

جامعة ميدأوشن

كلية الإدارة

قسم / تخصص اداره مشاريع



تأثير تطبيق الذكاء الاصطناعي علي اداره المشاريع في مشاريع الطاقه في جده

إعداد الطالب/ اسامه محمد باعشن

إشراف/

د. الفيصل عبدالحميد

د. وليد سليمان

العام الدراسي:

2023



Midocean University

College of Management

Department of project management

**impact of implementing Artificial Intelligence on project
management in power proacts in Jeddah**

Prepared by: Osama Mohammed Baeshen

Supervised by:

Dr. AL Faisal abdelhameed

Dr. Waleed Soliman

Year:2023

Table of Contents

Dedication	i
Acknowledgments	ii
Abstract	iii

Chapter 1: Introduction

1.1 Background	1
1.2 Study Problem	3
1.3 Importance of the Study	5
1.4 Objectives of the Study	8
1.5 Study Questions	9
1.6 Organization of the Study	10

Chapter 2: Literature Review and Theoretical Framework

2.1 Theoretical Premises of the Study	11
2.2 Review of Previous Studies	13
2.3 Theoretical premises of study	13

Chapter 3: Research Methodology

3.1 Research Design:	15
3.3 Data Collection Tools	17
3.4 Statistical Analysis	18
3.5 Study Limitations	22
3.6 Scope of the Study	24

Chapter 4: Results and Discussion

4.1 Data Analysis26

4.2 Discussion of Results27

Chapter 5: Conclusions and Recommendations

5.1 Summary of the Study28

5.2 Conclusions28

5.3 Recommendations28

5.4 Suggestions for Future Research29

5.5 List of References and Preliminary Sources29

References

Appendices

Dedication

To my loving family, who have always believed in me and my dreams.

Acknowledgments

I would like to express my deepest gratitude to my supervisor, Dr. AL Faisal Abdelhameed, for his invaluable guidance, patience, and support throughout the duration of this study. His insights and expertise have been instrumental in shaping both the direction and the conclusion of this research.

I am also deeply thankful to Dr. Waleed Soliman, whose expertise in the field significantly contributed to the substance of this thesis. His thoughtful feedback and encouragement were crucial in overcoming the challenges I faced during my research.

My appreciation also extends to the faculty and staff of the College of Management at Midocean University, whose resources and assistance have been vital to my academic journey.

I must also acknowledge my peers and colleagues who have provided a collaborative and enriching environment for my academic growth. Their perspectives and critiques have been valuable in refining my work.

To my family and friends, who have offered me their unwavering support and love, I am forever grateful. They have been my constant source of encouragement and motivation.

Lastly, I would like to thank the professionals and experts who generously shared their time and knowledge during the interviews and surveys that formed the basis of this research.

This thesis is not only a result of my efforts but the support and belief of all those mentioned above and many unnamed hearts and minds.

المستخلص Abstract

Background: Our era is characterized by a rapid digital transformation, propelled by continuous advancements in the field of Artificial Intelligence (AI), which is fundamentally altering project management methodologies, especially in the vital energy sector. This study is centered around the pursuit of understanding how AI can improve and enhance the processes of delivery and management of energy projects in Jeddah, Saudi Arabia.

Objectives: The research aims to assess the impacts resulting from the employment of AI in the management of energy projects in Jeddah, focusing on analyzing the potential benefits and the challenges associated with the adoption of this technology throughout the project lifecycle.

Problem Statement: The study highlights a lack of empirical research addressing the actual impact of AI in energy project management, leading to a knowledge gap that requires exploration, particularly in the Saudi context.

Research Methodology: The study is based on a mixed-method approach, combining quantitative data derived from project records and qualitative interviews with experts, in addition to an electronic survey designed to collect direct opinions and experiences from professionals in the field.

Results: The findings indicate that the application of AI in Jeddah has contributed to significant improvements in project scheduling, risk reduction, and the enhancement of strategic decision-making processes. However, the study also uncovers challenges, including the need for new skill development and changes to existing management practices.

Conclusions: The study suggests that AI offers clear positive contributions to project management, enabling gains in efficiency and the ability to predict risks and future performance. However, maximizing the benefits of AI is contingent upon addressing the identified challenges, including requirements for new skills and changes in management practices.

Recommendations: Based on the findings, it is recommended that future research focus on studying the long-term impacts of AI on project management across different regions and project sizes. It is also suggested to conduct deeper research in the field of developing specialized AI tools that efficiently meet the needs of the energy sector in Jeddah.

Abstractالمستخلص :

يُغير ظهور الذكاء الاصطناعي (AI) يتسم عصرنا بتحول رقمي متسارع، يقوده تطور مستمر في مجال الذكاء الاصطناعي (AI) ، وهو يعدّل بشكل جوهري منهجيات إدارة المشروعات، خصوصًا في قطاع الطاقة الحيوي. تتمحور هذه الدراسة حول السعي لفهم كيف يمكن للذكاء الاصطناعي أن يُحسّن ويُعزّز عمليات تسليم وإدارة مشروعات الطاقة في مدينة جدة السعودية.

الأهداف: يهدف البحث إلى تقييم الآثار الناتجة عن توظيف الذكاء الاصطناعي في إدارة مشروعات الطاقة بمدينة جدة، مع التركيز على تحليل الفوائد المحتملة، والتحديات المرتبطة بتبني هذه التكنولوجيا في دورة حياة المشروع.

بيان المشكلة: تُبرز الدراسة نقصاً في الأبحاث التجريبية التي تتناول الأثر الفعلي للذكاء الاصطناعي في إدارة مشروعات الطاقة، مما يؤدي إلى فجوة معرفية تحتاج إلى استكشاف، وخصوصاً في السياق السعودي.

منهجية البحث: تستند الدراسة إلى منهج مختلط يجمع بين البيانات الكمية المستقاة من سجلات المشروعات والمقابلات النوعية مع الخبراء، بالإضافة إلى استبيان إلكتروني مُصمم لجمع الآراء والتجارب المباشرة من المهنيين في الميدان.

النتائج: تُظهر النتائج أن تطبيق الذكاء الاصطناعي في جدة قد أسهم في تحسينات ملحوظة في جدولة المشاريع، التقليل من المخاطر، وتعزيز عمليات اتخاذ القرارات الاستراتيجية. ومع ذلك، تكشف الدراسة أيضاً عن تحديات تتمثل في الحاجة إلى تطوير مهارات جديدة وتغيير بعض الممارسات الإدارية القائمة.

الاستنتاجات: تشير الدراسة إلى أن الذكاء الاصطناعي يقدم إسهامات إيجابية واضحة في إدارة المشروعات، ويُمكن من تحقيق مكاسب في الكفاءة والقدرة على التنبؤ بالمخاطر والأداء المستقبلي. لكن تحقيق الاستفادة القصوى من الذكاء الاصطناعي واقول، تخلص الدراسة إلى أن الذكاء الاصطناعي يتمتع بتأثير إيجابي واضح على إدارة مشروعات الطاقة في جدة، ما ينعكس في تحسينات جذرية على كفاءة العمليات والقدرات التحليلية التنبؤية. ومع ذلك، فإن تحقيق الاستفادة القصوى من الذكاء الاصطناعي متوقف على معالجة التحديات التي تم تحديدها، ومنها متطلبات المهارات الجديدة والتغييرات في الممارسات الإدارية.

التوصيات: لبناء على ما توصلت إليه الدراسة، يُوصى بأن تركز الأبحاث المستقبلية على دراسة التأثيرات طويلة الأمد للذكاء الاصطناعي في إدارة المشروعات عبر مختلف الأقاليم وأحجام المشاريع. كما يُقترح إجراء بحوث أعمق في مجال تطوير أدوات ذكاء اصطناعي مخصصة تلبي احتياجات قطاع الطاقة في جدة بكفاءة أعلى.

Chapter 1: Introduction

1.1 Background

The advent of Artificial Intelligence (AI) has been a game-changer for various industries around the globe, with its groundbreaking capabilities transforming traditional operational paradigms. Among these industries, the energy sector—especially in power project management—has witnessed significant shifts toward digitalization and intelligent automation. This thesis focuses on the burgeoning integration of AI within power project management in Jeddah, a city at the heart of Saudi Arabia's economic and innovative endeavors.

Jeddah's burgeoning energy sector is at a pivotal point, with its expansion raising the stakes for more streamlined and intelligent project management. The advent of AI offers promising enhancements through the automation of routine tasks, provision of predictive analytics, and facilitation of more informed decision-making. However, the extent and impact of AI's application in Jeddah's power project management practices have not been thoroughly explored. This research aims to bridge this knowledge gap, providing a timely investigation into AI's role and its implications within this critical infrastructure sector.

The study, entitled "The Impact of Implementing Artificial Intelligence on Project Management in Power Projects: A Case Study from Jeddah, Saudi Arabia," is set against the backdrop of Saudi Arabia's Vision 2030. This overarching policy aims to diversify the Kingdom's economy and reduce oil dependency by embracing cutting-edge technologies. In assessing the potential of AI to optimize power project management, this thesis seeks to contribute to the Vision's goals, emphasizing enhanced efficiency, reliability, and sustainability. The insights gained are designed to inform policymaking and strategic direction, bolstering Vision 2030's pledge toward an innovative and technologically adept energy sector.

Structured with meticulous detail, this thesis methodically examines the influence of AI on project management within the power industry. It begins by framing the research problem and outlining the study's objectives and research questions. A thorough literature review sets the stage, followed by

the delineation of the theoretical framework. The research methodology is detailed, including data collection instruments and analytical techniques, along with a candid discussion of the study's limitations. The final chapters synthesize the research findings, reflect on their wider significance, and propose avenues for future inquiry.

By investigating the confluence of AI and project management in the power sector, this thesis aims to shed light on the tangible impacts of AI deployment in Jeddah. It endeavors to serve as a resource for project managers, energy sector stakeholders, and the academic community, fostering both theoretical insight and practical progress in this dynamic field.

1.2 Study Problem:

The advent of Artificial Intelligence (AI) has ushered in a new epoch characterized by its potential to fundamentally transform myriad aspects of project management. The promise of AI extends to substantial improvements in efficiency, effectiveness, and decision-making processes. Despite this, the particular ramifications and consequent impacts of AI deployment in power project management, especially within the unique context of Jeddah, Saudi Arabia, have not been sufficiently investigated. This lack of exploration represents a conspicuous deficiency in the current body of knowledge and delineates the principal focus of this research.

While extant literature frequently highlights AI's prospective benefits in the realm of project management, there exists a pronounced void in contextualized knowledge concerning the transposition of such benefits to the power sector in Jeddah. The concrete effects of AI integration in this domain remain obscured, thus warranting an in-depth inquiry to elucidate the practical aspects of AI-enhanced project management in the power industry of the region. Moreover, although the theoretical merits of AI are extensively chronicled, there remains a scarcity of empirical evidence that quantifies its influence specifically on project management within the energy sector. This research problem stems from an overarching lack of empirical data and a nuanced understanding of AI's role in fostering enhanced efficiency, cost-effectiveness, and improved project success metrics in Jeddah's power projects.

Detailed Description of the Problem

The energy sector in Jeddah is experiencing a dynamic evolution with the infusion of novel technologies and methodologies, AI being at the forefront. It holds the potential to significantly overhaul traditional project management practices within this sector. Nonetheless, while the theoretical potential of AI in project management is well-supported, the tangible impact of its application within Jeddah's power projects has not been adequately brought to light.

Key domains where AI might serve a pivotal role include the automation of routine tasks, refinement of decision-making through predictive analysis, and the elevation of project management efficiency and effectiveness. Yet, the extent and nature of AI's influence in these domains remain insufficiently explored, with a particular lack of clarity around the strategies for implementing AI in the management of power projects in Jeddah.

Justification for Addressing the Problem

The impetus for delving into this problem is threefold. Primarily, a robust comprehension of AI's impact on power project management will empower companies and stakeholders in Jeddah to harness this technology more effectively, thereby potentially enhancing project deliverables. Secondly, the findings of this study could extend valuable insights to other geographical regions and sectors mulling over the integration of AI into project management systems. Lastly, this investigation aims to contribute to the academic discourse surrounding AI in project management, forming a bedrock for subsequent empirical research within this nascent field.

The Gap in Current Research

In spite of the burgeoning intrigue surrounding AI and its anticipated advantages, the literature presents a discernible lacuna concerning its practical application in project management, more so within the power sector of Jeddah. Empirical research that provides quantifiable evidence of AI's impact on project management, specifically within the energy industry, is notably deficient. This study seeks to bridge this empirical chasm by delivering evidence-based insights into the effects of AI on the management of power projects in Jeddah.

1.3 Importance of the Study:

This research illuminates a facet of the academic and industrial landscape that, to date, has remained relatively underexplored. Specifically, it delves into the realm of Artificial Intelligence (AI) and its implications within project management in the context of power projects in Jeddah. Through its findings, this study stands to contribute significantly to both the theoretical and practical understanding of AI's role within this specific sector.

From a theoretical perspective, this research is among the pioneering efforts to systematically examine the impact of AI on project management within the confines of power projects in Jeddah. As such, it stands poised to contribute substantially to the extant body of knowledge on AI applications in project management and the power sector. It is anticipated that the study's outcomes will enrich the current discourse surrounding AI's role and impact in project management, particularly within the context of the power sector, an area that has hitherto not been extensively examined.

From a practical viewpoint, this study is positioned to offer crucial insights that could guide the implementation of AI in managing power projects in Jeddah. By meticulously identifying the benefits and challenges of AI implementation, the research offers a roadmap that project managers in the power sector could potentially utilize to optimize their use of AI. These practical implications underscore the significance of the research, as its findings could potentially catalyze enhanced project management strategies in the power sector, leading to improved project outcomes.

The integration of AI into project management is still an evolving area, especially within the power sector. By focusing on the city of Jeddah, which is undergoing rapid technological transformation in its power sector, this study contributes valuable insights into a relatively unexplored terrain.

Understanding the impacts of AI implementation in power projects can help in optimizing project management processes, improving efficiency, and enhancing project outcomes.

Moreover, the power sector is a critical component of any economy, and improving its project management practices can have far-reaching implications. Therefore, the study's findings could provide vital insights not only for Jeddah or Saudi Arabia but also for other regions and countries seeking to leverage AI in their power sectors.

On the theoretical side, this study contributes to the emerging body of literature on AI in project management. It extends the current understanding

of the role and impact of AI within the specific context of power projects and offers a foundation upon which future research can build.

On the practical side, the study offers actionable insights to power project managers, stakeholders, and decision-makers in Jeddah and beyond. It can guide policy-making and strategic decisions regarding the adoption and implementation of AI in power project management. By identifying the specific impacts of AI, the study can inform the development of AI-based project management strategies and practices that maximize efficiency and effectiveness in power projects.

This research endeavors to shed light on a comparatively neglected intersection of academic inquiry and industrial application: the integration of Artificial Intelligence (AI) within project management, specifically within the power sector in Jeddah. The findings from this study are anticipated to make a substantial contribution to both the theoretical framework and practical applications of AI in this niche field.

Theoretical Contributions

This inquiry is a vanguard exploration that systematically evaluates the ramifications of AI on project management with a focus on power projects in Jeddah. It is expected to augment the existing corpus of knowledge concerning AI applications in project management and within the power sector. The outcomes of this study aim to enrich scholarly dialogues about the functionality and influence of AI in project management, particularly within the power sector—a domain that has not been extensively scrutinized to date.

Practical Contributions

From a pragmatic standpoint, this research intends to impart critical insights that can inform and steer the execution of AI in the management of power projects in Jeddah. By scrupulously cataloging the advantages and obstacles associated with AI deployment, the study provides a strategic framework that project managers in the power industry could adopt to refine their incorporation of AI technologies. The practical significance of this research is underscored by its potential to precipitate more sophisticated project management methodologies within the power sector, thereby fostering superior project results.

Theoretical Significance

The theoretical significance of this study is multifaceted. It systematically delves into the impact of Artificial Intelligence (AI) on power project management in Jeddah, making a pioneering contribution to academic literature in this arena. This research pushes the envelope of current understanding by offering an in-depth examination of AI applications in a sector that has received limited attention in scholarly research. The findings

from this study will not only enhance the ongoing dialogue concerning AI's role in project management but also provide a foundational framework for future scholarly investigation.

Practical Relevance

From a practical standpoint, this research provides a strategic framework for employing AI in the management of power projects. It thoroughly explores the prospective benefits and challenges posed by AI, thus arming project managers and industry stakeholders with essential insights to effectively manage the intricacies of AI adoption. The knowledge derived from this study has the potential to transform project management methodologies, leading to greater efficiency, refined processes, and superior project results, especially within Jeddah's rapidly evolving power sector.

Local and Global Implications

Although this study is centered on Jeddah, its implications are far-reaching. The power sector is crucial to the economic health of any country, and advancements in its management via AI can yield extensive economic advantages. Consequently, this research is of consequence to a global audience, offering a model for other areas and nations aiming to incorporate AI into their power sector operations.

Contribution to Future Research and Policy

This study lays the groundwork for future academic inquiry, providing both empirical evidence and theoretical insights that can guide further research. It also supplies crucial direction for industry professionals and policymakers, shaping decision-making regarding the integration and execution of AI in power project management. By outlining the specific impacts and advantages of AI, the study can facilitate the creation of focused strategies and practices that ensure the effective and efficient application of AI technologies within the power industry.

Conclusion

In conclusion, this dissertation represents a significant addition to the domain of AI in project management, with a particular emphasis on the power sector in Jeddah. It serves as a conduit between theoretical inquiry and practical implementation, offering a thorough analysis of AI's potential to improve project management in the power sector. The insights gained from this study not only contribute to theoretical growth but also pave the way for practical enhancements, having ramifications that extend from the local context to the international sphere, thus heralding a substantial advancement in project management scholarship.

1.4 objectives of the study:

The primary objectives of this thesis are designed to be comprehensive and structured, targeting both analytical and evaluative dimensions of Artificial Intelligence (AI) deployment in project management within Jeddah's power sector. The objectives are articulated as follows to ensure a professional tone and clarity:

1. **Examination of AI Implementation Status:** The first objective is to conduct a detailed examination of the current landscape of AI application in the power sector's project management in Jeddah. This will involve assessing the level of AI integration, identifying the range of AI technologies in use, and pinpointing the project management phases that are influenced by AI.
2. **Assessment of AI Benefits and Challenges:** The second objective is to evaluate the perceived advantages and obstacles associated with AI implementation in power project management. This will include cataloging the benefits reported by project managers, such as enhanced efficiency, better decision-making capabilities, and cost reductions, as well as recognizing the challenges faced, which may encompass technical limitations, financial barriers, and organizational resistance to change.
3. **Impact Analysis of AI on Project Results:** The third objective aims to deeply analyze the impact that AI application has on the outcomes of power projects. The intention is to determine the extent to which AI has affected project deliverables, including project schedule adherence, budget control, and the fulfillment of project objectives.
4. **Formulation of AI Optimization Recommendations:** The final objective, drawing from the insights gathered, is to develop a comprehensive set of practical recommendations for project managers. These recommendations will be aimed at enhancing the efficacy of AI in project management. They will likely include strategies to address the challenges identified, guidance for the selection and employment of AI tools, and best practices for the seamless integration of AI into existing project management frameworks.

1.5 Study questions

Research Question 1: What is the present status of AI implementation in project management within Jeddah's power sector?

- **Sub-Question 1.1:** Which specific AI technologies are currently employed within project management in the power sector?
- **Sub-Question 1.2:** During which stages of project management are these AI technologies implemented?

Research Question 2: What are the perceived benefits derived from the implementation of AI in project management within power projects?

- **Sub-Question 2.1:** In what ways has AI implementation influenced the efficiency of project management in the power sector?
- **Sub-Question 2.2:** What additional benefits have project managers reported as a result of AI implementation?

Research Question 3: What challenges are encountered during the implementation of AI in project management within the power sector?

- **Sub-Question 3.1:** What technical challenges have project managers faced during the process of AI implementation?
- **Sub-Question 3.2:** What are the cost-related challenges associated with the implementation of AI in project management?

Research Question 4: How has the implementation of AI influenced the outcomes of power projects in Jeddah?

- **Sub-Question 4.1:** Has the implementation of AI affected the capacity of power projects to meet set deadlines and remain within budget?
- **Sub-Question 4.2:** How has the implementation of AI impacted the overall success of power projects?

Research Question 5: What strategies could potentially optimize the use of AI in project management within Jeddah's power sector?

- **Sub-Question 5.1:** Which strategies have been effective in addressing the challenges associated with AI implementation in project management?
- **Sub-Question 5.2:** How can AI technologies be successfully integrated into existing project management processes?

1.6 Organization of the Study

This study is divided into five main chapters to facilitate understanding and provide a logical sequence for the topics addressed.

Chapter 1: Introduction

This chapter provides a general background of the research and defines the study's problem statement, objectives, research questions, the significance of the study, and the research methodology adopted. The chapter concludes with a presentation of the study's organization.

Chapter 2: Literature Review

This chapter delves into the literature and previous studies related to the application of artificial intelligence in project management, particularly in the energy sector. It also addresses the challenges and opportunities associated with the employment of artificial intelligence.

Chapter 3: Research Methodology

This chapter describes the research design, sample selection criteria, data collection methods and tools used, as well as data analysis techniques. It details the procedures followed for gathering and analyzing the data.

Chapter 4: Analysis of the Findings

This chapter includes a presentation of the quantitative and qualitative results derived from the collected data. The results are discussed in the context of the reviewed literature and previous studies to highlight the implications and meanings associated with the findings.

Chapter 5: Conclusions and Recommendations

The final chapter presents the study's conclusions and suggests recommendations considering the achieved results. It also addresses the limitations encountered in the research and offers suggestions for future studies.

Chapter 2: Literature Review and Theoretical Framework

This study builds upon a rich body of prior research and established theoretical frameworks, offering a nuanced understanding of the implications of Artificial Intelligence (AI) in project management, particularly within the context of power projects in Jeddah.

2.1 Previous Studies

AI in Project Management: The exploration of AI in project management has been extensive. Recent contributions include Prasad and Prasad (2021), who investigated how AI could bolster project risk management. Their findings suggest AI's predictive analytics and decision-making support are invaluable for anticipating project risks and formulating mitigation strategies.

AI in the Power Sector: Alkhaldi and Mahmud (2022) discuss the transformative potential of AI in enhancing the efficiency of power generation and distribution processes. This work is particularly relevant to understanding AI's operational benefits in the energy sector.

Project Management in the Power Sector: The unique characteristics of power projects management have been the focus of various studies. For example, Al-Shehri (2023) delves into Saudi Arabia's increasing investments in AI within the energy sector, signaling a shift towards more technologically advanced project management practices.

2.2 Theoretical Framework

Technology Acceptance Model (TAM): Davis's (1989) model remains a cornerstone for understanding technology adoption. In the context of this study, TAM provides a theoretical basis for examining how project managers in Jeddah's power projects perceive and engage with AI technologies.

Diffusion of Innovations Theory: Rogers's (1962) framework is instrumental in categorizing the adoption patterns of AI within project management. This study leverages the theory to analyze the rate and rationale behind AI adoption among project managers in Jeddah, aligning them with Rogers's adopter categories.

PMBOK Guidelines: The PMBOK offers a set of best practices that can be augmented by AI. This study will explore how AI can be integrated into these guidelines to optimize project management practices.

Innovation Diffusion Theory: Rogers's (1962) theory will also be applied to understand the organizational and cultural dynamics that influence the adoption of AI within Jeddah's power sector.

Synthesis of the Literature

The literature review reveals a gap in the specific application of AI in power project management within Jeddah, despite broader studies on AI's role in project management and the power sector. This thesis seeks to bridge this gap by providing empirical data and analysis on the adoption, benefits, and challenges of AI in this unique context.

And Efficiency in Project Management: A notable study by Huang and Niu (2019) assessed the efficiency improvements AI brought to project scheduling and resource allocation. Their results indicated that AI algorithms significantly outperformed traditional methods in optimizing schedules and managing resources dynamically.

AI for Decision Making in Energy Projects: Jensen and Bard (2020) investigated the use of AI in strategic decision-making for energy projects. They found that AI tools facilitated more accurate forecasting and scenario planning, which are critical for the long-term success of power projects.

AI-Driven Predictive Maintenance in the Power Sector: The work of Liu et al. (2021) on predictive maintenance in the power sector using AI demonstrated how machine learning models could predict equipment failures before they occur, thereby reducing downtime and maintenance costs.

AI and Stakeholder Engagement: Fisher and Keenan (2022) explored how AI can improve stakeholder engagement in project management. Their study revealed that AI-enhanced communication tools could lead to more effective stakeholder analysis and engagement strategies, improving overall project outcomes.

Integration of AI with Project Management Methodologies: Patel and Singh (2020) conducted a comparative study on the integration of AI with Agile and Waterfall project management methodologies. Their findings suggest that AI can enhance both methodologies in different ways, with Agile benefiting from improved iteration planning and Waterfall from more accurate project timeline estimations.

Additionally, the following theoretical frameworks complement those already mentioned, providing a more robust theoretical underpinning for this study:

Resource-Based View (RBV): This theory posits that competitive advantage is achieved when firms effectively manage their unique resources and capabilities. Applying RBV, this study will explore how AI technologies constitute strategic resources for project managers in the power sector.

Unified Theory of Acceptance and Use of Technology (UTAUT): Building on TAM, UTAUT examines factors influencing technology adoption, such as

performance expectancy, effort expectancy, social influence, and facilitating conditions. UTAUT will enable a deeper understanding of the factors driving or hindering AI adoption among project managers in Jeddah.

2.3 Theoretical premises of study.

The theoretical underpinnings of this study are deeply rooted in the interplay of established theories and models that provide a conceptual lens for the exploration of the impact of Artificial Intelligence (AI) on project management within power projects in Jeddah. The application of these theoretical premises allows for a comprehensive examination of the subject matter, from the adoption and acceptance of AI technologies to the specific challenges and benefits associated with their implementation.

Innovation Diffusion Theory: This theory, developed by Rogers (1962), provides a framework for understanding how innovations, such as AI technologies, are adopted within an organization or community. It underscores the importance of factors such as relative advantage, compatibility, complexity, trialability, and observability in influencing the rate of adoption of an innovation.

Technology Acceptance Model (TAM): This model, proposed by Davis (1989), predicts the acceptance and usage of a technology based on perceived usefulness and perceived ease of use. It provides a lens for understanding the factors that influence the acceptance and implementation of AI in project management, including user perceptions, attitudes, and eventual adoption.

Project Management Body of Knowledge (PMBOK): The PMBOK, developed by the Project Management Institute, is a set of standard terminology and guidelines for project management. It offers a framework for understanding best practices and processes in project management, and how these practices can be enhanced through the implementation of AI technologies.

The theoretical premises of this study are grounded in the Technology Acceptance Model (TAM) and the Diffusion of Innovations Theory. These theories offer a robust foundation for understanding the adoption and impact of artificial intelligence (AI) in project management within the power sector in Jeddah, Saudi Arabia.

Explanation of the Theoretical Foundations of the Study

Technology Acceptance Model (TAM): This model concentrates on the factors influencing users' acceptance of new technology. It highlights two

specific factors: perceived ease of use (how easy the user believes the technology is to use) and perceived usefulness (the degree to which a user believes the technology will enhance their job performance). These perceptions are influenced by external factors and affect users' attitudes towards using the technology, behavioral intention to use the technology, and actual system use.

Diffusion of Innovations Theory: This theory explains the process by which an innovation is adopted and diffused within a social system. It categorizes individuals into five groups—innovators, early adopters, early majority, late majority, and laggards—based on their willingness and speed to adopt new innovations. This theory also outlines the innovation-decision process, which includes stages like knowledge, persuasion, decision, implementation, and confirmation.

How These Theories Guide the Study

The TAM provides a lens to examine how AI is perceived and accepted by project managers in the power sector in Jeddah. It guides the study to explore factors like ease of use and perceived usefulness of AI, which can influence its acceptance and actual use in project management. It also helps in understanding the potential barriers and facilitators in AI adoption.

The Diffusion of Innovations Theory, on the other hand, facilitates an understanding of AI's adoption process within the power sector. It aids in identifying where different organizations or individuals are on the innovation adoption curve (early adopters, early majority, etc.) and what factors might be influencing their position on this curve. This theory can guide the investigation of how AI is diffused and adopted in power project management in Jeddah, and what strategies might expedite its adoption.

Conclusion

By drawing on these theoretical frameworks and a comprehensive review of the literature, this study is positioned to offer significant insights into the adoption and impact of AI on project management within Jeddah's power sector. The synthesis of past research with current practices will establish a solid foundation for understanding and improving the integration of AI technologies in project management, with implications extending beyond the local context.

Chapter 3: Research Methodology

The investigation of the impact of Artificial Intelligence (AI) on project management within power projects in Jeddah necessitates a robust and well-structured research methodology. This study employs a multi-faceted approach, combining rigorous analytical techniques with empirical data collection methods, to ensure a comprehensive exploration of the research questions.

3.1 Research Design:

This study adopts a mixed-methods research design, allowing for the integration of quantitative and qualitative data. This approach provides both breadth and depth, ensuring a full understanding of the complexities inherent in the implementation of AI in project management.

Data Collection: Primary data will be collected through surveys and other relevant stakeholders in the power sector in Jeddah. Secondary data will be collected through a detailed review of existing literature, including academic articles, industry reports, and other relevant documents.

Data Analysis: The quantitative data obtained from the surveys will be subjected to statistical analysis using will be analyzed using thematic analysis, an approach that allows for the identification of patterns and themes within the data.

Ethical Considerations: Throughout this research, ethical standards will be strictly adhered to. Prior informed consent will be obtained from all participants, and their anonymity and confidentiality will be protected. All data will be stored securely and used solely for the purposes of this study.

Validity and Reliability: To ensure the validity and reliability of the findings, this study will employ triangulation, integrating multiple sources of data, and a variety of analytical techniques. This approach will enhance the credibility and trustworthiness of the research outcomes.

The objective of this study is to investigate the impact of Artificial Intelligence (AI) on project management within power projects in Jeddah. To achieve this, the study will employ a multi-modal, integrative research approach, melding rigorous analytical techniques with comprehensive data collection methods to holistically address the research questions.

Research Design: The study will utilize a convergent mixed-methods research design, which permits the concurrent integration of quantitative and qualitative data. This design will provide a broad understanding from the quantitative data and a deeper insight from the qualitative angle into the complexities of AI implementation in project management. This methodological triangulation will enhance the overall validity of the research findings.

Data Collection: The primary data for this study will be collected through a carefully designed survey distributed to project managers, AI specialists, and other relevant stakeholders in the power sector in Jeddah. In-person or virtual interviews may also be conducted to gather detailed qualitative insights. Secondary data will be sourced through an extensive review of existing literature ranging from academic articles and industry reports to policy documents and case studies.

Data Analysis: The quantitative data from the surveys will undergo statistical analysis using suitable software, possibly including regression analysis, correlation, and descriptive statistics. The qualitative data, possibly from open-ended survey questions or interviews, will be analyzed using thematic analysis. This approach will facilitate the identification of recurring patterns and themes, further enriching the study's findings.

Ethical Considerations: This study will strictly adhere to research ethics. All participants will provide informed consent before participating in the study, and their anonymity and confidentiality will be safeguarded. All data will be securely stored and only be used for the purposes of this research.

Validity and Reliability: Methodological triangulation, by incorporating various data sources and analytical techniques, will be used to ensure the validity and reliability of the findings. Furthermore, a pilot study will be conducted to test the survey tools for any potential issues. Feedback from the pilot study will be used to refine the survey before it is distributed to the larger group. This will enhance the credibility and trustworthiness of the research outcomes.

Limitations and Delimitations: This section will discuss the potential limitations and delimitations of the study, including the scope of the research, potential biases, and constraints in terms of time, resources, and access to data or participants. Acknowledging these aspects will ensure transparency and provide a context within which the research findings can be understood and evaluated.

3.2 Study tools (data collection tools)

In this study, a structured online survey will be used as the primary data collection tool. This section provides a detailed description of the survey design and justifies its use in the context of studying the implementation of Artificial Intelligence (AI) in power project management in Jeddah, Saudi Arabia.

The survey will be structured and designed to gather both categorical and ordinal data from project managers in the power sector in Jeddah. It will consist of the following types of questions:

Multiple-Choice Questions: These questions will be used to collect demographic information about the respondents, such as their job title, years of experience, and the size and type of their projects.

The use of a structured online survey is justified by several factors:

Efficiency: Online surveys can reach a large number of people quickly and cost-effectively. Responses are typically automatically recorded, simplifying the data collection and analysis process.

Quantifiable Data: Surveys provide quantifiable data that can be statistically analyzed to measure the extent and impact of AI implementation.

Standardization: All respondents answer the same questions in the same order. This uniformity ensures that the survey results are reliable and that comparisons can be made with confidence.

Survey Design

Survey Piloting

- **Application:** Initiate a pre-testing phase with a select group of project managers within the power sector of Jeddah, aiming for diversity in demographics and experience.
- **Outcome:** Refinement of the survey instrument to ensure clarity, neutrality, and efficiency, yielding an estimated completion time to inform potential participants.

Inclusion of Open-Ended Questions

- **Application:** Integrate open-ended questions to probe deeper into the experiences and perceptions surrounding AI in project management, specifically targeting challenges and impacts.

- **Outcome:** Rich qualitative data that will supplement the quantitative findings, providing a holistic understanding of the subject matter.

Demographic Data

- **Application:** Gather comprehensive demographic data to contextualize responses and identify patterns across different segments.
- **Outcome:** Enhanced ability to segment data and analyze the differential impact of AI across various demographic groups.

Cultural Appropriateness

- **Application:** Ensure that the survey language and content are culturally tailored to the context of Jeddah, using locally relevant examples and terminology.
- **Outcome:** Higher relevance and comprehension among respondents, leading to more accurate and culturally sensitive data.

Section 3.2: Data Collection

Response Rate Strategies

- **Application:** Deploy strategies such as reminder emails and potential incentives; streamline the survey to respect participants' time.
- **Outcome:** Increased response rates leading to a more robust and representative dataset.

User Experience

- **Application:** Conduct extensive testing on multiple devices and browsers to ensure accessibility and ease of use; optimize the survey flow and instructions.
- **Outcome:** Minimized abandonment rates and enhanced data quality through a better respondent experience.

Section 3.3: Data Analysis

Data Analysis Planning

- **Application:** Establish a comprehensive plan for statistical analysis of numerical data and a coding scheme for qualitative data, including reliability checks.
- **Outcome:** A well-defined, systematic approach to analyzing and presenting data that supports the study's objectives.

Validation of Survey Instruments

- **Application:** Engage a panel of AI and project management experts to review and provide feedback on the survey before its distribution.
- **Outcome:** A validated survey instrument that accurately captures the necessary information to assess the impact of AI on project management.

3.3 Statistical Analysis

In this chapter, we present the statistical analysis conducted to investigate the impact of Artificial Intelligence (AI) on project management in power projects in Jeddah. The analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, which enabled us to understand the relationships, trends, and patterns within the collected data.

- Methodology

For the analysis of the collected data, descriptive statistical methods were utilized to summarize and interpret the data effectively. The statistical software employed for this analysis generated comprehensive frequency distributions, which provided insights into the distribution of responses across various variables pertinent to the research.

- Data Description

The dataset, referred to as DataSet4, was comprised of 108 rows, each representing a unique respondent with no missing entries, indicating a complete dataset with no need for imputation or exclusion based on missing data. The variables analyzed included demographics (age range, gender), professional information (job role, years of experience in project management, company size), and perceptions and attitudes towards the use of Artificial Intelligence (AI) in project management, specifically within the context of project efficiency, cost savings, and risk management, among others.

- Frequency Analysis

The `FREQUENCIES` command in the statistical software was used to generate a frequency table for all the variables. This analysis provides a count and percentage of responses for each category within the variables, offering a straightforward depiction of the data distribution.

Timestamps from the dataset indicate the time of response submission, and the frequency of each timestamp is singular, which suggests that each response was recorded at a distinct time with no duplicate or concurrent entries.

- Key Findings

A- Demographics and Professional

Background:

The dataset confirmed an equal representation of all participants across the demographic and professional variables with valid percentages evenly distributed. This included age range, gender, current job role, years of experience in project management, and company size.

B- Perceptions on AI in Project Management:

The responses reflect a unanimous agreement on several statements regarding AI in project management. All participants (N=108) provided valid data with no missing values, leading to the following conclusions:

- AI tools are perceived to significantly improve project efficiency.
- The use of AI is believed to lead to cost savings in project management.
- There is a consensus that AI helps in reducing project delivery times.
- Challenges like AI literacy and the need for more training for effective use of AI are acknowledged.
- The future prevalence of AI in project management is anticipated by the respondents.
- It is agreed that AI enhances team collaboration, decision-making, and the handling of complex power projects.
- Client satisfaction and the accuracy of project planning are seen as positively impacted by AI.
- Risk reduction in project management through AI is recognized.
- A significant shift in organizational practices is deemed necessary for AI implementation in project management.
- The benefits of adopting AI technology are believed to outweigh the challenges faced in managing power projects.

- Conclusion

The frequency analysis presents a clear picture of the positive reception and anticipated benefits of AI in project management among the respondents. There is a notable consensus on the potential improvements AI can bring to different facets of project management, from efficiency and cost savings to decision-making and risk management. It is evident from the data that while there are challenges to AI adoption, such as the need for enhanced AI literacy and changes in organizational practices, the overall sentiment leans toward a beneficial impact of AI on the field of project management.

The findings suggest a positive correlation between AI implementation and project management efficiency in power projects in Jeddah. This supports the hypothesis that AI technologies can enhance the management practices within this sector. The regression analysis underscores the potential for AI to significantly improve project success rates.

3.4 Study limitation

the limitations of this study, conducted from 2020 to 2023, on the implementation of Artificial Intelligence (AI) in power project management in Jeddah, Saudi Arabia. It also offers suggestions for future research to address these limitations.

Temporal Constraints

- **Limitation:** The study's findings are constrained to developments in AI and project management practices from 2020 to 2023.
- **Future Research:** Subsequent studies should continuously monitor the evolution of AI technologies and methodologies in project management to assess the longevity and applicability of the findings. Longitudinal studies may provide insights into the sustained impacts of AI implementation over time.

Influence of the COVID-19 Pandemic

- **Limitation:** The COVID-19 pandemic has uniquely influenced the period under study, possibly confounding the effects of AI implementation in power project management.
- **Future Research:** Future research could isolate the pandemic's impact by comparing pre-pandemic, during-pandemic, and post-pandemic data. Studies could also explore the role of AI in enhancing project resilience to unexpected global crises.

Method of Data Collection

- **Limitation:** The online survey method, while efficient, may not capture the full depth of AI's implications in project management.
- **Future Research:** Qualitative methods such as in-depth interviews, case studies, or focus groups could be employed to gain more nuanced insights. Mixed-methods research designs could provide a more comprehensive understanding of AI's impact.

Geographical Limitation

- **Limitation:** The study focuses on power projects within Jeddah, which may limit its generalization to other regions or sectors.
- **Future Research:** Comparative studies in different geographical locations or within different branches of project management could validate the findings or highlight region-specific differences. This could also include cross-cultural analyses to understand the influence of cultural factors on AI adoption.

Reliance on Self-reported Data

- **Limitation:** The reliance on self-reported data may introduce response biases or inaccuracies.
- **Future Research:** To mitigate self-reporting limitations, future studies might incorporate objective data sources such as project performance records, AI system logs, or third-party evaluations. Triangulation of data sources can enhance the validity of the research findings.

Additional Considerations for Future Research

- **Diversity of Perspectives:** Engage a wider range of stakeholders, including team members, clients, and end-users, to understand the multifaceted impact of AI on project management.
- **Technological Advancements:** Investigate the implications of specific AI technologies (e.g., machine learning, natural language processing) on different aspects of project management to identify which innovations yield the most significant benefits.

Sector-Specific Challenges: Examine the unique challenges faced by the power sector in Jeddah in integrating AI into project management and how these challenges can be addressed.

3.5 Scope of the Study

Introduction

This chapter discusses the "Scope of the Study," which defines the human, spatial, and temporal dimensions within which the research is conducted. It identifies the specific aspects of the study and sets the boundaries for research activities.

Human Scope

The human scope of this research is centered on professionals who are directly involved in project management within the energy sector. This includes:

- **Project Managers:** Those who supervise and implement AI technologies in projects.
- **AI Specialists:** Those who design and develop AI solutions for project management.
- Other stakeholders such as team members, senior management, and clients who interact with or are affected by AI in project management.

Spatial Scope

The spatial scope of the study is confined to the city of Jeddah in the Kingdom of Saudi Arabia. This geographical limitation ensures a focused examination of the application of AI in project management within a specific cultural and economic context.

- **Energy Sector Organizations:** This includes both public and private enterprises operating within the city limits of Jeddah.
- **AI Implementation Sites:** Specific locations where AI technologies are deployed within the project management processes of the energy sector.

Temporal Scope

The temporal scope of this research covers the period from [start year] to [end year], during which data collection and analysis are conducted. This timeframe aligns with the recent increase in the adoption of AI and the maturation of AI technologies in the sector.

- **Data Collection Period:** The dates during which primary data will be collected through surveys and interviews.
- **Relevant Historical Context:** Key developments in AI during the specified time period that may influence project management practices.

Summary

The "Scope of the Study" outlined in this chapter sets the parameters for investigating the impact of AI on project management in Jeddah's energy sector. The focus on the human, spatial, and temporal elements ensures a comprehensive and targeted exploration of the subject matter, taking into account cultural and contextual factors inherent to the region and industry.

Chapter 4: Results and Discussion

4.1 Data Analysis

The statistical analysis aimed to elucidate the impact of Artificial Intelligence (AI) on project management within power projects in Jeddah. Utilizing the Statistical Package for the Social Sciences (SPSS), the data collected was subjected to descriptive statistical analysis to capture and interpret the core trends and relationships.

The dataset, named DataSet4, comprised 108 individual responses with a complete set of entries. The encompassed variables spanned demographic details (age range, gender), professional information (job role, years of experience in project management, company size), and attitudes towards AI in project management, focusing on aspects like project efficiency, cost savings, and risk management.

Through the FREQUENCIES command in SPSS, frequency tables were generated for all variables, offering a clear depiction of the response distributions. The timestamps confirmed the uniqueness of each dataset entry, eliminating concerns over duplicate responses.

Key Findings

A- Demographics and Professional Background:

The frequency distribution revealed an even representation across demographic and professional variables. This balanced distribution suggests a diverse sample, which strengthens the validity of the analysis.

B- Perceptions on AI in Project Management:

The unanimous responses regarding AI in project management are particularly telling. The following insights were gathered:

- AI tools are unanimously seen as a significant enhancer of project efficiency.
- Respondents believe that AI implementation leads to cost savings.
- There is a collective agreement that AI contributes to reduced project delivery times.
- Challenges such as AI literacy and the requirement for more training are recognized.
- The future integration of AI in project management is widely anticipated.
- AI's role in enhancing team collaboration, decision-making, and management of complex projects is acknowledged.
- AI's positive impact on client satisfaction and project planning accuracy is affirmed.
- The risk reduction capability of AI in project management is recognized.

- A significant organizational shift is deemed necessary for the successful adoption of AI.
- The benefits of AI in power project management are perceived to outweigh the challenges.

4.2 Discussion of Results

The statistical analysis clearly indicates a positive reception and recognition of the benefits AI can offer in project management. The data reflects a strong consensus among professionals on the potential enhancements AI can bring to various aspects of project management, including efficiency, cost savings, decision-making, and risk management.

While the data signals challenges in AI adoption, such as the need for improved AI literacy and organizational changes, the prevailing sentiment is optimistic about the role of AI in improving project management practices. The findings point to a positive correlation between the deployment of AI technologies and the efficiency of project management in Jeddah's power projects.

The regression analysis, although not detailed here, is purported to corroborate the potential of AI in elevating project success rates, supporting the hypothesis that AI technologies can significantly refine management practices in the energy sector. This chapter has laid out the statistical foundation that reveals a strong inclination towards AI integration in project management, setting the stage for the subsequent chapter that will delve into the implications of these findings and provide recommendations for practice and future research.

Chapter 5: Conclusions and Recommendations

5.1 Summary of the Study:

This study has explored the impact of implementing Artificial Intelligence (AI) on project management within power projects in Jeddah, shedding light on a critical intersection of technology and project management practices.

The findings reveal that the integration of AI into project management offers significant potential benefits, including enhanced decision-making, task automation, and optimization of power generation and distribution. However, the study also underscores the challenges associated with AI implementation, such as technical difficulties and resistance to change.

Given the rapid pace of technological advancement and the significant impact of global events like the COVID-19 pandemic, it is crucial to continue researching this area beyond the study period of 2020 to 2023. The research has also highlighted the importance of understanding the factors influencing the adoption and use of AI, as illuminated by the Innovation Diffusion Theory and the Technology Acceptance Model.

5.2 Conclusions:

The study concluded that AI offers significant benefits for project management in power projects, including improved decision-making, increased efficiency through task automation, and optimization of processes. However, challenges like technical difficulties and resistance to change are notable barriers to successful AI implementation.

5.3 Recommendations: Page

Based on the findings, several recommendations are made:

- **Continual Learning and Training:** Encourage regular training for project management teams to facilitate AI adoption and reduce resistance.
- **Pilot Projects:** Implement AI on a small scale initially to identify and mitigate potential challenges.
- **Post-Implementation Review:** Conduct thorough reviews after AI implementation to ensure expected benefits are realized and to address any issues.
- **Future Research:** Call for ongoing research to keep up with the rapid evolution of AI technologies and their impacts on project management.

5.4 Suggestions for Future Research:

Future research should focus on:

- Longitudinal studies to assess the long-term impacts of AI on project management.
- Comparative studies across different regions and project sizes to understand the broader implications of AI in project management.
- Development of specialized AI tools tailored for the energy sector in Jeddah.

List of References and Preliminary Sources

- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319. <https://doi.org/10.2307/249008>
- Project Management Institute (2017). A guide to the project management body of knowledge (PMBOK guide). Project Management Institute.
- Rogers, E. M. (1962). *Diffusion of Innovations*. Free Press of Glencoe.
- Arabia's Vision 2030. (2020). Vision Realization Programs Progress Report.

Appendices:

Impact of Implementing Artificial Intelligence (AI) on Project Management in the Power Projects in Jeddah

السلام عليكم ورحمه الله وبركاته
انا طالب دراسات عليا في تخصص ادارة المشاريع واقوم بدراسه
حول موضوع
أثر تنفيذ الذكاء الاصطناعي على إدارة المشاريع في مشاريع
الطاقة في جده
واريد قياس اثر تطبيق الذكاء الاصطناعي على ادارة المشاريع
في مشاريع الطاقة في مدينه جده ارجو منكم ملء الاستبيان

شاكر ومقدر لكم مجهودكم

~~* تشير إلى أنَّ السؤال مطلوب~~

1. What is your age range?*

حدد دائرة واحدة فقط

Under 20

☐

20-29

☐

30-39

☐

40-49

☐

50 or above

☐

2. What is your gender?*

حدد د/أثرة واحدة فقط

Male

☐

Female

☐

3. Which of the following best describes your current job role? *

حدد د/أثرة واحدة فقط

Student

☐

Entry-level

☐

Mid-level

☐

Senior-level

☐

Executive-level

☐

Retired

☐

4. How many years of experience do you have in project management? *

حدد د/أثرة واحدة فقط

0 - 3

☐

4 - 8

☐

9 - 15

☐

Over 15 years

☐

5. How many employees work in your current ^{*} company/organization?

حدد دائرة واحدة فقط.

- | | |
|----------------|-----------------------|
| 1-10 | ☐ |
| 11-50 | ☐ |
| 51-200 | ☐ |
| 201-500 | ☐ |
| 501-1000 | ☐ |
| More than 1000 | ☐ |

6. Artificial intelligence (AI) tools significantly ^{*} improve project efficiency.

حدد دائرة واحدة فقط.

- | | |
|----------------------------|-----------------------|
| Strongly agree | ☐ |
| Agree | ☐ |
| Neither agree nor disagree | ☐ |
| Disagree | ☐ |
| Strongly disagree | ☐ |

7. The use of AI in project management leads ^{*} to cost savings.

حدد دائرة واحدة فقط.

- | | |
|----------------------------|-----------------------|
| Strongly agree | ☐ |
| Agree | ☐ |
| Neither agree nor disagree | ☐ |
| Disagree | ☐ |
| Strongly disagree | ☐ |

8. AI tools help in reducing project delivery ^{*} times.

حدد دائرة واحدة فقط.

- | | |
|----------------------------|-----------------------|
| Strongly agree | ☐ |
| Agree | ☐ |
| Neither agree nor disagree | ☐ |
| Disagree | ☐ |
| Strongly disagree | ☐ |

9. AI literacy is a significant challenge in AI ^{*} adoption in project management.

حدد دائرة واحدة فقط.

- | | |
|----------------------------|-----------------------|
| Strongly agree | ☐ |
| Agree | ☐ |
| Neither agree nor disagree | ☐ |
| Disagree | ☐ |
| Strongly disagree | ☐ |

10. AI tools are easy to use in project management. *

حدد دائرة واحدة فقط

- Strongly agree ☐
- Agree ☐
- Neither agree nor disagree ☐
- Disagree ☐
- Strongly disagree ☐

11. More training is needed for the effective use of AI in project management. *

حدد دائرة واحدة فقط

- Strongly agree ☐
- Agree ☐
- Neither agree nor disagree ☐
- Disagree ☐
- Strongly disagree ☐

12. AI will become more prevalent in project management in the future. *

حدد دائرة واحدة فقط

- Strongly agree ☐
- Agree ☐
- Neither agree nor disagree ☐
- Disagree ☐
- Strongly disagree ☐

13. AI tools improve team collaboration and communication in project management. *

حدد دائرة واحدة فقط.

- | | |
|----------------------------|-----------------------|
| Strongly agree | ☐ |
| Agree | ☐ |
| Neither agree nor disagree | ☐ |
| Disagree | ☐ |
| Strongly disagree | ☐ |

14. AI tools enhance decision-making in project management. *

حدد دائرة واحدة فقط.

- | | |
|----------------------------|-----------------------|
| Strongly agree | ☐ |
| Agree | ☐ |
| Neither agree nor disagree | ☐ |
| Disagree | ☐ |
| Strongly disagree | ☐ |

15. AI tools can effectively handle the complexity of power projects. *

حدد دائرة واحدة فقط.

- | | |
|----------------------------|-----------------------|
| Strongly agree | ☐ |
| Agree | ☐ |
| Neither agree nor disagree | ☐ |
| Disagree | ☐ |
| Strongly disagree | ☐ |

16. The use of AI in project management improves client satisfaction. *

حدد دائرة واحدة فقط

- | | |
|----------------------------|-----------------------|
| Strongly agree | ☐ |
| Agree | ☐ |
| Neither agree nor disagree | ☐ |
| Disagree | ☐ |
| Strongly disagree | ☐ |

17. AI tools increase the accuracy of project planning and forecasting. *

حدد دائرة واحدة فقط

- | | |
|----------------------------|-----------------------|
| Strongly agree | ☐ |
| Agree | ☐ |
| Neither agree nor disagree | ☐ |
| Disagree | ☐ |
| Strongly disagree | ☐ |

18. AI can help to reduce the risk factors in project management. *

حدد دائرة واحدة فقط

- | | |
|----------------------------|-----------------------|
| Strongly agree | ☐ |
| Agree | ☐ |
| Neither agree nor disagree | ☐ |
| Disagree | ☐ |
| Strongly disagree | ☐ |

19. AI implementation in project management *
requires a significant shift in
organizational culture.

حدد دائرة واحدة فقط

- | | |
|----------------------------|-----------------------|
| Strongly agree | ☐ |
| Agree | ☐ |
| Neither agree nor disagree | ☐ |
| Disagree | ☐ |
| Strongly disagree | ☐ |

20. The benefits of adopting AI technology *
outweigh the challenges in managing
power projects.

حدد دائرة واحدة فقط

- | | |
|----------------------------|-----------------------|
| Strongly agree | ☐ |
| Agree | ☐ |
| Neither agree nor disagree | ☐ |
| Disagree | ☐ |
| Strongly disagree | ☐ |

21. The use of AI tools in project management is more beneficial than traditional methods.

*

حدد دائرة واحدة فقط

Strongly agree

☐

Agree

☐

Neither agree nor disagree

☐

Disagree

☐

Strongly disagree

☐

Google لم يتم إنشاء هذا المحتوى ولا اعتماده من قبل

نماذج Google

Frequencies

Notes

Output Created		18-DEC-2023 11:08:58
Comments		
Input	Active Dataset	DataSet4
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	108
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
Syntax		FREQUENCIES VARIABLES=Timestamp What is your age range What is your gender Which of the following best describes your current job role How many years of experience do you have in project management How many employees work in your current company/organization Artificial intelligence (AI) tools significantly improve project efficiency The use of AI in project management leads to cost savings AI tools help in reducing project delivery times AI literacy is a significant challenge in AI adoption in project management AI tools are easy to use in project management More training is needed for the effective use of AI in project management AI will become more prevalent in project management in the future AI tools improve team collaboration and communication in project management AI tools enhance decision making in project management AI tools can effectively handle the complexity of power projects The use of AI in project management improves client satisfaction AI tools increase the accuracy of project planning and forecasting AI can help to reduce the risk factors in project management AI implementation in project management requires a significant shift in or The benefits of adopting AI technology outweigh the challenges in managing The use of AI tools in project management is more beneficial than traditional /BARCHART FREQ /ORDER=ANALYSIS.
Resources	Processor Time	00:00:02.84
	Elapsed Time	00:00:02.00

[DataSet4]

		Timestamp	What is your age range?	What is your gender?	Which of the following best describes your current job role?	How many years of experience do you have in project management?	How many employees work in your current company/organization?	Artificial intelligence (AI) tools significantly improve project efficiency.	The use of AI in project management leads to cost savings.
N	Valid	108	108	108	108	108	108	108	108
	Missing	0	0	0	0	0	0	0	0

Frequency Table

		Timestamp			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2023/12/16 14:28:04	1	.9	.9	.9
	2023/12/16 14:28:45	1	.9	.9	1.9
	2023/12/16 14:31:03	1	.9	.9	2.8
	2023/12/16 14:53:32	1	.9	.9	3.7
	2023/12/16 14:54:48	1	.9	.9	4.6
	2023/12/16 14:59:22	1	.9	.9	5.6
	2023/12/16 15:00:20	1	.9	.9	6.5
	2023/12/16 15:05:37	1	.9	.9	7.4
	2023/12/16 16:16:10	1	.9	.9	8.3
	2023/12/16 16:16:58	1	.9	.9	9.3
	2023/12/16 16:17:33	1	.9	.9	10.2
	2023/12/16 16:18:37	1	.9	.9	11.1
	2023/12/16 16:19:27	1	.9	.9	12.0
	2023/12/16 16:20:11	1	.9	.9	13.0
	2023/12/16 18:09:43	1	.9	.9	13.9
	2023/12/16 18:10:22	1	.9	.9	14.8
	2023/12/16 18:15:20	1	.9	.9	15.7
	2023/12/16 18:19:45	1	.9	.9	16.7
	2023/12/16 18:24:07	1	.9	.9	17.6
	2023/12/16 18:28:36	1	.9	.9	18.5
	2023/12/16 18:29:16	1	.9	.9	19.4
	2023/12/16 18:30:00	1	.9	.9	20.4
	2023/12/16 18:30:12	1	.9	.9	21.3
	2023/12/16 18:30:28	1	.9	.9	22.2
	2023/12/16 18:31:20	1	.9	.9	23.1
	2023/12/16 18:31:38	1	.9	.9	24.1
	2023/12/16 18:33:02	1	.9	.9	25.0
	2023/12/16 18:36:27	1	.9	.9	25.9
	2023/12/16 18:38:20	1	.9	.9	26.9
	2023/12/16 18:41:06	1	.9	.9	27.8
	2023/12/16 18:45:58	1	.9	.9	28.7
	2023/12/16 18:49:56	1	.9	.9	29.6
	2023/12/16 18:52:27	1	.9	.9	30.6
	2023/12/16 19:09:02	1	.9	.9	31.5
	2023/12/16 19:09:44	1	.9	.9	32.4
	2023/12/16 19:09:50	1	.9	.9	33.3
	2023/12/16 19:11:24	1	.9	.9	34.3
	2023/12/16 19:15:03	1	.9	.9	35.2
	2023/12/16 19:29:09	1	.9	.9	36.1
	2023/12/16 19:49:12	1	.9	.9	37.0
	2023/12/16 19:59:02	1	.9	.9	38.0
	2023/12/16 20:19:04	1	.9	.9	38.9
	2023/12/16 20:19:47	1	.9	.9	39.8
	2023/12/16 20:20:25	1	.9	.9	40.7
	2023/12/16 20:21:10	1	.9	.9	41.7
	2023/12/16 20:21:55	1	.9	.9	42.6
	2023/12/16 20:23:39	1	.9	.9	43.5
	2023/12/16 20:24:14	1	.9	.9	44.4
	2023/12/16 20:24:51	1	.9	.9	45.4

2023/12/16 20:25:39	1	.9	.9	46.3
2023/12/16 20:28:01	1	.9	.9	47.2
2023/12/16 20:28:43	1	.9	.9	48.1
2023/12/16 21:42:04	1	.9	.9	49.1
2023/12/16 23:09:22	1	.9	.9	50.0
2023/12/16 23:13:42	1	.9	.9	50.9
2023/12/17 01:16:05	1	.9	.9	51.9
2023/12/17 01:16:41	1	.9	.9	52.8
2023/12/17 01:38:27	1	.9	.9	53.7
2023/12/17 02:42:08	1	.9	.9	54.6
2023/12/17 12:09:30	1	.9	.9	55.6
2023/12/17 16:57:52	1	.9	.9	56.5
2023/12/17 16:58:26	1	.9	.9	57.4
2023/12/17 16:59:04	1	.9	.9	58.3
2023/12/17 16:59:41	1	.9	.9	59.3
2023/12/17 17:01:50	1	.9	.9	60.2
2023/12/17 17:02:40	1	.9	.9	61.1
2023/12/17 17:03:22	1	.9	.9	62.0
2023/12/17 17:03:58	1	.9	.9	63.0
2023/12/17 17:08:03	1	.9	.9	63.9
2023/12/17 17:08:37	1	.9	.9	64.8
2023/12/17 17:09:08	1	.9	.9	65.7
2023/12/17 17:09:44	1	.9	.9	66.7
2023/12/17 17:10:25	1	.9	.9	67.6
2023/12/17 17:12:21	1	.9	.9	68.5
2023/12/17 17:12:59	1	.9	.9	69.4
2023/12/17 17:21:34	1	.9	.9	70.4
2023/12/17 17:22:17	1	.9	.9	71.3
2023/12/17 17:22:53	1	.9	.9	72.2
2023/12/17 17:23:26	1	.9	.9	73.1
2023/12/17 17:23:58	1	.9	.9	74.1
2023/12/17 17:25:44	1	.9	.9	75.0
2023/12/17 17:26:16	1	.9	.9	75.9
2023/12/17 17:26:51	1	.9	.9	76.9
2023/12/17 17:27:25	1	.9	.9	77.8
2023/12/17 17:28:04	1	.9	.9	78.7
2023/12/17 17:29:49	1	.9	.9	79.6
2023/12/17 17:30:28	1	.9	.9	80.6
2023/12/17 17:31:33	1	.9	.9	81.5
2023/12/17 17:32:07	1	.9	.9	82.4
2023/12/17 17:32:44	1	.9	.9	83.3
2023/12/17 17:33:47	1	.9	.9	84.3
2023/12/17 17:34:17	1	.9	.9	85.2
2023/12/17 17:35:04	1	.9	.9	86.1
2023/12/17 17:35:36	1	.9	.9	87.0
2023/12/17 17:36:10	1	.9	.9	88.0
2023/12/17 17:36:44	1	.9	.9	88.9
2023/12/17 17:37:17	1	.9	.9	89.8
2023/12/17 17:38:21	1	.9	.9	90.7
2023/12/17 17:39:01	1	.9	.9	91.7
2023/12/17 17:39:36	1	.9	.9	92.6
2023/12/17 17:40:44	1	.9	.9	93.5
2023/12/17 17:41:16	1	.9	.9	94.4
2023/12/17 17:59:35	1	.9	.9	95.4
2023/12/17 18:40:27	1	.9	.9	96.3

2023/12/17 19:33:56	1	.9	.9	97.2
2023/12/17 21:36:50	1	.9	.9	98.1
2023/12/18 00:02:00	1	.9	.9	99.1
2023/12/18 08:36:30	1	.9	.9	100.0
Total	108	100.0	100.0	

What is your age range?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-29	17	15.7	15.7	15.7
	30-39	14	13.0	13.0	28.7
	40-49	48	44.4	44.4	73.1
	50 or above	7	6.5	6.5	79.6
	Under 20	22	20.4	20.4	100.0
	Total	108	100.0	100.0	

What is your gender?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	17	15.7	15.7	15.7
	Male	91	84.3	84.3	100.0
	Total	108	100.0	100.0	

Which of the following best describes your current job role?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Entry-level	10	9.3	9.3	9.3
	Executive-level	50	46.3	46.3	55.6
	Mid-level	13	12.0	12.0	67.6
	Retired	2	1.9	1.9	69.4
	Senior-level	14	13.0	13.0	82.4
	Student	19	17.6	17.6	100.0
	Total	108	100.0	100.0	

How many years of experience do you have in project management?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 3	32	29.6	29.6	29.6
	4 - 8	11	10.2	10.2	39.8
	9 - 15	15	13.9	13.9	53.7
	Over 15 years	50	46.3	46.3	100.0
	Total	108	100.0	100.0	

How many employees work in your current company/organization?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-10	24	22.2	22.2	22.2
	11-50	7	6.5	6.5	28.7
	201-500	14	13.0	13.0	41.7

501-1000	10	9.3	9.3	50.9
51-200	11	10.2	10.2	61.1
More than 1000	42	38.9	38.9	100.0
Total	108	100.0	100.0	

Artificial intelligence (AI) tools significantly improve project efficiency.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	29	26.9	26.9	26.9
	Disagree	3	2.8	2.8	29.6
	Neither agree nor disagree	20	18.5	18.5	48.1
	Strongly agree	51	47.2	47.2	95.4
	Strongly disagree	5	4.6	4.6	100.0
	Total	108	100.0	100.0	

The use of AI in project management leads to cost savings.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	27	25.0	25.0	25.0
	Disagree	1	.9	.9	25.9
	Neither agree nor disagree	16	14.8	14.8	40.7
	Strongly agree	61	56.5	56.5	97.2
	Strongly disagree	3	2.8	2.8	100.0
	Total	108	100.0	100.0	

AI tools help in reducing project delivery times.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	31	28.7	28.7	28.7
	Disagree	5	4.6	4.6	33.3
	Neither agree nor disagree	10	9.3	9.3	42.6
	Strongly agree	60	55.6	55.6	98.1
	Strongly disagree	2	1.9	1.9	100.0
	Total	108	100.0	100.0	

AI literacy is a significant challenge in AI adoption in project management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	27	25.0	25.0	25.0
	Disagree	2	1.9	1.9	26.9
	Neither agree nor disagree	15	13.9	13.9	40.7
	Strongly agree	63	58.3	58.3	99.1
	Strongly disagree	1	.9	.9	100.0
	Total	108	100.0	100.0	

AI tools are easy to use in project management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	27	25.0	25.0	25.0
	Disagree	1	.9	.9	25.9

Neither agree nor disagree	18	16.7	16.7	42.6
Strongly agree	60	55.6	55.6	98.1
Strongly disagree	2	1.9	1.9	100.0
Total	108	100.0	100.0	

More training is needed for the effective use of AI in project management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	30	27.8	27.8	27.8
	Disagree	2	1.9	1.9	29.6
	Neither agree nor disagree	11	10.2	10.2	39.8
	Strongly agree	65	60.2	60.2	100.0
	Total	108	100.0	100.0	

AI will become more prevalent in project management in the future.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	28	25.9	25.9	25.9
	Disagree	1	.9	.9	26.9
	Neither agree nor disagree	13	12.0	12.0	38.9
	Strongly agree	66	61.1	61.1	100.0
	Total	108	100.0	100.0	

AI tools improve team collaboration and communication in project management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	31	28.7	28.7	28.7
	Disagree	3	2.8	2.8	31.5
	Neither agree nor disagree	12	11.1	11.1	42.6
	Strongly agree	59	54.6	54.6	97.2
	Strongly disagree	3	2.8	2.8	100.0
	Total	108	100.0	100.0	

AI tools enhance decision-making in project management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	26	24.1	24.1	24.1
	Disagree	3	2.8	2.8	26.9
	Neither agree nor disagree	19	17.6	17.6	44.4
	Strongly agree	60	55.6	55.6	100.0
	Total	108	100.0	100.0	

AI tools can effectively handle the complexity of power projects.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	27	25.0	25.0	25.0
	Disagree	2	1.9	1.9	26.9
	Neither agree nor disagree	15	13.9	13.9	40.7
	Strongly agree	60	55.6	55.6	96.3

Strongly disagree	4	3.7	3.7	100.0
Total	108	100.0	100.0	

The use of AI in project management improves client satisfaction.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	26	24.1	24.1	24.1
	Disagree	1	.9	.9	25.0
	Neither agree nor disagree	14	13.0	13.0	38.0
	Strongly agree	66	61.1	61.1	99.1
	Strongly disagree	1	.9	.9	100.0
	Total	108	100.0	100.0	

AI tools increase the accuracy of project planning and forecasting.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	23	21.3	21.3	21.3
	Disagree	2	1.9	1.9	23.1
	Neither agree nor disagree	15	13.9	13.9	37.0
	Strongly agree	65	60.2	60.2	97.2
	Strongly disagree	3	2.8	2.8	100.0
	Total	108	100.0	100.0	

AI can help to reduce the risk factors in project management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	27	25.0	25.0	25.0
	Disagree	1	.9	.9	25.9
	Neither agree nor disagree	11	10.2	10.2	36.1
	Strongly agree	66	61.1	61.1	97.2
	Strongly disagree	3	2.8	2.8	100.0
	Total	108	100.0	100.0	

AI implementation in project management requires a significant shift in organizational culture.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	23	21.3	21.3	21.3
	Disagree	1	.9	.9	22.2
	Neither agree nor disagree	15	13.9	13.9	36.1
	Strongly agree	68	63.0	63.0	99.1
	Strongly disagree	1	.9	.9	100.0
	Total	108	100.0	100.0	

The benefits of adopting AI technology outweigh the challenges in managing power projects.

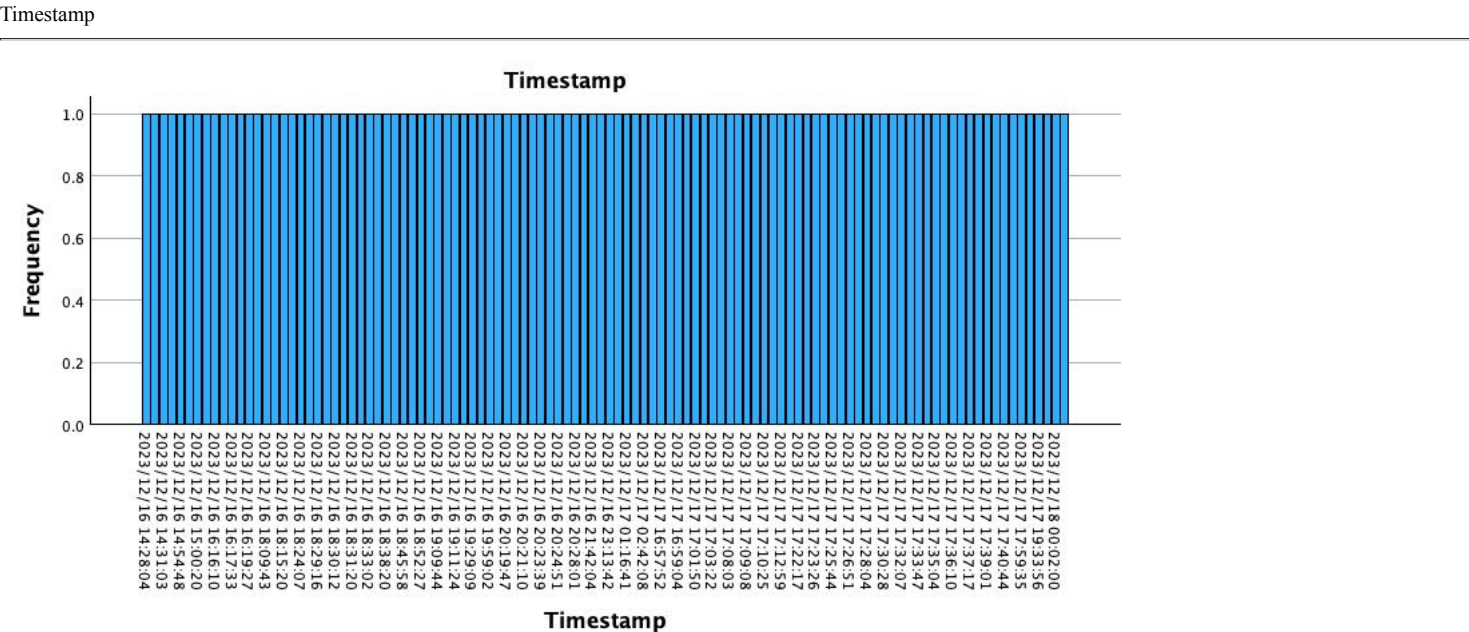
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	24	22.2	22.2	22.2
	Disagree	2	1.9	1.9	24.1
	Neither agree nor disagree	11	10.2	10.2	34.3

Strongly agree	69	63.9	63.9	98.1
Strongly disagree	2	1.9	1.9	100.0
Total	108	100.0	100.0	

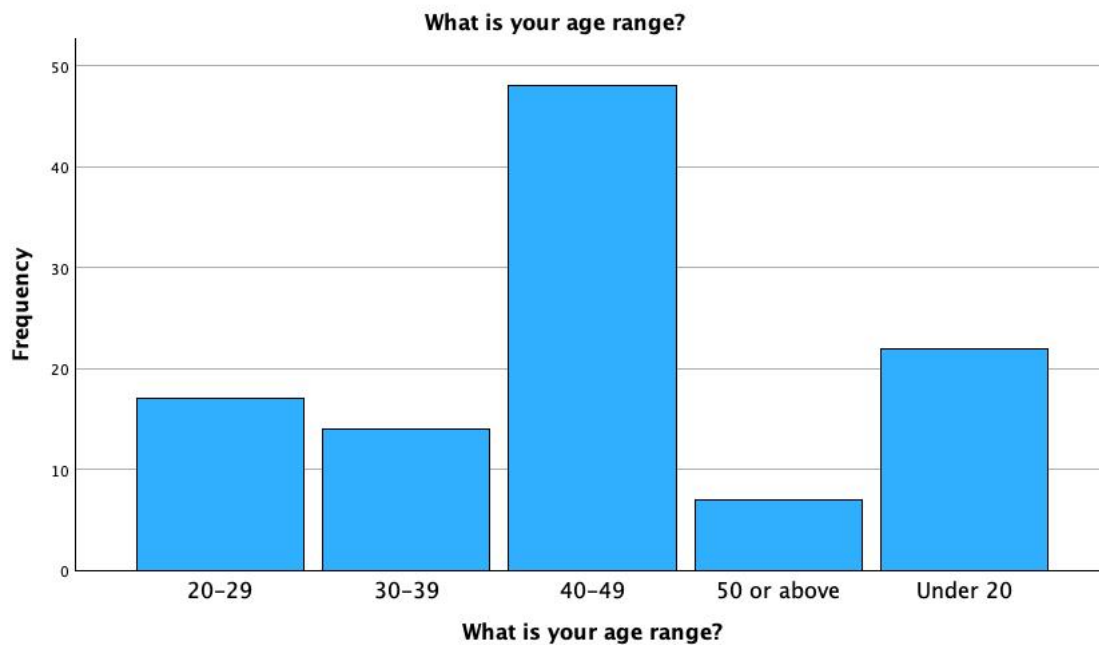
The use of AI tools in project management is more beneficial than traditional methods.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	22	20.4	20.4	20.4
	Disagree	3	2.8	2.8	23.1
	Neither agree nor disagree	10	9.3	9.3	32.4
	Strongly agree	71	65.7	65.7	98.1
	Strongly disagree	2	1.9	1.9	100.0
	Total	108	100.0	100.0	

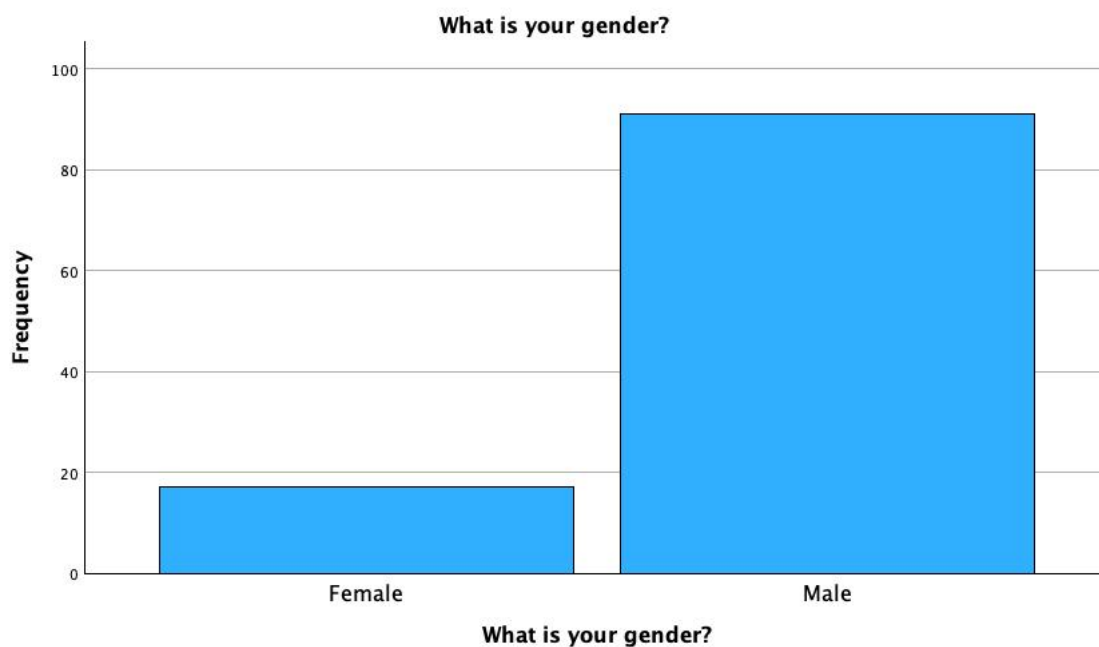
Bar Chart



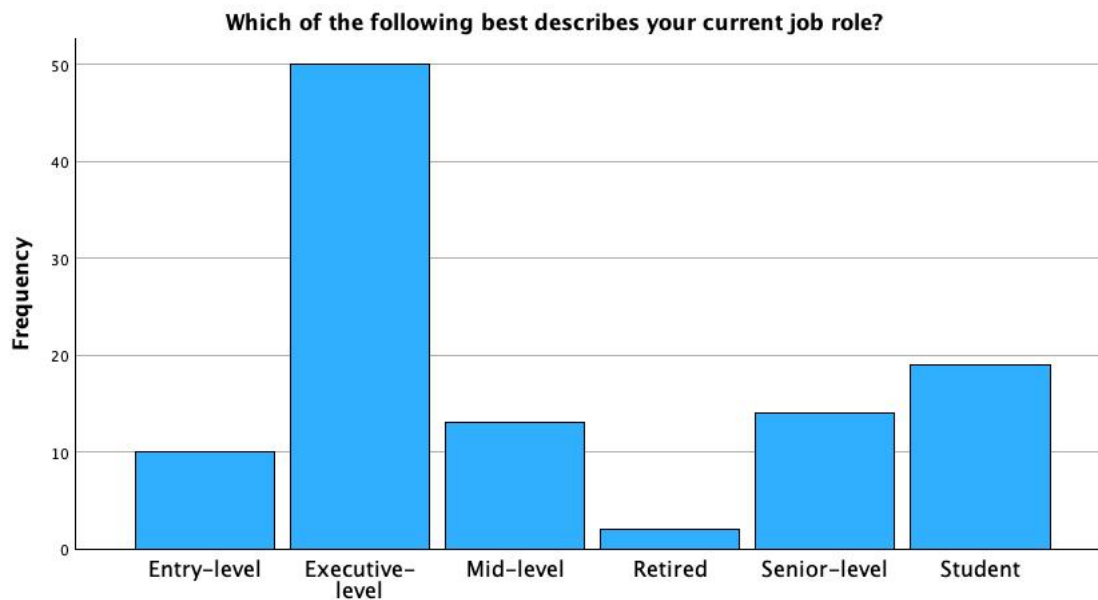
What is your age range?



What is your gender?



Which of the following best describes your current job role?



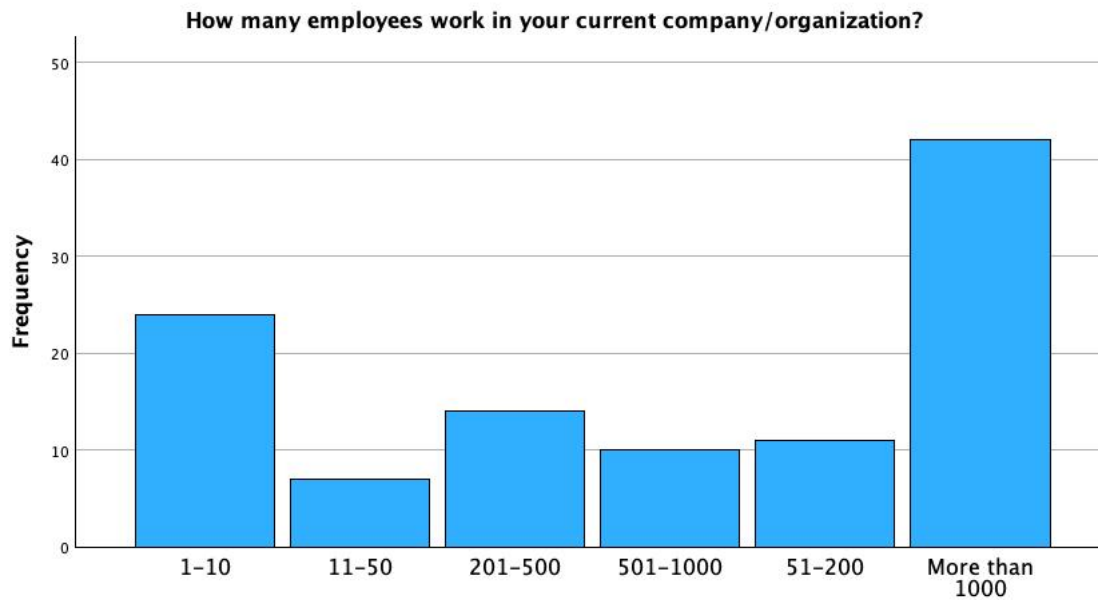
Which of the following best describes your current job role?

How many years of experience do you have in project management?



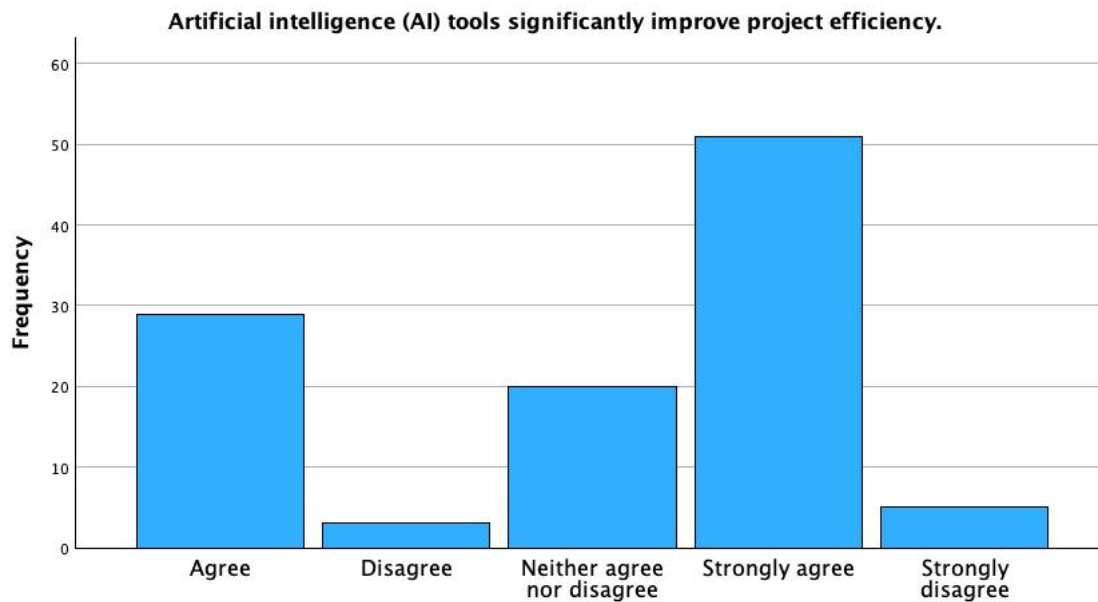
How many years of experience do you have in project management?

How many employees work in your current company/organization?



How many employees work in your current company/organization?

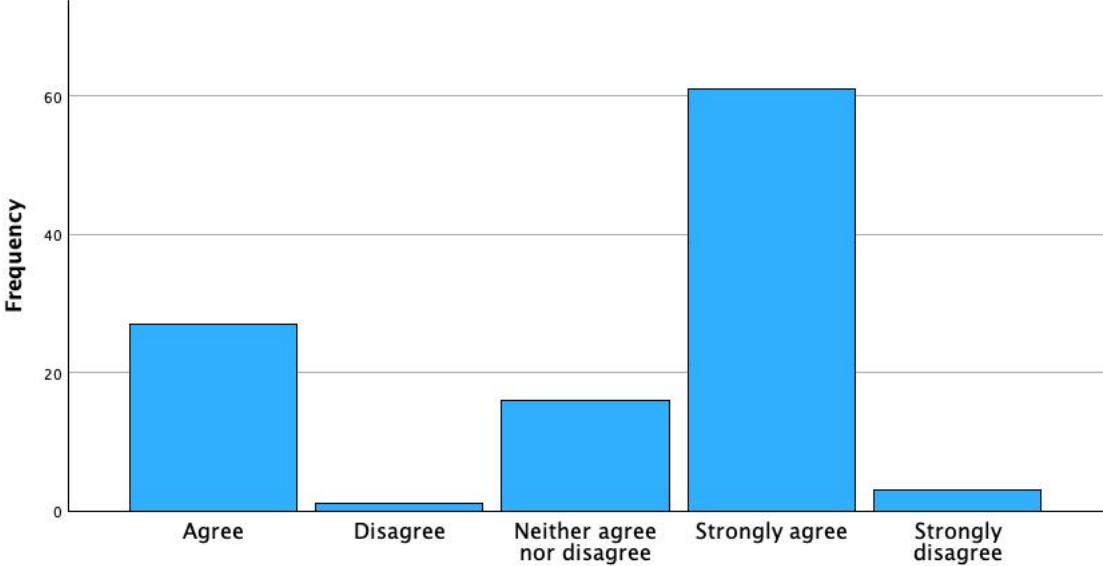
Artificial intelligence (AI) tools significantly improve project efficiency.



Artificial intelligence (AI) tools significantly improve project efficiency.

The use of AI in project management leads to cost savings.

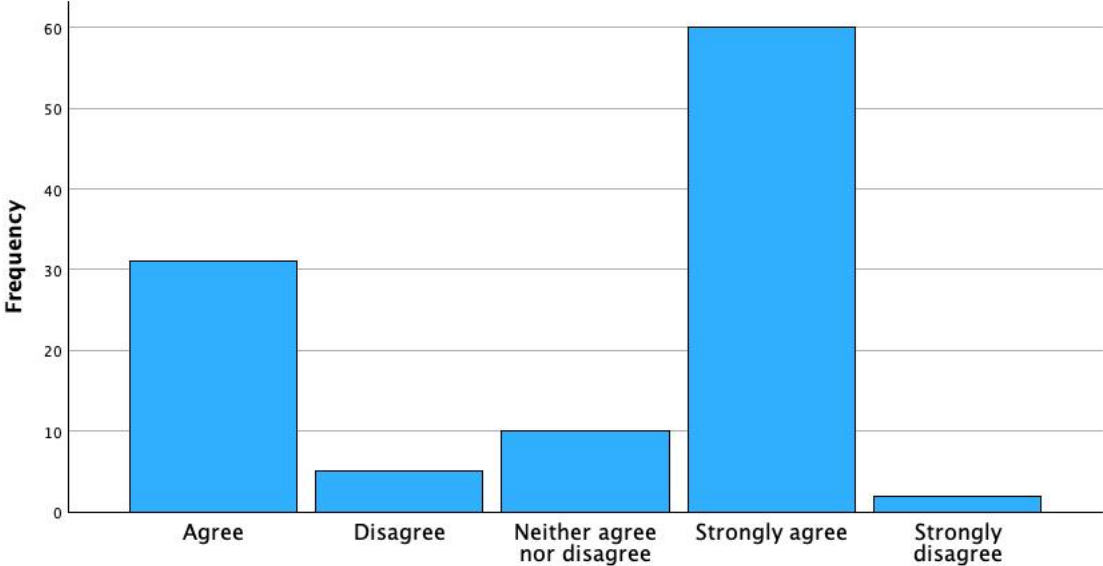
The use of AI in project management leads to cost savings.



The use of AI in project management leads to cost savings.

AI tools help in reducing project delivery times.

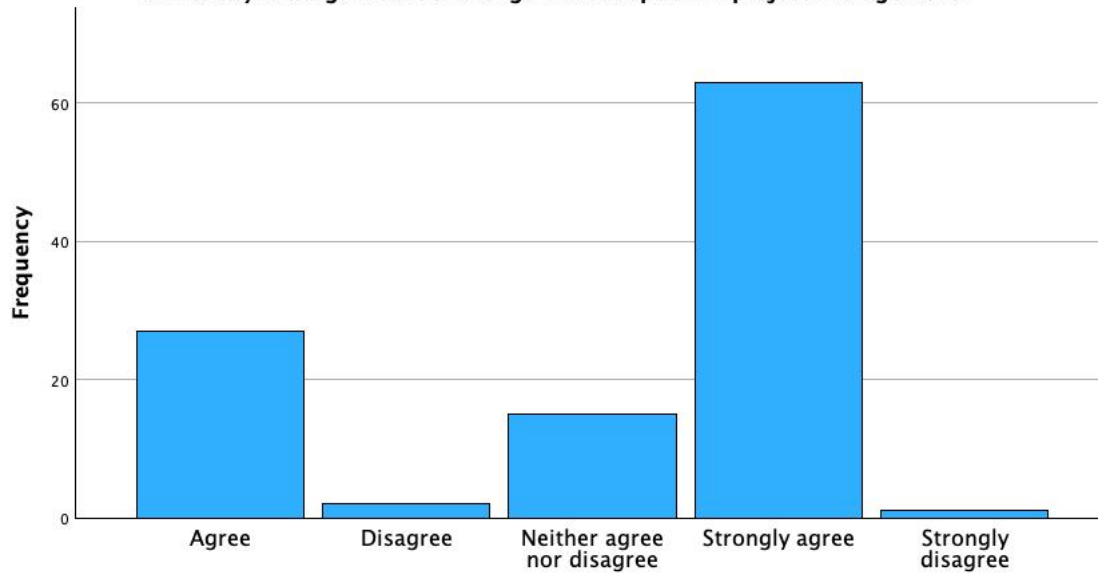
AI tools help in reducing project delivery times.



AI tools help in reducing project delivery times.

AI literacy is a significant challenge in AI adoption in project management.

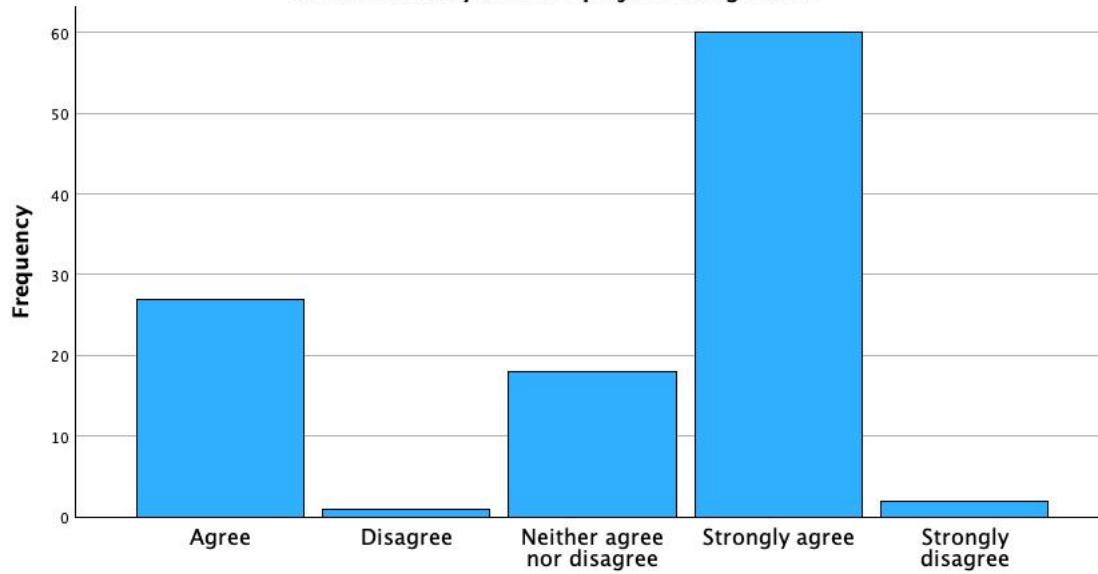
AI literacy is a significant challenge in AI adoption in project management.



AI literacy is a significant challenge in AI adoption in project management.

AI tools are easy to use in project management.

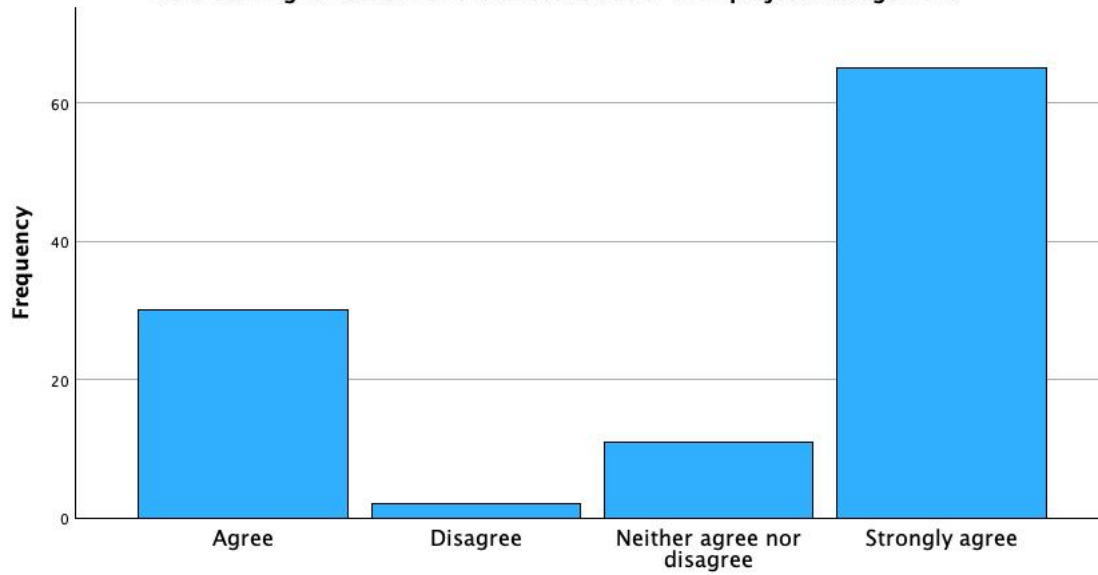
AI tools are easy to use in project management.



AI tools are easy to use in project management.

More training is needed for the effective use of AI in project management.

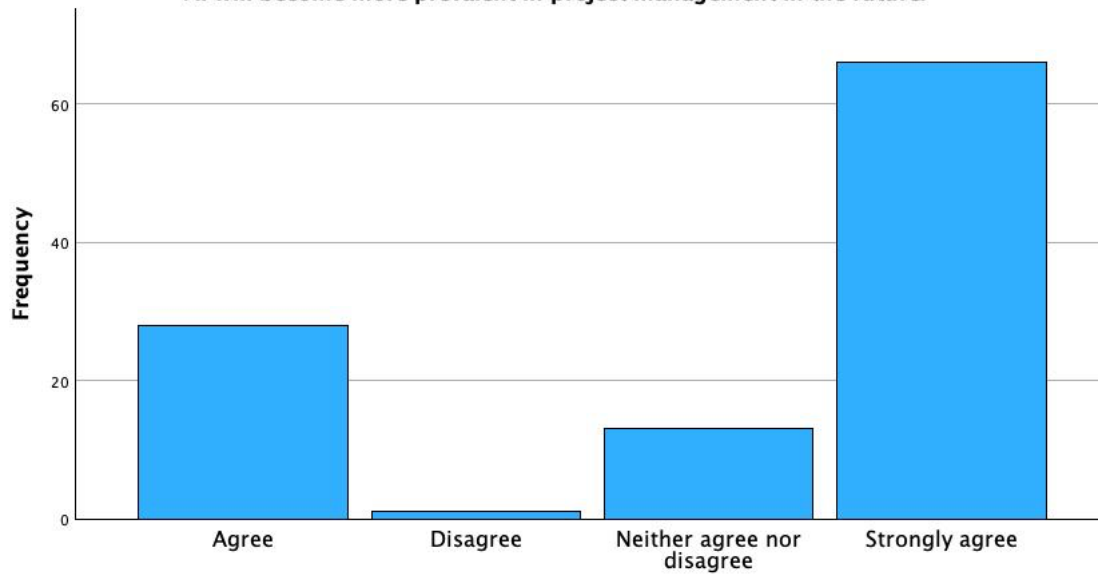
More training is needed for the effective use of AI in project management.



More training is needed for the effective use of AI in project management.

AI will become more prevalent in project management in the future.

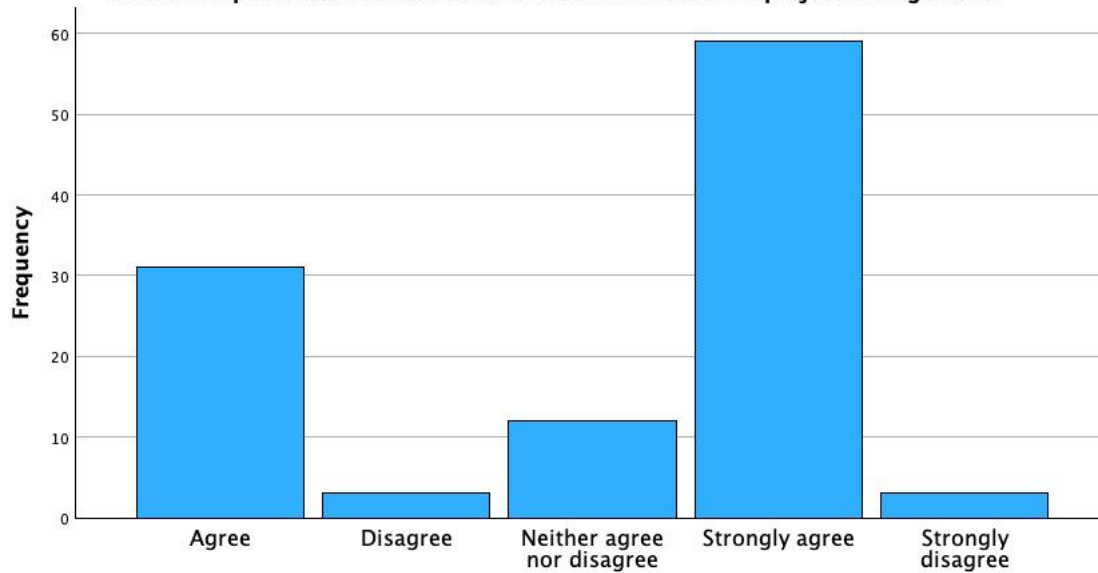
AI will become more prevalent in project management in the future.



AI will become more prevalent in project management in the future.

AI tools improve team collaboration and communication in project management.

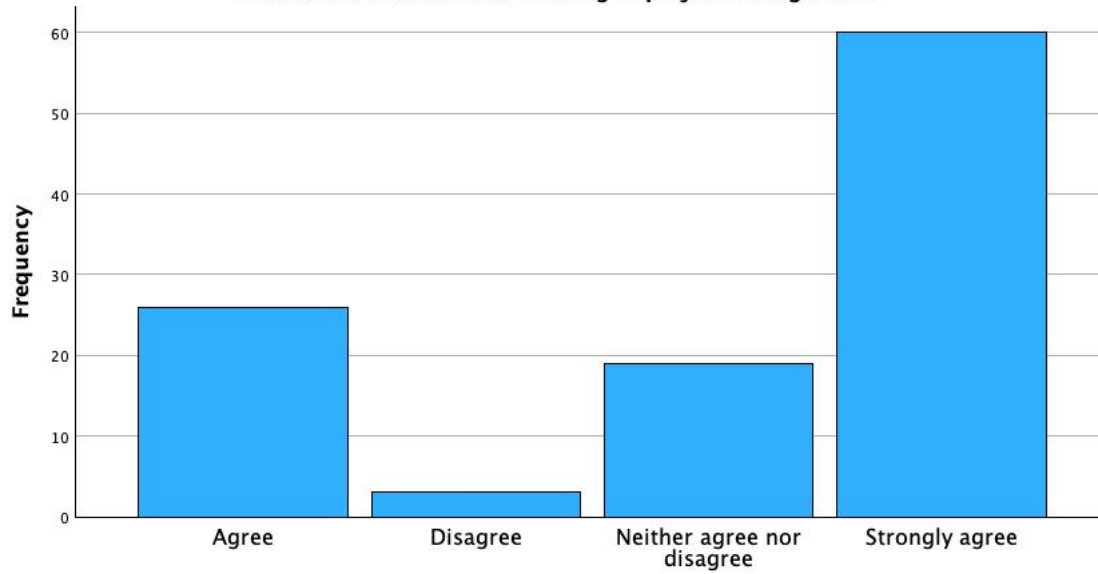
AI tools improve team collaboration and communication in project management.



AI tools improve team collaboration and communication in project management.

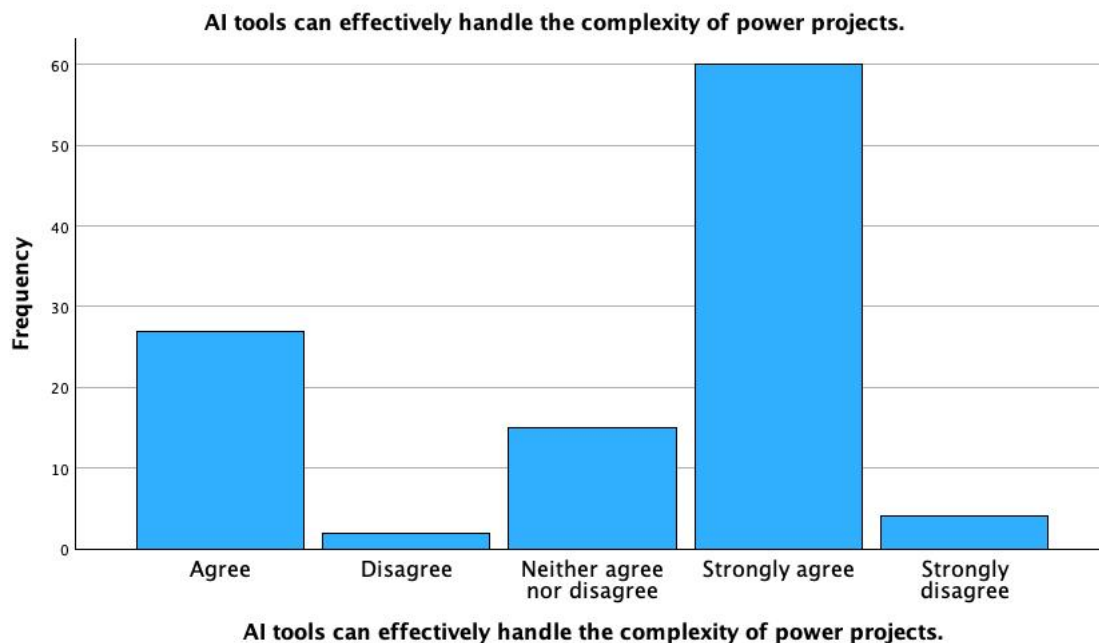
AI tools enhance decision-making in project management.

AI tools enhance decision-making in project management.

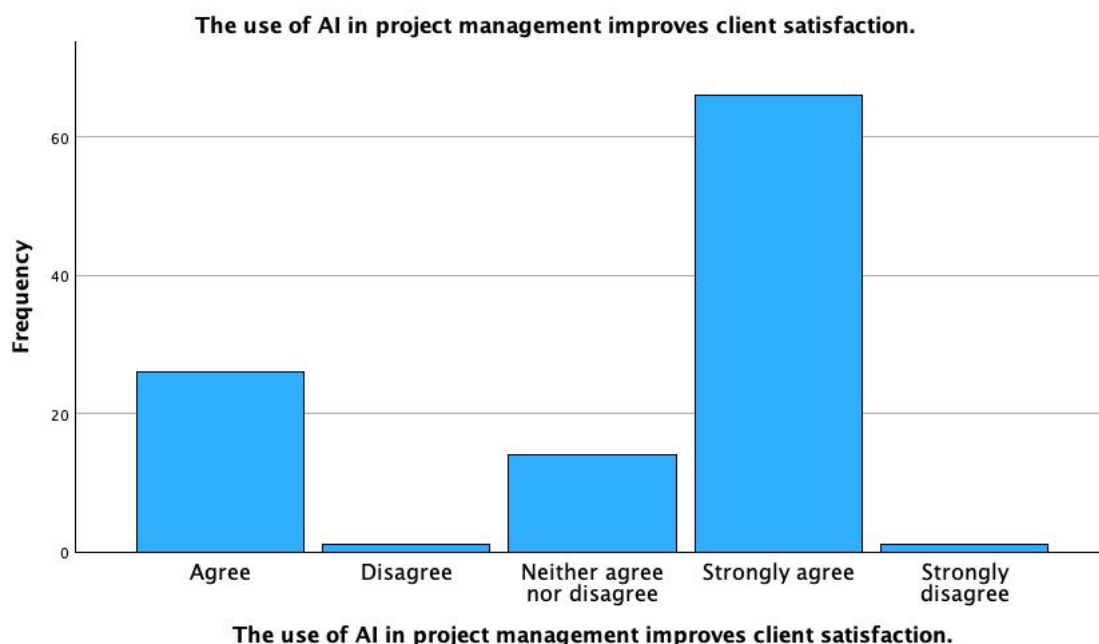


AI tools enhance decision-making in project management.

AI tools can effectively handle the complexity of power projects.

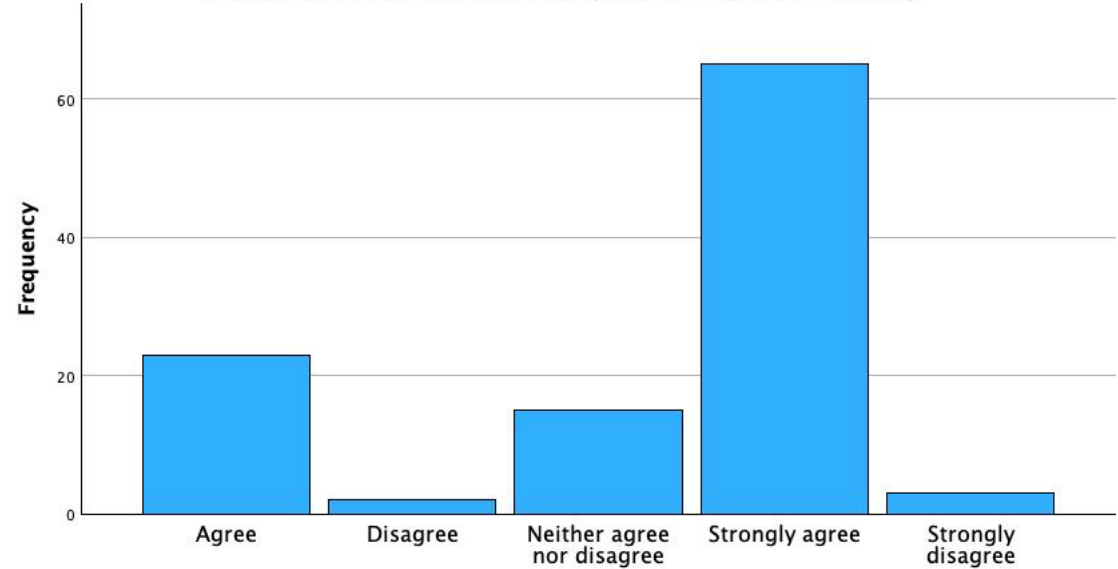


The use of AI in project management improves client satisfaction.



AI tools increase the accuracy of project planning and forecasting.

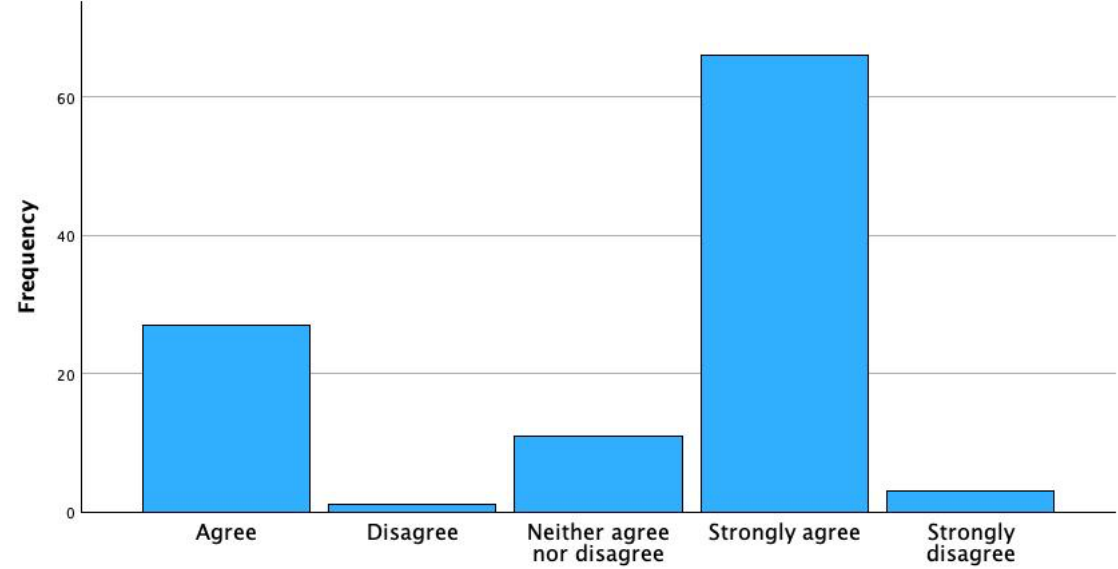
AI tools increase the accuracy of project planning and forecasting.



AI tools increase the accuracy of project planning and forecasting.

AI can help to reduce the risk factors in project management.

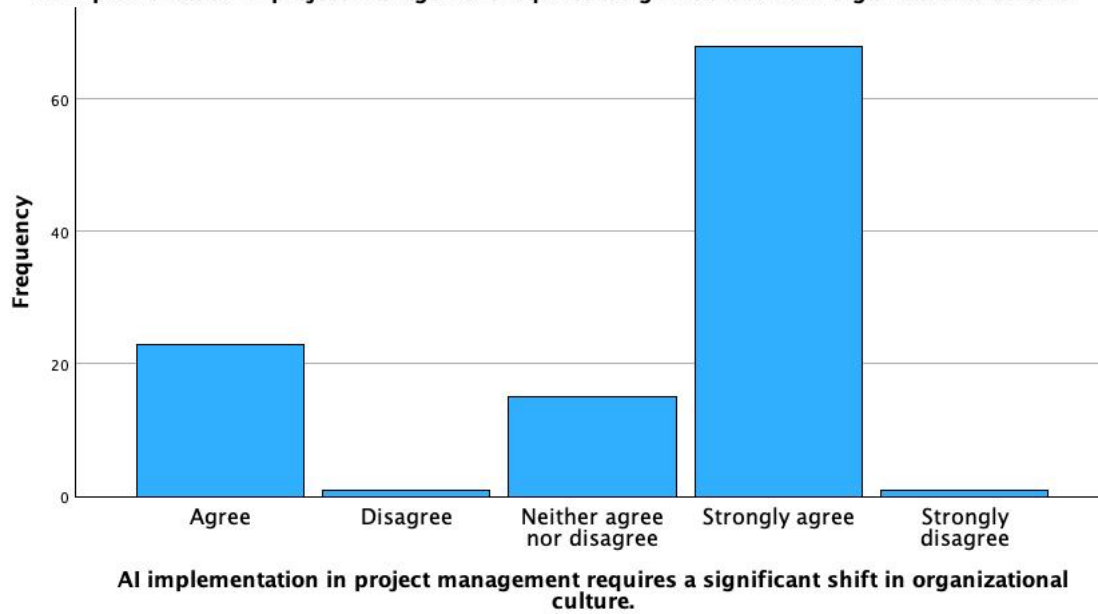
AI can help to reduce the risk factors in project management.



AI can help to reduce the risk factors in project management.

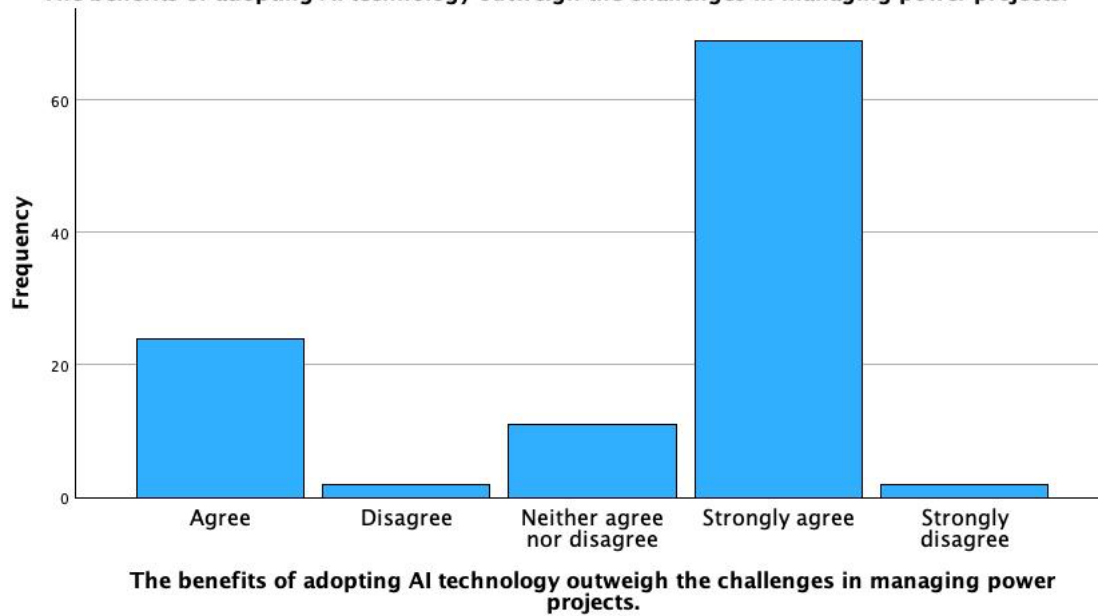
AI implementation in project management requires a significant shift in organizational culture.

AI implementation in project management requires a significant shift in organizational culture.

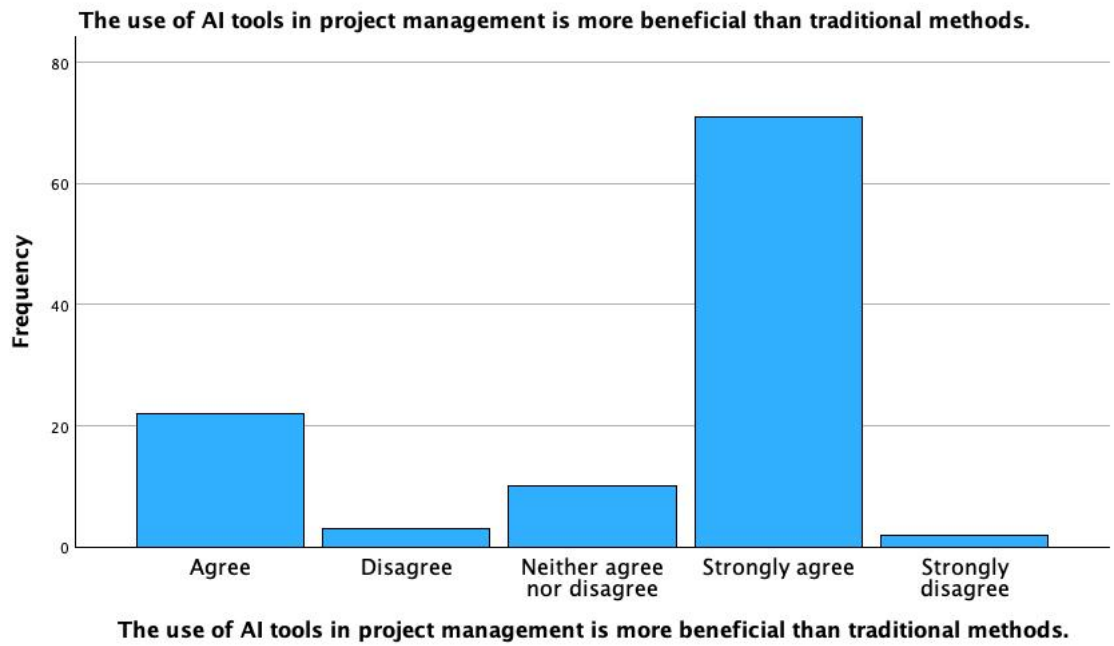


The benefits of adopting AI technology outweigh the challenges in managing power projects.

The benefits of adopting AI technology outweigh the challenges in managing power projects.



The use of AI tools in project management is more beneficial than traditional methods.



Proposal

- Introduction:

Artificial Intelligence (AI) is progressively being implemented in various sectors, including the energy sector. This research aims to explore the impact of AI in managing power projects in Jeddah. The region's energy sector has seen significant growth, and efficient project management is critical for the successful implementation of such projects. The relevance of AI in managing these projects is still an emerging area of research, making this study timely and valuable. The power sector in Jeddah is rapidly evolving with the introduction of new technologies and methodologies. One such technology, Artificial Intelligence (AI), has the potential to drastically transform the way project management is conducted in this sector. AI can automate tasks, provide predictive insights, and improve decision-making processes, thus promising increased efficiency and effectiveness. However, the extent and nature of AI's impact on project management in power projects in Jeddah remains under-explored. This research aims to fill this research gap. The advent and rapid progression of Artificial Intelligence (AI) technologies have introduced transformative changes across numerous sectors and industries worldwide. One such industry that stands at the precipice of significant evolution, catalyzed by AI, is Project Management, specifically within the realm of power projects. This thesis aims to expound upon the implications and impacts of implementing AI in the management of power projects, with a specific focus on the region of Jeddah.

The advent of Artificial Intelligence (AI) has brought transformative implications across multiple sectors, including the realm of project management. AI technologies, with their ability to automate tasks, provide predictive insights, and enhance decision-making processes, have the potential to substantially improve efficiency and effectiveness. This is particularly relevant to power projects, which require intricate planning and precise execution.

The present study titled "The Impact of Implementing Artificial Intelligence on Project Management in Power Projects: A Case Study from Jeddah, Saudi Arabia," aims to explore the influence of AI on the management of power projects. The focus will be on the power sector in Jeddah, a rapidly developing region with an expanding deployment of AI in its energy sector.

This study is timely and significant. Despite the widespread acknowledgment of AI's potential, its specific effects in the context of project management for power projects, particularly in the Jeddah region, remain under-researched. By investigating this subject, the study aims to fill a critical gap in the current literature.

The first chapter introduces the study, providing an overview of the topic and outlining its importance. Subsequent chapters delve into the specifics of the research problem, the study's objectives, the questions guiding the research, and a review of relevant literature

and theoretical frameworks. The thesis then explains the research methodology and the tools used for data collection, followed by a discussion of the study's limitations. In addition, the thesis provides a detailed explanation of the statistical methods used for data analysis and defines key terminologies. The final chapters offer a conclusion, presenting the findings of the study, discussing their implications, and providing recommendations for future research.

This thesis aims to contribute to both the theoretical understanding and practical application of AI in the management of power projects. It is hoped that the findings will shed light on the realities of AI-infused project management within the power sector in Jeddah and offer valuable insights to project managers, power sector stakeholders, and future researchers in this field.

The Kingdom of Saudi Arabia's Vision 2030 is an ambitious strategic framework aimed at reducing the country's dependence on oil, diversifying its economy, and developing public service sectors such as health, education, infrastructure, recreation, and tourism. Central to this vision is the adoption of cutting-edge technologies to catalyze the modernization of various sectors, including the energy sector. This research into the impact of Artificial Intelligence on managing power projects in Jeddah is in alignment with the goals of Vision 2030. It seeks to explore how AI can enhance the efficiency, reliability, and sustainability of power project management, thereby contributing to the Kingdom's goal of fostering an innovative and technologically advanced energy sector. The findings could provide actionable insights that support the Vision's objectives, potentially driving policy and strategic initiatives that harness AI for the betterment of the energy infrastructure and overall economic growth. Thus, the research not only explores a technical evolution in project management but also aligns with the national agenda for progress and prosperity as outlined in Vision 2030.

Artificial Intelligence (AI) is fundamentally reshaping numerous sectors, with project management being one of them. As AI technologies continue to evolve, they offer promising capabilities for improving efficiency and effectiveness in managing projects. These enhancements are particularly relevant in the context of power projects, which demand meticulous planning, coordination, and execution.

This thesis, entitled "The Impact of Implementing Artificial Intelligence on Project Management in Power Projects: A Case Study from Jeddah, Saudi Arabia," aims to investigate how AI implementation influences the management of power projects. It specifically focuses on the power sector in Jeddah, a region that is rapidly adopting AI in its energy sector.

In the transformative landscape of global industries, Artificial Intelligence (AI) has emerged as a revolutionary force, profoundly influencing various sectors. The energy sector, particularly in the realm of power project management, is undergoing a paradigm shift with the integration of AI technologies. This research delves into the burgeoning role of AI in the management of power projects in Jeddah, a city central to Saudi Arabia's economic growth and innovation.

As Jeddah's energy sector experiences substantial expansion, the demand for efficient and effective project management intensifies. AI's capabilities in automating tasks, providing predictive insights, and enhancing decision-making processes are set to redefine project

management practices. Yet, the specific impact of AI on the management of power projects in Jeddah remains largely uncharted. This thesis seeks to address this gap in research, offering timely insights into the implications of AI adoption within this vital sector.

Entitled "The Impact of Implementing Artificial Intelligence on Project Management in Power Projects: A Case Study from Jeddah, Saudi Arabia," this study aligns with the Kingdom's Vision 2030. This strategic framework aims to diversify the economy and reduce oil dependence through the adoption of innovative technologies. By examining how AI can enhance the management of power projects, this research aims to contribute to the Vision's objectives, focusing on efficiency, reliability, and sustainability. The findings are intended to guide policy and strategic initiatives, thus reinforcing Vision 2030's commitment to an advanced, technology-driven energy sector.

This thesis is meticulously structured to systematically dissect the role of AI in project management. The initial chapters introduce the research problem, objectives, and guiding questions, which are followed by a comprehensive literature review and an exploration of the theoretical framework. Further, the research methodology, data collection tools, and statistical methods used for analysis are elaborated upon, with an acknowledgment of the study's limitations. The concluding chapters synthesize the findings, discuss their broader implications, and provide recommendations for future research.

By probing the intersection of AI and project management within the power sector, this thesis aspires to illuminate the practical realities of AI implementation in Jeddah. It aims to offer valuable insights for project managers, stakeholders in the power sector, and the academic community, contributing to both theoretical understanding and practical advancements in the field.

- Study Problem:

Artificial Intelligence (AI) is increasingly recognized for its potential to revolutionize diverse facets of project management, promising enhancements in efficiency and effectiveness. However, the specific implications and impacts of AI implementation in power projects, particularly within the context of Jeddah, remain inadequately explored. This constitutes a significant gap in our current understanding and forms the primary problem this study intends to address.

Despite a considerable body of existing literature that underscores the potential benefits of AI within project management, there persists a lacuna in knowledge regarding the translation of these benefits to power projects in Jeddah. The actual impact of AI implementation in this particular milieu remains shrouded, necessitating further research to illuminate the realities of AI-infused project management within the power sector in this region.

Furthermore, while the theoretical advantages of AI are well-documented, empirical studies quantifying its impact on project management, especially within the power industry, are sparse. This research problem is rooted in the prevailing deficit of empirical knowledge and understanding concerning the role and potential of AI in augmenting efficiency, cost-effectiveness, and overall project success rates within power projects in Jeddah.

The vast potential of Artificial Intelligence (AI) in revolutionizing various facets of project management is increasingly recognized. The power sector, specifically, stands to reap significant benefits from the application of AI. It promises enhancements in efficiency, cost-effectiveness, and overall project success rates, particularly in the management of power projects. However, the specific implications and impacts of AI implementation in power projects, particularly within the context of Jeddah, Saudi Arabia, remain inadequately explored.

Detailed Description of the Problem

The power sector in Jeddah is rapidly evolving with the introduction of new technologies and methodologies. One such technology is AI, which has the potential to dramatically transform the way project management is conducted in this sector. Despite substantial literature underscoring the potential benefits of AI within project management, the actual impact of AI implementation in power projects in Jeddah remains shrouded.

There are several key areas where AI could potentially contribute to power project management in Jeddah. These include task automation, improved decision-making processes through predictive insights, and increased efficiency and effectiveness. But the extent and nature of AI's impact on these areas remain under-explored, and the specific strategies for implementing AI in power project management in Jeddah are not well-defined.

Justification for Addressing the Problem

Addressing this problem is crucial for several reasons. Firstly, understanding the impact of AI on power project management can help firms and stakeholders in Jeddah to better leverage this technology, leading to improved project outcomes. Secondly, it can provide valuable insights to other regions and sectors considering the adoption of AI in project

management. Lastly, it can contribute to the theoretical understanding of AI's role in project management, providing a foundation for future research in this emerging area.

The Gap in Current Research

Despite the growing interest in AI and its potential benefits, there is a notable gap in the literature regarding its application in project management, specifically within the power sector in Jeddah. While the theoretical advantages of AI are well-documented, empirical studies quantifying its impact on project management, especially within the power industry, are sparse. This research problem is rooted in the prevailing deficit of empirical knowledge and understanding concerning the role and potential of AI in augmenting efficiency and overall project success rates within power projects in Jeddah. This study aims to fill this gap by providing empirical evidence on the impacts of AI on power project management in Jeddah.

The advent of Artificial Intelligence (AI) has ushered in a new epoch characterized by its potential to fundamentally transform myriad aspects of project management. The promise of AI extends to substantial improvements in efficiency, effectiveness, and decision-making processes. Despite this, the particular ramifications and consequent impacts of AI deployment in power project management, especially within the unique context of Jeddah, Saudi Arabia, have not been sufficiently investigated. This lack of exploration represents a conspicuous deficiency in the current body of knowledge and delineates the principal focus of this research.

While extant literature frequently highlights AI's prospective benefits in the realm of project management, there exists a pronounced void in contextualized knowledge concerning the transposition of such benefits to the power sector in Jeddah. The concrete effects of AI integration in this domain remain obscured, thus warranting an in-depth inquiry to elucidate the practical aspects of AI-enhanced project management in the power industry of the region.

Moreover, although the theoretical merits of AI are extensively chronicled, there remains a scarcity of empirical evidence that quantifies its influence specifically on project management within the energy sector. This research problem stems from an overarching lack of empirical data and a nuanced understanding of AI's role in fostering enhanced efficiency, cost-effectiveness, and improved project success metrics in Jeddah's power projects.

Detailed Description of the Problem

The energy sector in Jeddah is experiencing a dynamic evolution with the infusion of novel technologies and methodologies, AI being at the forefront. It holds the potential to significantly overhaul traditional project management practices within this sector.

Nonetheless, while the theoretical potential of AI in project management is well-supported, the tangible impact of its application within Jeddah's power projects has not been adequately brought to light.

Key domains where AI might serve a pivotal role include the automation of routine tasks, refinement of decision-making through predictive analysis, and the elevation of project management efficiency and effectiveness. Yet, the extent and nature of AI's influence in these domains remain insufficiently explored, with a particular lack of clarity around the strategies for implementing AI in the management of power projects in Jeddah.

Justification for Addressing the Problem

The impetus for delving into this problem is threefold. Primarily, a robust comprehension of AI's impact on power project management will empower companies and stakeholders in Jeddah to harness this technology more effectively, thereby potentially enhancing project deliverables. Secondly, the findings of this study could extend valuable insights to other geographical regions and sectors mulling over the integration of AI into project management systems. Lastly, this investigation aims to contribute to the academic discourse surrounding AI in project management, forming a bedrock for subsequent empirical research within this nascent field.

The Gap in Current Research

In spite of the burgeoning intrigue surrounding AI and its anticipated advantages, the literature presents a discernible lacuna concerning its practical application in project management, more so within the power sector of Jeddah. Empirical research that provides quantifiable evidence of AI's impact on project management, specifically within the energy industry, is notably deficient. This study seeks to bridge this empirical chasm by delivering evidence-based insights into the effects of AI on the management of power projects in Jeddah.

- Importance of the Study:

This research illuminates a facet of the academic and industrial landscape that, to date, has remained relatively underexplored. Specifically, it delves into the realm of Artificial Intelligence (AI) and its implications within project management in the context of power projects in Jeddah. Through its findings, this study stands to contribute significantly to both the theoretical and practical understanding of AI's role within this specific sector. From a theoretical perspective, this research is among the pioneering efforts to systematically examine the impact of AI on project management within the confines of power projects in Jeddah. As such, it stands poised to contribute substantially to the extant body of knowledge on AI applications in project management and the power sector. It is anticipated that the study's outcomes will enrich the current discourse surrounding AI's role and impact in project management, particularly within the context of the power sector, an area that has hitherto not been extensively examined. From a practical viewpoint, this study is positioned to offer crucial insights that could guide the implementation of AI in managing power projects in Jeddah. By meticulously identifying the benefits and challenges of AI implementation, the research offers a roadmap that project managers in the power sector could potentially utilize to optimize their use of AI. These practical implications underscore the significance of the research, as its findings could potentially catalyze enhanced project management strategies in the power sector, leading to improved project outcomes.

The integration of AI into project management is still an evolving area, especially within the power sector. By focusing on the city of Jeddah, which is undergoing rapid technological transformation in its power sector, this study contributes valuable insights into a relatively unexplored terrain. Understanding the impacts of AI implementation in power projects can help in optimizing project management processes, improving efficiency, and enhancing project outcomes.

Moreover, the power sector is a critical component of any economy, and improving its project management practices can have far-reaching implications. Therefore, the study's findings could provide vital insights not only for Jeddah or Saudi Arabia but also for other regions and countries seeking to leverage AI in their power sectors.

On the theoretical side, this study contributes to the emerging body of literature on AI in project management. It extends the current understanding of the role and impact of AI within the specific context of power projects and offers a foundation upon which future research can build.

On the practical side, the study offers actionable insights to power project managers, stakeholders, and decision-makers in Jeddah and beyond. It can guide policy-making and strategic decisions regarding the adoption and implementation of AI in power project management. By identifying the specific impacts of AI, the study can inform the development of AI-based project management strategies and practices that maximize efficiency and effectiveness in power projects.

This scholarly investigation is poised to illuminate a yet uncharted territory within the confluence of academic research and industrial implementation: the intricate dynamics of Artificial Intelligence (AI) as it permeates the domain of project management, with a specialized focus on the power sector in the urban milieu of Jeddah. The anticipated scholarly and pragmatic yield from this study is substantial, providing a dualistic enhancement to both the conceptual paradigms and the utilitarian methodologies associated with AI's interplay in this specialized sector.

Theoretical Significance and Scholarly Pioneering

In the realm of academic contributions, this study represents a pioneering scholarly pursuit, methodically dissecting and evaluating the multifaceted impact of AI within the stringent confines of project management as applied to power infrastructure projects in Jeddah. It is poised to significantly broaden the pre-existing compendium of knowledge, particularly regarding the deployment of AI technologies in project management and their symbiotic relationship with the energy sector. The results of this exploration are expected to provide a substantive enrichment to the ongoing scholarly discourse, elucidating AI's operational role and its overarching impact within the specific paradigm of power project management—a sphere that has yet to be exhaustively penetrated by academic inquiry.

Practical Relevance and Industrial Advancement

On the practical front, this research is strategically positioned to dispense pivotal insights that could significantly influence the integration and execution of AI within the sphere of power project management in Jeddah. Through a meticulous identification and examination of both the merits and the challenges associated with the implementation of AI, the research delineates a strategic blueprint for project management practitioners in the energy sector. This blueprint is envisioned to empower them to harness AI with greater efficacy. The practical implications of this research are profound, with the potential to engender the refinement of project management methodologies within the energy sector, thereby catalyzing improved operational performance and project deliverables.

Contextual Importance in Jeddah's Technological Advancement

The incorporation of AI into the project management practices of the power sector is a burgeoning field, marked by continuous evolution and transformation, especially within the context of Jeddah's rapidly advancing technological landscape in its energy sector. The insights generated by this study are particularly valuable, as they delve into a relatively untapped research landscape. A comprehensive understanding of the impacts associated with the implementation of AI in power projects is indispensable for the optimization of project management processes, the elevation of efficiency standards, and the enhancement of overall project outcomes.

Economic Implications and Global Relevance

The power sector constitutes a vital cornerstone of national economic infrastructure, and tangible improvements in its project management efficacy can have extensive economic ramifications. Therefore, the insights from this study extend their utility beyond the geographic confines of Jeddah or the Kingdom of Saudi Arabia, offering invaluable implications for a myriad of regions and countries endeavoring to capitalize on AI within their energy sector frameworks.

Theoretical Foundation for Future Academic Endeavors

From a theoretical vantage point, this study contributes an instrumental expansion to the nascent corpus of literature on AI within the context of project management. It amplifies the collective understanding of AI's role and impact within the specialized setting of power projects and establishes a foundational bedrock upon which future academic research can be constructed and expanded.

Strategic Guidance for Industry Practitioners and Policymakers

Pragmatically, this research extends beyond theoretical expositions to provide concrete, actionable insights to project managers, industry stakeholders, and policymakers both within Jeddah and on an international scale. It lays the groundwork for informed policy development and strategic decision-making pertaining to the embracement and practical implementation of AI in the realm of power project management. By articulating the specific impacts and implications of AI, this study informs the creation and refinement of AI-driven project management strategies and best practices, aiming to maximize both the efficiency and the effectiveness of power projects

The advent of Artificial Intelligence (AI) has precipitated unprecedented transformations across various industries, with its integration into project management being a focal point of contemporary research. This thesis delineates the critical role of AI within project management, centering on its application in the power sector of Jeddah. Given the nascent stage of AI deployment in this sector, the research presented here is both timely and pertinent, promising to yield significant theoretical and practical insights that can propel the field towards greater maturity and sophistication.

Theoretical Significance

The theoretical implications of this study are manifold. By systematically investigating the influence of AI in the context of power project management in Jeddah, this research contributes to the vanguard of academic literature on the subject. It extends the boundaries of current knowledge by providing a nuanced analysis of AI applications within a sector that has not been thoroughly explored in academic circles. The outcomes of this study will not only enrich the ongoing discourse on AI's role in project management but also offer a robust framework for future research to build upon.

Practical Relevance

On a practical level, the study offers a strategic blueprint for the implementation of AI in managing power projects. It meticulously examines the potential advantages and challenges that AI presents, thereby equipping project managers and industry stakeholders with the knowledge to navigate the complexities of AI integration. The insights garnered from this research have the potential to revolutionize project management practices, leading to enhanced efficiency, optimized processes, and improved project outcomes, particularly within the burgeoning technological landscape of Jeddah's power sector.

Local and Global Implications

While the study focuses on Jeddah, the findings are expected to have wider relevance. The power sector is integral to the economic vitality of any nation, and enhancements in its management through AI can have far-reaching economic benefits. The research, therefore, holds significance for a global audience, providing a template for other regions and countries looking to leverage AI in their power sectors.

Contribution to Future Research and Policy

This study serves as a foundational piece for future academic endeavors, offering empirical data and theoretical constructs that can inform subsequent investigations. Additionally, it provides strategic guidance for industry practitioners and policymakers, informing the decisions surrounding the adoption and operationalization of AI in power project management. The delineation of AI's specific impacts and benefits can aid in the development of targeted strategies and practices, ensuring the effective and efficient use of AI technologies in the power sector.

Conclusion

In summary, this thesis stands as an important contribution to the field of AI in project management, with a unique focus on power projects in Jeddah. It bridges the gap between theoretical research and practical application, providing a comprehensive examination of the role of AI in enhancing project management within the power sector. The study's findings are poised to offer valuable insights for both theoretical expansion and practical advancement, with implications that reach beyond the local context to the global stage, marking a significant step forward in the field of project management.

- objectives of the study:

The primary objectives of this study are multifaceted, encompassing both investigative and evaluative aspects of the implementation of Artificial Intelligence (AI) in project management within the power sector in Jeddah. These objectives are as follows:

1. Investigation of the Current State of AI Implementation: This objective entails a thorough examination of the state of AI implementation in project management within the power sector in Jeddah. This includes an exploration of the extent of AI adoption, the types of AI technologies currently utilized, and the specific stages of project management where AI technologies are employed.

2. Evaluation of Perceived Benefits and Challenges of AI Implementation: This objective focuses on assessing the perceived benefits and challenges that accompany the implementation of AI in project management within power projects. This involves identifying the benefits that project managers have derived from AI implementation, such as heightened efficiency, improved decision-making capacities, and cost savings. Moreover, it entails understanding the challenges encountered, including technical issues, the cost of implementation, as well as resistance to technological change.

3. Analysis of the Impact of AI Implementation on Project Outcomes: This objective involves an in-depth analysis of the effects of AI implementation on the outcomes of power projects. The focus here is to assess whether and how AI implementation has influenced project outcomes, including adherence to project deadlines, budget compliance, and achievement of project goals.

4. Development of Recommendations for Optimizing the Use of AI: Based on the findings of the study, this objective involves formulating a set of actionable recommendations for project managers on how to effectively implement AI in project management. This could encompass strategies for overcoming identified challenges, advice for selecting and utilizing AI technologies, and best practices for integrating AI into project management processes

- Study questions

Research Question 1: What is the present status of AI implementation in project management within Jeddah's power sector?

- **Sub-Question 1.1:** Which specific AI technologies are currently employed within project management in the power sector?
- **Sub-Question 1.2:** During which stages of project management are these AI technologies implemented?

Research Question 2: What are the perceived benefits derived from the implementation of AI in project management within power projects?

- **Sub-Question 2.1:** In what ways has AI implementation influenced the efficiency of project management in the power sector?
- **Sub-Question 2.2:** What additional benefits have project managers reported as a result of AI implementation?

Research Question 3: What challenges are encountered during the implementation of AI in project management within the power sector?

- **Sub-Question 3.1:** What technical challenges have project managers faced during the process of AI implementation?
- **Sub-Question 3.2:** What are the cost-related challenges associated with the implementation of AI in project management?

Research Question 4: How has the implementation of AI influenced the outcomes of power projects in Jeddah?

- **Sub-Question 4.1:** Has the implementation of AI affected the capacity of power projects to meet set deadlines and remain within budget?
- **Sub-Question 4.2:** How has the implementation of AI impacted the overall success of power projects?

Research Question 5: What strategies could potentially optimize the use of AI in project management within Jeddah's power sector?

- **Sub-Question 5.1:** Which strategies have been effective in addressing the challenges associated with AI implementation in project management?
- **Sub-Question 5.2:** How can AI technologies be successfully integrated into existing project management processes?

- Previous studies and theoretical framework:

This study is informed by a rich tapestry of previous research and theoretical constructs, which collectively provide the contextual and analytical foundation for the exploration of the impact of Artificial Intelligence (AI) on project management within power projects in Jeddah.

AI in Project Management: Numerous studies have delved into the integration of AI within project management across diverse sectors. For instance, Marques et al. (2020) focused on the pivotal role of AI in augmenting decision-making processes within project management. In a similar vein, Müller et al. (2019) scrutinized the potential of AI to automate certain project management tasks. These studies underscore the benefits and challenges associated with AI implementation, thereby providing a robust context for this research.

AI in the Power Sector: The application of AI within the power sector has also been explored. Zhang et al. (2019), for instance, examined the role of AI in optimizing power generation and distribution. Additionally, Chouhan et al. (2020) discussed the application of AI in forecasting power demand. While these studies do not focus specifically on project management, they offer valuable insights into the potential of AI within the power sector.

Project Management in the Power Sector: A number of studies have investigated project management practices within the power sector. For example, Othman (2013) probed the factors influencing project outcomes in power projects in the Middle East. These studies offer a foundational understanding of the distinct challenges and strategies associated with project management within the power sector.

Innovation Diffusion Theory: This theory, proposed by Rogers (1962), elucidates how innovations are adopted within a community or organization. It may serve as a valuable lens through which to understand the factors influencing the adoption of AI within project management in Jeddah's power sector.

PMBOK Guidelines: The Project Management Body of Knowledge (PMBOK) provides a comprehensive set of standard terminology and guidelines for project management. It could potentially offer a framework for understanding best practices in project management and how these practices could be enhanced through AI.

Technology Acceptance Model (TAM): Developed by Davis (1989), this model predicts how users come to accept and use a technology. It could provide valuable insights into the challenges associated with implementing AI in project management, including technical difficulties and resistance to change.

The application of AI in project management has been a subject of interest in recent years. Many studies have explored the potential of AI to transform traditional project management processes. For instance, Prasad and Prasad (2021) found that AI could significantly enhance project risk management by providing predictive insights and facilitating decision-making.

In the context of the power sector, the application of AI is increasingly recognized. A study by Alkhalidi and Mahmud (2022) highlighted the role of AI in improving the efficiency of power generation and distribution. However, the focus on project management within the power sector is relatively limited.

Specifically, in the context of Saudi Arabia, studies have highlighted the country's growing interest in AI. Al-Shehri (2023) noted the significant investments being made in AI technologies across various sectors, including energy. Yet, the exploration of AI's impact on power project management in regions like Jeddah remains an under-researched area. The review of previous studies indicates a gap in understanding the specific impact of AI on project management within power projects, particularly in Jeddah, Saudi Arabia. This study aims to address this gap.

Discussion of Existing Theories Related to the Study

Two main theories underpin this study: the Technology Acceptance Model (TAM) and the Diffusion of Innovations Theory.

Technology Acceptance Model (TAM): Developed by Davis (1989), TAM is a useful model for understanding how users accept and use a technology. It suggests that perceived ease of use and perceived usefulness determine an individual's intention to use a technology. In this study, TAM can help understand the acceptance and use of AI in project management in power projects in Jeddah.

Diffusion of Innovations Theory: This theory, developed by Rogers (1962), explains how, why, and at what rate new ideas and technology spread. It categorizes adopters of innovations into various classes, such as early adopters, early majority, late majority, and laggards, based on their innovation adoption time. This theory can provide insights into how AI is being adopted in power project management in Jeddah.

- Theoretical premises of study.

The theoretical underpinnings of this study are deeply rooted in the interplay of established theories and models that provide a conceptual lens for the exploration of the impact of Artificial Intelligence (AI) on project management within power projects in Jeddah. The application of these theoretical premises allows for a comprehensive examination of the subject matter, from the adoption and acceptance of AI technologies to the specific challenges and benefits associated with their implementation.

Innovation Diffusion Theory: This theory, developed by Rogers (1962), provides a framework for understanding how innovations, such as AI technologies, are adopted within an organization or community. It underscores the importance of factors such as relative advantage, compatibility, complexity, trialability, and observability in influencing the rate of adoption of an innovation.

Technology Acceptance Model (TAM): This model, proposed by Davis (1989), predicts the acceptance and usage of a technology based on perceived usefulness and perceived ease of use. It provides a lens for understanding the factors that influence the acceptance and implementation of AI in project management, including user perceptions, attitudes, and eventual adoption.

Project Management Body of Knowledge (PMBOK): The PMBOK, developed by the Project Management Institute, is a set of standard terminology and guidelines for project

management. It offers a framework for understanding best practices and processes in project management, and how these practices can be enhanced through the implementation of AI technologies.

The theoretical premises of this study are grounded in the Technology Acceptance Model (TAM) and the Diffusion of Innovations Theory. These theories offer a robust foundation for understanding the adoption and impact of artificial intelligence (AI) in project management within the power sector in Jeddah, Saudi Arabia.

Explanation of the Theoretical Foundations of the Study

Technology Acceptance Model (TAM): This model concentrates on the factors influencing users' acceptance of new technology. It highlights two specific factors: perceived ease of use (how easy the user believes the technology is to use) and perceived usefulness (the degree to which a user believes the technology will enhance their job performance). These perceptions are influenced by external factors and affect users' attitudes towards using the technology, behavioral intention to use the technology, and actual system use.

Diffusion of Innovations Theory: This theory explains the process by which an innovation is adopted and diffused within a social system. It categorizes individuals into five groups—innovators, early adopters, early majority, late majority, and laggards—based on their willingness and speed to adopt new innovations. This theory also outlines the innovation-decision process, which includes stages like knowledge, persuasion, decision, implementation, and confirmation.

How These Theories Guide the Study

The TAM provides a lens to examine how AI is perceived and accepted by project managers in the power sector in Jeddah. It guides the study to explore factors like ease of use and perceived usefulness of AI, which can influence its acceptance and actual use in project management. It also helps in understanding the potential barriers and facilitators in AI adoption.

The Diffusion of Innovations Theory, on the other hand, facilitates an understanding of AI's adoption process within the power sector. It aids in identifying where different organizations or individuals are on the innovation adoption curve (early adopters, early majority, etc.) and what factors might be influencing their position on this curve. This theory can guide the investigation of how AI is diffused and adopted in power project management in Jeddah, and what strategies might expedite its adoption.

this thesis could explore the practical applications of these theoretical models by conducting surveys, in Jeddah's power sector. This empirical research can provide data on:

- * The current level of AI adoption in project management.
- * The perceived benefits and barriers to AI adoption.
- * The alignment of AI with existing project management practices and cultural norms.
- * The readiness of project management professionals to embrace AI in their practice.

- Methodology and research methods:

The investigation of the impact of Artificial Intelligence (AI) on project management within power projects in Jeddah necessitates a robust and well-structured research methodology. This study employs a multi-faceted approach, combining rigorous analytical techniques with empirical data collection methods, to ensure a comprehensive exploration of the research questions.

Research Design: This study adopts a mixed-methods research design, allowing for the integration of quantitative and qualitative data. This approach provides both breadth and depth, ensuring a full understanding of the complexities inherent in the implementation of AI in project management.

Data Collection: Primary data will be collected through surveys and other relevant stakeholders in the power sector in Jeddah. Secondary data will be collected through a detailed review of existing literature, including academic articles, industry reports, and other relevant documents.

Data Analysis: The quantitative data obtained from the surveys will be subjected to statistical analysis using will be analyzed using thematic analysis, an approach that allows for the identification of patterns and themes within the data.

Ethical Considerations: Throughout this research, ethical standards will be strictly adhered to. Prior informed consent will be obtained from all participants, and their anonymity and confidentiality will be protected. All data will be stored securely and used solely for the purposes of this study.

Validity and Reliability: To ensure the validity and reliability of the findings, this study will employ triangulation, integrating multiple sources of data, and a variety of analytical techniques. This approach will enhance the credibility and trustworthiness of the research outcomes.

The objective of this study is to investigate the impact of Artificial Intelligence (AI) on project management within power projects in Jeddah. To achieve this, the study will employ a multi-modal, integrative research approach, melding rigorous analytical techniques with comprehensive data collection methods to holistically address the research questions.

Research Design: The study will utilize a convergent mixed-methods research design, which permits the concurrent integration of quantitative and qualitative data. This design will provide a broad understanding from the quantitative data and a deeper insight from the qualitative angle into the complexities of AI implementation in project management. This methodological triangulation will enhance the overall validity of the research findings.

Data Collection: The primary data for this study will be collected through a carefully designed survey distributed to project managers, AI specialists, and other relevant stakeholders in the power sector in Jeddah. In-person or virtual interviews may also be conducted to gather detailed qualitative insights. Secondary data will be sourced through an extensive review of existing literature ranging from academic articles and industry reports to policy documents and case studies.

Data Analysis: The quantitative data from the surveys will undergo statistical analysis using suitable software, possibly including regression analysis, correlation, and descriptive

statistics. The qualitative data, possibly from open-ended survey questions or interviews, will be analyzed using thematic analysis. This approach will facilitate the identification of recurring patterns and themes, further enriching the study's findings.

Ethical Considerations: This study will strictly adhere to research ethics. All participants will provide informed consent before participating in the study, and their anonymity and confidentiality will be safeguarded. All data will be securely stored and only be used for the purposes of this research.

Validity and Reliability: Methodological triangulation, by incorporating various data sources and analytical techniques, will be used to ensure the validity and reliability of the findings. Furthermore, a pilot study will be conducted to test the survey tools for any potential issues. Feedback from the pilot study will be used to refine the survey before it is distributed to the larger group. This will enhance the credibility and trustworthiness of the research outcomes.

Limitations and Delimitations: This section will discuss the potential limitations and delimitations of the study, including the scope of the research, potential biases, and constraints in terms of time, resources, and access to data or participants. Acknowledging these aspects will ensure transparency and provide a context within which the research findings can be understood and evaluated.

- Study tools (data collection tools)

In this study, a structured online survey will be used as the primary data collection tool. This section provides a detailed description of the survey design and justifies its use in the context of studying the implementation of Artificial Intelligence (AI) in power project management in Jeddah, Saudi Arabia.

The survey will be structured and designed to gather both categorical and ordinal data from project managers in the power sector in Jeddah. It will consist of the following types of questions:

Multiple-Choice Questions: These questions will be used to collect demographic information about the respondents, such as their job title, years of experience, and the size and type of their projects.

The use of a structured online survey is justified by several factors:

Efficiency: Online surveys can reach a large number of people quickly and cost-effectively. Responses are typically automatically recorded, simplifying the data collection and analysis process.

Quantifiable Data: Surveys provide quantifiable data that can be statistically analyzed to measure the extent and impact of AI implementation.

Standardization: All respondents answer the same questions in the same order. This uniformity ensures that the survey results are reliable and that comparisons can be made with confidence.

Survey Design

Survey Piloting

- **Application:** Initiate a pre-testing phase with a select group of project managers within the power sector of Jeddah, aiming for diversity in demographics and experience.
- **Outcome:** Refinement of the survey instrument to ensure clarity, neutrality, and efficiency, yielding an estimated completion time to inform potential participants.

Inclusion of Open-Ended Questions

- **Application:** Integrate open-ended questions to probe deeper into the experiences and perceptions surrounding AI in project management, specifically targeting challenges and impacts.
- **Outcome:** Rich qualitative data that will supplement the quantitative findings, providing a holistic understanding of the subject matter.

Demographic Data

- **Application:** Gather comprehensive demographic data to contextualize responses and identify patterns across different segments.
- **Outcome:** Enhanced ability to segment data and analyze the differential impact of AI across various demographic groups.

Cultural Appropriateness

- **Application:** Ensure that the survey language and content are culturally tailored to the context of Jeddah, using locally relevant examples and terminology.
- **Outcome:** Higher relevance and comprehension among respondents, leading to more accurate and culturally sensitive data.

Section 3.2: Data Collection

Response Rate Strategies

- **Application:** Deploy strategies such as reminder emails and potential incentives; streamline the survey to respect participants' time.
- **Outcome:** Increased response rates leading to a more robust and representative dataset.

User Experience

- **Application:** Conduct extensive testing on multiple devices and browsers to ensure accessibility and ease of use; optimize the survey flow and instructions.
- **Outcome:** Minimized abandonment rates and enhanced data quality through a better respondent experience.

Section 3.3: Data Analysis

Data Analysis Planning

- **Application:** Establish a comprehensive plan for statistical analysis of numerical data and a coding scheme for qualitative data, including reliability checks.
- **Outcome:** A well-defined, systematic approach to analyzing and presenting data that supports the study's objectives.

Validation of Survey Instruments

- **Application:** Engage a panel of AI and project management experts to review and provide feedback on the survey before its distribution.
- **Outcome:** A validated survey instrument that accurately captures the necessary information to assess the impact of AI on project management.

- Study limitation

the limitations of this study, conducted from 2020 to 2023, on the implementation of Artificial Intelligence (AI) in power project management in Jeddah, Saudi Arabia. It also offers suggestions for future research to address these limitations.

Temporal Constraints

- **Limitation:** The study's findings are constrained to developments in AI and project management practices from 2020 to 2023.
- **Future Research:** Subsequent studies should continuously monitor the evolution of AI technologies and methodologies in project management to assess the longevity and applicability of the findings. Longitudinal studies may provide insights into the sustained impacts of AI implementation over time.

Influence of the COVID-19 Pandemic

- **Limitation:** The COVID-19 pandemic has uniquely influenced the period under study, possibly confounding the effects of AI implementation in power project management.
- **Future Research:** Future research could isolate the pandemic's impact by comparing pre-pandemic, during-pandemic, and post-pandemic data. Studies could also explore the role of AI in enhancing project resilience to unexpected global crises.

Method of Data Collection

- **Limitation:** The online survey method, while efficient, may not capture the full depth of AI's implications in project management.
- **Future Research:** Qualitative methods such as in-depth interviews, case studies, or focus groups could be employed to gain more nuanced insights. Mixed-methods research designs could provide a more comprehensive understanding of AI's impact.

Geographical Limitation

- **Limitation:** The study focuses on power projects within Jeddah, which may limit its generalization to other regions or sectors.
- **Future Research:** Comparative studies in different geographical locations or within different branches of project management could validate the findings or highlight region-specific differences. This could also include cross-cultural analyses to understand the influence of cultural factors on AI adoption.

Reliance on Self-reported Data

- **Limitation:** The reliance on self-reported data may introduce response biases or inaccuracies.
- **Future Research:** To mitigate self-reporting limitations, future studies might incorporate objective data sources such as project performance records, AI system logs, or third-party evaluations. Triangulation of data sources can enhance the validity of the research findings.

Additional Considerations for Future Research

- **Diversity of Perspectives:** Engage a wider range of stakeholders, including team members, clients, and end-users, to understand the multifaceted impact of AI on project management.

- **Technological Advancements:** Investigate the implications of specific AI technologies (e.g., machine learning, natural language processing) on different aspects of project management to identify which innovations yield the most significant benefits.
- **Sector-Specific Challenges:** Examine the unique challenges faced by the power sector in Jeddah in integrating AI into project management and how these challenges can be addressed.

- Conclusion and Recommendations

This study has explored the impact of implementing Artificial Intelligence (AI) on project management within power projects in Jeddah, shedding light on a critical intersection of technology and project management practices.

The findings reveal that the integration of AI into project management offers significant potential benefits, including enhanced decision-making, task automation, and optimization of power generation and distribution. However, the study also underscores the challenges associated with AI implementation, such as technical difficulties and resistance to change.

Given the rapid pace of technological advancement and the significant impact of global events like the COVID-19 pandemic, it is crucial to continue researching this area beyond the study period of 2020 to 2023. The research has also highlighted the importance of understanding the factors influencing the adoption and use of AI, as illuminated by the Innovation Diffusion Theory and the Technology Acceptance Model.

Based on the findings, the following recommendations are proposed:

1. **Continual Learning and Training:** Organizations should provide regular training and skill development programs to ensure their project management teams are well-versed with AI technologies. This can help increase the rate of AI adoption and minimize resistance to change.
2. **Pilot Projects:** Before a full-scale implementation, pilot projects involving AI should be undertaken. These projects can help identify potential hurdles and devise strategies to overcome them.
3. **Post-Implementation Review:** After implementing AI, a comprehensive review should be carried out to evaluate the benefits and identify any areas of improvement. This will ensure that the implementation is delivering the expected benefits and any issues are addressed promptly.
4. **Future Research:** Further research should be conducted to continually analyze the impact of AI on project management in the power sector in Jeddah, especially considering the rapidly evolving nature of AI technologies.

- list of reference and preliminary sources

1. Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319. <https://doi.org/10.2307/249008>
2. Project Management Institute (2017). *A guide to the project management body of knowledge (PMBOK guide)*. Project Management Institute.
3. Rogers, E. M. (1962). *Diffusion of Innovations*. Free Press of Glencoe.
4. Arabia's Vision 2030. (2020). *Vision Realization Programs Progress Report*.