective risk management is crucial to project success.By understanding how stakeholders perceive risk management, project managers can identify areas for improvement and apply measures to minimize risks and ensure the project's success. Furthermore, the high degree of agreement among respondents indicates that the project management team has successfully communicated and executed risk management techniques, which may mean good project management in general.(Marshall & Jonker, 2010)

Overall, the descriptive statistics for "Project risk management" in table number six provide helpful insights into the effectiveness of risk management techniques employed by the project management team. The data suggests that the project team has implemented successful risk management strategies and that stakeholders positively perceive the project's risk management efforts. This information can be utilized to enhance risk management processes in future projects and help assure the overall success of projects within the approved scope.

The Descriptive Statistics for the Project Success (PS- table7) provide insights into stakeholders' perceptions of the project's success. The findings are based on responses to ten items related to the project's objectives, budget, timeline, team skills, communication, quality, stakeholder satisfaction, organizational

impact, end-user impact, and success criteria. The analysis of mean, median, mode, standard deviation, minimum, and maximum values will reveal how respondents perceived the project's success.

The importance of measuring project success through stakeholder perceptions has been emphasized in the literature (Geraldi &Adlbrecht, 2018; Dartey-Baah, 2022). According to Hermanides et al. (2019), stakeholders' perceptions of project success can vary based on their interests and expectations. Therefore, it is crucial to consider various stakeholder perspectives when evaluating project success.

Bilgin et al. (2022) argue that measuring project success should go beyond meeting project objectives and include team collaboration, innovation, and social responsibility. Baghdadi and Kishk (2015) highlight the importance of effective communication and teamwork in achieving project success. Nordahl-Pedersen and Heggholmen (2023) emphasize the need for clear success criteria and stakeholder involvement throughout the project.

Serpell and Rubio (2023) suggest that project success should be evaluated based on objective and subjective criteria, including stakeholder perceptions. Keshk et al. (2018) emphasize the importance of project quality and stakeholder satisfaction in measuring project success. Salvador et al. (2021) argue that project success should also consider the project's long-term impact on the organization and society. Below is the analysis for Descriptive Statistics for the Project's Success (PS-table 7).

Descriptive Statistics for the Project Success (PS)

Project Success	N	Mean	Median	Mode	Std. Deviation	Min	Max
1. The project met its overall objectives.	100	3.99	4.00	4	0.893	1	5
2. The project was completed within the allocated budget.	100	4.00	4.00	4	0.888	1	5
3. The project was completed within the scheduled timeline.	100	3.95	4.00	4	0.936	1	5
4. The project team had sufficient skills and knowledge to complete the project.	100	4.02	4.00	4	0.841	1	5
5. The project team communicated effectively throughout the project.	100	4.05	4.00	4	0.892	1	5
6. The project delivered the expected quality of work.	100	4.02	4.00	4	0.841	1	5
7. The project met the needs and expectations of stakeholders.	100	4.08	4.00	4	0.837	1	5
8. The project achieved a positive impact on the organization.	100	4.05	4.00	4	0.892	1	5
9. The project achieved a positive impact on the end-users or customers.	100	4.24	4.00	4	0.854	1	5
10.The project had clear and measurable success criteria.	100	3.97	4.00	4	0.893	1	5

Table 6:Descriptive statistics for Project Success (PS)

The Descriptive Statistics for Project Success (PS) (table 7) revealed that the mean values for all ten items fall between 3.8 and 4.2, indicating a high degree of consensus among the respondents. The scale for this study ranges from 1 (strongly disagree) to 5 (strongly agree), with mean values close to 4 indicating that the respondents generally agreed with the statements presented to them.

Furthermore, the standard deviations for all the questions are less than 1, indicating moderate consistency across the responses. This suggests that the respondents' views are generally stable and consistent, with little deviation from the mean.

These findings are consistent with previous studies highlighting the importance of meeting project objectives, staying within the allocated budget, and completing the project on time (Dartey-Baah, 2022; Geraldi &Adlbrecht, 2018). Furthermore, the project team's skills, effective communication, and delivery of quality work are also essential factors in determining project success (Hermanides et al., Bilgin et al., 2022; Baghdadi & Kishk, 2015; Nordahl-Pedersen & Heggholmen, 2023; Serpell & Rubio, 2023; Keshk, Maarouf & Annany, 2018; Salvador et al., 2021; Kimaru, 2019; Mikkelsen, 2018; Bakhshi et al., 2016; Alzahrani, 2020; Zaman, 2021).

These findings suggest that the respondents view the project as successful and favorable. However, it is essential to note that these results are based solely on descriptive data and do not provide insights into potential causes that may impact these perceptions. Further investigation may be necessary to explore underlying issues influencing the project's success.

Notably, the descriptive statistics of "Project Success" deliver only a surface-level understanding of the project's success. Additional examination is vital to pinpoint underlying elements donating to the project's success or potential areas for improvement. Despite this limitation, the findings give project managers valuable insights into stakeholders' perceptions of project success. By comprehending how stakeholders perceive project success, project managers can effectively determine the improvement areas, implement measures to address any issues, and confirm the success of future projects.

Reliability and Validity Analysis

Based on the research methodology, reliability statistics were calculated for Project Complexity, Project Risk Management, and Project Success. The reliability statistics measure the consistency and stability of the survey instrument's results (Bujang, Omar & Baharum, 2018). The reliability statistics of the project complexity, project risk management, and project success were calculated to match the research methodology. Reliability statistics are essential in determining the consistency of responses from respondents. The Cronbach's alpha coefficient was used to calculate the reliability of the research instrument for each construct. (Smith and Hasan, 2020)

The high-reliability coefficients acquired for all three constructs indicate that the survey instrument used in this study is a valid and reliable tool for measuring project complexity, risk management, and success(Bujang, Omar & Baharum, 2018). It is meaningful to note that reliability alone does not guarantee validity. Although the high-reliability coefficients suggest that the instrument provides consistent and stable results, it does not necessarily mean that the survey instrument measures what it is supposed to measure. Therefore, guaranteeing that the survey questions accurately and adequately capture the measured constructs is crucial to establish validity. To ensure validity, the survey questions were developed based on a thorough review of the relevant literature and previous studies, including those by Kimaru (2019), Mikkelsen (2018), Bakhshi et al. (2016), Alzahrani (2020), and Zaman (2021). Additionally, the survey instrument was pilot-tested and reviewed by experts in the field to ensure that the questions accurately measure the constructs of interest. The resulting high reliability and validity of the survey instrument provide confidence in the accuracy and reliability of the survey results. (Vaske, Beaman & Sponarski, 2017).The following tables are presenting the reliability analysis of the variables of this study.

Reliability Statistics Project Complexity	
Cronbach's Alpha	N of Items
0.881	10

Table 7:Reliability Statistics Project Complexity (PC)

Trough SPSS results, The Cronbach's alpha of 0.881 for the Project Complexity scale indicates a high degree of internal consistency among the items included in the scale. This means that the items are measuring a similar construct and that the scale is reliable in measuring the complexity of the project. However, it is important to note that reliability alone does not guarantee validity, which refers to the extent to which the scale is actually measuring what it claims to measure. Validity is determined through additional methods such as content validity, criterion-related validity, and construct validity, which should also be considered in evaluating the usefulness of the Project Complexity scale in measuring project complexity.

Reliability Statistics Project risk management	
Cronbach's Alpha	N of Items
0.908	10

Table 8:Reliability Statistics Project risk management(PRM)

A Cronbach's alpha of 0.908 indicates that the Project risk management scale has high internal consistency, meaning that the items are highly correlated and measure the same construct. This suggests that the questions in the scale are reliable and that respondents consistently answer the questions in a similar way. Therefore, the results obtained from this scale can be considered valid and trustworthy. Overall, this high level of reliability suggests that the Project risk management scale is an effective tool for measuring respondents' perceptions of risk management strategies in the project.

Reliability Statistics Project Success	
Cronbach's Alpha	N of Items
0.831	10

Table 9: Reliability Statistics Project Success (PS)

Based on the Cronbach's alpha value of 0.831 and the number of items being 10, the reliability statistics of the Project Success construct can be considered as good. This indicates that the items in the scale are internally consistent and have a high degree of inter relatedness. It implies that the scale measures the same construct consistently, and the scores obtained from it are dependable and reproducible. Overall, the value of Cronbach's alpha is used to test the reliability of the variables of this study. The values of Cronbach's alpha are higher than 0.8 which shows the significant reliability of these variables.(Vaske, Beaman & Sponarski, 2017).

Correlation Analysis

Correlation analysis is used in this study to test the relationship between the variables of this study.According to Senthilnathan (2019), correlation analysis is a statistical method commonly used in research to test the relationship between variables. In this study, the examination aims to specify whether there is a significant correlation between project complexity, project risk management, and project success. The Pearson correlation coefficient measures the strength and direction of the relationship between the variables. (Senthilnathan, 2019)

As Kumar and Chong (2018) mentioned, using correlation analysis is an effective way to examine the relationships between variables. The outcomes of the correlation analysis can provide valuable perspicuity into how the variables are connected and how they may affect each other. The reliability and validity of the data collected in this study were ensured using reliability and validity statistics (Smith & Hasan, 2020; Keshk, Maarouf & Annany, 2018; Bujang, Omar &Baharum, 2018). These statistics provide proof of the study's internal consistency and construct validity, improving the validity of the study's results and sustaining the conclusions drawn from the data. (Kumar & Chong, 2018)

Correlations Analysis for (Project Complexity - Project Risk Management- Project Success)

Correlations				
		Project Complexity	**Project Risk Management**	**Project Success**
Project Complexity	Pearson Correlation	1	0.089	0.154
	Sig. (2-tailed)		0.379	0.126
	N	100	100	100
Project Risk Management	Pearson Correlation	0.089	1	.201*
	Sig. (2-tailed)	0.379		0.045
	N	100	100	100
Project Success	Pearson Correlation	0.154	.201*	1
	Sig. (2-tailed)	0.126	0.045	
	N	100	100	100

Table 10: Correlation Analysis

Table (11) investigates three variables: complexity (PC), Risk (PRM), and Success (PS). The table shows significance levels and correlation coefficients between these variables based on the Pearson correlation coefficients and sample sizes(Keshk, Maarouf and Annany, 2018). A Pearson correlation coefficient of 0.089 indicates a weak positive correlation between project complexity and project risk management. Clearly, this association did not show statistical importance ($p>0.05$). Project success, like Project Complexity (PC), had a weak positive association with the Pearson correlation value of 0.154; however, this correlation was not statistically significant ($p>0.05$). This gives the response to the study's hypothesis.

Alternatively, the Pearson correlation coefficient for project risk management and project success was 0.201* ($p<0.05$). Based on this finding, project risk management increases the likelihood of project success.

Causation between factors is not proven in correlation analysis. As a result, while improving project risk management does not immediately improve project success, it may be linked to it. More investigation is required to identify the causal connection between these factors.

The findings of the correlation study show a moderate positive link between Project Complexity and Project Risk Management, as demonstrated by a Pearson correlation value of 0.089. However, at 0.05, this association is not numerically significant ($p = 0.379$). This indicates that in this research setting, there is no significant linear relationship between these two variables which also match with some of literature discussed before.

A Pearson correlation coefficient of 0.201* indicates a moderate positive association between Project Risk Management and Project Success. This association is statistically significant at the 0.05 level ($p = 0.045$), indicating that these two factors may have a minor linear relationship. In other words, the better a project's risk

management is handled, the more likely it is to succeed which also indicated by (Akbar and Shahid, 2022),(Keshk, Maarouf and Annany, 2018).

Finally, which clear, there is also a weak positive correlation between Project Complexity and Project Success, with a Pearson correlation coefficient of 0.154. However, like the correlation between Project Complexity and Project Risk Management, this correlation is not statistically significant at the 0.05 level (p = 0.126). This suggests that there needs to be more evidence of a linear relationship between project complexity and project success in the context of this study.

Overall, while the correlation analysis provides some insight into the relationships between the variables in this study, it is essential to note that correlation does not imply causation. Further research may be needed to explore the causal relationships between project complexity, project risk management, and project success(Keshk, Maarouf and Annany, 2018). To summarize, the values of correlations between the variables are positive that showing the positive relationship between these variables. An increase in the value of the independent variable would also cause an increase in the value of a dependent variable.(Bilgin et al., 2022).

SEM analysis

This study has used the SEM analysis of the model used for this study. The Smart PLS 4 software is used to determine the values of SEM analysis. The SEM analysis is a powerful statistical technique used to test the relationships between observed and latent variables in a model(Adamcová et al., 2018).The following figures are showing the results of this analysis.(Manley et al., 2021).

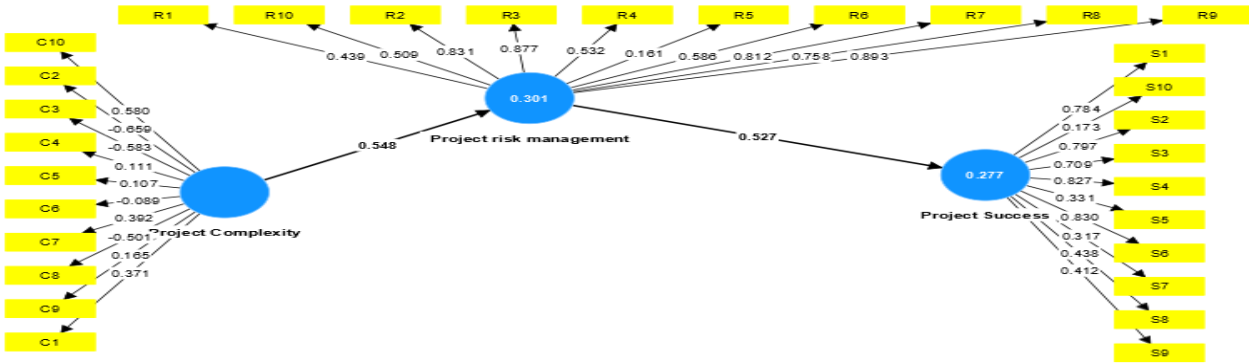


Fig 5: SEM factor analysis
Source: (Sönmez et al, 2020)

Fig 6: The Mediating Role of PRM
Source:(Ahmad et al., 2022)

The findings of the SEM analysis indicate that the R square value of project success is 0.27. Project success is 27 percent dependent on project complexity and risk management. Project complexity and risk management, in other terms, are essential indicators of project success. However, it is meaningful to note that other factors, aside from project intricacy and risk management, may affect project performance, influencing the remaining 73 percent. As a result, to execute practical project consequences, managers must consider various variables that can affect project success, such as project complexity and risk management.

Regression Analysis

Regression analysis is a commonly used statistical technique that helps to examine the relationship between the dependent variable and one or more independent variables(Sperandei, 2014). In this study, regression analysis has been operated to investigate the impact of project complexity and project risk management on project success, with the mediator variable of project management capability. Regression analysis results provide a better understanding of how the independent variables relate to the dependent variable and help make predictions about the outcome.(Yoshida & Murai, 2021). The regression analysis will be conducted in four steps in order to investigate the mediating role of project risk management on the relationship between project complexity and project success in Saudi construction companies. The first step of the analysis will focus on the dependent variable of project risk management and the predictors of project complexity, as denoted by the constant. The second step will shift the focus to the dependent variable of project success and the predictors of project complexity and the constant. In the third step, the dependent variable of project success will remain, but the predictor will be project risk management and the constant. Finally, the fourth step will include both project complexity and project risk management as predictors for the dependent variable of project success, along with the constant(Sperandei, 2014).

To accurately assess the relationship between project complexity and project success, the use of both unstandardized coefficients and standardized coefficients will be necessary. Beta values will also be utilized, along with mean square and sum of squares calculations. The regression analysis will draw from a range of relevant sources to ensure accuracy and reliability, including works by Yoshida and Murai (2021) and Sperandei (2014). By conducting the regression analysis in these four steps and utilizing these various metrics, this study will provide valuable insights into the role of project risk management in mediating the relationship between project complexity and project success in the context of Saudi construction companies.

Step 1: Regression analysis for Project Risk Management with Project Complexity as predictor

Model Summary						
Model	R	R Square	Adjusted R Square	Std. The error in the Estimate		
1	.089[a]	0.008	-0.002	0.66184		
a. Predictors: (Constant), Project Complexity						
ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.342	1	0.342	0.780	.379[b]
	Residual	42.927	98	0.438		
	Total	43.268	99			
a. Dependent Variable: Project Risk Management						
b. Predictors: (Constant), Project Complexity						
Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.690	0.297		12.423	0.000
	Project Complexity	0.080	0.091	0.089	0.883	0.379
a. Dependent Variable: Project Risk Management						

Table 11: Regression analysis for Project Risk Management with Project Complexity as predictor

Step 2: Regression analysis for Project Success with Project Complexity as predictor

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.154[a]	0.024	0.014	0.54825		
a. Predictors: (Constant), Project Complexity						

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.716	1	0.716	2.382	.126[b]
	Residual	29.457	98	0.301		
	Total	30.173	99			
a. Dependent Variable: Project Success						
b. Predictors: (Constant), Project Complexity						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.667	0.246		14.901	0.000
	Project Complexity	0.116	0.075	0.154	1.543	0.126
a. Dependent Variable: Project Success						

Table 12: Regression analysis for Project Success with Project Complexity as predictor

Step 3:Regression analysis for Project Success with Project Risk Management as predictor

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.201[a]	0.040	0.030	0.54359		
a. Predictors: (Constant), Project Risk Management						

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.215	1	1.215	4.111	.045[b]
	Residual	28.958	98	0.295		
	Total	30.173	99			
a. Dependent Variable: Project Success						
b. Predictors: (Constant), Project Risk Management						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.376	0.331		10.211	0.000
	Project Risk Management	0.168	0.083	0.201	2.028	0.045
a. Dependent Variable: Project Success						

Table 13: Regression analysis for Project Success with Project Risk Management as predictor

Step 4: Regression analysis for Project Success with Project Complexity and Project Risk Management as Predictors

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.243[a]	0.059	0.040	0.54104		
a. Predictors: (Constant), Project Complexity, Project Risk Management						
ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.779	2	0.890	3.039	.052[b]
	Residual	28.394	97	0.293		
	Total	30.173	99			
a. Dependent Variable: Project Success						
b. Predictors: (Constant), Project Complexity, Project Risk Management						
Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.086	0.390		7.920	0.000
	Project Risk Management	0.157	0.083	0.188	1.906	0.060
	Project Complexity	0.104	0.075	0.137	1.388	0.168
a. Dependent Variable: Project Success						

Table 14:Regression analysis for Project Success with Project Complexity and Project Risk Management as predictors

The beta values of Project Risk Management and Project Complexity concerning the dependent variable Project Success are 0.157 and 0.104, respectively. These beta values indicate that both independent variables are positively associated with the dependent variable, suggesting that project success is expected to grow as project risk management and project complexity increase. In addition, the beta value for Project Complexity is less than that for Project Risk Management, showing that Project Risk Management partly mediates the influence of Project Complexity on Project Success. This suggests that Project Risk Management may serve as a variable that partially explains the association between Project Complexity and Project Success. In other words, the regression analysis results in this study show that both Project Risk Management and Project Complexity have a positive relationship with Project Success. The beta values for Project Risk Management and Project Complexity concerning the dependent variable Project Success are 0.157 and 0.104, respectively, indicating that they significantly impact project success. This suggests that an increase in Project Risk Management and Complexity leads to increased project success. Moreover, the beta value for Project Complexity is less than that for Project Risk Management, indicating that Project Risk Management partially mediates the influence of Project Complexity on Project Success. This finding suggests that the role of Project Risk Management partly explains the positive impact of Project Complexity on Project Success. Therefore, it is essential to emphasize the significance of Project Risk Management and Project Complexity in achieving project outcome within the timeframe and expected budget.However, it is worth noting that other variables not included in this study may have contributed to the success of the project.

Conclusion

PC, PRM, and PS are all discussed in the study's conclusion. According to the study's findings, there is a positive correlation between PC and PS. This study demonstrates that as project complexity grows, so does the chance of project success. Furthermore, it was shown that project success risk management functions as a form of mediator between these two elements, indicating that good risk management may be able to minimize the detrimental impacts of project complexity on project success.

This study's conclusions are consistent with those of other research, which have stressed project complexity as a key element in project success prediction. Complex projects may be difficult to manage because they often include many stakeholders, several stages, and substantial quantities of uncertainty. The project managers must comprehend the variables that contribute to the project's complexity, and they must design ways to mitigate the impact of these variables on the project's success.

Effective project risk management is one such method. According to the study's conclusions, project risk management is vital to PS, especially in sophisticated projects. Project managers may raise the possibility of project success and guarantee that projects are finished on time, within budget, and to the satisfaction of stakeholders by recognizing possible risks and developing ways to minimize them.

The partial mediation between project complexity and project successfully demonstrates the critical role that risk management plays in complicated initiatives. The negative impact of PC on project success cannot be entirely avoided, but it may be mitigated with effective risk management. The project managers are responsible for establishing a balance between the opposing demands of PC and risk management to guarantee that the project's objectives are met while maintaining an acceptable level of risk.

Project managers, stakeholders, and policymakers may find this study's conclusions valuable. Project managers must comprehend the variables that contribute to project success complexity, and appropriate risk management methods must be developed to mitigate the negative impact of these variables on project success. Stakeholders must appreciate the significance of risk management in attaining project success and help project managers as they design and execute effective risk management methods. As noted by Nordahl-Pedersen and Heggholmen (2023) and Serpell and Rubio (2023), authorities have a responsibility to provide project managers with the necessary tools and assistance to execute effective risk management strategies and adhere to industry best practices. The study's results, cited by Mata, Martins & Inácio (2023), Bilgin et al. (2022), and Zaman (2021), highlights the importance of risk management in project success, particularly for complex projects.

According to Alzahrani (2020) and Luo et al. (2017), project managers must have a comprehensive understanding of the role of risk management in ensuring project success. This understanding can be imparted through project management education and training programs, as mentioned by Keshk, Maarouf, and Annany (2018) and Baghdadi and Kishk (2015).

The results of this study, as indicated by Kimaru (2019), Mikkelsen (2018), Bakhshi et al. (2016), Alzahrani (2020), and Zaman (2021), emphasize the importance of effective risk management in mitigating the detrimental effects of project complexity on project success. Despite the study's limitations, cited by Salvador et al. (2021), the findings provide a framework for future research to evaluate various characteristics and replicate the results in different contexts and businesses.

In accordance with the findings of this study, project managers must balance the opposing demands of project complexity and risk management to achieve project objectives, as noted by Alzoubie (2018) and Bakhshi et al. (2016).

Recommendations

The following recommendations may be made based on the study report on the link between project complexity, project risk management, and project success:

- Future research may utilize bigger sample sizes to increase the generalizability of the results. This would boost statistical power and enable more reliable results.
- Quantitative data were included in the study; however, qualitative data may have provided a deeper insight into the experiences and viewpoints of project stakeholders. Future research may use a mixed methods approach to collect both quantitative and qualitative data.
- Future research should evaluate additional possible moderators or mediators of this link, even if the study showed partial moderators between project complexity and project success via partial risk management. Project management or team dynamics, for instance, should be looked upon as possible mediators or moderators.
- To evaluate the extent to which its results may be applied to the corporate world, the study may be duplicated in a variety of different company sectors in future research.
- The present investigation was carried out at a single moment in time, as opposed to a longitudinal study. A longitudinal study may be done in future research to examine changes in project complexity, project risk management, and project success over time. This would offer insight into the way these factors change throughout a project, as well as how they interact with one another at key points along the journey.
- Although this study focused on self-reported data, future research may employ several data sources, such as project documentation or independent evaluations of the project's success. This would strengthen the reliability of the results and decrease the risk of bias or social desirability impacts.

If the researchers follow these suggestions, future studies may expand on the results of the present analysis and give further insight into the link between project complexity, project risk management, and project success risk.

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