

**Mid-Ocean University**  
**College of Management**  
**Department: Project Management**



**Research Title:**

The Role of Artificial Intelligence in Improving Project  
Management Processes: An Applied Study on the  
Information Technology Sector in the Kingdom of Saudi  
Arabia

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## المستخلص

تحلل هذه الدراسة الدور المهم للذكاء الاصطناعي في تعزيز إجراءات إدارة المشاريع ضمن قطاع تكنولوجيا المعلومات في المملكة العربية السعودية. ومع استمرار نمو المشهد الرقمي، برز دمج تقنية الذكاء الاصطناعي كجانب مهم في تحسين الكفاءة والدقة والإبداع في تقنيات إدارة المشاريع. يستخدم البحث أسلوبًا كميًا، باستخدام استبيان منظم تم إجراؤه على عينة من 135 محترفًا مشاركًا في أعمال تكنولوجيا المعلومات. تم اختيار هؤلاء الأفراد لمشاركة آرائهم حول تجاربهم ووجهات نظرهم حول نشر الذكاء الاصطناعي في أنشطة إدارة المشاريع الخاصة بهم. خضعت البيانات التي تم الحصول عليها من المسوحات لتحليل إحصائي صارم لقياس تأثير الذكاء الاصطناعي على العديد من أبعاد إدارة المشاريع. تُظهر النتائج أن الذكاء الاصطناعي يلعب دورًا كبيرًا في تقليل الأخطاء البشرية، وبالتالي تعزيز الجودة الشاملة لمخرجات المشروع. من خلال أتمتة العمليات المتكررة والاستفادة من التحليلات التنبؤية، يقلل الذكاء الاصطناعي من فرصة حدوث الأخطاء التي قد تنتج عن الإجراءات اليدوية، مما يؤدي إلى مخرجات مشروع أكثر موثوقية. من خلال تقليل قنوات الاتصال، يخلق الذكاء الاصطناعي بيئة عمل موحدة أكثر، مما يمكن الفرق من الاستجابة بسرعة للعقبات والتكيف مع احتياجات المشروع المتغيرة. تسلط هذه الدراسة الضوء على الإمكانيات الثورية للذكاء الاصطناعي في صناعة تكنولوجيا المعلومات في المملكة العربية السعودية، وتسلط الضوء على دوره الحاسم في تحويل إجراءات إدارة المشاريع. تقدم النتائج رؤى مهمة لممارسي الصناعة وصناع القرار، ودعم نشر تكنولوجيا الذكاء الاصطناعي لتحقيق التميز التشغيلي وتعزيز الابتكار. من خلال فهم وتسخير فوائد الذكاء الاصطناعي، قد تزيد الشركات من قدراتها على إدارة المشاريع، مما يؤدي في النهاية إلى نتائج مشروع متفوقة وميزة تنافسية مستدامة في عالم التكنولوجيا سريع التغير.

الكلمات المفتاحية: الذكاء الاصطناعي - إدارة المشاريع - تحسين العمليات - قطاع تكنولوجيا المعلومات - المملكة العربية السعودية - دراسات تطبيقية - تقنيات المعلومات.

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## Table of content

|                                                          |    |
|----------------------------------------------------------|----|
| Copyright permission .....                               | 2  |
| المستخلص .....                                           | 3  |
| Acknowledgments.....                                     | 4  |
| Table of content .....                                   | 5  |
| Tables list.....                                         | 7  |
| Figueres list .....                                      | 8  |
| Chapter One.....                                         | 9  |
| Introduction .....                                       | 10 |
| Study problem.....                                       | 11 |
| Study objectives .....                                   | 14 |
| Importance of the study .....                            | 16 |
| Study Questions .....                                    | 19 |
| Study hypotheses.....                                    | 19 |
| The scientific theory used to prepare the research ..... | 21 |
| Chapter Two.....                                         | 23 |
| Previous Studies .....                                   | 23 |
| Introduction .....                                       | 24 |
| Study variables .....                                    | 25 |
| Previous studies .....                                   | 26 |
| Theoretical framework.....                               | 33 |
| Chapter Three .....                                      | 37 |
| Study Methodology.....                                   | 37 |
| Introduction .....                                       | 38 |
| Methodology and Research Methods.....                    | 40 |
| Research community.....                                  | 41 |
| Data collection steps .....                              | 43 |
| Research limits .....                                    | 45 |
| Chapter Four .....                                       | 47 |
| Study Results.....                                       | 47 |
| Introduction .....                                       | 48 |
| Study results.....                                       | 49 |

|                       |    |
|-----------------------|----|
| Recommendations ..... | 83 |
| References.....       | 85 |
| Appendices.....       | 88 |
| Questionnaire: .....  | 89 |

## Tables list

| Tables title                                                                                                                                                                            | P.N |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Table 3-1: Statistical description of the data.                                                                                                                                         | 51  |
| Table 3 – 2: Statistical description of the participants' age.                                                                                                                          | 53  |
| Table 3 – 3: Statistical analysis of participants' gender.                                                                                                                              | 54  |
| Table 3 – 4: Statistical analysis of the scientific degree of the participants.                                                                                                         | 55  |
| Table 3 - 5: Statistical analysis for AI to improve the efficiency of project management processes.                                                                                     | 56  |
| Table 3 – 6: Statistical analysis of artificial intelligence helps reduce human errors.                                                                                                 | 57  |
| Table 3 – 7: Statistical analysis of artificial intelligence in decision making.                                                                                                        | 58  |
| Table 3 – 8: Statistical analysis of the use of artificial intelligence helps accelerate project completion.                                                                            | 59  |
| Table 3 – 9: AI statistical analysis improves communication between team members.                                                                                                       | 60  |
| Table 3 – 10: Statistical analysis helps AI enhance coordination and collaboration between teams.                                                                                       | 61  |
| Table 3 – 11: Statistical Analysis Artificial Intelligence Tools in Tracking Team Performance.                                                                                          | 62  |
| Table 3 -12: Statistical analysis of artificial intelligence provides recommendations to improve team performance.                                                                      | 63  |
| Table 3 – 13: Statistical analysis helps AI improve resource allocation more effectively indeed.                                                                                        | 64  |
| Table 3 – 14: Statistical analysis helps AI reduce resource waste in the project.                                                                                                       | 66  |
| Table 3 – 15: Statistical analysis helps AI predict a project's future resource needs.                                                                                                  | 67  |
| Table 3 – 16: Statistical analysis of AI tools provides accurate data to improve resource allocation decisions.                                                                         | 68  |
| Table 3 – 17: Statistical analysis of artificial intelligence enables accurate analysis of project-related data.                                                                        | 69  |
| Table 3 – 18: Statistical analysis of artificial intelligence helps in predicting future project problems.                                                                              | 70  |
| Table 3 – 19: Statistical analysis of AI-powered analytics tools plays a major role in reducing risks in project management.                                                            | 71  |
| Table 3 – 20: statistical analysis for AI helps improve schedule accuracy and budget forecasts.                                                                                         | 73  |
| Table 3 – 21: Data validity percentage.                                                                                                                                                 | 75  |
| Table 3 – 22: Cronbach's coefficient                                                                                                                                                    | 75  |
| Table 3 – 23: Chi-square test the role of artificial intelligence in reducing human errors in the information technology sector in the Kingdom of Saudi Arabia                          | 78  |
| Table 3 – 24: The chi-square test for the role of artificial intelligence in improving the decision-making process in the information technology sector in the Kingdom of Saudi Arabia. | 80  |
| Table 3 – 25: Chi-square test for the role of artificial intelligence in improving communications in the IT sector in the Kingdom of Saudi Arabia.                                      | 82  |

## Figueres list

| Figures title                                                                                                                                                                             | P.N |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Figure 2-1: Theoretical framework                                                                                                                                                         | 36  |
| Figure 3 – 1: Statistical description of the participants' age                                                                                                                            | 54  |
| Figure 3 – 2: Statistical analysis of participants' gender                                                                                                                                | 55  |
| Figure 3 – 3: Statistical analysis of the scientific degree of the participants                                                                                                           | 56  |
| Figure 3 – 4: Statistical analysis for AI to improve the efficiency of project management processes                                                                                       | 57  |
| Figure 3 – 6: Statistical analysis of artificial intelligence in decision making                                                                                                          | 59  |
| Figure 3 – 7: Statistical analysis of the use of artificial intelligence helps accelerate project completion                                                                              | 61  |
| Figure 3 – 8: AI statistical analysis improves communication between team members                                                                                                         | 62  |
| Figure 3 – 9: Statistical analysis helps AI enhance coordination and collaboration between teams                                                                                          | 63  |
| Figure 3 – 10: Statistical Analysis Artificial Intelligence Tools in Tracking Team Performance                                                                                            | 64  |
| <i>Figure 3 – 11: Statistical analysis of artificial intelligence provides recommendations to improve team performance</i>                                                                | 65  |
| Figure 3 – 12: Statistical analysis helps AI improve resource allocation more effectively indeed                                                                                          | 66  |
| Figure 3 – 13: Statistical analysis helps AI reduce resource waste in the project                                                                                                         | 67  |
| Figure 3 – 14: Statistical analysis helps AI predict a project's future resource needs                                                                                                    | 68  |
| Figure 3 – 15: Statistical analysis of AI tools provides accurate data to improve resource allocation decisions                                                                           | 70  |
| Figure 3 -16: Statistical analysis of artificial intelligence enables accurate analysis of project-related data                                                                           | 71  |
| Figure 3 -17: Statistical analysis of artificial intelligence helps in predicting future project problems                                                                                 | 72  |
| Figure 3 -18: Statistical analysis of AI-powered analytics tools plays a major role in reducing risks in project management                                                               | 73  |
| Figure 3 – 19: statistical analysis for AI helps improve schedule accuracy and budget forecasts                                                                                           | 74  |
| Figure 3 – 20: Dependent and independent study variables                                                                                                                                  | 77  |
| Figure 3 – 21: Identical columns of cross-tabulations of the role of artificial intelligence in reducing human errors in the information technology sector in the Kingdom of Saudi Arabia | 79  |
| Figure 3 – 22: The role of artificial intelligence in improving the decision-making process in the IT sector in the Kingdom of Saudi Arabia                                               | 82  |
| Figure 3 – 23: Identical columns of cross-tabulations of the role of artificial intelligence in improving communications in the IT sector in the Kingdom of Saudi Arabia                  | 78  |
| Table 3 – 24: The chi-square test for the role of artificial intelligence in improving the decision-making process in the information technology sector in the Kingdom of Saudi Arabia.   | 84  |

# **Chapter One**

## Introduction

The rising complexity of projects in the current corporate environment has forced the adoption of novel technologies to boost project management operations. Among these options, Artificial Intelligence (AI) has emerged as a disruptive force, transforming the way projects are planned, executed, and monitored. In the context of the Information Technology (IT) industry in the Kingdom of Saudi Arabia, the integration of AI into project management procedures promises to increase efficiency, decision-making, and overall project results. As enterprises in Saudi Arabia embrace digital transformation, understanding the role of AI in project management becomes critical for boosting competitiveness and attaining strategic objectives (Niederman, 2021).

AI's power to evaluate enormous volumes of data in real time helps project managers to make educated decisions based on insights that would be hard to gain manually. This data-driven strategy enables the identification of possible hazards and bottlenecks early in the project lifetime, allowing for timely responses. In the IT business, where project timeframes are typically short and resources restricted, the ability to identify and minimize risks is crucial. AI systems can sift through previous project data, discover trends, and forecast future project issues, giving project managers with actionable insight that helps planning and execution. As such, AI not only assists in risk management but also adds to more accurate project forecasting, eventually leading to improved project delivery deadlines and outcomes (Odejide, 2024).

Moreover, AI can boost communication and cooperation among project teams, which is a vital part of effective project management. By employing natural language processing and machine learning methods, AI systems can promote more effective communication among team members, regardless of geographical obstacles. In Saudi Arabia, where many IT projects involve foreign teams, the ability to interact fluidly may lead to greater coordination and alignment on project objectives. Additionally, AI-driven collaboration solutions may assist manage projects, measure progress, and assure responsibility, minimizing the possibility of misunderstandings and miscommunications. This expanded cooperation is particularly crucial in a fast-paced IT environment, where project needs can change frequently, needing a high degree of flexibility and response from teams (Karamthulla, 2024).

Furthermore, AI may automate repetitive and time-consuming operations inside project management procedures, freeing up project managers and team members to focus on more

important activities. Tasks such as scheduling, resource allocation, and progress monitoring may be easily handled by AI systems, allowing project managers to dedicate more time to high-level planning and stakeholder interaction. Automation not only enhances productivity but also decreases the danger of human mistake, which can have substantial implications for project success. In the Saudi Arabian IT business, where projects typically require detailed technical intricacies and tight schedules, the benefits of automation cannot be emphasized. By optimizing workflows and boosting operational efficiency, AI allows project teams to produce higher-quality outputs within set timescales (Estanislao, 2024).

Lastly, the application of AI in project management procedures corresponds with the wider objectives of the Saudi Vision 2030 plan, which intends to diversify the economy and stimulate innovation. By embracing AI technology, firms in the IT sector may not only boost their project management capabilities but also position themselves as leaders in the digital economy. The successful integration of AI into project management procedures may act as a catalyst for larger organizational transformation, creating a culture of innovation and continuous improvement. As Saudi Arabia continues its journey toward becoming a worldwide hub for technology and innovation, the role of AI in enhancing project management procedures will be important in determining the future of the IT industry and contributing to the nation's overall economic success (Nahar, 2024).

## **Study problem**

In recent years, the rapid expansion of technology has transformed many fields, including project management. However, despite the potential benefits of AI in enhancing project management processes, companies in the IT industry in Saudi Arabia face several obstacles in effectively integrating these technologies. The problem of the study is to identify the unique challenges that prevent the proper implementation of AI in project management within this framework. The following five points identify the main difficulties that will be investigated in this study (Bakr, 2023).

- **Lack of knowledge and understanding of AI technology is significant**

There is a significant lack of knowledge and understanding of AI technology among project managers and team members in the IT sector. Many professionals are either ignorant of the capabilities of AI or have a misunderstanding about its applicability in project management. This gap in understanding may contribute to resistance to implementing AI solutions, as humans may be wary of trusting unknown technologies. Furthermore, insufficient understanding of how AI can be leveraged to improve project management processes may result in missed opportunities to improve efficiency and effectiveness. Therefore, raising awareness and providing education about the potential benefits of AI is critical to building acceptance and facilitating integration (Olan, 2022).

- **Integrating AI into Project Management**

This requires a significant investment in technology and infrastructure. Many companies in the Saudi IT industry may lack the resources to efficiently implement AI-based solutions. This cost barrier may limit their ability to upgrade legacy systems, invest in training, or attract qualified experts who are proficient in dealing with AI technology. As a result, companies may struggle to leverage the full potential of AI, ultimately hindering the progress of their project management processes. Addressing the financial issues associated with adopting AI is critical to building a culture of innovation and enhancing project success (Obafunsho, 2024).

- **Data Quality and Availability**

Data quality and availability are significant barriers to the effective implementation of AI into project management. AI systems rely heavily on vast amounts of accurate and important data to develop insights and predictions. However, many companies in the Saudi IT industry may have fragmented or insufficient data, hindering the ability of AI algorithms to perform properly. Additionally, challenges related to data privacy and security may hinder the integration of AI, as companies may not want to disclose sensitive information necessary for effective AI research. Ensuring that companies have access to high-quality data is vital to the effective adoption of AI-powered project management systems (Noordt, 2023).

- **Corporate Culture and Change Aversion**

Corporate culture and change aversion are an additional barrier to adopting AI in project management. Many companies in the Saudi IT sector have established processes and practices that can be difficult to adapt, leading to stagnation in the acceptance of new technology. Employees may feel fearful of AI's potential to automate jobs and change established roles, leading to resistance to adopting AI solutions. To overcome this cultural barrier, organizations must intentionally create an environment that supports experimentation and embraces technological advancements. Leadership plays a critical role in communicating the benefits of AI and demonstrating its value in enhancing project management processes (Alattas, 2023).

- **Lack of established frameworks and standards for deploying AI**

The lack of established frameworks and standards for deploying AI in project management can lead to uncertainty and inconsistency in practice. The absence of recognized best practices makes it difficult for companies to navigate the complexities of integrating AI into existing project management technologies. As a result, companies may struggle to formulate a cohesive strategy for adopting AI, leading to fragmented efforts and poor outcomes. Establishing established standards and frameworks will be vital in providing companies with a clear roadmap for adopting AI into their project management processes, allowing for a smoother transition and reap the benefits of these technologies (Kelly, 2023).

Finally, addressing these issues will be critical for companies in the Saudi IT industry that aim to improve project management processes through the integration of AI. By identifying and overcoming these limitations, stakeholders can leverage the potential of AI to enhance efficiency, decision-making, and project outcomes, ultimately contributing to the success of the sector as a whole.

Main Research Question: What are the key challenges preventing the effective integration of Artificial Intelligence (AI) in project management processes within the Information Technology sector in the Kingdom of Saudi Arabia, and how can these challenges be addressed to enhance project management outcomes?

## Study objectives

- **Main Objective**

The main purpose of this study is to evaluate the role of AI in enhancing project management processes within the IT sector in Saudi Arabia. As companies increasingly see the potential of AI to revolutionize their operations, understanding how these technologies can specifically improve project management techniques becomes vital. This general purpose drives the research, providing a framework for examining the many ramifications of integrating AI into project management.

To achieve this main purpose, the research will explore several sub-objectives that focus on distinct areas of AI impact on project management.

- **Sub-objectives**

1. Examine the current status of AI use in project management within the Saudi IT sector.

This entails examining how companies are currently adopting AI technology into their project management processes, the extent of this adoption, and the prevailing tools and strategies being implemented. By establishing a baseline for AI use, the research can uncover patterns and where AI is having the greatest impact, as well as areas that may require further inquiry or development. Understanding the current scenario will also show how ready companies are to embrace AI solutions, establishing the framework for subsequent investigations.

2. Identifying the key benefits of integrating AI into project management processes.

This involves exploring how AI can enhance efficiency, decision-making, and collaboration within project teams. By focusing on specific benefits such as improved risk management, increased forecasting, and automation of routine processes, the research attempts to provide a comprehensive picture of the benefits that companies may receive from implementing AI. This knowledge will be crucial for stakeholders to recognize the benefits of AI and motivate them to invest in these technologies.

3. Examining the obstacles and barriers that companies face when integrating AI into their project management processes.

Challenges such as lack of knowledge, inadequate infrastructure, data quality concerns, reluctance to change, and lack of standardized frameworks may limit successful adoption. By identifying and

assessing these issues, the research aims to provide actionable insights that may help companies develop strategies to overcome these barriers, thereby facilitating easier adoption of AI.

4. Analyzing the impact of corporate culture on the successful integration of AI into project management.

This entails assessing how leadership, employee engagement, and organizational values influence the acceptance and use of AI technology. Understanding the cultural forces at play can help companies build a supportive environment that fosters innovation and reduces resistance to change. This research is particularly relevant in the context of the Saudi IT sector, where traditional norms may conflict with the need for technical growth.

5. Provide a framework or set of principles for using AI effectively in project management processes.

Based on the findings from the previous objectives, this framework will attempt to provide companies with practical advice for integrating AI into their project management techniques. The criteria will include topics such as training, technology investments, data management, and change management techniques. By presenting a systematic approach to deploying AI, the research seeks to equip companies with the skills needed to harness the full potential of AI in their project management efforts.

In short, this study attempts to provide a comprehensive assessment of the role of AI in enhancing project management processes within the Saudi IT sector. By addressing these objectives, the research will provide important insights that will help companies manage the challenges of AI integration and improve their overall project outcomes.

## **Importance of the study**

- **Scientific Importance**

- ✓ **Advancement of Knowledge:**

This study contributes to the current body of knowledge on project management by studying the interaction of Artificial Intelligence (AI) and project management procedures. By exploring how AI technologies may boost efficiency, decision-making, and cooperation, the research advances theoretical frameworks that define these interactions. It establishes a platform for future academic investigation, providing academics with a clearer knowledge of the mechanisms via which AI impacts project management techniques. Such breakthroughs not only enhance academic literature but also open the path for empirical investigations that can further confirm the findings and investigate undiscovered elements of AI's influence.

- ✓ **Identification of Gaps:**

By assessing the present level of AI integration in the Saudi IT sector, this study highlights gaps in both research and practice regarding AI's role in project management. Many businesses have yet to completely comprehend how to employ AI successfully, which restricts their capacity to improve project outcomes. By highlighting these shortcomings, the research motivates future studies to solve these flaws, investigate alternative AI applications, and give insights into successful deployments. This identification of gaps is vital for stimulating innovation and ensuring that academic discourse stays relevant to the difficulties encountered by industry practitioners.

- ✓ **Methodological Insights:**

The research gives a systematic way to exploring AI applications in project management, presenting useful approaches that other researchers might take or adapt in their own studies. By explaining the research strategy, data collection methods, and analytical procedures employed in this study, it provides as a useful guidance for future researchers. This methodological rigor boosts the trustworthiness of the findings and facilitates replication studies, which are vital for verifying study conclusions. Furthermore, sharing these techniques stimulates interdisciplinary cooperation, since academics from many domains may apply these ideas to diverse situations.

### ✓ **Framework Development:**

This study attempts to present a complete framework for the effective deployment of AI in project management procedures. By combining the data from various research, it will give theoretical foundations that enterprises may leverage to drive their AI adoption plans. This methodology will improve theoretical debate in project management and AI literature by proposing a defined road for integration. Additionally, it will serve as a reference for future study focused at researching best practices in AI deployment, supporting a more methodical approach to understanding how these technologies might enhance project management tasks.

### ✓ **Contribution to AI Literature:**

By concentrating especially on the IT sector in Saudi Arabia, this study offers unique regional insights to the worldwide conversation around AI's role in project management. The specific problems and possibilities faced by enterprises in this region show the relevance of context in understanding AI applications. By contributing to the literature on AI, this research enables comparative studies that may assess how diverse cultural, economic, and legal aspects impact AI integration. These insights boost the applicability of findings across multiple contexts, providing a wider understanding of AI's influence on project management worldwide.

### • **Practical Importance**

#### ✓ **Guidance for firms:**

This report gives practical insights and actionable advice for firms looking to integrate AI into their project management processes. By describing the stages necessary for efficient deployment, companies may better negotiate the complexity inherent with AI adoption. These insights cover best practices for technology selection, data management, and staff training. By offering a path for enterprises, the study intends to assist faster transitions toward AI-driven project management, eventually increasing project results. This information is particularly beneficial for firms that may be hesitant to employ AI owing to ambiguity about its advantages and limitations.

#### ✓ **Enhancing Efficiency:**

The research underlines the potential benefits of AI integration, emphasizing how firms may simplify their project management tasks. By automating mundane jobs, boosting data analysis, and

improving decision-making processes, AI has the potential to greatly increase operational efficiency. This efficiency can lead to decreased project schedules, improved resource allocation, and ultimately, cost savings. The study's findings serve as a persuasive rationale for enterprises to engage in AI technology, illustrating how these advancements may lead to more effective project management and greater alignment with company goals.

✓ **Risk Mitigation:**

The outcomes of this study might aid firms in detecting possible hazards connected with AI adoption in project management. By identifying these risks—such as data privacy issues, implementation problems, and employee resistance—organizations may build methods to reduce them proactively. This proactive strategy is vital for ensuring that AI integration does not lead to unanticipated negative repercussions. By establishing a framework for risk assessment and management, the research gives businesses with the skills needed to traverse the intricacies of AI deployment successfully, promoting a culture of informed decision-making.

✓ **Skill Development:**

The study underlines the necessity of training and skill development among project managers and team members to properly exploit AI technology. By defining the exact skills needed for effective AI integration, the research underscores the need of investing in workforce development. Organizations may utilize these insights to design tailored training programs that boost employees' competencies in data analysis, AI tool usage, and change management. This focus on skill development not only empowers people but also guarantees that firms are well-equipped to exploit the benefits of AI in their project management processes.

✓ **Alignment with National Goals:**

By contributing to the knowledge of AI in project management, this study serves the larger objectives of Saudi Vision 2030, which aspires to diversify the economy and foster innovation. The insights collected from this research can guide governments and industry leaders on how to harness AI to increase the competitiveness of the IT sector. By creating a culture of creativity and encouraging enterprises to use AI technology, the research fits with government plans to establish a knowledge-based economy, eventually contributing to the overall growth and modernization of the Saudi economy.

## Study Questions

- **Main Question:**

- ✓ What is the role of Artificial Intelligence (AI) in boosting project management procedures within the Information Technology (IT) industry in the Kingdom of Saudi Arabia?

- **Sub-Questions:**

- ✓ What is the current status of AI usage in project management methods across companies in the Saudi IT sector?
- ✓ What particular benefits do companies find from integrating AI into their project management processes?
- ✓ What are the primary obstacles and barriers experienced by companies in the Saudi IT sector when applying AI in project management?
- ✓ How does organizational culture impact the acceptance and integration of AI technology in project management?
- ✓ What structure or principles can be offered to support the efficient adoption of AI in project management processes?

## Study hypotheses

- **Main Hypothesis:**

The integration of Artificial Intelligence (AI) in project management procedures considerably boosts project efficiency and results in the Information Technology (IT) industry in the Kingdom of Saudi Arabia.

- **Sub-Hypotheses:**

- ✓ **Sub-Hypothesis 1:**

Organizations who embrace AI technologies in project management will enjoy a quantifiable improvement in project completion times compared to those that do not.

This hypothesis proposes that AI may optimize project workflows, automate mundane operations, and enhance resource allocation, leading to speedier project delivery. By assessing project schedules before and after AI deployment, the research will evaluate the level of efficiency advantages.

✓ **Sub-Hypothesis 2:**

The employment of AI in project management will lead to increased decision-making capacities among project managers.

AI's data analysis skills may give project managers with useful insights and predictive analytics, helping them to make better educated decisions. This hypothesis will be explored by comparing decision-making processes and outcomes in AI-adopting firms to those that depend on traditional approaches.

✓ **Sub-Hypothesis 3:**

Organizations facing considerable impediments to AI adoption will report lower levels of project success and efficiency.

This hypothesis implies that reluctance to change, lack of resources, and limited awareness regarding AI might negatively affect project outcomes. By measuring project success rates and efficiency indicators in connection to identified obstacles, the research will highlight the association between problems and project performance.

✓ **Sub-Hypothesis 4:**

A good corporate culture that fosters innovation and change will help the successful integration of AI in project management.

This hypothesis proposes that firms with a culture receptive to technological growth will be more effective in integrating AI. The research will investigate the link between corporate culture characteristics and AI adoption success rates, offering insights into how cultural aspects impact technological integration.

### ✓ **Sub-Hypothesis 5:**

The creation and implementation of standardized frameworks for AI integration will improve project management techniques in the IT sector.

This hypothesis implies that providing firms with clear rules and best practices for AI adoption will strengthen their project management processes. The research will analyze firms who use these frameworks versus those that do not, examining improvements in project results and efficiency.

## **The scientific theory used to prepare the research**

### **1. Technology Acceptance Model (TAM)**

The Technology Acceptance Model (TAM) is a theoretical framework that describes how people come to accept and use new technology. It proposes that perceived ease of use and perceived utility considerably impact people's adoption of technology. In the context of this research, TAM can assist in understanding how project managers and team members in the Saudi IT sector view AI technology. By examining these perspectives, the study can uncover elements that either assist or inhibit the use of AI in project management procedures. Understanding these factors can aid companies in resolving concerns and boosting acceptance rates (Mugo, 2017).

### **2. Diffusion of Innovations Theory**

The Diffusion of Innovations Theory, created by Everett Rogers, explains how, why, and at what pace new ideas and technologies spread across individuals and organizations. The theory outlines various aspects impacting the adoption process, including the innovation's relative benefit, compatibility, complexity, trialability, and observability. This hypothesis is particularly important to the study as it can give insights into how AI technologies are utilized within the Saudi IT sector. By studying the characteristics of AI advances and their perceived advantages, the research can uncover hurdles to adoption and solutions to assist smoother integration into project management procedures (Mbatha, 2024).

### **3. Resource-Based View (RBV)**

The Resource-Based View (RBV) believes that an organization's resources and skills are vital for establishing a competitive advantage. This approach highlights the value of unique resources, such as technology, knowledge, and human capital, in producing outstanding performance. In the context of this research, RBV can assist examine how the incorporation of AI technology helps project management processes by using current organizational resources. By evaluating the connection between AI deployment and resource allocation, the research can give insights into how businesses might utilize their resources to enhance project outcomes and overall efficiency in the IT industry (Stoian, 2024).

#### **4. Social Cognitive Theory**

Social Cognitive Theory, established by Albert Bandura, stresses the interplay between individual cognition, behavior, and environmental effects. The idea suggests that individuals acquire and adopt habits by observing others and via social interactions. In the context of AI adoption in project management, this theory can assist explain how project managers and team members affect each other's acceptance of AI technology. By evaluating social elements, such as peer support and leadership endorsement, the study can expose how social dynamics effect the successful integration of AI in project management processes, showing the need of a supportive corporate climate (Rumjaun, 2020).

#### **5. Change Management Theory**

Change Management Theory focuses on the procedures and strategies that businesses adopt to manage changes effectively. It discusses ways for enabling change, resolving opposition, and ensuring that changes are effectively implemented and perpetuated. This idea is particularly pertinent to the study, as incorporating AI technology in project management implies a considerable organizational transformation. By adopting Change Management Theory, the research can assess how firms in the Saudi IT industry plan for, implement, and sustain AI adoption. The insights gathered can assist design tactics that alleviate opposition, increase participation, and ultimately boost the success of AI integration in project management techniques (Chhatre, 2024).

## **Chapter Two**

### **Previous Studies**

## Introduction

This chapter includes a detailed evaluation of prior research related to the integration of Artificial Intelligence (AI) in project management processes, concentrating on the Information Technology (IT) sector in the Kingdom of Saudi Arabia. The topic is arranged into three basic sections: research variables, prior investigations, and the theoretical framework.

The first part discusses the research variables, which consist of both independent and dependent constructs that play a crucial role in project management. The independent variables cover numerous AI technologies, including machine learning, natural language processing, and automation tools, which are projected to boost project management efficiency and decision-making. The dependent variable focusses on the project management procedures itself, comprising planning, implementation, monitoring, and closing activities. Understanding the link between these variables is vital for measuring AI's influence on project results and identifying key elements for successful integration.

In the second section, a review of past research highlights extant literature on AI applications in project management. This section synthesizes major data about the benefits, obstacles, and variables driving AI adoption within enterprises. By examining past studies, the chapter finds patterns, gaps, and opportunities for additional investigation, establishing the framework for the present study's aims and approach.

The final part presents the theoretical foundation that governs the investigation. It examines key ideas, such as the Technology Acceptability Model (TAM) and Diffusion of Innovations Theory, which give insights into user acceptability and the adoption process of AI technologies in project management. By integrating these ideas, the research intends to provide a comprehensive knowledge of the factors impacting AI integration, eventually contributing to superior project management practices in the Saudi IT industry.

## **Study variables**

- **Independent variables**

- ✓ **Reducing Human Errors**

Reducing human mistakes is a crucial independent variable in the context of project management procedures enhanced by Artificial Intelligence (AI). Human mistakes can emerge from several sources, including cognitive overload, misunderstanding, and exhaustion, frequently resulting to project delays, higher expenses, and degraded quality. AI technology, like as machine learning algorithms and automation tools, can decrease these mistakes by giving data-driven insights, automating regular operations, and enabling predictive analytics. By minimizing the possibility of mistakes, AI leads to more accurate project execution and outcomes, thus boosting overall project efficiency and success in the IT sector (Haight, 2019).

- ✓ **Improving the Decision-Making Process**

Improving the decision-making process is another crucial independent variable that AI impacts inside project management. Effective decision-making is vital for project success, since it entails analyzing choices, predicting hazards, and allocating resources effectively. AI aids decision-making through enhanced analytics, real-time data processing, and predictive modeling. By providing project managers with actionable insights and projections, AI enables for better informed and timely choices. This skill is particularly important in complicated IT projects, where dynamic factors and uncertainties can confound the decision-making environment. Consequently, AI's involvement in enhancing decision-making helps to better project results and strategy alignment (Felicetti, 2024).

- ✓ **Improving Communication**

Improving communication is a crucial independent variable that AI may greatly affect in project management procedures. Effective communication among team members, stakeholders, and clients is vital for project coordination and success. AI-driven solutions, including as chatbots, natural language processing software, and collaboration platforms, can facilitate real-time communication and information exchange. By simplifying communication channels and providing fast access to essential data, AI helps decrease misunderstandings and promotes collaboration

among team members. Improved communication generates a more unified work atmosphere, eventually leading to greater project efficiency and effectiveness within the IT industry (Kalogiannidis, 2024).

- **Dependent variable**

- ✓ **The Role of Artificial Intelligence**

The function of Artificial Intelligence (AI) acts as the dependent variable in this study, encompassing the revolutionary influence AI technologies have on project management procedures. AI's integration into the IT industry helps numerous areas of project management, including work automation, data analysis, and risk assessment. By adopting AI, enterprises may streamline workflows, boost productivity, and minimize mistakes, eventually leading to improved project outcomes. This variable demonstrates how the use of AI not only impacts operational processes but also reshapes the strategic landscape of project management, underlining its rising relevance in fostering innovation and competitive advantage within the sector.

## **Previous studies**

The development of artificial intelligence is the most exciting technical achievement of the twenty-first century. Artificial intelligence has become a ubiquitous technology in modern times, and the business world is no exception. Even though AI is still emerging, it has already had a big influence on the commercial sector. It has enabled company managers to find unique techniques to package and even convey the final product to the consumer. The goal of this study is to analyze the different potential and problems related with the integration of artificial intelligence in commercial communication channels. Data was obtained from 384 business and technology specialists in Greece using a well-designed questionnaire. The business sector is going through a dramatic transition in how it interacts with customers and other firms. AI has been efficiently employed in various commercial domains, including biometrics, chatbots, robotics, integrated buying and inventories, recommendation and suggestion engines, and kiosks. In addition to keeping up with the rapid breakthroughs in artificial intelligence, it is also contributing in the change of consumer behavior and the corporate sector. Undoubtedly, the industry has gained tremendously from the deployment of artificial intelligence, but many individuals are still

uninformed of its potential. The findings highlight critical difficulties that are specific to firms driven by AI. The results give light on the special complexity and issues that firms may run into when employing AI in business operations by pinpointing these difficulties (Karamthulla, 2024).

With the extensive usage of artificial intelligence (AI), construction engineering and management (CEM) is seeing a rapid digital transition. Since AI-based solutions in CEM has become the current research focus, it needs to be completely understood. In this regard, this study offers a systematic evaluation under both scient metric and qualitative analysis to show the current state of AI adoption in the context of CEM and analyze its future research directions. To begin with, a scient metric review is undertaken to analyze the features of keywords, journals, and clusters based on 4,473 journal articles published between 1997–2020. It is discovered that there has been an explosion of relevant publications notably in the previous 10 years along with the change in keyword popularity from expert systems to building information modeling (BIM), digital twins, and others. Then, a basic knowledge of CEM is presented, which may be benefitted from the increasing trend of AI in terms of automation, risk mitigation, high efficiency, digitalization, and computer vision. Special attention has been made on six current research issues that show the benefit of AI in CEM, including (1) knowledge representation and reasoning, (2) information fusion, (3) computer vision, (4) natural language processing, (5) intelligence optimization, and (6) process mining. The purpose of these subjects is to model, forecast, and optimize challenges in a data-driven way across the complete lifespan of the real complicated project. To further narrow the gap between AI and CEM, six key directions of future research, such as smart robotics, cloud virtual and augmented reality (cloud VR/AR), Artificial Intelligence of Things (AIoT), digital twins, 4D printing, and blockchains, are highlighted to constantly facilitate the automation and intelligence in CEM (Pan, 2021).

The primary goal of our research is to examine the impact of artificial intelligence (AI) on company performance, particularly by focusing on the commercial value of AI-based transformation initiatives. This study followed a four-step sequential approach: (1) analysis of AI and AI concepts/technologies; (2) in-depth exploration of case studies from a wide range of industrial sectors; (3) data collection from the databases (websites) of AI-based solution providers; and (4) a review of AI literature to identify their impact on organizational performance while emphasizing the business value of AI-enabled project transformation within organizations. This

study used IT capability theory to capture the impact of AI business value on company performance (at both the organizational and process levels). The research procedure (responding to the research topic, discussing, interpreting and comparing, and creating suggestions) was based on an examination of 500 case studies from IBM, AWS, Cloudera, Nvidia, Conversica, and Universal Robots websites, among other sources. To investigate the impact of AI on organizational performance, particularly the business value of such organizations' AI-enabled transformation projects, we conducted an archival data analysis in three stages: conceptual, refinement and development, and assessment. AI encompasses a wide range of technologies, including machine translation, chatbots, and self-learning algorithms, all of which may help people better comprehend their surroundings and behave appropriately. Organizations have been using AI technical advances in order to adapt to or disrupt their ecosystem, as well as create and optimize their strategic and competitive advantage. AI's full potential is realized through its capacity to optimize existing processes, improve automation, information, and transformation impacts, as well as detect, predict, and interact with humans. Thus, the findings of our study have emphasized the benefits of AI in firms, particularly its capacity to increase performance at both the organizational (financial, marketing, and administrative) and process levels. Organizations may increase the business value of their changed initiatives by using these AI features. The same findings revealed that businesses attain performance through AI capabilities only when they leverage their features/technologies to restructure their operations. AI clearly impacts the way companies are conducted nowadays. As a result, practitioners and academics must regard AI as a beneficial tool or perhaps a prototype for a new business model. For the purposes of our research, we used a research paradigm designed to be more inclusive and thorough in order to properly account for the intangible advantages of AI within enterprises. In terms of curiosity, this work fosters scientific interest by presenting a model for measuring the impact of AI on organizational performance while also filling a vacuum in the literature. In terms of managerial interest, our research aims to provide managers with elements that can be reconfigured or added to take full advantage of the benefits of AI, thereby improving organizational performance, the profitability of their investments in AI transformation projects, and gaining a competitive advantage. This study also enables managers to view AI as a set/combination of several different IT configurations in various company business areas, as multiple key elements must be brought together to ensure the success of AI data, talent mix, domain knowledge, key decisions, external partnerships, and scalable infrastructure. This article

examines case studies involving the utilization of secondary data from AI deployment reports in businesses. The transformation of projects via the application of AI focuses primarily on business process innovations and, indirectly, those occurring at the organisational level. Thus, 500 case studies are being reviewed in order to give significant and real proof concerning the commercial value of AI-based initiatives as well as the influence of AI on corporate performance. More precisely, this article, via these case studies, demonstrates the impact of AI on both organizational and process performance levels, while seeing it as a set/combination of numerous alternative IT setups in diverse sectors rather than a single technology (Wamba-Taguimdje, 2020).

The construction industry's development is severely hampered by the numerous complex difficulties it encounters, including cost and schedule overruns, health and safety, productivity, and labor shortages. Also, the construction business is one of the least computerized in the world, making it difficult to address the issues it is now facing. Artificial Intelligence (AI) is a cutting-edge digital technology that is currently transforming sectors such as manufacturing, retail, and communications. AI subfields such as machine learning, knowledge-based systems, computer vision, robotics, and optimisation have been effectively used in different sectors to improve profitability, efficiency, safety, and security. Despite embracing the benefits of AI applications, the construction sector continues to face several AI-related obstacles. This study seeks to uncover AI applications, evaluate AI methodologies in use, and identify opportunities and difficulties for AI applications in the construction sector. A thorough evaluation of existing literature on AI applications in the construction sector, such as activity monitoring, risk management, resource and waste optimization, was carried out. Furthermore, this study identified and highlighted the potential and limitations associated with AI applications in construction. This report provides insights into major AI applications as they relate to construction-specific difficulties, as well as a roadmap for realizing the attainable advantages of AI in the construction sector (Abioye, 2021).

Artificial intelligence (AI) has emerged as a transformative force in project management, disrupting traditional techniques and expanding human capabilities. This study looks into the many roles that artificial intelligence (AI) plays in project management and how it affects project success rates. This study reveals that the introduction of artificial intelligence in project management has resulted in a significant increase in project completion rates. Overall, artificial intelligence execution has resulted in a significant increase of around 20% in project success rates across

various companies. Artificial intelligence has demonstrated its potential to smooth out project work processes and mitigate risks by automating boring tasks, enhancing asset allocation, and developing dynamic cycles. Nonetheless, despite its promised benefits, artificial intelligence implementation poses challenges such as information security problems, moral considerations, and labor force reskilling requirements. This abstract discusses the fundamental need of incorporating artificial intelligence developments into project management to achieve more proficiency, adequacy, and development. Looking ahead, further study is planned to look into emerging trends and solve the growing challenges of bridging artificial intelligence for project success (Zia, 2024).

Artificial intelligence (AI) is a cutting-edge technology that has altered the administration of investment projects. Artificial intelligence provides numerous opportunities to improve the efficiency and quality of investment projects, including data analysis and the ability to process massive amounts of data, allowing artificial intelligence to effectively analyze both historical and current data. This leads to more accurate judgments and a better awareness of future trends and issues. enhancing planning also aids artificial intelligence in enhancing planning procedures and identifying potential dangers. Using sophisticated forecasting models, investors may predict various implications and discover best scenarios for increasing ROI and enhancing project management. Artificial intelligence may enhance project management procedures by anticipating and recognizing possible problems early, allowing for prompt remedial action and avoiding unexpected delays. Improved decision-making adds to increased decision-making ability by providing detailed analysis and reporting. This enables investors and executives to make educated decisions based on accurate and timely information (Abuzabiba, 2024).

This study examines the use and influence of artificial intelligence in the field of project management. First, it defines AI and discusses its history of development, as well as its widespread use in a variety of sectors. The article then goes into detail on AI's influence on project management, covering project planning and scheduling, cost estimate and forecasting, risk management and decision support, communication and collaboration, quality management and monitoring, and resource allocation and optimization. Artificial intelligence technology has demonstrated considerable advantages in terms of decision-making precision, resource utilization, and risk management. At the same time, this article analyzes the issues of AI in project management, such as data quality, algorithm transparency, and personnel literacy, as well as the

skill needs, and job shifts that AI will bring to project managers and teams. Finally, it anticipates that AI in project management will lead to additional discoveries and breakthroughs, resulting in more efficient and smarter project management systems (Diao, 2024).

Artificial intelligence (AI) is altering project management by automating mundane operations, boosting decision-making, and streamlining risk management procedures. Traditional project management systems frequently fail to keep up with the complexity of current projects, which include larger teams, remote locations, and more detailed deliverables. AI has evolved as a strong tool capable of analyzing large datasets, predicting project outcomes, effectively allocating resources, and automating monotonous work, freeing up project managers to focus on strategic decision-making and leadership. This article investigates the influence of AI on project management, with a focus on three major areas: increasing efficiency, reducing risks, and improving decision-making. First, we look at how AI automates regular operations like scheduling, resource allocation, and reporting, therefore increasing efficiency and minimizing human error. Real-world case studies are provided to demonstrate how businesses have effectively utilized AI-powered solutions to shorten project timelines and optimize resource usage. Second, the essay goes into AI's capabilities for risk detection and mitigation. Predictive analytics enables AI to identify possible hazards early in the project lifecycle, giving project managers actionable information. We examine case studies in which AI has been utilized to manage risks in areas such as construction and IT, resulting in better project outcomes. Third, we investigate how AI might improve decision-making by providing real-time data analytics and scenario simulations. Machine learning algorithms can forecast outcomes using previous project data, allowing project managers to make data-driven decisions that improve project performance. The article provides instances of AI-enhanced decision-making in financial and IT projects, demonstrating how AI's contribution improved budget management, deadline adherence, and overall project performance. While AI has tremendous benefits, there are problems involved with its deployment. The essay discusses data privacy, interaction with old systems, and opposition to change, and provides strategies for overcoming these challenges. It also anticipates the future of AI in project management, including its involvement in Agile techniques, project portfolio management, and the changing role of the project manager. Finally, AI is transforming project management by boosting efficiency, reducing risk, and improving decision-making processes. Project managers must embrace AI not as a replacement for human leadership, but as a tool to enhance their talents, allowing them to execute

more effective and efficient projects in an increasingly complicated corporate environment (Ogunbukola, 2024).

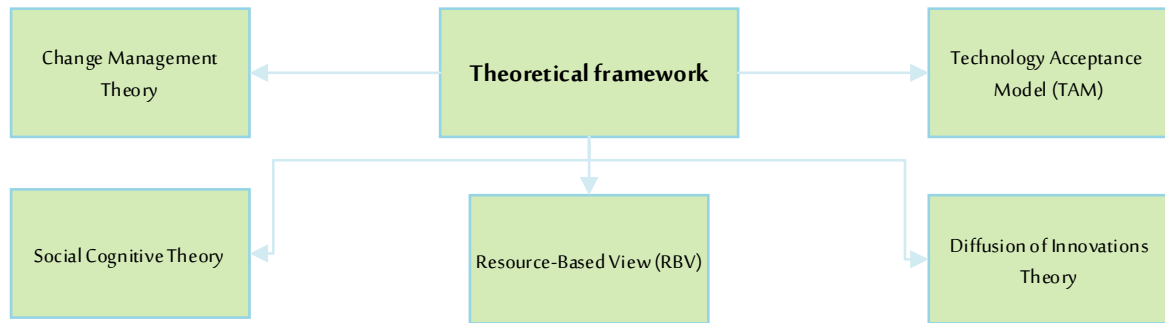
The combination of Artificial Intelligence (AI) with a focus on human aspects is transforming the area of dentistry, resulting in Hybrid Intelligence Dentistry (HID). This article investigates the substantial influence of AI and human factors in dentistry, focusing on the relationship between technical improvements and human knowledge. It focuses on how AI-powered tools and algorithms improve diagnosis, treatment planning, and patient care, while also discussing the ethical, regulatory, and practical implications of deploying these technologies. The essay also discusses the critical role of dental professionals in realizing the full potential of HID, arguing for a collaborative approach. The research emphasizes the construction of sustainable dental care by presenting real-world examples from dental practice that demonstrate the supported use of AI in conjunction with human elements. Furthermore, the essay adds to a better knowledge of dental concerns within the contexts of Industry 5.0 and Society 5.0, making it useful to a wide variety of stakeholders. Acknowledgments include financing from numerous programs and organizations, and the authors declare no competing interests (Pavlova, 2024).

The absence of digitalization in construction project management, particularly in areas such as dispute resolution, project scheduling, resource allocation, and risk management, remains a significant unresolved issue. This shortcoming causes inefficiencies in workflow, increased project costs, and longer project durations. To address these concerns, this study looks into the usage of Generative Pre-trained Transformers, an AI technology, as an artificially intelligent construction project manager. It provides a novel hybrid work paradigm that combines a Professional Construction Project Manager (PrCPM) and a Construction Project Manager-Artificial Intelligence (CPM-AI) model, using digital innovation to particularly target and minimize inefficiencies. To assist this analysis, the paper proposes the Artificial Pedagogy Phenomenology Theory (APPt), which describes how combining AI talents with human insights might maximize hybrid labor models, resulting in better construction project outcomes. This theory also covers ethical considerations around AI deployment, such as the balance of accountability and employment displacement, with a focus on Engineering and the Built Environment disciplines. Using a positivist research ethic and a quantitative deductive methodology, this study utilizes educational methodologies and secondary data to simulate

construction project managers' decision-making processes. The transformer algorithm's pedagogical training is critical to this methodology because it uses queries to identify current project issues, incorporates relevant historical data from previous projects for context, derives actionable insights from past scenarios, and ensures balanced and effective decision-making. The pre-alpha unit testing of the CPM-AI model, which is taught to handle dispute settlement, project scheduling, resource allocation, and risk management, yielded statistically significant results in performance validation testing. In performance testing for dispute resolution decision-making tasks, the model scored more than 88.6% accuracy. Furthermore, it demonstrated effectiveness in program scheduling and resource allocation, as well as noteworthy performance in answering standardized historical Project Management Professional Exam questions, resulting in a high aggregate score in risk assessment. These findings offer guidance for creating customized Built Environment-Artificial Intelligence (BE-AI) models while also demonstrating seamless interaction with current tools and approaches. Research constraints include reliance on secondary data quality and possible AI biases, which require continual improvement and validation to assure model accuracy and applicability in a variety of building scenarios. The study focuses on practical consequences such as increased project management efficiency, better decision-making accuracy, and shorter project costs and durations, eventually adding to the continuing discussion regarding technological improvements in the built environment (Weaich, 2024).

## **Theoretical framework**

This study draws on numerous known theories to give a complete understanding of the function of Artificial Intelligence (AI) in enhancing project management procedures in the construction industry. These theories provide a platform for investigating how AI technologies may be effectively incorporated into current project management techniques, as well as the variables that influence their acceptance and deployment. The research intends to understand the difficulties of digital transformation in construction and its influence on project results by harnessing insights from these theories.



*Figure 2-1: Theoretical framework*

### **1. Technology Acceptance Model (TAM)**

The Technology Acceptance Model (TAM) is a well-known concept that describes how people learn to accept and use new technology. It asserts that perceived ease of use and perceived utility are the major factors influencing technology adoption. TAM is used in this study to better understand how construction professionals view AI tools and their potential benefits in improving project management procedures. By identifying the characteristics that drive acceptance, this model may guide tactics for instilling a favorable attitude toward AI technology, ultimately leading to their effective incorporation into project management techniques (Mugo, 2017).

### **2. Diffusion of Innovation Theory**

Everett Rogers established Diffusion of Innovations Theory, which investigates how new ideas and technology spread inside and between companies. It identifies important aspects that impact the adoption process, such as the innovation's relative benefit, compatibility, complexity, trialability, and observability. In this study, the theory aids in analyzing how AI technologies might spread in the construction sector and what constraints may prevent their acceptance. Understanding the processes of innovation diffusion is critical for establishing methods that encourage AI adoption and integration in construction project management, resulting in increased overall project efficiency and effectiveness (Mbatha, 2024).

### **3. Resource-Based View (RBV)**

The Resource-Based View (RBV) highlights the role of an organization's internal resources and skills in gaining a competitive edge. This idea holds that distinctive resources, like as technology assets, human capital, and organizational procedures, are essential for success. In this paper, RBV explains how AI technologies may be used as important tools in building project management. By incorporating AI technologies into current processes, businesses may increase their resource capabilities, resulting in better project outputs. This viewpoint promotes a strategic approach to AI adoption, with an emphasis on optimizing resources for increased efficiency and effectiveness (Stoian, 2024).

### **4. Social Cognitive Theory**

Albert Bandura established Social Cognitive Theory, which focuses on the interaction of personal, behavioral, and environmental elements in learning and behavior modification. This theory emphasizes the role of observational learning, imitation, and modeling in the adoption of new technology. Social Cognitive Theory is used in this study to better understand how construction workers might learn about AI applications in project management from their peers and mentors. Organizations may improve their workforce's skills and confidence by creating an atmosphere that supports knowledge sharing and cooperation, resulting in increased adoption and successful usage of AI technology in construction projects (Rumjaun, 2020).

### **5. Change Management Theory**

Change Management Theory comprises a variety of techniques designed to help businesses navigate transitions and changes. It emphasizes the significance of handling opposition, communication, and stakeholder engagement throughout change processes. In this study, Change Management Theory provides a framework for understanding the problems of incorporating AI into construction project management. By addressing the human elements involved in change, such as employee fears and the need for training, this theory can inspire methods for a smoother

transition to AI-enhanced practices, ultimately leading to better project management results and a more agile corporate culture (Chhatre, 2024).

# **Chapter Three**

## **Study Methodology**

## Introduction

Chapter Three describes the methodology utilized in this study, including a detailed review of the research strategy and methodologies used to evaluate the role of Artificial Intelligence (AI) in enhancing project management procedures in the construction industry. The methodology section is critical because it describes the framework within which the research was done, ensuring that the study's objectives are accomplished rigorously and reliably. By defining a defined methodological approach, this chapter intends to provide insights into how data was acquired, processed, and interpreted to answer the research questions stated in prior chapters.

The study follows a positivist research paradigm, which emphasizes objectivity, measurement, and the use of quantitative tools to get generalizable results. This method is especially useful for investigating the influence of AI technologies on project management since it enables statistical analysis of data to detect patterns and connections. The research community is made up of construction industry professionals and stakeholders such as project managers, engineers, and technology specialists who have personal knowledge of the deployment and consequences of artificial intelligence in project management.

Data gathering for this study was a methodical procedure that used both primary and secondary sources to gain pertinent information. Surveys, interviews, and existing literature were used to gather a diverse variety of viewpoints on the incorporation of AI into building project management. The chapter describes the procedures in data gathering, stressing the necessity of maintaining data quality, validity, and dependability throughout the study process. By triangulating data from numerous sources, the research hopes to increase the reliability of the findings and give a comprehensive knowledge of the issues at hand. The chapter addresses the study's geographical, temporal, and human limitations. Spatial restrictions refer to the geographical scope of the research, which focuses largely on building projects in a certain region or nation, whilst temporal limits refer to the timeframe in which the data was collected and evaluated. Human limitations refer to the qualities of the research participants, such as their credentials, experiences, and positions in the construction sector. Recognizing these limitations is critical for contextualizing the findings and comprehending their relevance to larger settings. Chapter Three is a basic component of the research, outlining the methods used to explore the integration of AI into construction project management. This chapter intends to improve the transparency and replicability of the study by

outlining the processes followed during the research process, therefore adding to the continuing discussion about technology adoption in the built environment.

## **Methodology and Research Methods**

### **1. Quantitative Research Approach**

This study takes a quantitative research technique, which is suitable for carefully gathering, analyzing, and interpreting numerical data in order to make relevant findings. The quantitative technique allows for the measurement of certain factors linked to the integration of Artificial Intelligence (AI) into building project management procedures.

### **2. Questionnaire Design**

Professionals in the construction business will get a well-structured questionnaire. The questionnaire contains closed-ended questions that allow respondents to offer quantitative replies on their experiences and perceptions of AI technologies. This organized style improves the reliability and validity of the data by reducing ambiguity in respondents' responses.

### **3. Study Sample**

The study sample includes a varied set of people working in various professions in the construction industry, such as project managers, engineers, architects, and technology experts. This diversity guarantees that the findings reflect a wide range of viewpoints on the use of AI in project management, offering a comprehensive understanding of its benefits and drawbacks.

### **4. Sample Size Determinants**

The sample size of 135 participants was selected by numerous parameters, including the general population of construction professionals in the target region.

- The desired degree of accuracy for the analysis.
- Anticipated response rate.

The sample size was calculated using statistical procedures, guaranteeing that there was enough data to conduct credible analysis.

### **5. Participant Recruitment**

Participants will be recruited using a variety of tactics, including outreach through professional groups, internet platforms, and direct contact with construction businesses. This comprehensive

strategy attempts to maximize response rates while also ensuring a representative sample that appropriately reflects the perspectives of industry professionals.

## **6. The Data Collection Process.**

The data gathering procedure will include delivering questionnaires to chosen people, then collecting completed surveys for analysis. This strategy guarantees that a full dataset is created for statistical analysis, allowing for the detection of important trends and correlations connected to AI adoption in project management.

## **7. Data Analysis.**

After collection, the data will be evaluated using appropriate statistical techniques to uncover patterns and correlations among the replies. This investigation will give insights into the influence of AI technology on project management procedures, hence supporting the study's aims.

In conclusion, our study's quantitative technique, which focuses on the distribution, collecting, and analysis of questionnaires, provides a strong foundation for exploring the function of AI in building project management. The carefully selected sample size of 135 participants, together with a varied variety of professional backgrounds, increases the study's validity and allows for complete insights into the integration of AI technologies in the construction sector.

## **Research community**

The research community for this study is centered on the Kingdom of Saudi Arabia, especially among companies and institutions that are devoted to the growth and implementation of Artificial Intelligence (AI) in project management. The government has realized the revolutionary potential of AI and has made tremendous gains in integrating technology into numerous industries, notably in building and project management. This research community covers a wide range of stakeholders, including academic institutions, governmental agencies, commercial firms, and industry groups that are actively participating in the application and study of AI technology.

One of the key components of this research community is university institutions that provide degrees in engineering, construction management, and information technology. These

institutions play a crucial role in expanding knowledge and competence in AI applications. Universities and research institutions are increasingly focused on interdisciplinary studies that blend AI with project management approaches. By promoting collaboration between faculties of engineering, computer science, and business administration, these institutions contribute to the creation of a professional workforce suited to exploit AI tools successfully.

Governmental entities in Saudi Arabia are also crucial to this research community. The Saudi government has launched projects targeted at supporting digital transformation across several industries, including construction. For instance, the National Transformation Program (NTP) and Vision 2030 highlight the necessity of embracing innovative technology to boost production and efficiency in the building sector. These governmental efforts establish an enabling environment for research and development in AI, supporting cooperation between public sector firms and academic institutions.

In addition to academic and governmental agencies, business firms in the construction sector are key players in the research community. Many construction organizations are investing in AI technology to improve project management procedures, cut costs, and boost decision-making skills. These organizations regularly cooperate with academic institutes to prototype breakthrough AI solutions, offering vital insights that may guide further research and development. By participating in real-world applications of AI, private firms contribute to the practical understanding of how these technologies may be effectively deployed in project management.

Industry groups and professional organizations in Saudi Arabia also play a significant role in encouraging research in AI and project management. These organizations encourage information exchange and networking among experts, researchers, and practitioners in the subject. They typically arrange conferences, workshops, and training sessions that focus on the newest advancements in AI technology and their applications in project management. By facilitating collaboration among many stakeholders, industrial organizations assist to build a vibrant research community that stimulates innovation and the exchange of best practices.

Furthermore, the research community in Saudi Arabia benefits from the country's vast range of experiences and cultural viewpoints. This variety can boost the knowledge of how AI can be adjusted to address the distinct demands and difficulties encountered by the construction sector in the area. Engaging with a wide range of stakeholders ensures that research efforts are relevant and culturally grounded, leading to more successful and sustainable solutions.

In conclusion, the research community focusing on AI in project management within the Kingdom of Saudi Arabia is complex, spanning university institutions, governmental agencies, commercial firms, and industry groups. This collaborative environment is vital for generating innovation, facilitating information sharing, and eventually boosting the integration of AI technology in building project management. By harnessing the skills of each stakeholder, the research community aspires to address the issues encountered by the construction sector and contribute to the wider goals of digital transformation and economic diversification defined in Vision 2030.

## **Data collection steps**

**Data Collection Steps** The data gathering procedure is a major component of this research study, aiming at examining the integration of Artificial Intelligence (AI) in building project management. A systematic strategy ensures that the data acquired is trustworthy, valid, and relevant to the study objectives. Below are the main processes involved in the data gathering process:

### **1. Define Research Objectives**

The first stage is to explicitly establish the study objectives, which will drive the whole data gathering procedure. Identifying the important variables to be examined is crucial, since it guarantees that the data obtained will directly address the issues asked by the research. This concentrated strategy helps to retain clarity throughout the research process and allows for targeted data analysis.

### **2. Design the Questionnaire**

Developing a structured questionnaire is a critical step in obtaining quantitative data. The questionnaire should include a variety of closed-ended questions aimed to examine participants' perspectives and experiences connected to AI in project management. Questions should be straightforward, succinct, and relevant to the study objectives, encompassing issues such as the perceived benefits of AI, problems experienced in its deployment, and its overall influence on project management efficiency.

### **3. Select the Sample**

Once the questionnaire is prepared, the following stage entails determining the target demographic for the study. In this example, the focus is on experts in the construction business, including project managers, engineers, architects, and technology specialists. It is crucial to have a wide representation of positions throughout the sector, since this variety will enhance the findings and give a full knowledge of AI integration.

#### **4. Distribute and Collect Responses**

The finished questionnaire will be sent to the selected sample of 135 participants using a combination of online surveys and email invitations. Clear instructions should be provided to ensure that participants understand how to complete the questionnaire. Additionally, ensuring the secrecy and anonymity of responders will promote participation and create honest feedback. Following the first distribution, researchers should monitor the response rate and do follow-ups to enhance participation.

#### **5. Data Cleaning and Analysis**

After collecting the replies, the next stage is data cleaning, which entails examining the dataset for any incomplete or inconsistent responses. Cleaning the data guarantees that the analysis is based on high-quality information. Once the dataset is created, proper statistical techniques will be utilized to examine the data, allowing researchers to find important patterns and correlations connected to AI in project management.

#### **6. Interpret Results and Report Findings**

Finally, the outcomes of the analysis will be evaluated in the context of the study objectives. Researchers will draw significant inferences from the data, outlining the significance of the findings for the incorporation of AI technology in building project management. A full report will be created, providing the findings in a clear and ordered manner, supported with visual representations of data to assist comprehension.

Through these procedures, the study intends to systematically acquire data that gives useful insights on the role of AI in boosting project management processes within the construction sector. The organized methodology assures that the study findings will be both relevant and influential, adding to the larger conversation on technology integration in construction.

## **Research limits**

The scope of this research is constrained by numerous essential boundaries, which include temporal, geographical, and human elements. Understanding these boundaries is vital for contextualizing the findings and establishing the relevance of the results within the unique framework of this study.

- **Temporal Limits**

This research focuses on the period from 2019 until 2024. This era is particularly interesting because of the substantial breakthroughs in Artificial Intelligence (AI) throughout these years. The use of AI technology has advanced quickly, impacting several areas, including building project management. By focussing on this specific time, the study intends to capture the growing nature of AI applications and their influence on project management techniques within the construction sector in Saudi Arabia. The adoption of this time constraint also enables for an investigation of trends and innovations that have evolved in response to the rising acknowledgment of AI's ability to boost efficiency and decision-making processes.

- **Spatial Limits**

The spatial scope of this research is constrained to the relevant authorities and organizations functioning inside the Kingdom of Saudi Arabia. This comprises governmental authorities, construction enterprises, and industry groups that are actively involved in the deployment and study of AI technology in project management. By focusing on this geographical area, the research intends to address the particular difficulties and possibilities existing in the Saudi construction scene, which is defined by its socio-economic context, regulatory environment, and cultural aspects. This regional approach gives a more nuanced knowledge of how AI is being integrated into project management techniques within the nation.

- **Human Limits**

The human side of this research is characterized by the target demographic, which comprises of professionals working in the construction business, including project managers, engineers, architects, and technology specialists. The study will rely on the experiences and perspectives of

these individuals on the integration of AI into their processes. By engaging with a varied set of experts, the research intends to capture a wide variety of views that represent the complexity of AI adoption in project management. However, it is vital to realize that the findings may not be generalizable to other situations outside of the Saudi Arabian construction industry or to experts in various industries.

## **Chapter Four**

### **Study Results**

## Introduction

We report the findings of the data analysis resulting from the questionnaire given to experts in the construction sector about the integration of Artificial Intelligence (AI) in project management procedures. Utilizing statistical analysis techniques via the SPSS program, we strive to give a complete summary of the findings and insights received from the respondents. To guarantee the reliability and validity of the data obtained, the Cronbach's alpha coefficient was applied to examine the internal consistency of the questionnaire items. This statistical metric is critical for identifying the extent to which the items inside the questionnaire are associated and measure the same underlying construct. A high Cronbach's alpha score implies that the questionnaire successfully captures the key elements of AI integration in project management, offering confidence in the reliability of the results. The chi-square test will be performed to investigate the associations between category data. This statistical approach allows for the evaluation of whether significant relationships exist between diverse aspects, such as the extent of AI use and the perceived benefits or obstacles experienced by experts in project management. By utilizing these statistical techniques, we intend to find important patterns and trends within the data, adding to a greater understanding of the role AI plays in strengthening project management methods. The findings reported in this chapter are not only crucial for addressing the study questions but also serve as a basis for the suggestions that follow. These suggestions will give practical insights for industry stakeholders, aiding them in efficiently incorporating AI technology into their project management frameworks.

This chapter strives to give a clear and methodical explanation of the study results, enabling readers to appreciate the significance of the findings and their relevance to the ongoing conversation around AI integration in the construction sector. Through careful analysis and interpretation of the data, we want to provide useful insights that might influence future research and practical applications in this fast-growing sector.

## Study results

- **Descriptive statistics**

In this study titled "The Role of Artificial Intelligence in Improving Project Management Processes: An Applied Study on the Information Technology Sector in the Kingdom of Saudi Arabia," a comprehensive statistical analysis was conducted on the questionnaire data collected from a sample of 135 professionals in the IT sector. The investigation aims to analyze the reliability and validity of the data while also analyzing the relevant links between various parameters connected to the integration of artificial intelligence (AI) in project management procedures. To guarantee the reliability of the questionnaire, the Cronbach's alpha coefficient was applied as a measure of internal consistency. This statistical approach is crucial in identifying how closely connected a set of items are as a group. In this study, the Cronbach's alpha values were determined for different portions of the questionnaire to confirm that the items accurately examined the desired constructs linked to AI's impact on project management. A Cronbach's alpha score above 0.70 is typically deemed acceptable, suggesting that the questionnaire is a credible tool for evaluating the perceptions and experiences of respondents about AI applications in their project management operations. The estimated alpha values for the questionnaire sections exceeded this criterion, showing a high level of internal consistency among the items. This outcome supports the view that the questionnaire was well-structured and that the respondents had a cohesive comprehension of the topics provided about AI's involvement in their work environment. In addition to testing dependability, chi-square tests were undertaken to study the associations between categorical variables. This statistical approach is particularly effective for detecting if there is a significant relationship between two or more category variables. In the context of this study, chi-square tests were utilized to evaluate how various aspects, such as the amount of AI adoption, the perceived advantages, and the obstacles experienced by IT professionals, are interrelated. The results demonstrated statistically significant connections, suggesting that higher degrees of AI integration associated with superior project outcomes, including enhanced decision-making processes, fewer human mistakes, and more effective communication among project stakeholders. These findings accord with the aims of the study and corroborate the notion that AI has a considerable influence on project management techniques. The combination of Cronbach's alpha for reliability and chi-square tests for association offers a sound statistical foundation for the results made in this

research. By applying these statistical analyses, the study not only supports the questionnaire's efficiency as a data gathering instrument but also reveals the crucial interdependencies across key elements of AI integration in project management. Ultimately, the statistical description of the data, supported by these rigorous analyses, lays the groundwork for a deeper understanding of how artificial intelligence can transform project management processes in the IT sector of Saudi Arabia, paving the way for enhanced operational efficiencies and improved project delivery outcomes in a rapidly evolving technological landscape (Cooksey, 2020).

*Table 3-1: Statistical description of the data.*

| Statistics                                                     |       |         |                    |                |          |
|----------------------------------------------------------------|-------|---------|--------------------|----------------|----------|
|                                                                | N     |         | Std. Error of Mean | Std. Deviation | Variance |
|                                                                | Valid | Missing |                    |                |          |
| Age                                                            | 135   | 0       | .113               | 1.316          | 1.732    |
| Gender                                                         | 135   | 0       | .043               | .498           | .248     |
| Degree                                                         | 135   | 0       | .129               | 1.500          | 2.249    |
| AI improves the efficiency of project management processes.    | 135   | 0       | .111               | 1.292          | 1.670    |
| AI helps reduce human errors in projects.                      | 135   | 0       | .104               | 1.209          | 1.461    |
| AI facilitates decision-making in project management.          | 135   | 0       | .126               | 1.463          | 2.141    |
| Using AI helps accelerate project completion.                  | 135   | 0       | .137               | 1.593          | 2.538    |
| AI helps improve communication between team members.           | 135   | 0       | .116               | 1.348          | 1.816    |
| AI helps enhance coordination and collaboration between teams. | 135   | 0       | .134               | 1.558          | 2.427    |
| AI tools help track team performance effectively.              | 135   | 0       | .129               | 1.493          | 2.230    |

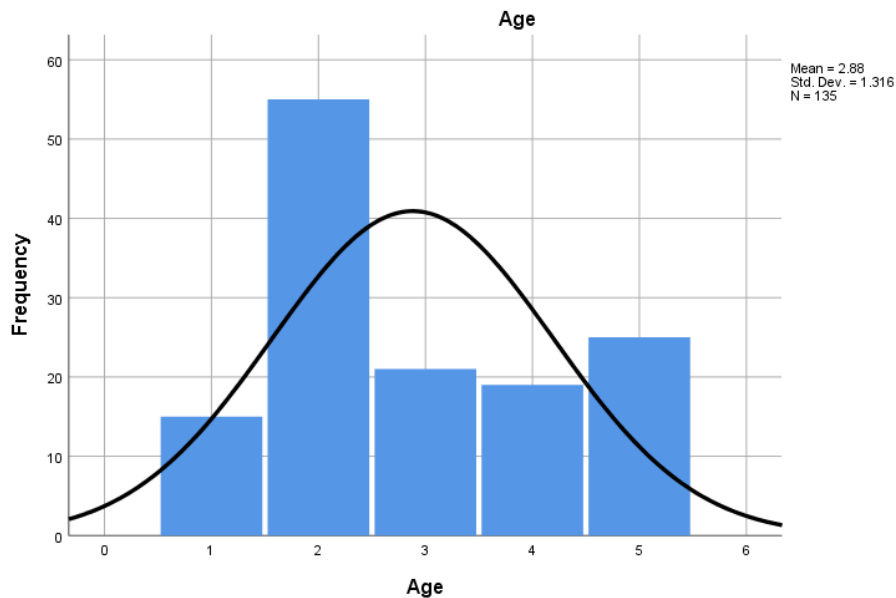
|                                                                     |     |   |      |       |       |
|---------------------------------------------------------------------|-----|---|------|-------|-------|
| AI helps provide recommendations to improve team performance.       | 135 | 0 | .113 | 1.313 | 1.724 |
| AI helps improve resource allocation more effectively.              | 135 | 0 | .121 | 1.402 | 1.965 |
| AI helps reduce resource waste in the project.                      | 135 | 0 | .133 | 1.550 | 2.402 |
| AI helps predict future resource needs for the project.             | 135 | 0 | .130 | 1.515 | 2.297 |
| AI provides accurate data to improve resource allocation decisions. | 135 | 0 | .138 | 1.600 | 2.559 |
| AI enables accurate analysis of project-related data.               | 135 | 0 | .137 | 1.595 | 2.544 |
| AI helps predict future project issues.                             | 135 | 0 | .133 | 1.543 | 2.381 |
| AI-powered analytics tools help reduce risks in project management. | 135 | 0 | .126 | 1.465 | 2.146 |
| AI helps improve the accuracy of timeline and budget forecasts.     | 135 | 0 | .108 | 1.260 | 1.587 |

- **How old are you?**

It is clear from the table that the percentages are close between the age groups, which indicates the randomness of the answers and the strength of the questionnaire.

*Table 3 – 2: Statistical description of the participants' age.*

|       |       | Age       |         |               |                    |
|-------|-------|-----------|---------|---------------|--------------------|
|       |       | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | 20-30 | 15        | 11.1    | 11.1          | 11.1               |
|       | 30-40 | 55        | 40.7    | 40.7          | 51.9               |
|       | 40-50 | 21        | 15.6    | 15.6          | 67.4               |
|       | 50-60 | 19        | 14.1    | 14.1          | 81.5               |
|       | 60+   | 25        | 18.5    | 18.5          | 100.0              |
|       | Total | 135       | 100.0   | 100.0         |                    |



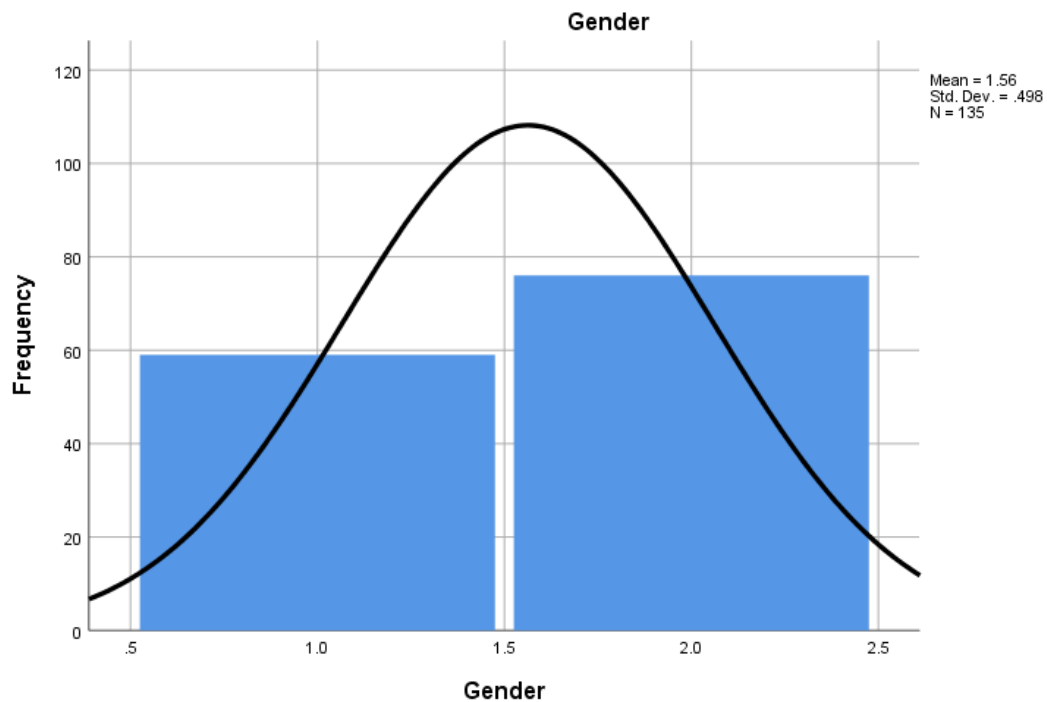
*Figure 3 – 1: Statistical description of the participants' age*

- **What's your gender?**

The percentage is close for men and women, which indicates that there is randomness in the questionnaire answers.

*Table 3 – 3: Statistical analysis of participants' gender.*

| Gender |        |           |         |               |                    |
|--------|--------|-----------|---------|---------------|--------------------|
|        |        | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid  | Female | 59        | 43.7    | 43.7          | 43.7               |
|        | Male   | 76        | 56.3    | 56.3          | 100.0              |
|        | Total  | 135       | 100.0   | 100.0         |                    |



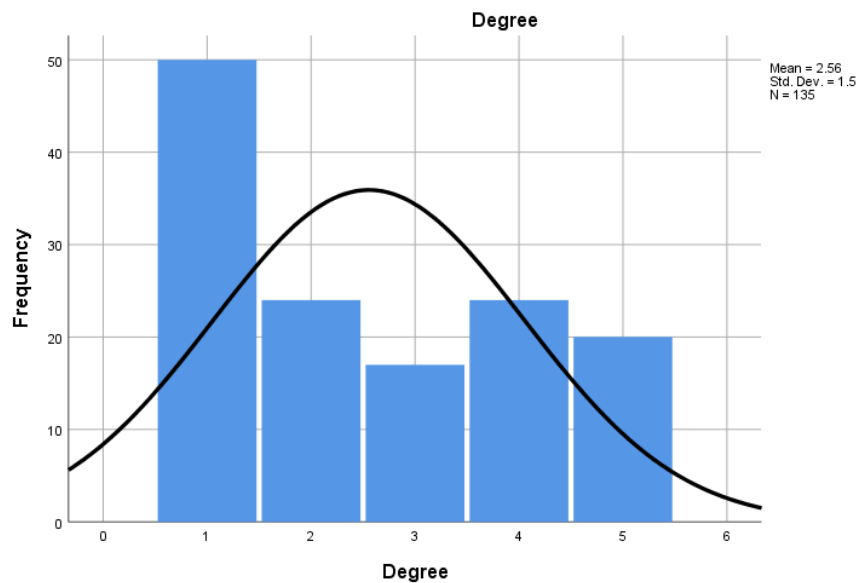
*Figure 3 – 2: Statistical analysis of participants' gender*

- **What is your academic degree?**

The closeness of the ratios between the academic degrees of the participants in the experiment indicates the interest of all groups in the subject of the research study.

*Table 3 – 4: Statistical analysis of the scientific degree of the participants.*

|       |                     | Degree    |         |               |                    |
|-------|---------------------|-----------|---------|---------------|--------------------|
|       |                     | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Bachelor's degree   | 50        | 37.0    | 37.0          | 37.0               |
|       | High school diploma | 24        | 17.8    | 17.8          | 54.8               |
|       | Higher degree       | 17        | 12.6    | 12.6          | 67.4               |
|       | Master's            | 24        | 17.8    | 17.8          | 85.2               |
|       | PHD                 | 20        | 14.8    | 14.8          | 100.0              |
|       | Total               | 135       | 100.0   | 100.0         |                    |



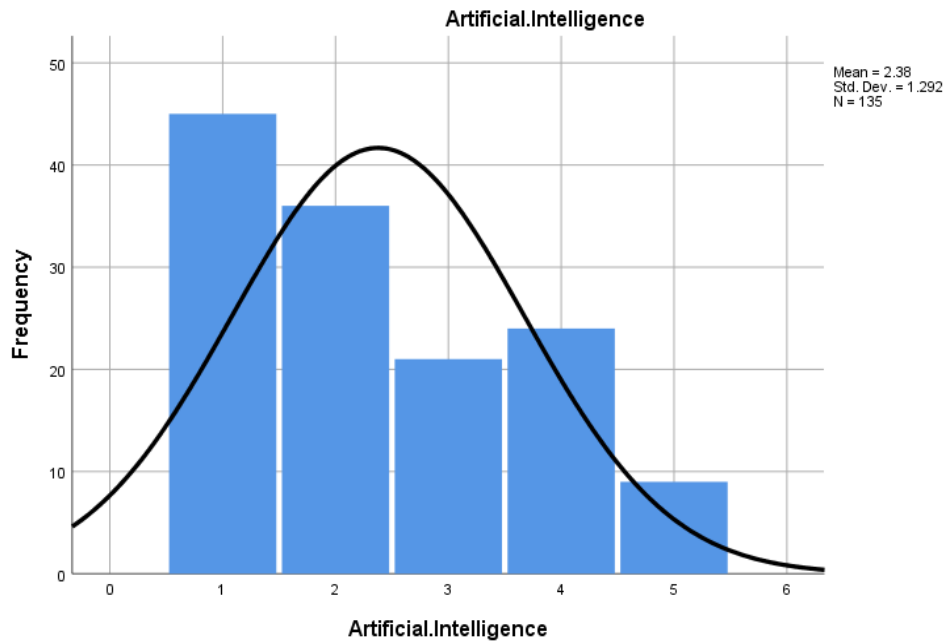
*Figure 3 – 3: Statistical analysis of the scientific degree of the participants*

- **AI improves the efficiency of project management processes.**

The percentage of agreement and strong agreement is approximately 50%, which indicates that artificial intelligence is working to improve the efficiency of project management processes.

*Table 3 – 5: Statistical analysis for AI to improve the efficiency of project management processes.*

| AI improves the efficiency of project management processes. |                            |           |         |               |                    |
|-------------------------------------------------------------|----------------------------|-----------|---------|---------------|--------------------|
|                                                             |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                                       | Agree                      | 45        | 33.3    | 33.3          | 33.3               |
|                                                             | Disagree                   | 36        | 26.7    | 26.7          | 60.0               |
|                                                             | Neither agree nor disagree | 21        | 15.6    | 15.6          | 75.6               |
|                                                             | Strongly agree             | 24        | 17.8    | 17.8          | 93.3               |
|                                                             | Strongly disagree          | 9         | 6.7     | 6.7           | 100.0              |
|                                                             | Total                      | 135       | 100.0   | 100.0         |                    |



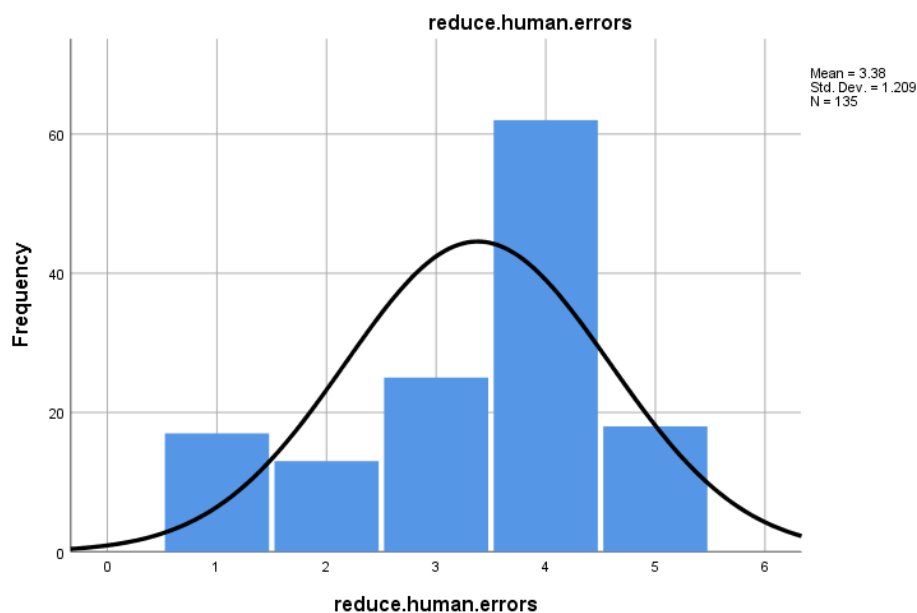
*Figure 3 – 4: Statistical analysis for AI to improve the efficiency of project management processes*

- **AI helps reduce human errors in projects.**

Exceeding the percentage of agreement and strongly agreement of 55% indicates that artificial intelligence helps in reducing human errors.

*Table 3 – 6: Statistical analysis of artificial intelligence helps reduce human errors.*

| AI helps reduce human errors in projects |                            |           |         |               |                    |
|------------------------------------------|----------------------------|-----------|---------|---------------|--------------------|
|                                          |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                    | Agree                      | 17        | 12.6    | 12.6          | 12.6               |
|                                          | Disagree                   | 13        | 9.6     | 9.6           | 22.2               |
|                                          | Neither agree nor disagree | 25        | 18.5    | 18.5          | 40.7               |
|                                          | Strongly agree             | 62        | 45.9    | 45.9          | 86.7               |
|                                          | Strongly disagree          | 18        | 13.3    | 13.3          | 100.0              |
|                                          | Total                      | 135       | 100.0   | 100.0         |                    |



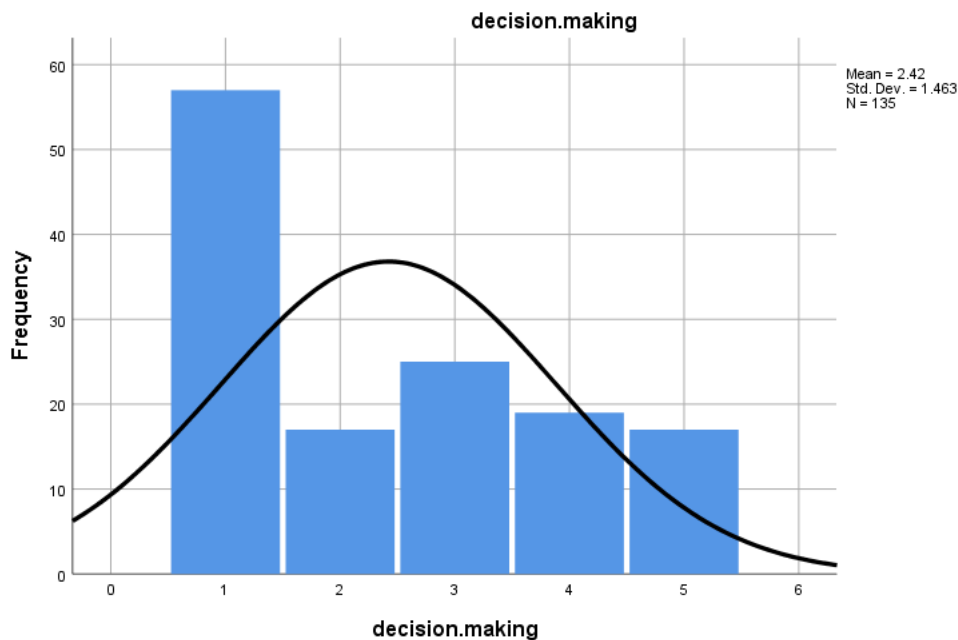
*Figure 3 – 5: Statistical analysis of artificial intelligence helps reduce human errors*

- **AI facilitates decision-making in project management.**

The fact that the percentage of agreement and strong agreement exceeded 55% indicates that there is great importance of artificial intelligence in decision-making.

*Table 3 – 7: Statistical analysis of artificial intelligence in decision making.*

| AI facilitates decision-making in project mana |                            |           |         |               |                    |
|------------------------------------------------|----------------------------|-----------|---------|---------------|--------------------|
|                                                |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                          | Agree                      | 57        | 42.2    | 42.2          | 42.2               |
|                                                | Disagree                   | 17        | 12.6    | 12.6          | 54.8               |
|                                                | Neither agree nor disagree | 25        | 18.5    | 18.5          | 73.3               |
|                                                | Strongly agree             | 19        | 14.1    | 14.1          | 87.4               |
|                                                | Strongly disagree          | 17        | 12.6    | 12.6          | 100.0              |
|                                                | Total                      | 135       | 100.0   | 100.0         |                    |



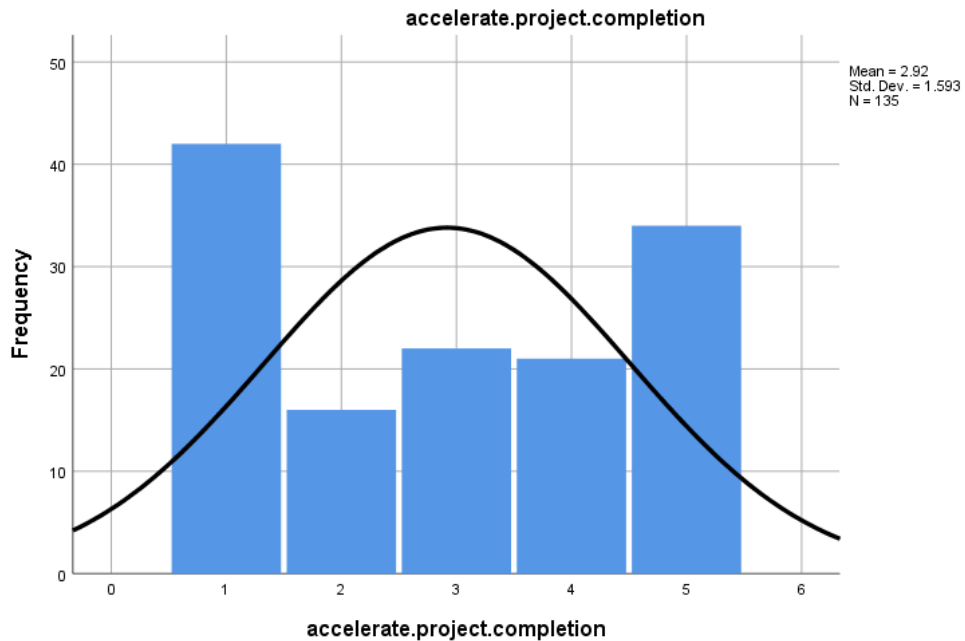
*Figure 3 – 6: Statistical analysis of artificial intelligence in decision making*

- **Using AI helps accelerate project completion.**

There is no doubt that the use of artificial intelligence helps in accelerating the completion of the project, and the evidence for this is that the percentage of approval and strong approval is close to 50%.

*Table 3 – 8: Statistical analysis of the use of artificial intelligence helps accelerate project completion.*

| Using AI helps accelerate project completion |                            |           |         |               |                    |
|----------------------------------------------|----------------------------|-----------|---------|---------------|--------------------|
|                                              |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                        | Agree                      | 42        | 31.1    | 31.1          | 31.1               |
|                                              | Disagree                   | 16        | 11.9    | 11.9          | 43.0               |
|                                              | Neither agree nor disagree | 22        | 16.3    | 16.3          | 59.3               |
|                                              | Strongly agree             | 21        | 15.6    | 15.6          | 74.8               |
|                                              | Strongly disagree          | 34        | 25.2    | 25.2          | 100.0              |
|                                              | Total                      | 135       | 100.0   | 100.0         |                    |



*Figure 3 – 7: Statistical analysis of the use of artificial intelligence helps accelerate project completion*

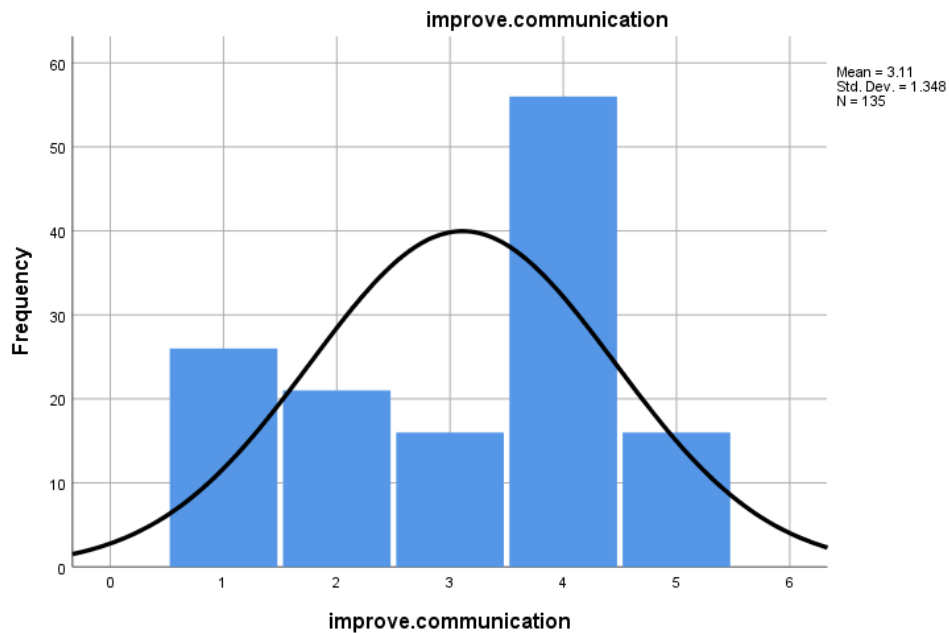
- **AI helps improve communication between team members.**

There is no doubt that artificial intelligence improves communication between team members, and the evidence for this is that the percentage of agreement and strong agreement is approximately 60%.

*Table 3 – 9: AI statistical analysis improves communication between team members.*

| AI helps improve communication between team members. |                            |           |         |               |                    |
|------------------------------------------------------|----------------------------|-----------|---------|---------------|--------------------|
|                                                      |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                                | Agree                      | 26        | 19.3    | 19.3          | 19.3               |
|                                                      | Disagree                   | 21        | 15.6    | 15.6          | 34.8               |
|                                                      | Neither agree nor disagree | 16        | 11.9    | 11.9          | 46.7               |
|                                                      | Strongly agree             | 56        | 41.5    | 41.5          | 88.1               |
|                                                      | Strongly disagree          | 16        | 11.9    | 11.9          | 100.0              |

|  |       |     |       |       |  |
|--|-------|-----|-------|-------|--|
|  | Total | 135 | 100.0 | 100.0 |  |
|--|-------|-----|-------|-------|--|



*Figure 3 – 8: AI statistical analysis improves communication between team members*

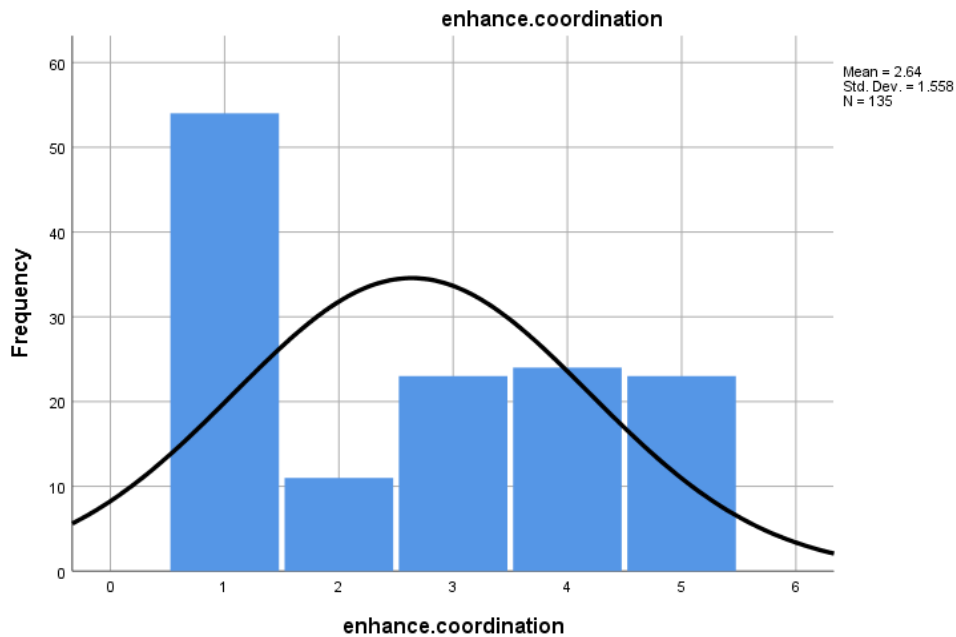
- **AI helps enhance coordination and collaboration between teams.**

Artificial intelligence helps enhance coordination and cooperation between teams. This is certain, and the evidence for this is that the percentage of agreement and strong disagreement is approximately 60%.

*Table 3 – 10: Statistical analysis helps AI enhance coordination and collaboration between teams.*

| AI helps enhance coordination and collaboration between teams |                            |           |         |               |                    |
|---------------------------------------------------------------|----------------------------|-----------|---------|---------------|--------------------|
|                                                               |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                                         | Agree                      | 54        | 40.0    | 40.0          | 40.0               |
|                                                               | Disagree                   | 11        | 8.1     | 8.1           | 48.1               |
|                                                               | Neither agree nor disagree | 23        | 17.0    | 17.0          | 65.2               |

|  |                   |     |       |       |       |
|--|-------------------|-----|-------|-------|-------|
|  | Strongly agree    | 24  | 17.8  | 17.8  | 83.0  |
|  | Strongly disagree | 23  | 17.0  | 17.0  | 100.0 |
|  | Total             | 135 | 100.0 | 100.0 |       |



*Figure 3 – 9: Statistical analysis helps AI enhance coordination and collaboration between teams*

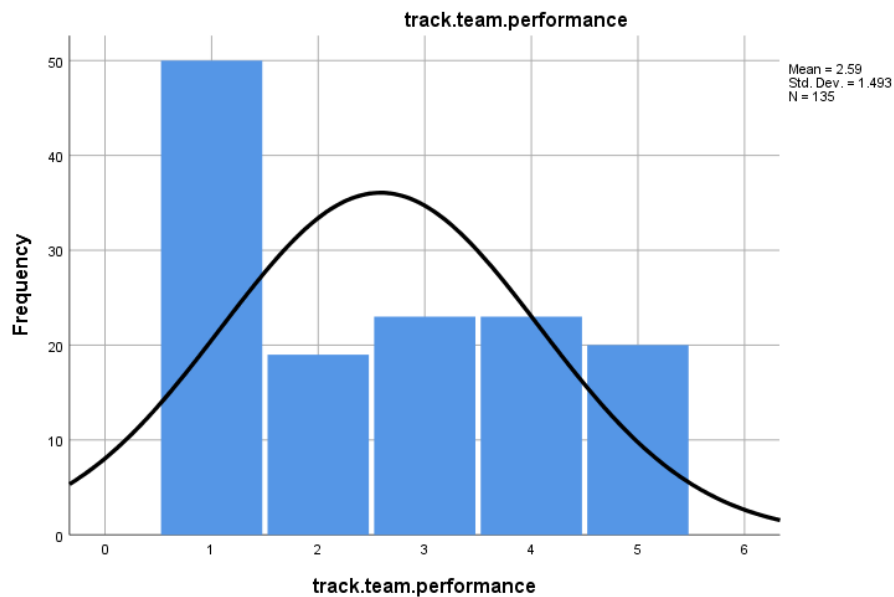
- **AI tools help track team performance effectively.**

The fact that the percentages of agreement and disagreement are very close to 55% indicates that AI tools have greatly helped in tracking team performance.

*Table 3 – 11: Statistical Analysis Artificial Intelligence Tools in Tracking Team Performance.*

| AI tools help track team performance effectively. |       |           |         |               |                    |
|---------------------------------------------------|-------|-----------|---------|---------------|--------------------|
|                                                   |       | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                             | Agree | 50        | 37.0    | 37.0          | 37.0               |

|  |                            |     |       |       |       |
|--|----------------------------|-----|-------|-------|-------|
|  | Disagree                   | 19  | 14.1  | 14.1  | 51.1  |
|  | Neither agree nor disagree | 23  | 17.0  | 17.0  | 68.1  |
|  | Strongly agree             | 23  | 17.0  | 17.0  | 85.2  |
|  | Strongly disagree          | 20  | 14.8  | 14.8  | 100.0 |
|  | Total                      | 135 | 100.0 | 100.0 |       |



*Figure 3 – 10: Statistical Analysis Artificial Intelligence Tools in Tracking Team Performance*

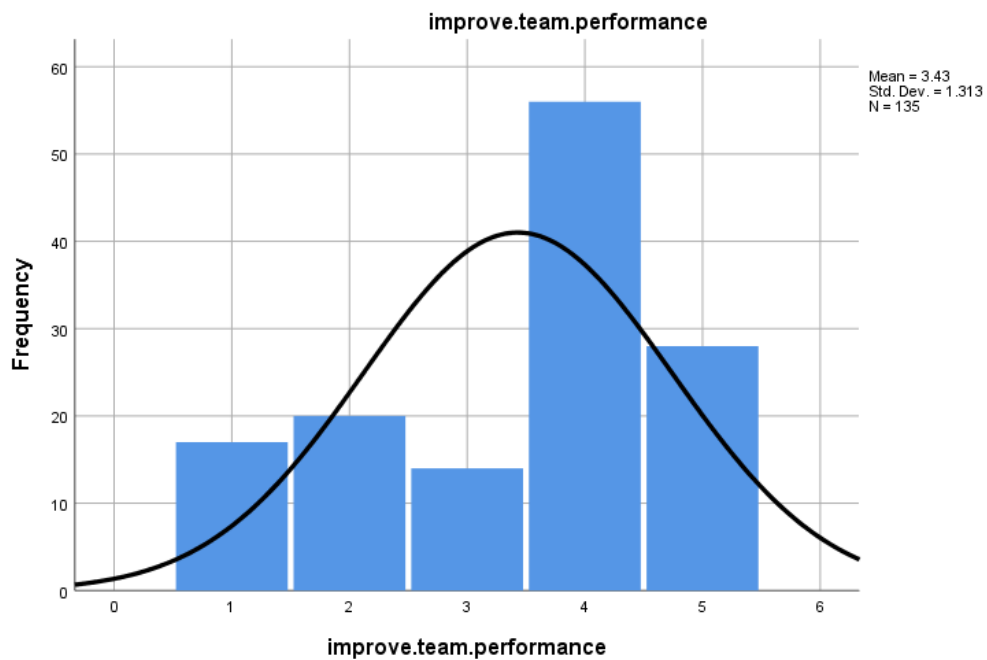
- **AI helps provide recommendations to improve team performance.**

The fact that the percentage of agreement and disagreement is very close to 55% indicates that artificial intelligence provides recommendations to improve team performance.

*Table 3 –12: Statistical analysis of artificial intelligence provides recommendations to improve team performance.*

| AI helps provide recommendations to improve team performance |       |           |         |               |                    |
|--------------------------------------------------------------|-------|-----------|---------|---------------|--------------------|
|                                                              |       | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                                        | Agree | 17        | 12.6    | 12.6          | 12.6               |

|  |                            |     |       |       |       |
|--|----------------------------|-----|-------|-------|-------|
|  | Disagree                   | 20  | 14.8  | 14.8  | 27.4  |
|  | Neither agree nor disagree | 14  | 10.4  | 10.4  | 37.8  |
|  | Strongly agree             | 56  | 41.5  | 41.5  | 79.3  |
|  | Strongly disagree          | 28  | 20.7  | 20.7  | 100.0 |
|  | Total                      | 135 | 100.0 | 100.0 |       |



*Figure 3 – 11: Statistical analysis of artificial intelligence provides recommendations to improve team performance*

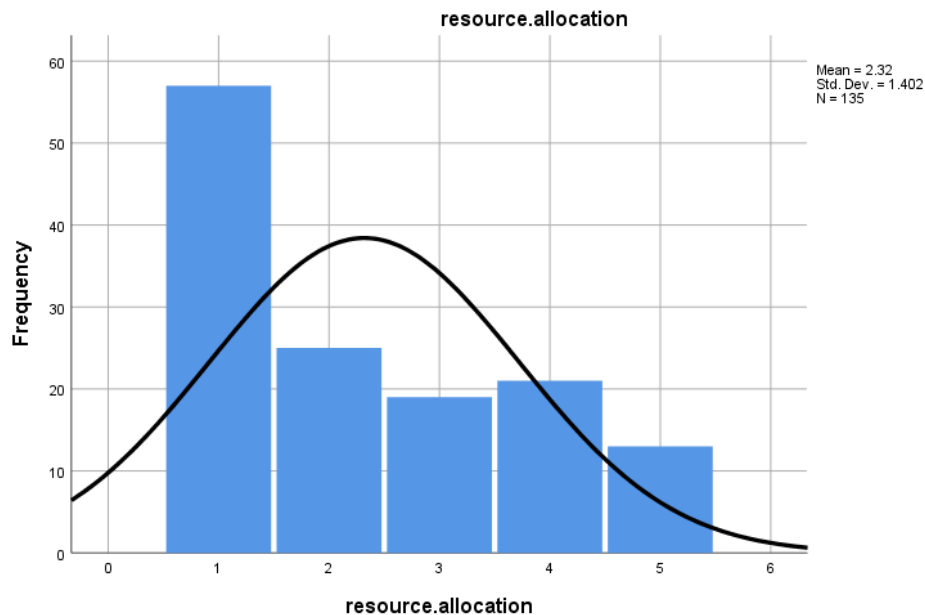
- **AI helps improve resource allocation more effectively.**

AI is already helping to allocate resources more effectively, and the evidence for this is that the percentage of agreement and strong agreement is approaching 60%.

*Table 3 – 13: Statistical analysis helps AI improve resource allocation more effectively indeed.*

|                                                       |
|-------------------------------------------------------|
| AI helps improve resource allocation more effectively |
|-------------------------------------------------------|

|       |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|----------------------------|-----------|---------|---------------|--------------------|
| Valid | Agree                      | 57        | 42.2    | 42.2          | 42.2               |
|       | Disagree                   | 25        | 18.5    | 18.5          | 60.7               |
|       | Neither agree nor disagree | 19        | 14.1    | 14.1          | 74.8               |
|       | Strongly agree             | 21        | 15.6    | 15.6          | 90.4               |
|       | Strongly disagree          | 13        | 9.6     | 9.6           | 100.0              |
|       | Total                      | 135       | 100.0   | 100.0         |                    |



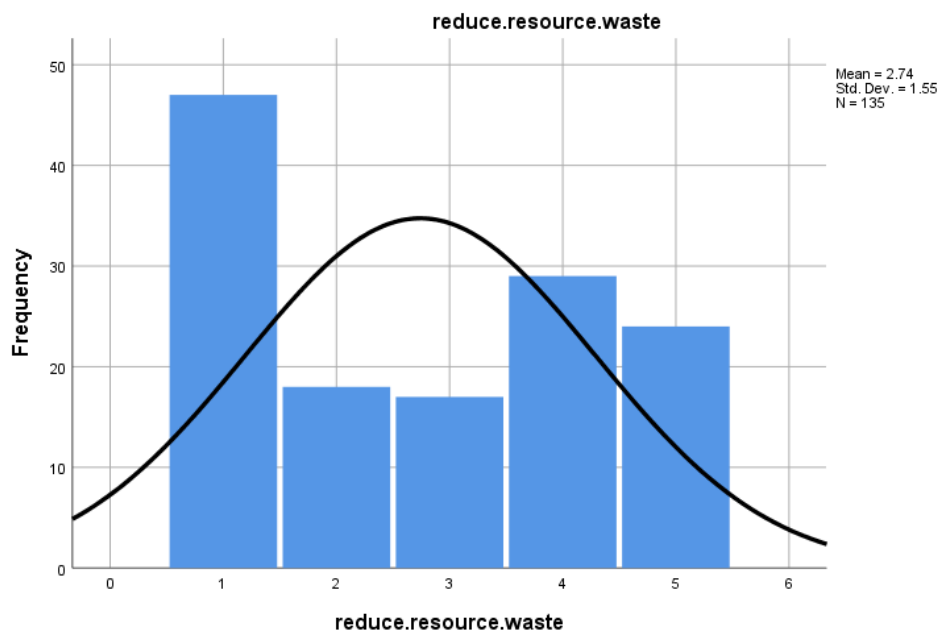
*Figure 3 – 12: Statistical analysis helps AI improve resource allocation more effectively indeed*

- **AI helps reduce resource waste in the project.**

It is clear from the table that the percentage of agreement and strong agreement is approximately 55%, which indicates that artificial intelligence helps in reducing the waste of resources in the project.

*Table 3 – 14: Statistical analysis helps AI reduce resource waste in the project.*

| AI helps reduce resource waste in the project |                            |           |         |               |                    |
|-----------------------------------------------|----------------------------|-----------|---------|---------------|--------------------|
|                                               |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                         | Agree                      | 47        | 34.8    | 34.8          | 34.8               |
|                                               | Disagree                   | 18        | 13.3    | 13.3          | 48.1               |
|                                               | Neither agree nor disagree | 17        | 12.6    | 12.6          | 60.7               |
|                                               | Strongly agree             | 29        | 21.5    | 21.5          | 82.2               |
|                                               | Strongly disagree          | 24        | 17.8    | 17.8          | 100.0              |
|                                               | Total                      | 135       | 100.0   | 100.0         |                    |



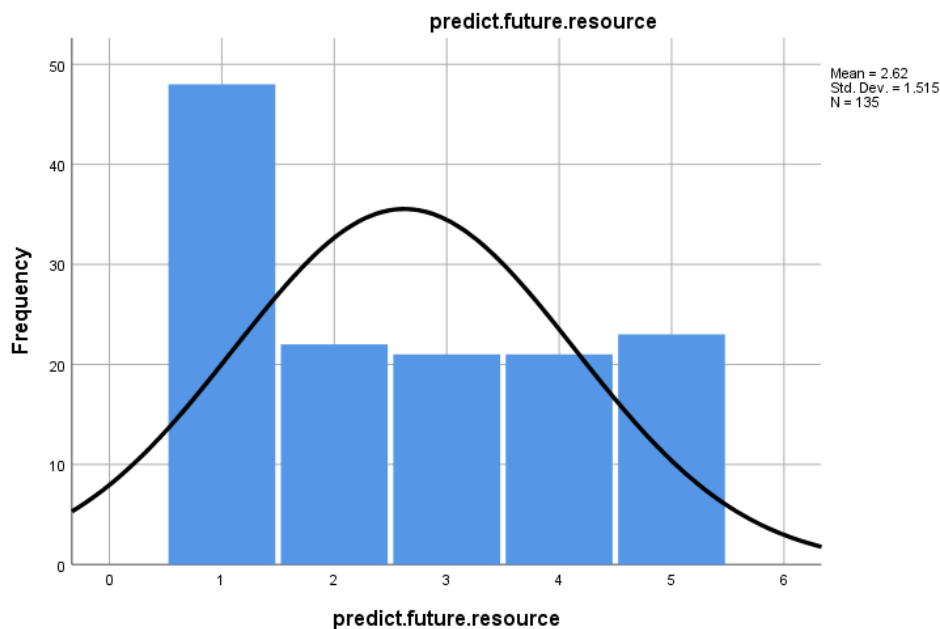
*Figure 3 – 13: Statistical analysis helps AI reduce resource waste in the project*

- **AI helps predict future resource needs for the project.**

There is no doubt that artificial intelligence tools help predict the future resource needs of the project, and the evidence for this is that the percentage of agreement and strong agreement exceeded 50%.

*Table 3 – 15: Statistical analysis helps AI predict a project's future resource needs.*

| AI helps predict future resource needs for the project |                            |           |         |               |                    |
|--------------------------------------------------------|----------------------------|-----------|---------|---------------|--------------------|
|                                                        |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                                  | Agree                      | 48        | 35.6    | 35.6          | 35.6               |
|                                                        | Disagree                   | 22        | 16.3    | 16.3          | 51.9               |
|                                                        | Neither agree nor disagree | 21        | 15.6    | 15.6          | 67.4               |
|                                                        | Strongly agree             | 21        | 15.6    | 15.6          | 83.0               |
|                                                        | Strongly disagree          | 23        | 17.0    | 17.0          | 100.0              |
|                                                        | Total                      | 135       | 100.0   | 100.0         |                    |



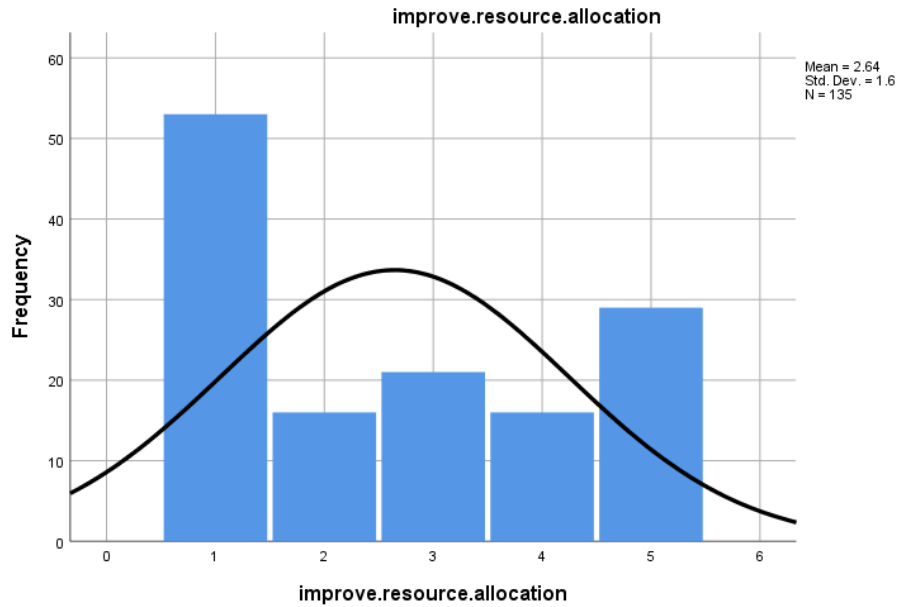
*Figure 3 – 14: Statistical analysis helps AI predict a project's future resource needs*

- **AI provides accurate data to improve resource allocation decisions.**

There is no doubt that artificial intelligence tools provide accurate data to improve resource allocation decisions. Evidence of this is that the percentage of agreement and strong agreement is approximately 50%.

*Table 3 – 16: Statistical analysis of AI tools provides accurate data to improve resource allocation decisions.*

| AI provides accurate data to improve resource allocation decisions |                            |           |         |               |                    |
|--------------------------------------------------------------------|----------------------------|-----------|---------|---------------|--------------------|
|                                                                    |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                                              | Agree                      | 53        | 39.3    | 39.3          | 39.3               |
|                                                                    | Disagree                   | 16        | 11.9    | 11.9          | 51.1               |
|                                                                    | Neither agree nor disagree | 21        | 15.6    | 15.6          | 66.7               |
|                                                                    | Strongly agree             | 16        | 11.9    | 11.9          | 78.5               |
|                                                                    | Strongly disagree          | 29        | 21.5    | 21.5          | 100.0              |
|                                                                    | Total                      | 135       | 100.0   | 100.0         |                    |



*Figure 3 – 15: Statistical analysis of AI tools provides accurate data to improve resource allocation decisions*

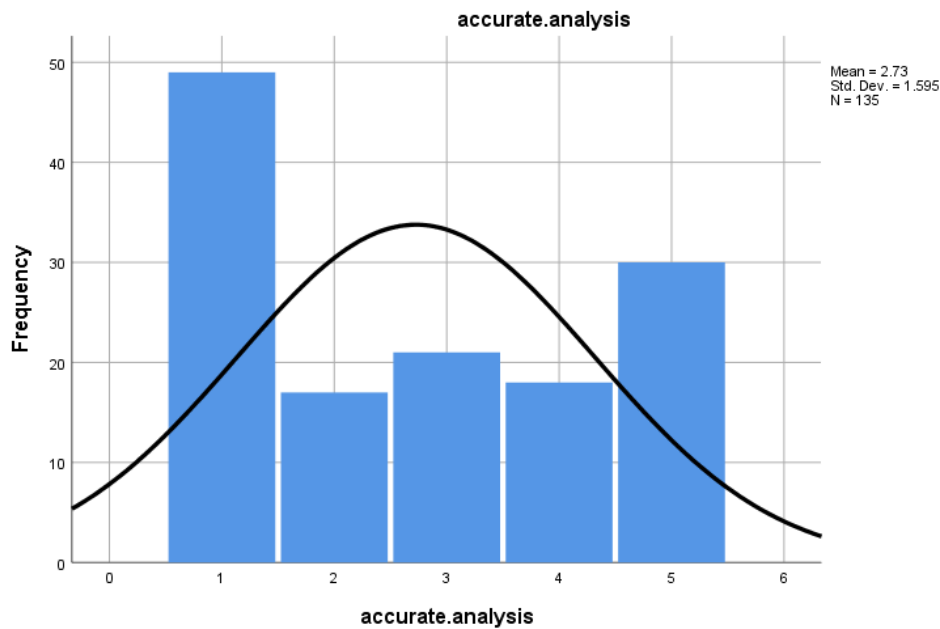
- **AI enables accurate analysis of project-related data.**

There is no doubt that artificial intelligence allows for accurate analysis of data related to the project, and the evidence for this is that the percentage of agreement and strong agreement is approximately 50%.

*Table 3 – 17: Statistical analysis of artificial intelligence enables accurate analysis of project-related data.*

| AI enables accurate analysis of project-related data |                            |           |         |               |                    |
|------------------------------------------------------|----------------------------|-----------|---------|---------------|--------------------|
|                                                      |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                                | Agree                      | 49        | 36.3    | 36.3          | 36.3               |
|                                                      | Disagree                   | 17        | 12.6    | 12.6          | 48.9               |
|                                                      | Neither agree nor disagree | 21        | 15.6    | 15.6          | 64.4               |
|                                                      | Strongly agree             | 18        | 13.3    | 13.3          | 77.8               |
|                                                      | Strongly disagree          | 30        | 22.2    | 22.2          | 100.0              |

|  |       |     |       |       |  |
|--|-------|-----|-------|-------|--|
|  | Total | 135 | 100.0 | 100.0 |  |
|--|-------|-----|-------|-------|--|



*Figure 3 –16: Statistical analysis of artificial intelligence enables accurate analysis of project-related data*

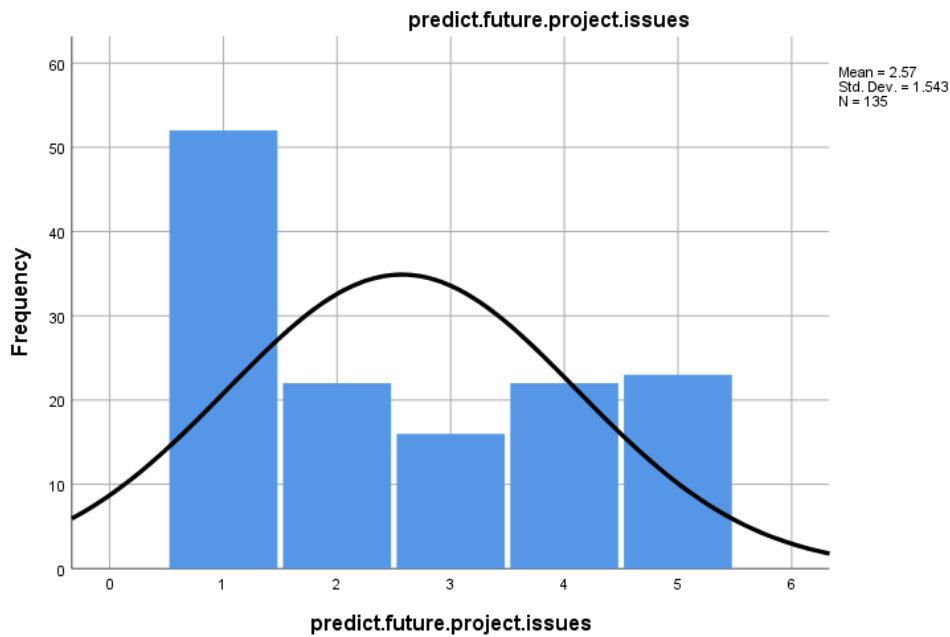
- **AI helps predict future project issues.**

Naturally, artificial intelligence helps in predicting future project problems, and this was also agreed upon by the participants in the experiment, as the percentage of agreement and strong agreement came close to 55%.

*Table 3 – 18: Statistical analysis of artificial intelligence helps in predicting future project problems.*

| AI helps predict future project issues |          |           |         |               |                    |
|----------------------------------------|----------|-----------|---------|---------------|--------------------|
|                                        |          | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                  | Agree    | 52        | 38.5    | 38.5          | 38.5               |
|                                        | Disagree | 22        | 16.3    | 16.3          | 54.8               |

|  |                            |     |       |       |       |
|--|----------------------------|-----|-------|-------|-------|
|  | Neither agree nor disagree | 16  | 11.9  | 11.9  | 66.7  |
|  | Strongly agree             | 22  | 16.3  | 16.3  | 83.0  |
|  | Strongly disagree          | 23  | 17.0  | 17.0  | 100.0 |
|  | Total                      | 135 | 100.0 | 100.0 |       |



*Figure 3 –17: Statistical analysis of artificial intelligence helps in predicting future project problems*

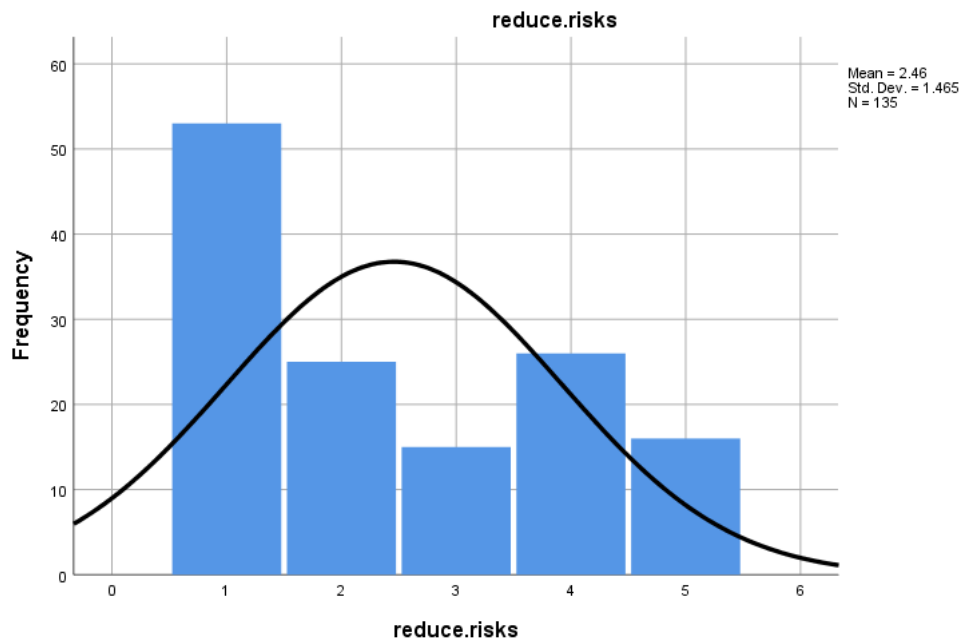
- **AI-powered analytics tools help reduce risks in project management.**

There is no doubt that AI-powered analytics tools play a major role in reducing risks in project management. The evidence for this is that the percentage of approval and strong approval is close to 60%.

*Table 3 – 19: Statistical analysis of AI-powered analytics tools plays a major role in reducing risks in project management.*

|                                                                     |
|---------------------------------------------------------------------|
| AI-powered analytics tools help reduce risks in project management. |
|---------------------------------------------------------------------|

|       |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|----------------------------|-----------|---------|---------------|--------------------|
| Valid | Agree                      | 53        | 39.3    | 39.3          | 39.3               |
|       | Disagree                   | 25        | 18.5    | 18.5          | 57.8               |
|       | Neither agree nor disagree | 15        | 11.1    | 11.1          | 68.9               |
|       | Strongly agree             | 26        | 19.3    | 19.3          | 88.1               |
|       | Strongly disagree          | 16        | 11.9    | 11.9          | 100.0              |
|       | Total                      | 135       | 100.0   | 100.0         |                    |



*Figure 3 –18: Statistical analysis of AI-powered analytics tools plays a major role in reducing risks in project management*

- **AI helps improve the accuracy of timeline and budget forecasts.**

There is no doubt that artificial intelligence helps improve the accuracy of schedule and budget forecasts, and the evidence for this is that the approval and strong approval rate exceeded 50%.

Table 3 – 20: statistical analysis for AI helps improve schedule accuracy and budget forecasts.

| AI helps improve the accuracy of timeline and budget forecasts |                            |           |         |               |                    |
|----------------------------------------------------------------|----------------------------|-----------|---------|---------------|--------------------|
|                                                                |                            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                                                          | Agree                      | 17        | 12.6    | 12.6          | 12.6               |
|                                                                | Disagree                   | 18        | 13.3    | 13.3          | 25.9               |
|                                                                | Neither agree nor disagree | 23        | 17.0    | 17.0          | 43.0               |
|                                                                | Strongly agree             | 55        | 40.7    | 40.7          | 83.7               |
|                                                                | Strongly disagree          | 22        | 16.3    | 16.3          | 100.0              |
|                                                                | Total                      | 135       | 100.0   | 100.0         |                    |

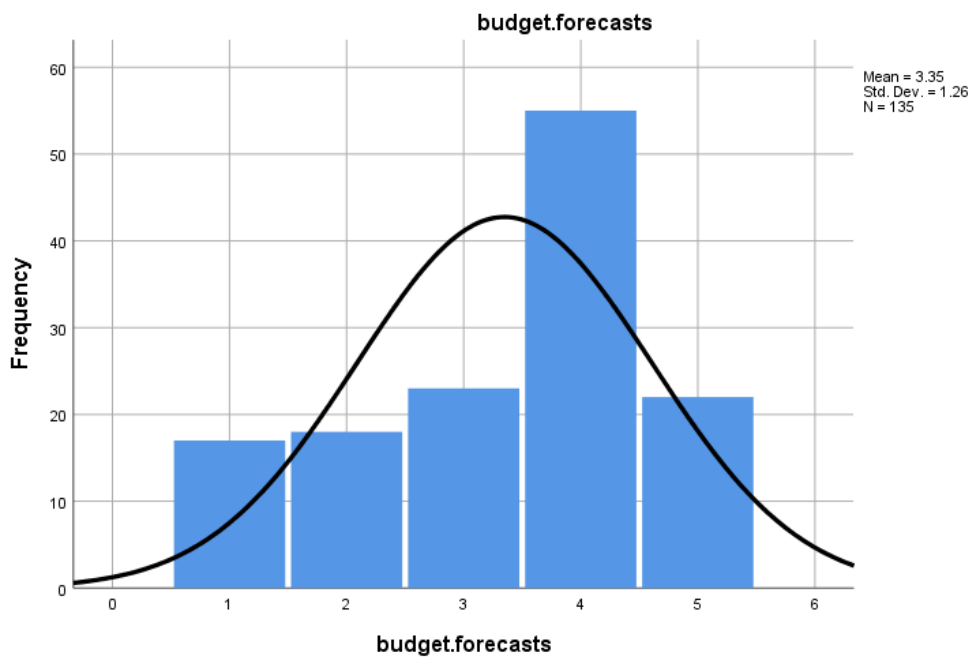


Figure 3 – 19: statistical analysis for AI helps improve schedule accuracy and budget forecasts

- **Creditability and Validity analysis**

The reliability and credibility analysis of this study, titled "The Role of Artificial Intelligence in Improving Project Management Processes: An Applied Study on the Information Technology Sector in the Kingdom of Saudi Arabia," was undertaken by the use of Cronbach's alpha. This metric, frequently used in social sciences, examines the internal consistency of a questionnaire by analyzing the degree to which responses across several items are connected. A greater Cronbach's alpha coefficient suggests more reliability, implying that the items repeatedly capture the same underlying notion, whereas values over 0.70 are often viewed as acceptable in social research. In this study, Cronbach's alpha was determined for several portions of the questionnaire pertaining to AI applications in project management. The results indicated a high level of internal consistency across sections, verifying that the questionnaire items were reliable and fit with the study aims. The parts examining the influence of AI on minimizing human mistakes, improving decision-making, and strengthening communication in project management each provided alpha values over the acceptable level, verifying the coherence and clarity of the questionnaire items for responders. This dependability demonstrates that the gathered responses properly reflect the perspectives and experiences of IT professionals in the Kingdom of Saudi Arabia about AI's involvement in project management. The constant reliability ratings across parts further bolster the credibility of the research findings and boost trust in the study's conclusions concerning AI's revolutionary significance. By ensuring that the survey items accurately assess the targeted variables, this study creates a trustworthy framework for evaluating the responses and providing practical suggestions based on these findings. The inclusion of Cronbach's alpha as a reliability metric thereby increases the validity of the research and highlights its contribution to understanding the function of AI in boosting project management procedures within the Kingdom's IT industry.

The data validity rate was 100%, which indicates that the study results are of great importance. The Cronbach's Alpha coefficient was .744, which indicates that the data has the characteristics of reliability and credibility.

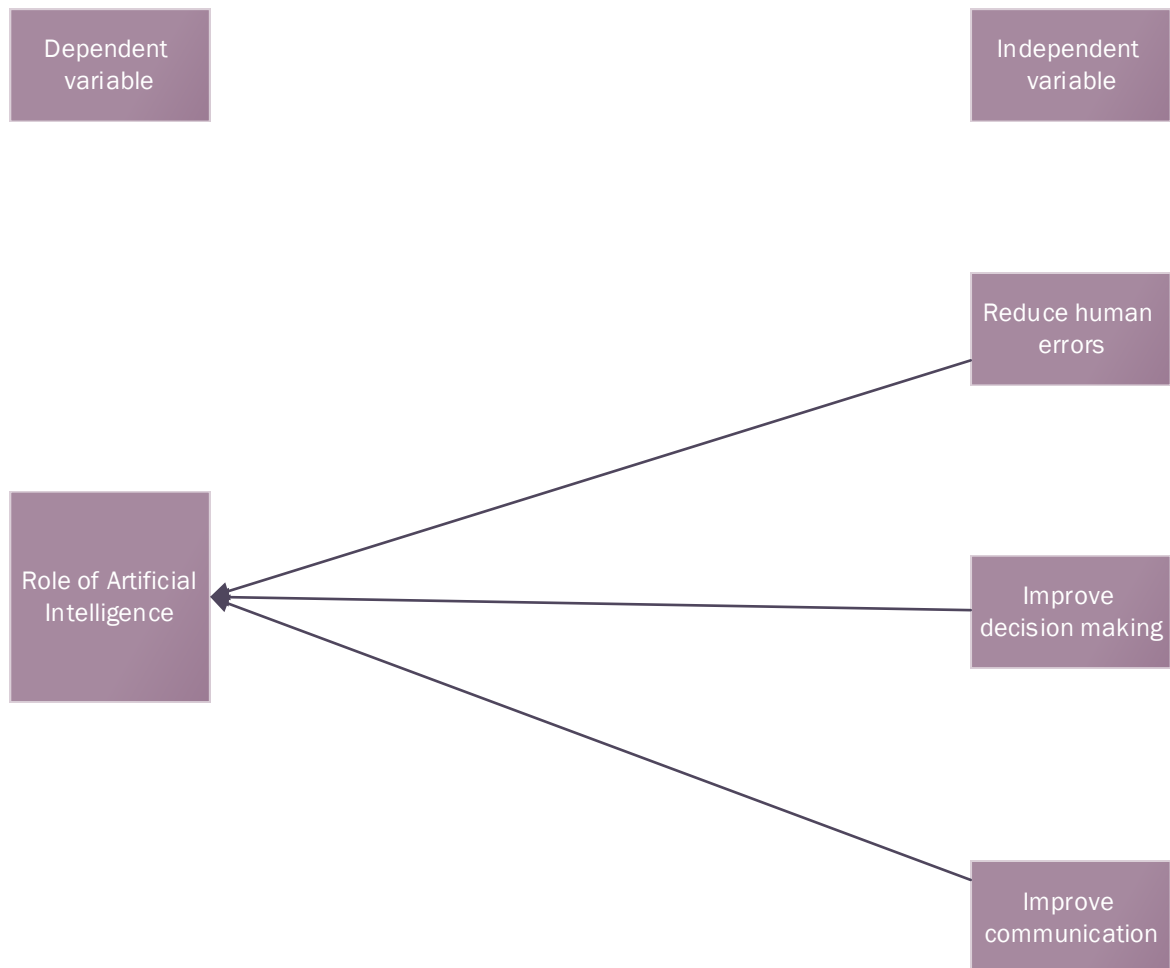
*Table 3 – 21: Data validity percentage.*

| Case Processing Summary                                       |                       |     |       |
|---------------------------------------------------------------|-----------------------|-----|-------|
|                                                               |                       | N   | %     |
| Cases                                                         | Valid                 | 135 | 100.0 |
|                                                               | Excluded <sup>a</sup> | 0   | .0    |
|                                                               | Total                 | 135 | 100.0 |
| a. Listwise deletion based on all variables in the procedure. |                       |     |       |

*Table 3 – 22: Cronbach's coefficient*

| Reliability Statistics |                                                    |            |
|------------------------|----------------------------------------------------|------------|
| Cronbach's Alpha       | Cronbach's Alpha<br>Based on Standardized<br>Items | N of Items |
| .744                   | .775                                               | 19         |

- **Research variables**



*Figure 3 – 20: Dependent and independent study variables*

- **The Role of Artificial Intelligence in Reducing Human Errors in the IT Sector in the Kingdom of Saudi Arabia**

Artificial intelligence (AI) plays a fundamental role in minimizing human mistakes in the information technology (IT) sector in the Kingdom of Saudi Arabia, supporting the country's commitment to digital transformation and efficiency improvement across numerous industries. By automating regular and error-prone procedures, AI decreases the risks associated with manual processes, minimizing the possibility of mistakes that might come from weariness, supervision, or repetitive operations. For example, machine learning algorithms can monitor enormous datasets, spot abnormalities, and resolve errors without human interaction, which greatly minimizes human error in data handling—a major difficulty in IT-related tasks.

Additionally, AI-driven predictive analytics may detect possible difficulties before they emerge into larger ones, allowing teams to proactively address risks and prevent errors. This capacity is particularly valuable in complicated IT systems, where AI-based solutions may evaluate prior trends and behaviors to uncover patterns that people would ignore. In doing so, AI assists in optimizing decision-making processes, hence boosting accuracy in areas such as software development, network security, and systems administration. AI techniques like automated code review and testing tools also expedite the development lifecycle, finding coding problems early in the process to avoid bugs and vulnerabilities from making their way into the final product.

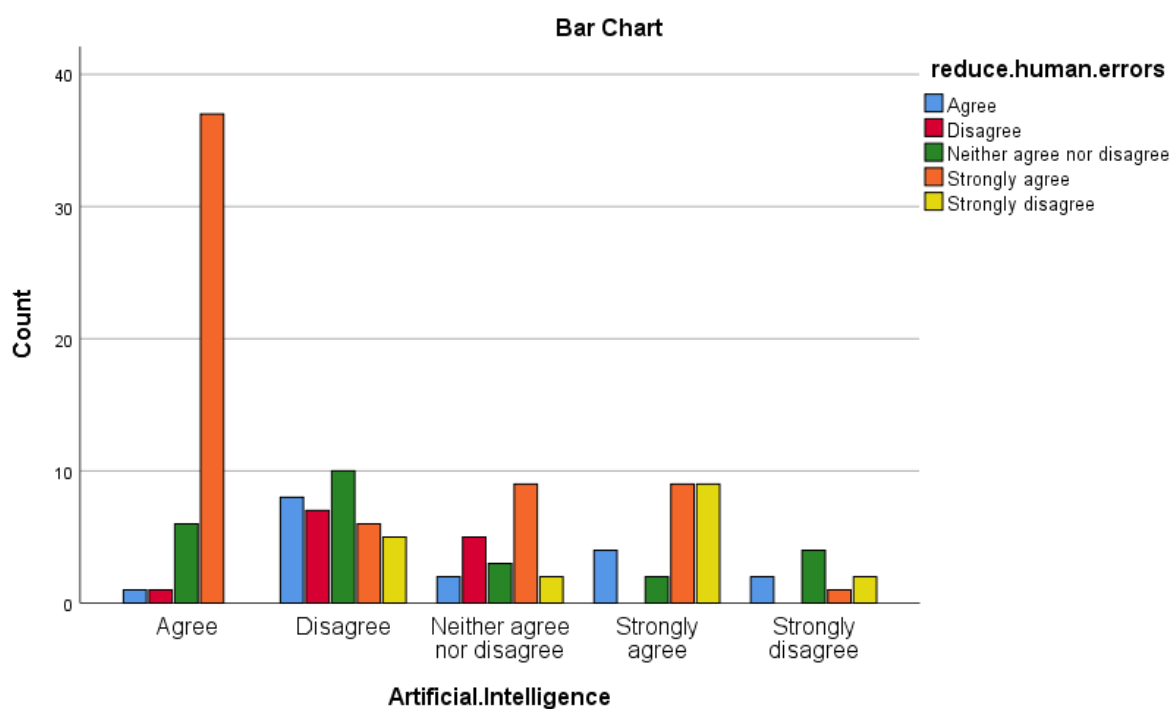
Moreover, AI boosts the dependability of project execution by standardizing procedures and maintaining consistency, which is crucial for complicated, large-scale IT projects. In project management, AI algorithms may assess adherence to project procedures, monitor compliance with regulatory requirements, and give real-time advice, further eliminating human oversight. In the context of Saudi Arabia's Vision 2030, which prioritizes innovation and digital excellence, AI's role in reducing human errors in the IT sector contributes to the national agenda by enhancing productivity, improving quality standards, and reinforcing the Kingdom's competitive edge in technology-driven markets.

It is clear from the table that the degree of freedom between the variables is equal to 4, which indicates the importance of the role of artificial intelligence in reducing human errors in the information technology sector in the Kingdom of Saudi Arabia.

*Table 3 – 23: Chi-square test the role of artificial intelligence in reducing human errors in the information technology sector in the Kingdom of Saudi Arabia*

| Chi-Square Tests             |                     |    |                                   |
|------------------------------|---------------------|----|-----------------------------------|
|                              | Value               | df | Asymptotic Significance (2-sided) |
| Pearson Chi-Square           | 68.184 <sup>a</sup> | 4  | .000                              |
| Likelihood Ratio             | 74.315              | 4  | .000                              |
| Linear-by-Linear Association | .209                | 1  | .647                              |
| N of Valid Cases             | 135                 |    |                                   |

a. 17 cells (68.0%) have expected count less than 5. The minimum expected count is .87.



*Figure 3 – 21: Identical columns of cross-tabulations of the role of artificial intelligence in reducing human errors in the information technology sector in the Kingdom of Saudi Arabia*

- **The Role of Artificial Intelligence in Improving Decision-Making in the IT Sector in the Kingdom of Saudi Arabia**

Artificial intelligence (AI) plays a vital role in enhancing decision-making processes within the information technology (IT) industry in the Kingdom of Saudi Arabia. By exploiting AI's capabilities for data analysis, predictive modeling, and real-time insights, decision-makers in the IT sector may obtain accurate, relevant information more swiftly, allowing for informed choices that directly influence operational efficiency and strategic growth. AI systems can interpret huge volumes of data from numerous sources—such as previous project results, current performance measurements, and industry trends—at speeds well beyond human power. This enables IT executives to make judgments on full facts, rather than depending on assumptions or limited information, which dramatically decreases the risks associated with crucial business and technological decisions.

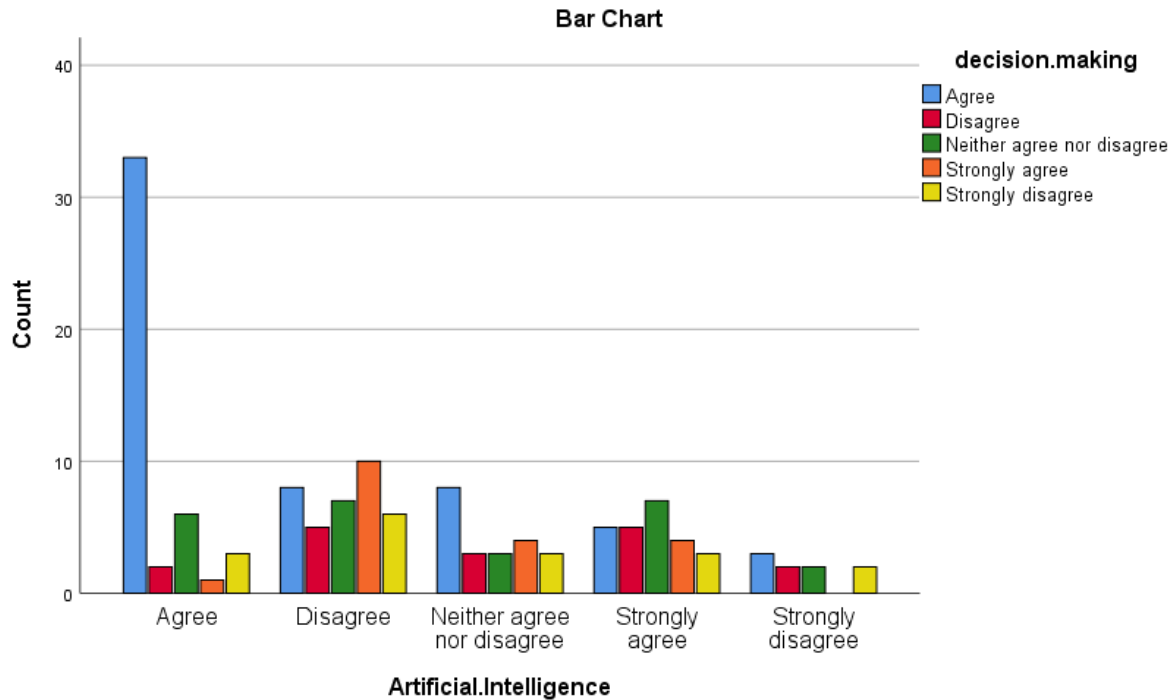
Additionally, AI boosts predicted accuracy in decision-making. By utilizing machine learning algorithms that evaluate historical behaviors and trends, AI systems can anticipate future outcomes with surprising precision, allowing IT teams insights into possible dangers, market movements, or project performance concerns before they become big problems. This predictive capacity enables proactive decision-making, allowing firms to adopt preventative measures or change methods to optimize performance. In domains such as cybersecurity, for example, AI can assess possible threats and propose the best protections, allowing IT administrators to make quicker, more accurate choices to protect digital assets.

Furthermore, AI aids decision-making by boosting operational transparency and delivering real-time feedback. AI systems can monitor processes continually, exposing inefficiencies and opportunities for development, which helps decision-makers to make modifications on the fly and ensuring that choices are data-driven and timely. This feature is particularly beneficial in high-stakes IT situations, where delays or blunders can have major implications. In keeping with Saudi Arabia's Vision 2030, which stresses digital transformation and innovation, the use of AI in decision-making processes not only boosts the Kingdom's IT industry but also coincides with national aims of establishing a diverse, knowledge-based economy. Through better, data-informed decision-making, AI enables growth, agility, and competitive advantage for Saudi Arabia's IT industry.

There is no doubt that the role of artificial intelligence in improving the decision-making process in the information technology sector in the Kingdom of Saudi Arabia is of great importance. The evidence for this is that the degree of freedom is equal to 5, which is a small value indicating the absence of dispersion.

*Table 3 – 24: The chi-square test for the role of artificial intelligence in improving the decision-making process in the information technology sector in the Kingdom of Saudi Arabia.*

| Chi-Square Tests                                                                         |                     |    |                                   |
|------------------------------------------------------------------------------------------|---------------------|----|-----------------------------------|
|                                                                                          | Value               | df | Asymptotic Significance (2-sided) |
| Pearson Chi-Square                                                                       | 36.900 <sup>a</sup> | 5  | .002                              |
| Likelihood Ratio                                                                         | 39.401              | 5  | .001                              |
| Linear-by-Linear Association                                                             | 7.381               | 1  | .007                              |
| N of Valid Cases                                                                         | 135                 |    |                                   |
| a. 15 cells (60.0%) have expected count less than 5. The minimum expected count is 1.13. |                     |    |                                   |



*Figure 3 – 22: The role of artificial intelligence in improving the decision-making process in the IT sector in the Kingdom of Saudi Arabia*

- The Role of Artificial Intelligence in Improving Communication in the IT Sector in the Kingdom of Saudi Arabia**

Artificial intelligence (AI) is altering communication within the information technology (IT) industry in the Kingdom of Saudi Arabia, promoting clearer, quicker, and more efficient information exchange among teams and stakeholders. In an industry where precision, responsiveness, and collaboration are crucial, AI-powered communication tools, such as chatbots, virtual assistants, and automated reporting systems, streamline interactions by automating routine responses, providing instant information, and enabling continuous connectivity across distributed teams. For instance, AI chatbots may handle initial customer interactions or IT support requests, addressing frequently asked questions or channeling inquiries to the proper department without delay, so freeing up human workers for more difficult duties and boosting service response times.

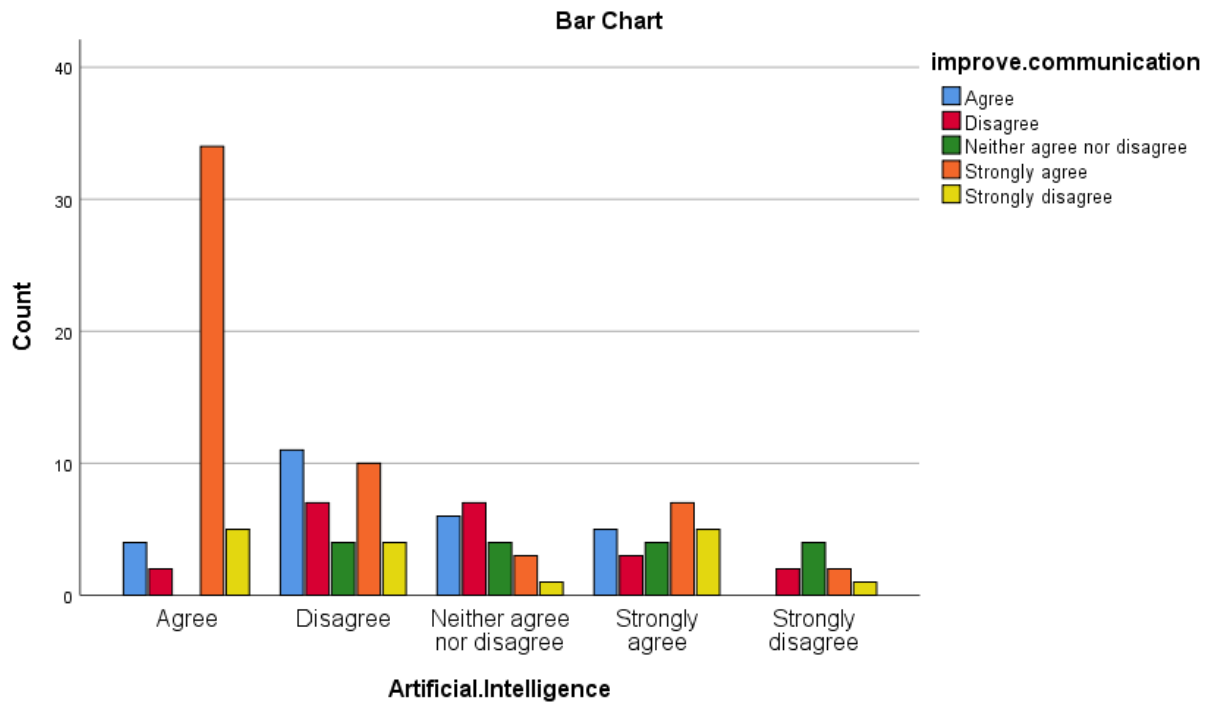
AI also offers enhanced data analysis and visualization, allowing IT teams effectively explain complicated information to non-technical stakeholders. By creating real-time reports and

actionable insights, AI solutions make it easier for IT workers to provide data in an intelligible fashion, thereby boosting transparency and alignment across departments. This feature is especially beneficial in large-scale projects when project managers and stakeholders need frequent information on project milestones, performance data, and possible concerns. AI-powered natural language processing (NLP) systems may also evaluate textual communications, including as emails and project documents, to highlight crucial action items or sentiment, ensuring that vital messages are not missed and that priorities stay apparent.

There is no doubt that the role of artificial intelligence in improving communications in the information technology sector in the Kingdom of Saudi Arabia is of great importance, and the evidence for this is that the degree of freedom between the variables is equal to 4.

*Table 3 – 25: Chi-square test for the role of artificial intelligence in improving communications in the IT sector in the Kingdom of Saudi Arabia.*

| Chi-Square Tests                                                                         |                     |    |                                   |
|------------------------------------------------------------------------------------------|---------------------|----|-----------------------------------|
|                                                                                          | Value               | df | Asymptotic Significance (2-sided) |
| Pearson Chi-Square                                                                       | 53.218 <sup>a</sup> | 4  | .000                              |
| Likelihood Ratio                                                                         | 56.422              | 4  | .000                              |
| Linear-by-Linear Association                                                             | 3.873               | 1  | .049                              |
| N of Valid Cases                                                                         | 135                 |    |                                   |
| a. 15 cells (60.0%) have expected count less than 5. The minimum expected count is 1.07. |                     |    |                                   |



*Figure 3 – 23: Identical columns of cross-tabulations of the role of artificial intelligence in improving communications in the IT sector in the Kingdom of Saudi Arabia*

## **Recommendations**

Based on the findings of this study, various recommendations are offered to strengthen the integration of Artificial Intelligence (AI) in project management procedures within the construction sector in Saudi Arabia. These ideas attempt to overcome the highlighted difficulties and utilize the benefits of AI technology, eventually leading to greater efficiency and effectiveness in project management.

### **1. Invest in Training and Education**

To leverage the potential of AI in construction project management, it is vital to engage in comprehensive training and educational programs for experts in the industry. Organizations should give tailored training sessions that focus on AI tools and technology, project management processes, and the ethical aspects around AI adoption. By strengthening the knowledge and abilities of project managers, engineers, and other stakeholders, businesses may guarantee that they are well-equipped to properly deploy AI technologies. This training should also incorporate practical applications and real-world case studies, enabling learners to obtain hands-on experience with AI technology.

### **2. Foster a Collaborative Environment**

Successful AI integration needs coordination among multiple stakeholders, including project managers, engineers, IT specialists, and external technology suppliers. Organizations can create a culture of cooperation and information sharing by arranging frequent meetings, workshops, and forums that bring together experts from diverse backgrounds. This collaborative approach will foster the sharing of ideas and best practices, leading to more inventive solutions and increased problem-solving capabilities. Additionally, developing strong ties with technology suppliers may enable firms obtain cutting-edge AI solutions and assistance for their deployment.

### **3. Develop a Clear AI Strategy**

Organizations should design a clear and comprehensive AI strategy that specifies their goals, objectives, and the specific AI technologies they aim to deploy. This plan should examine the particular difficulties and possibilities within the Saudi construction sector, as well as the organizational culture and competencies. By defining a well-defined roadmap for AI adoption,

companies may better focus their resources and efforts toward attaining their targeted results. The plan should also contain metrics for monitoring the performance of AI projects, enabling firms to track progress and make data-driven modifications as needed.

#### **4. Emphasize Ethical Considerations**

As AI technologies become increasingly incorporated into project management processes, ethical issues must be considered. Organizations should adopt standards and procedures that address possible ethical challenges connected to AI implementation, such as data protection, accountability, and employment displacement. Creating an ethical framework can assist enterprises negotiate the complexity of AI implementation while ensuring that the rights and interests of all stakeholders are respected. Furthermore, engaging multiple viewpoints in the decision-making process might increase the ethical concerns around AI use and build higher public confidence in these technologies.

#### **5. Continuously Evaluate and Adapt AI Tools**

The world of AI technology is continually expanding, and enterprises must stay nimble and responsive to these developments. Regularly monitoring the success of AI tools and processes is vital for ensuring that they continue to satisfy the needs of the company and its stakeholders. Organizations should build channels for feedback collecting from users of AI technology, allowing them to discover areas for improvement and adaptation. Additionally, maintaining educated about upcoming AI trends and developments will help firms to proactively embrace new tools and processes, keeping them competitive in a quickly evolving sector.

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## **Appendices**

## Questionnaire:

- **General questions**

- ✓ Age
- ✓ Gender
- ✓ Academic degree

- **Questionnaire questions**

- ✓ AI improves the efficiency of project management processes.
- ✓ AI helps reduce human errors in projects.
- ✓ AI facilitates decision-making in project management.
- ✓ Using AI helps accelerate project completion.
- ✓ AI helps improve communication between team members.
- ✓ AI helps enhance coordination and collaboration between teams.
- ✓ AI tools help track team performance effectively.
- ✓ AI helps provide recommendations to improve team performance.
- ✓ AI helps improve resource allocation more effectively.
- ✓ AI helps reduce resource waste in the project.
- ✓ AI helps predict future resource needs for the project.
- ✓ AI provides accurate data to improve resource allocation decisions.
- ✓ AI enables accurate analysis of project-related data.
- ✓ AI helps predict future project issues.
- ✓ AI-powered analytics tools help reduce risks in project management.
- ✓ AI helps improve the accuracy of timeline and budget forecasts.

- <https://docs.google.com/forms/d/1g5I9tIauu8ApK88kITAJsIRnKznZhYRvjPFeGUJars/edit>

## **Abstract:**

This study analyzes the significant role of AI in enhancing project management processes within the IT sector in Saudi Arabia. As the digital landscape continues to grow, the integration of AI technology has emerged as an important aspect in improving efficiency, accuracy, and creativity in project management techniques. The research uses a quantitative approach, using a structured questionnaire conducted on a sample of 135 IT professionals. These individuals were selected to share their insights about their experiences and perspectives on deploying AI in their project management activities. The data obtained from the surveys was subjected to rigorous statistical analysis to measure the impact of AI on several dimensions of project management. The results show that AI plays a significant role in reducing human errors, thereby enhancing the overall quality of project deliverables. By automating repetitive processes and leveraging predictive analytics, AI reduces the chance of errors that may arise from manual procedures, resulting in more reliable project deliverables. By reducing communication channels, AI creates a more unified work environment, enabling teams to respond quickly to obstacles and adapt to changing project needs. This study highlights the revolutionary potential of AI in the IT industry in Saudi Arabia, and its critical role in transforming project management processes. The findings provide important insights for industry practitioners and decision makers, supporting the deployment of AI technology to achieve operational excellence and enhance innovation. By understanding and harnessing the benefits of AI, companies may enhance their project management capabilities, ultimately leading to superior project outcomes and a sustainable competitive advantage in a rapidly changing technology world.

**Keywords:** Artificial Intelligence - Project Management - Process Improvement - IT Sector - Saudi Arabia - Applied Studies - Information Technology.