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# **The Impact of Artificial Intelligence on Project Management in Saudi Arabia: A Case Study on Red Sea Global Company in Jeddah**

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# Table of Contents

|                                                                         |           |
|-------------------------------------------------------------------------|-----------|
| Abstract.....                                                           | 4         |
| <b>1. Chapter One: Introduction .....</b>                               | <b>5</b>  |
| 1.1. Research Background .....                                          | 6         |
| 1.2. Research Problem.....                                              | 8         |
| 1.2.1. Theoretical Gaps .....                                           | 8         |
| 1.2.2. Practical Gaps.....                                              | 9         |
| 1.3. Research Significance.....                                         | 9         |
| 1.3.1. At the Theoretical Level .....                                   | 9         |
| 1.3.2. At the Practical Level.....                                      | 10        |
| 1.4. Research Questions .....                                           | 10        |
| 1.5. Research Objectives .....                                          | 10        |
| 1.6. Research Hypotheses.....                                           | 11        |
| 1.7. Research Model .....                                               | 11        |
| 1.8. Scope of Study.....                                                | 11        |
| 1.9. The Project Structure.....                                         | 12        |
| <b>2. Chapter Two: Literature Review .....</b>                          | <b>13</b> |
| 2.1. Introduction .....                                                 | 14        |
| 2.2. The independent variable: Artificial Intelligence .....            | 14        |
| 2.3. The dependent variable: Project Management.....                    | 15        |
| 2.4. The relationship between independent and dependent variables ..... | 16        |
| 2.5. Conclusion .....                                                   | 17        |
| <b>3. Chapter Three: Research Methodology.....</b>                      | <b>19</b> |
| 3.1. Introduction .....                                                 | 20        |
| 3.2. Operational definitions for research variables .....               | 20        |
| 3.3. Research design (research onion).....                              | 21        |
| 3.4. Research population & Sampling methods and technique .....         | 21        |
| 3.5. Data collection method .....                                       | 22        |
| 3.6. Types of data .....                                                | 22        |
| 3.7. Statistical analysis procedures.....                               | 22        |
| 3.8. Conclusion .....                                                   | 23        |
| 4.1. Introduction .....                                                 | 25        |

|      |                                                                                |    |
|------|--------------------------------------------------------------------------------|----|
| 4.2. | Sample profile (descriptive statistics for research sample).....               | 25 |
| 4.3. | Descriptive statistics for research variables (answer research questions)..... | 32 |
| 4.4. | Testing Hypotheses & Findings Discussion.....                                  | 34 |
| 4.5. | Conclusion .....                                                               | 37 |
| 5.   | Chapter five: Research limitations, Recommendations & Conclusion .....         | 38 |
| 5.1. | Introduction .....                                                             | 39 |
| 5.2. | Research Limitations & Future Research.....                                    | 39 |
| 5.3. | Research Recommendations .....                                                 | 40 |
| 5.4. | Conclusion .....                                                               | 41 |
|      | References.....                                                                | 42 |
|      | References.....                                                                | 43 |
|      | Appendix.....                                                                  | 45 |
|      | الملخص العربي .....                                                            | 52 |

### **List of Figures:**

|                                                                       |    |
|-----------------------------------------------------------------------|----|
| Figure 1: Sample distribution graphically by Job Title .....          | 27 |
| Figure 2: Sample distribution graphically by Years of Experience..... | 28 |

### **List of tables:**

|                                                                                                                                 |    |
|---------------------------------------------------------------------------------------------------------------------------------|----|
| Table 1: Frequencies and percentages of the distribution of the study sample by Job Title .....                                 | 25 |
| Table 2: Frequencies and percentages of the distribution of the study sample by Years of Experience in Project Management ..... | 26 |
| Table 3: showing the internal validity of the questionnaire .....                                                               | 29 |
| Table 4: the Cronbach alpha method .....                                                                                        | 31 |
| Table 5: Correlation between AI Adoption and Project Planning Effectiveness .....                                               | 32 |

|                                                                                                                                                 |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Table 6: Correlation between AI Adoption and project execution and monitoring processes.....</b>                                             | <b>33</b> |
| <b>Table 7: Correlation between AI Adoption and project success.....</b>                                                                        | <b>33</b> |
| <b>Table 8: Results of Simple Linear Regression Analysis for the Effect of AI Adoption on Project Planning Effectiveness .....</b>              | <b>34</b> |
| <b>Table 9: Results of Simple Linear Regression Analysis for the Effect of AI Adoption on Project Execution and Monitoring Efficiency .....</b> | <b>35</b> |
| <b>Table 10: Multiple Regression Results for Hypothesis 3 – Moderating Effect of Organizational Culture.....</b>                                | <b>36</b> |

## **Abstract**

This study investigates the impact of Artificial Intelligence (AI) adoption on project management practices in Saudi Arabia, using Red Sea Global Company in Jeddah as a case study. The research aims to assess how AI tools influence project planning, execution, monitoring, and overall project success. A quantitative approach was adopted using a structured questionnaire distributed among project managers, engineers, and IT professionals. The findings reveal that AI adoption significantly enhances project planning accuracy and execution efficiency. Furthermore, the study confirms a positive correlation between AI tools and project success rates. It also highlights that organizational culture plays a moderating role in strengthening the relationship between AI implementation and project outcomes. These results underscore the potential of AI as a transformative driver in project management and support its integration in alignment with Saudi Arabia's Vision 2030. Recommendations are proposed for organizations, decision-makers, and researchers to harness the benefits of AI in future project environments.

**Keywords:** Artificial Intelligence, Project Management, Project Success, Planning and Execution, Organizational Culture, Saudi Arabia, Red Sea Global, Vision 2030.

# **1. Chapter One: Introduction**

## **1.1. Research Background**

In the contemporary landscape of global industry, project management has emerged as a critical discipline essential for the successful execution of initiatives across diverse sectors (Kerzner, 2017). As projects grow in complexity, the demand for tools and methodologies that enhance precision, efficiency, and strategic decision-making has intensified. Among the technological innovations transforming project management is artificial intelligence (AI), a field once considered futuristic but now rapidly integrating into mainstream management practices. AI's capabilities in predictive analytics, natural language processing, and autonomous systems have shown profound effects on traditional project workflows, influencing everything from risk mitigation to resource optimization (Duan et al., 2019).

The integration of AI into project management is not just a trend but a paradigm shift. Studies have shown that AI tools enable project managers to anticipate challenges, streamline communication, and make data-driven decisions that enhance the likelihood of success (PMI, 2020). Organizations across the globe are increasingly investing in AI-driven project platforms to maintain competitiveness and adapt to rapidly changing market conditions. This transformation is particularly evident in sectors where project outcomes have high financial, social, or environmental stakes. As such, AI is increasingly viewed as a strategic asset in project execution rather than a supplementary tool (Marnewick & Marnewick, 2020).

Saudi Arabia presents a unique and dynamic case for the study of AI in project management. As part of its Vision 2030 initiative, the Kingdom has embarked on an ambitious journey of economic diversification and digital transformation. This strategic national framework encourages the adoption of cutting-edge technologies across all sectors, including construction, tourism, healthcare, and information technology (Saudi Vision 2030, 2016). The inclusion of AI within national mega

projects such as NEOM and The Red Sea Project is a testament to the government's commitment to innovation. Consequently, the demand for highly efficient, AI-enabled project management strategies is rapidly increasing in the Saudi context (Gil Ruiz et al., 2021).

One notable organization at the forefront of this technological evolution is the Red Sea Global Company, based in Jeddah. The company is leading one of the world's most ambitious regenerative tourism projects, emphasizing environmental sustainability, cultural preservation, and advanced digital integration. Its projects are characterized by their scale, complexity, and visibility, making the organization an ideal case for exploring how AI tools affect project outcomes. The company's proactive embrace of digital solutions, including AI, positions it as a model for understanding the operational and strategic impacts of intelligent technologies in project environments (Ogunbukola, 2024).

Despite global enthusiasm for AI in project management, the body of research specifically focused on Saudi Arabia remains limited. Most studies in this domain originate from Western or East Asian contexts, which may not fully reflect the cultural, regulatory, and operational nuances of the Saudi business environment. Furthermore, empirical data regarding the implementation of AI in real-world projects within the Kingdom are scarce. This lack of localized research creates a knowledge gap that this study aims to address (Gil Ruiz et al., 2021).

Therefore, the purpose of this research is to explore and assess the impact of artificial intelligence on project management within the specific context of Saudi Arabia, using the Red Sea Global Company as a focal point. Through this lens, the study will evaluate how AI technologies influence project planning, execution, monitoring, and overall success. It will also identify the enablers and barriers to AI integration within complex project environments, offering insights for both scholars and practitioners. Ultimately, the research aims to contribute to a deeper

understanding of AI's role in enhancing project performance in alignment with Saudi Arabia's Vision 2030 (PMI, 2020). Through this lens, the study will evaluate how AI technologies influence project planning, execution, monitoring, and overall success. It will also identify the enablers and barriers to AI integration within complex project environments, offering insights for both scholars and practitioners. Ultimately, the research aims to contribute to a deeper understanding of AI's role in enhancing project performance in alignment with Saudi Arabia's Vision 2030.

## **1.2. Research Problem**

Artificial Intelligence (AI) has become a key enabler in transforming project management across various industries. Despite its rising importance, the practical and academic understanding of AI's role in project management within the Saudi Arabian context remains limited. A growing interest in the integration of AI tools into project life cycles, especially in mega-projects like those undertaken by the Red Sea Global Company, necessitates a closer examination of the underlying gaps in theory and practice. This section presents a structured analysis of these gaps.

### **1.2.1. Theoretical Gaps**

While several global studies have explored the relationship between AI technologies and project management performance, most of them focus on general frameworks or Western business environments. There is a lack of theoretical models tailored to the cultural, organizational, and regulatory dimensions specific to Saudi Arabia. Existing literature often overlooks the influence of contextual factors such as hierarchical organizational structures, government policy influences, and differing levels of digital maturity within Saudi firms. Furthermore, there are few studies that propose a comprehensive framework for evaluating how AI capabilities such as machine learning or predictive analytics influence specific stages of the project life cycle, such as planning, execution, or monitoring.

### **1.2.2. Practical Gaps**

From a practical standpoint, organizations in Saudi Arabia face several challenges in adopting AI in project management. These include limited technical infrastructure, resistance to change among project teams, insufficient training, and uncertainty around ROI from AI investments. In the case of Red Sea Global Company, although some AI tools have been introduced, there remains a gap in fully embedding AI-driven systems in strategic and operational decision-making. Additionally, most available insights come from anecdotal or pilot-scale applications, lacking robust data to confirm AI's long-term value on project efficiency and success.

To address these shortcomings, the present study poses the following research question:

**How does the integration of artificial intelligence impact project management processes and outcomes within Red Sea Global Company in Jeddah, Saudi Arabia?**

### **1.3. Research Significance**

This study holds significance on both theoretical and practical levels, offering contributions to academic understanding and real-world applications of artificial intelligence in project management.

#### **1.3.1. At the Theoretical Level**

At the theoretical level, this research aims to bridge a notable gap in existing literature concerning the application of AI in project management within the Saudi Arabian context. While global research has established a foundation for understanding how AI technologies impact project performance, localized studies remain scarce. This study contributes by contextualizing AI's role within Saudi cultural, regulatory, and organizational dynamics. It also attempts to develop a

framework that can guide future theoretical investigations into AI-driven decision-making and its influence on different phases of the project life cycle in emerging markets.

### **1.3.2. At the Practical Level**

From a practical standpoint, the research provides actionable insights for project stakeholders, particularly those operating in technologically evolving environments like the Red Sea Global Company. It sheds light on the operational benefits, challenges, and strategies related to AI integration in project workflows. By focusing on an active Saudi organization, the study delivers empirical evidence that can inform best practices, training needs, investment strategies, and organizational change management processes. It supports project managers, engineers, and IT professionals in making informed decisions about AI deployment, thus enhancing project efficiency and alignment with Saudi Vision 2030.

## **1.4. Research Questions**

- How does artificial intelligence impact project planning in Saudi Arabia?
- What is the influence of AI on project execution and monitoring processes?
- How can AI contribute to improving project success rates in Saudi organizations?

## **1.5. Research Objectives**

- To analyze the impact of AI tools on project planning, execution, and monitoring in Saudi Arabia.
- To identify key challenges and barriers to AI adoption in project management.
- To evaluate how AI contributes to enhancing project outcomes and success rates.
- To propose recommendations for effective AI integration in project management practices.

## **1.6. Research Hypotheses**

- H1: AI adoption has a significant positive effect on the effectiveness of project planning in Saudi Arabia.
- H2: AI tools enhance project execution efficiency and monitoring accuracy.
- H3: Organizational culture moderates the relationship between AI adoption and project success.

## **1.7. Research Model**

The conceptual model proposed in this study positions AI adoption as the independent variable influencing project success as the dependent variable. The model incorporates mediating and moderating variables, including organizational culture, technology readiness, and project complexity, which may affect the strength of these relationships.

## **1.8. Scope of Study**

This study focuses on projects executed within The Red Sea Global Company based in Jeddah, Saudi Arabia. The company operates in the tourism and construction sectors and is known for leveraging innovative technologies in large-scale development initiatives. The research targets project managers, engineers, and IT professionals involved in AI-enabled projects across the organization. This specific context offers a representative environment to explore AI's role in project management within a Saudi business setting aligned with Vision 2030.

## **1.9. The Project Structure**

This research project is structured as follows:

Chapter 1: Introduction – Provides background, problem statement, objectives, significance, and scope.

Chapter 2: Literature Review – Presents a critical analysis of previous studies on AI and project management.

Chapter 3: Research Methodology – Details research design, data collection methods, and analysis techniques.

Chapter 4: Statistical Analysis and Discussion – Describes the data analysis and links findings to the literature.

Chapter 5: Limitations, Recommendations, and Conclusion – Summarizes the study findings and offers recommendations for practice and future research.

## **2. Chapter Two: Literature Review**

## **2.1. Introduction**

This chapter provides a comprehensive review of scholarly literature relevant to the topic of artificial intelligence (AI) in project management. The aim is to examine prior research findings to identify the current state of knowledge, theories, and debates concerning the influence of AI on project success. The review also identifies theoretical foundations and empirical studies that support the development of this research. It is structured to examine the independent and dependent variables of this study, explore their interrelationships, and highlight gaps in literature that justify the research objectives.

## **2.2. The independent variable: Artificial Intelligence**

Artificial Intelligence (AI) is the independent variable in this study. It is defined as the simulation of human intelligence in machines that are programmed to think and act like humans. In the context of project management, AI includes a range of tools and technologies such as machine learning, natural language processing, and intelligent automation that assist in project planning, execution, and control (Duan et al., 2019).

Several studies have investigated the role of AI in organizational and operational settings. For instance, Gil Ruiz et al. (2021) conducted a review of AI applications in project management, aiming to map the current state of research and identify dominant AI tools used in the field. Their methodology was a structured literature review, and the findings highlighted predictive analytics and intelligent decision support systems as the most influential applications.

Similarly, PMI (2020) explored how AI innovators are reshaping project management through practical applications of intelligent systems. The study used a

qualitative case study approach and concluded that AI significantly enhances resource planning, communication flow, and risk management in complex projects. Marnewick & Marnewick (2020), in another empirical study, found that AI-enabled systems improved decision-making speed and accuracy in project settings, using a mixed-method approach involving surveys and interviews.

These findings collectively establish AI as a multi-dimensional construct that has the potential to transform how projects are delivered, especially in environments demanding high accuracy and real-time responsiveness.

Artificial Intelligence refers to the capability of machines and computer systems to perform tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, and language understanding (Duan et al., 2019). Modern AI systems are largely built upon subfields such as machine learning (ML), natural language processing (NLP), computer vision, and robotics. In project management, AI applications span across forecasting, decision support systems, scheduling, risk assessment, and automation of administrative tasks.

### **2.3. The dependent variable: Project Management**

Project Management is the dependent variable in this research. It refers to the application of knowledge, skills, tools, and techniques to meet project requirements effectively and efficiently. This includes domains such as project planning, scheduling, resource management, risk assessment, monitoring, and project closure (Kerzner, 2017).

In the academic realm, various researchers have examined project management performance and success factors. Ogunbukola (2024) studied the challenges and opportunities of integrating digital tools into complex project environments. The

study used a case study approach focusing on infrastructure projects in emerging markets, concluding that digital integration—including AI—contributed significantly to enhanced project control and stakeholder satisfaction.

Kerzner (2017) provided a foundational framework for assessing project success across five dimensions: scope, time, cost, quality, and stakeholder satisfaction. Many studies continue to adopt this framework when evaluating the influence of external tools like AI on project outcomes. Moreover, studies like that of Marnewick & Marnewick (2020) indicate that enhanced analytics and AI systems support project managers in tracking key performance indicators (KPIs), reducing human error, and maintaining consistent project alignment with strategic goals.

Numerous studies emphasize the growing role of AI in improving project management functions. AI can optimize resource allocation, generate accurate time and cost estimates, and enhance communication across teams (PMI, 2020). AI-powered analytics also contribute to identifying patterns in project data that help predict risks and performance bottlenecks. Some tools are used for dynamic scheduling and real-time monitoring, which enables faster responses to deviations in project plans.

## **2.4. The relationship between independent and dependent variables**

Numerous studies have attempted to explore the correlation between AI (independent variable) and project management performance (dependent variable). For example, Marnewick & Marnewick (2020) conducted a mixed-method study analyzing how AI tools influence project success metrics such as cost, time, and scope control. The results indicated a strong positive relationship, particularly in areas related to scheduling optimization and proactive risk identification.

Similarly, PMI (2020) presented findings from multiple case studies showing that AI adoption leads to higher consistency in project outcomes, particularly when AI tools are integrated into strategic decision-making processes. Gil Ruiz et al. (2021) also emphasized that AI-enabled systems support project transparency and cross-functional communication, which are critical for successful execution.

In the Saudi context, Ogunbukola (2024) highlighted that AI contributes to improving stakeholder engagement and reduces uncertainty in complex, multi-phase projects like those managed by Red Sea Global Company. The research emphasized that when AI is aligned with organizational capabilities, it significantly enhances monitoring, evaluation, and adaptive planning.

These findings support the conceptual model used in this research, which hypothesizes that AI adoption has a measurable and positive impact on project management efficiency, particularly in digitally progressive environments.

## **2.5. Conclusion**

This chapter has provided a structured and critical review of the literature addressing the use of artificial intelligence (AI) in project management. It began by defining AI as the independent variable, highlighting its various capabilities such as machine learning and predictive analytics, and its role in project processes such as planning, risk assessment, and communication. Several studies, including those by Gil Ruiz et al. (2021) and PMI (2020), were discussed to illustrate how AI is reshaping the traditional project management landscape.

The chapter then addressed dependent variable, project management, reviewing foundational theories and frameworks such as those by Kerzner (2017) and empirical studies like Ogunbukola (2024), which showcase how digital tools influence project

success metrics. The review demonstrated that project success is a multi-dimensional construct influenced by time, cost, scope, quality, and stakeholder engagement, all of which can be enhanced through AI.

Following this, the chapter explored the relationship between the two variables, presenting evidence from multiple studies that confirm a positive and significant correlation between AI implementation and improved project management performance. These studies reveal how AI contributes to better scheduling, proactive risk management, stakeholder coordination, and decision-making.

Finally, this literature review helped identify gaps, especially the lack of empirical research specific to the Saudi Arabian context and its flagship initiatives like Red Sea Global. These insights justify the need for the current study and provide a strong foundation for the next chapter, which will elaborate on the methodology to empirically assess AI's impact on project management in this context.

### **3. Chapter Three: Research Methodology**

### 3.1. Introduction

This chapter outlines the methodology employed to conduct this research, which investigates the impact of artificial intelligence (AI) on project management within Red Sea Global Company in Jeddah, Saudi Arabia. The methodology provides a clear structure for how data will be gathered, measured, and analyzed to test the research hypotheses. It includes operational definitions of variables, the research design, sampling strategy, data collection techniques, and statistical methods used for analysis.

### 3.2. Operational definitions for research variables

1. **Artificial Intelligence (AI) Adoption:** The extent to which project teams utilize AI tools such as predictive analytics, machine learning, and automation in planning, execution, and monitoring.
2. **Project Planning Effectiveness:** The accuracy, clarity, and feasibility of planning activities as influenced by AI tools.
3. **Project Execution & Monitoring Efficiency:** The ability to carry out and track project activities effectively and in real-time.
4. **Project Success:** Achievement of project goals in terms of time, cost, quality, and stakeholder satisfaction.
5. **Organizational Culture:** The shared values and attitudes within an organization that may facilitate or hinder AI integration.

### 3.3. Research design (research onion)

The study adopts the research onion framework introduced by Saunders et al. (2012):

- **Philosophy:** Positivism, as the study seeks to test hypotheses through quantifiable data.
- **Approach:** Deductive, since it begins with theory and tests hypotheses using empirical data.
- **Strategy:** Survey-based strategy using structured questionnaires.
- **Choice:** Quantitative mono-method.
- **Time Horizon:** Cross-sectional, as the data will be collected at a single point in time.
- **Techniques and Procedures:** Statistical analysis using SPSS for data interpretation.

### 3.4. Research population & Sampling methods and technique

The target population consists of employees at Red Sea Global Company involved in project planning, execution, and management. These include project managers, team leaders, engineers, and IT professionals.

- **Sampling Technique:** A purposive sampling method is used to ensure participants have relevant experience with AI in project management.
- **Sample Size:** A minimum of 50 participants will be targeted to ensure statistical reliability and validity.

### 3.5. Data collection method

Primary data will be collected using a structured online questionnaire developed via Google Forms. The questionnaire includes Likert-scale items aligned with each research variable and hypothesis. Participants will receive the survey link through internal communication channels.

### 3.6. Types of data

- **Primary Data:** Collected through questionnaire responses from project staff.
- **Secondary Data:** Literature from academic journals, reports, and organizational documents used to support the theoretical framework.

### 3.7. Statistical analysis procedures

Data collected will be analyzed using Statistical Package for the Social Sciences (SPSS). The following procedures will be used:

- **Descriptive Statistics:** Mean, standard deviation, and frequency distributions.
- **Reliability Testing:** Cronbach's Alpha for internal consistency.
- **Correlation Analysis:** To examine relationships between variables.
- **Multiple Regression Analysis:** To test the hypotheses and determine the strength and significance of AI's impact on project management outcomes.
- **Moderation Analysis:** To explore the role of organizational culture as a moderator in the relationship between AI adoption and project success.

### **3.8. Conclusion**

This chapter has outlined the methodological framework for the study, justifying the use of a quantitative approach to explore the relationship between artificial intelligence and project management. It detailed the operational definitions of variables, research design, population, sampling techniques, data types, and the statistical tools selected for analysis. The next chapter will present the findings of the data analysis and link them to the research hypotheses and literature review.

## **4. Chapter Four: Statistical Analysis & Findings discussion**

## 4.1. Introduction

This chapter presents the results of the data analysis based on responses from employees at Red Sea Global Company. It includes a summary of the sample profile, tests for the reliability and validity of the questionnaire, descriptive statistics for the main variables, and hypothesis testing. The findings are discussed in relation to the research questions and literature review to draw meaningful conclusions about the impact of artificial intelligence on project management.

## 4.2. Sample profile (descriptive statistics for research sample)

This section presents the demographic and professional characteristics of the research sample who participated in the study. Descriptive statistics are used to summarize variables such as job title and years of experience. These characteristics help contextualize the findings and ensure that the sample is appropriate for investigating the impact of AI on project management in Red Sea Global Company.

### 4.2.1. Distribution by Job Title

**Table 1: Frequencies and percentages of the distribution of the study sample by Job Title**

| Job Title |                 | Frequencies | Percentages % |
|-----------|-----------------|-------------|---------------|
|           | Project Manager | 40          | 33.6          |
|           | Team Leader     | 37          | 31.1          |
|           | Engineer        | 15          | 12.6          |
|           | IT Specialist   | 15          | 12.6          |
|           | Other           | 12          | 10.1          |
|           | Total           | 119         | 100%          |

Table (1) shows the descriptive distribution of the study sample according to job title. It is evident that the largest percentage of participants are Project Managers, representing 33.6% (40 respondents), followed by Team Leaders at 31.1% (37 respondents). Additionally, Engineers and IT Specialists each account for 12.6% (15 respondents). The "Other" category represents 10.1% (12 respondents). This distribution reflects a good variety in the roles of respondents, which enhances the comprehensiveness of the results regarding AI adoption in project management across different professional levels.

#### 4.2.2. Distribution by Years of Experience in Project Management

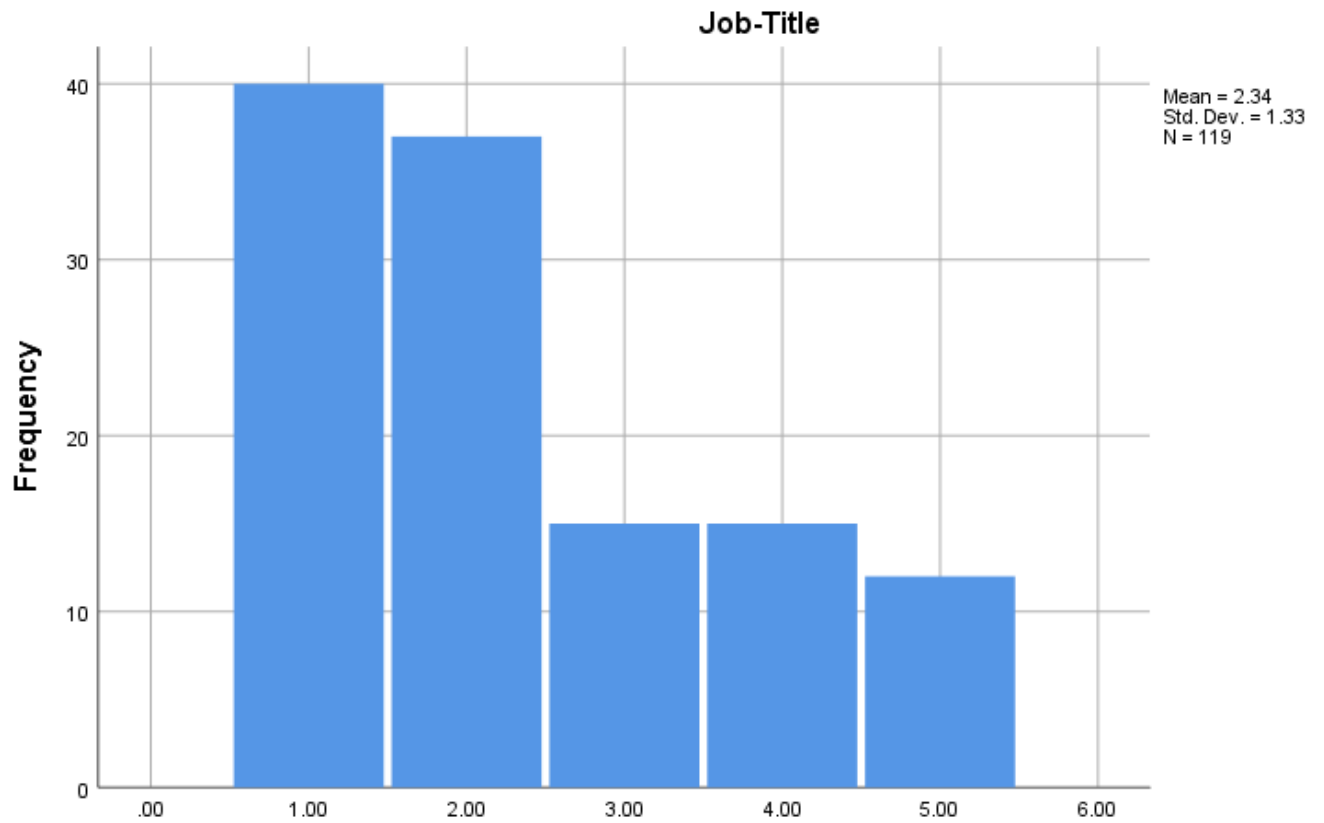
**Table 2: Frequencies and percentages of the distribution of the study sample by Years of Experience in Project Management**

| <b>Years of Experience in Project Management</b> |                           | <b>Frequencies</b> | <b>Percentages %</b> |
|--------------------------------------------------|---------------------------|--------------------|----------------------|
|                                                  | <b>Less than 2 years</b>  | <b>30</b>          | <b>25.2</b>          |
|                                                  | <b>2–5 years</b>          | <b>47</b>          | <b>39.5</b>          |
|                                                  | <b>6–10 years</b>         | <b>27</b>          | <b>22.7</b>          |
|                                                  | <b>More than 10 years</b> | <b>15</b>          | <b>12.6</b>          |
|                                                  | <b>Total</b>              | <b>119</b>         | <b>100</b>           |

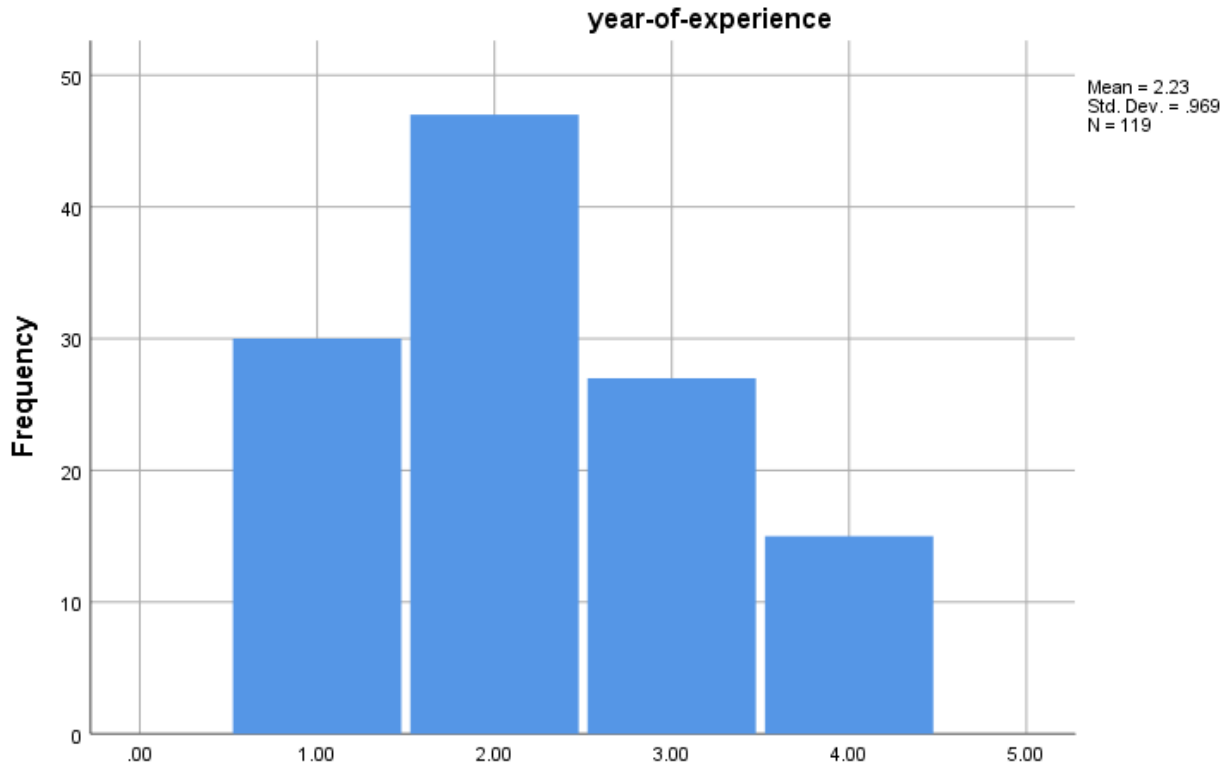
The table illustrates the distribution of respondents based on their years of experience in project management. Many participants (39.5%) have 2–5 years of experience (47 respondents), followed by 25.2% with less than 2 years of experience (30 respondents). Those with 6–10 years of experience represent 22.7% (27 respondents), while 12.6% have more than 10 years of experience (15 respondents). This variation in experience levels provides a balanced view of perspectives from

both early-career and more experienced professionals regarding AI use in project management.

#### 4.2.3. Sample distribution graphically:



**Figure 1: Sample distribution graphically by Job Title**



**Figure 2: Sample distribution graphically by Years of Experience**

#### **4.2.4. Validity & reliability tests for the questionnaires**

##### **4.2.4.1. Validity Test**

The internal validity of the questionnaire was calculated by measuring the extent to which the paragraphs of the questionnaire are related to its sections, which is shown in the following table:

**Table 3: showing the internal validity of the questionnaire**

| N.                                                      |                                                                         | R       | Sig.  |
|---------------------------------------------------------|-------------------------------------------------------------------------|---------|-------|
| <b>Section A: AI Adoption</b>                           |                                                                         |         |       |
| 1                                                       | My organization is actively implementing AI tools in project management | 0.390** | 0.000 |
| 2                                                       | I am familiar with AI-based tools used in our projects                  | 0.624** | 0.000 |
| 3                                                       | AI technologies are integrated into daily project processes             | 0.547** | 0.000 |
| 4                                                       | The decision to adopt AI is supported by top management                 | 0.595** | 0.000 |
| <b>Section B: Project Planning Effectiveness</b>        |                                                                         |         |       |
| 5                                                       | Project planning has become more accurate due to AI tools               | 0.485** | 0.000 |
| 6                                                       | AI helps in identifying realistic project timelines                     | 0.618** | 0.000 |
| 7                                                       | AI facilitates better estimation of project costs and resources         | 0.787** | 0.000 |
| 8                                                       | AI use in planning helps reduce uncertainty and improve documentation   | 0.499** | 0.000 |
| <b>Section C: Execution &amp; Monitoring Efficiency</b> |                                                                         |         |       |
| 9                                                       | AI helps track real-time project progress effectively                   | 0.560** | 0.000 |
| 10                                                      | Resource allocation during execution is improved through AI             | 0.609** | 0.000 |
| 11                                                      | AI tools support faster issue detection and resolution                  | 0.708** | 0.000 |
| 12                                                      | Monitoring dashboards based on AI enhance team responsiveness           | 0.572** | 0.000 |
| <b>Section D: Project Success</b>                       |                                                                         |         |       |
| 13                                                      | Projects using AI are more likely to achieve goals within scope         | 0.402** | 0.000 |
| 14                                                      | AI adoption contributes to project stakeholder satisfaction             | 0.539** | 0.000 |
| 15                                                      | AI-enabled projects are more likely to meet deadlines and budget        | 0.711** | 0.000 |
| 16                                                      | Project performance is improved through AI-based reporting              | 0.549** | 0.000 |

| Section E: Organizational Culture |                                                                      |         |       |
|-----------------------------------|----------------------------------------------------------------------|---------|-------|
| 17                                | Our organization encourages digital transformation and AI adoption   | 0.505** | 0.000 |
| 18                                | There is openness to change and innovation in project processes      | 0.678** | 0.000 |
| 19                                | Project teams are trained and supported in using AI tools            | 0.562** | 0.000 |
| 20                                | Collaboration and information sharing are common in our work culture | 0.538** | 0.000 |

The results of the internal consistency validity test using Pearson's correlation coefficient demonstrate that all questionnaire items are significantly correlated with their corresponding research dimensions at a significant level of Sig = 0.000. These findings confirm that each item reliably measures the concept it is designed to assess, showing strong alignment with the theoretical structure of the study.

The correlation coefficients between items and their respective variables ranged from (0.390) to (0.787), which indicates moderate to strong relationships according to standard statistical benchmarks. The highest correlations were observed in items measuring project planning effectiveness and project success, particularly those assessing cost estimation, deadline achievement, and stakeholder satisfaction.

These results provide robust evidence of the internal validity of the research instrument. Accordingly, the questionnaire is validated as a reliable tool for measuring the main dimensions of the study: (AI Adoption, Project Planning Effectiveness, Execution and Monitoring Efficiency, Project Success and Organizational Culture).

#### 4.2.4.2. Calculation of reliability by the Cronbach alpha method

**Table 4: the Cronbach alpha method**

| <b>N.</b>    | <b>Section</b>                               | <b>Cronbach alpha</b> | <b>Number of Phrases</b> |
|--------------|----------------------------------------------|-----------------------|--------------------------|
| <b>1</b>     | <b>AI Adoption</b>                           | 0.780                 | 4                        |
| <b>2</b>     | <b>Project Planning Effectiveness</b>        | 0.550                 | 4                        |
| <b>3</b>     | <b>Execution &amp; Monitoring Efficiency</b> | 0.455                 | 4                        |
| <b>4</b>     | <b>Project Success</b>                       | 0.620                 | 4                        |
| <b>5</b>     | <b>Organizational Culture</b>                | 0.546                 | 4                        |
| <b>Total</b> |                                              | <b>0.684</b>          | <b>20</b>                |

The reliability of the research instrument was assessed using Cronbach's Alpha coefficient for each section of the questionnaire as well as for the entire instrument. As presented in Table 4, the Cronbach's Alpha values across individual sections ranged from 0.455 to 0.780.

The highest reliability was observed in the "AI Adoption" section ( $\alpha = 0.780$ ), indicating strong internal consistency and coherent measurement of the construct. Conversely, the "Execution and Monitoring Efficiency" section exhibited the lowest reliability ( $\alpha = 0.455$ ), which is relatively low and may suggest that some items in this section require refinement or rewording for future research applications.

The overall reliability coefficient for the full questionnaire, which consisted of 20 items, was 0.684. Although this is slightly below the widely accepted threshold of 0.70, it is still considered acceptable for exploratory research in the field of social and management sciences. These findings suggest that the instrument possesses a moderate level of internal consistency, making it reasonably reliable for analyzing

the impact of artificial intelligence on project management within the Saudi context, particularly in the case of Red Sea Global Company.

#### **4.3. Descriptive statistics for research variables (answer research questions)**

This section provides statistical analysis to answer the research questions by examining descriptive measures and correlation results between AI adoption and project management dimensions. The analysis reveals key relationships that support understanding the impact of AI in Saudi project environments.

##### **Question 1: How does artificial intelligence impact project planning in Saudi Arabia?**

**Table 5: Correlation between AI Adoption and Project Planning Effectiveness**

| <b>Variables</b>               | <b>R</b>       | <b>Sig.</b>  |
|--------------------------------|----------------|--------------|
| AI Adoption → Project Planning | <b>0.370**</b> | <b>0.000</b> |

The results indicate a statistically significant positive correlation ( $r = 0.370$ ,  $p < 0.01$ ) between AI adoption and project planning effectiveness. This suggests that higher levels of AI adoption are associated with improvements in project planning processes within the surveyed organization.

**Question 2: What is the influence of AI on project execution and monitoring processes?**

**Table 6: Correlation between AI Adoption and project execution and monitoring processes**

| <b>Variables</b>                                   | <b>R</b>      | <b>Sig.</b>  |
|----------------------------------------------------|---------------|--------------|
| AI Adoption → Execution<br>& Monitoring Efficiency | <b>0.222*</b> | <b>0.015</b> |

The Pearson correlation analysis revealed a statistically significant but weak positive relationship between AI adoption and execution & monitoring efficiency ( $r = 0.222$ ,  $p = 0.015$ ). This result suggests that while AI tools do contribute to improvements in project execution and real-time monitoring, the strength of this association is modest. Nevertheless, the significance level indicates that the observed relationship is unlikely due to chance.

**Question 3: How can AI contribute to improving project success rates in Saudi organizations?**

**Table 7: Correlation between AI Adoption and project success**

| <b>Variables</b>                 | <b>R</b>       | <b>Sig.</b>  |
|----------------------------------|----------------|--------------|
| AI Adoption → project<br>success | <b>0.530**</b> | <b>0.015</b> |

The Pearson correlation analysis reveals a moderate and statistically significant positive relationship between AI adoption and project success ( $r = 0.530$ ,  $p = 0.015$ ). This indicates that the higher the adoption of AI tools in project environments, the

greater the likelihood of achieving project success in terms of scope, time, budget, and stakeholder satisfaction within Saudi organizations.

#### 4.4. Testing Hypotheses & Findings Discussion

- **H1: AI adoption has a significant positive effect on the effectiveness of project planning in Saudi Arabia.**

**Table 8: Results of Simple Linear Regression Analysis for the Effect of AI Adoption on Project Planning Effectiveness**

| Model               | Unstandardized Coefficients (B) | Standard Error | Standardized Coefficients (Beta) | T     | Sig. (p-value) |
|---------------------|---------------------------------|----------------|----------------------------------|-------|----------------|
| Constant            | 2.417                           | 0.395          | —                                | 6.125 | 0.000          |
| AI Adoption (meanA) | 0.410                           | 0.095          | 0.370                            | 4.306 | 0.000          |

The regression results show that AI Adoption has a statistically significant positive effect on Project Planning Effectiveness ( $\beta = 0.370$ ,  $p < 0.001$ ). The model explains approximately 13.7% of the variance in planning effectiveness. This supports hypothesis H1, confirming that increased adoption of AI tools is associated with improved accuracy and efficiency in project planning within Saudi organizations.

- **H2: AI tools enhance project execution efficiency and monitoring accuracy.**

**Table 9: Results of Simple Linear Regression Analysis for the Effect of AI Adoption on Project Execution and Monitoring Efficiency**

| <b>Model</b>        | <b>Unstandardized Coefficients (B)</b> | <b>Standard Error</b> | <b>Standardized Coefficients (Beta)</b> | <b>T</b> | <b>Sig. (p-value)</b> |
|---------------------|----------------------------------------|-----------------------|-----------------------------------------|----------|-----------------------|
| Constant            | 3.155                                  | 0.407                 | —                                       | 7.749    | 0.000                 |
| AI Adoption (meanA) | 0.242                                  | 0.098                 | 0.222                                   | 2.463    | 0.015                 |

The results indicate a statistically significant positive effect of AI adoption on project execution and monitoring efficiency. The regression coefficient ( $B = 0.242$ ) is significant at the 0.05 level ( $p = 0.015$ ), confirming the validity of Hypothesis 2.

- **H3: Organizational culture moderates the relationship between AI adoption and project success.**

**Table 10: Multiple Regression Results for Hypothesis 3 – Moderating Effect of Organizational Culture**

| Variable             | Unstandardized Coefficients (B) | Standard Error | Standardized Coefficients (Beta) | T-value | Sig. (p-value) |
|----------------------|---------------------------------|----------------|----------------------------------|---------|----------------|
| Constant             | 8.808                           | 3.586          | —                                | 2.456   | 0.016          |
| AI Adoption (meanA)  | -1.283                          | 0.868          | -1.281                           | -1.478  | 0.142          |
| Org. Culture (meanE) | -1.305                          | 0.862          | -1.220                           | -1.514  | 0.133          |
| Interaction Term     | 0.349                           | 0.208          | 2.140                            | 1.680   | 0.096          |

The results of the multiple regression analysis suggest a moderating effect of organizational culture on the relationship between AI adoption and project success, though this effect is marginally significant.

The interaction term (AI Adoption  $\times$  Organizational Culture) has a coefficient of 0.349 and a p-value of 0.096, which is slightly above the conventional 0.05 significance level, indicating a potential moderating effect at the 10% level.

Neither AI adoption nor organizational culture alone shows a statistically significant direct effect on project success (p-values = 0.142 and 0.133, respectively).

The model explains 7.3% of the variance in project success ( $R^2 = 0.073$ ) and is statistically significant ( $F = 3.015$ ,  $p = 0.033$ ).

## **4.5. Conclusion**

This chapter presented the statistical analysis of the data and discussed the findings derived from the research sample. The results provided clear answers to the research questions, and the hypotheses were tested using correlation and regression analyses. The findings indicated that AI adoption has a positive and statistically significant impact on project planning effectiveness, and it also contributes to improving execution efficiency and monitoring accuracy, although the latter relationship was relatively weaker. As for the role of organizational culture as a moderating variable in the relationship between AI adoption and project success, it received partial support, as its effect approached the statistical significance level.

Descriptive statistics also revealed that participants have a high level of awareness and effective integration of AI technologies, reflecting a digitally advanced environment within the studied organization. The validity and internal consistency tests confirmed that the research instrument possesses an acceptable level of reliability and measurement accuracy. These results reinforce the theoretical framework of the study and provide important practical insights into the role of AI in project management, particularly within the Saudi context.

## **5. Chapter five: Research limitations, Recommendations & Conclusion**

## **5.1. Introduction**

This chapter presents the concluding aspects of the research, summarizing the study's contributions, outlining its limitations, suggesting directions for future research, and offering practical recommendations based on the findings. The chapter aims to reflect on the overall objectives and significance of the study, tying together theoretical insights and empirical outcomes in the context of artificial intelligence (AI) in project management in Saudi Arabia.

## **5.2. Research Limitations & Future Research**

Despite the valuable findings of this study, there are several limitations that should be acknowledged.

- First, the research was limited to a single case study—the Red Sea Global Company in Jeddah—which may restrict the generalizability of the results to other sectors or organizations.
- Second, the study relied solely on quantitative data collected through self-reported questionnaires, which could introduce bias or limit the depth of understanding of complex behaviors.
- Third, the cross-sectional nature of the study means that the findings capture perceptions at a single point in time and may not reflect changes over time or long-term effects of AI adoption.

**For future research, it is recommended to:**

- Expand the sample to include multiple companies or sectors across Saudi Arabia for broader insight.
- Utilize mixed-method approaches, combining qualitative interviews with surveys to gain deeper understanding.
- Conduct longitudinal studies to track the impact of AI adoption over time.

### **5.3. Research Recommendations**

Based on the study findings, the following practical recommendations are proposed:

- For project managers: Invest in training programs to enhance team familiarity with AI tools and their applications in project management stages.
- For organizations: Develop supportive organizational cultures that encourage innovation, collaboration, and openness to AI integration.
- For policymakers: Promote national strategies that support digital transformation and offer incentives for AI implementation in strategic projects.
- For technology developers: Design user-friendly AI solutions that align with project-specific needs and enhance usability across teams.

## **5.4. Conclusion**

This study has provided empirical evidence on the significant role that AI plays in enhancing project planning, execution, and success in a Saudi organizational context. The results affirmed the relevance of AI tools in improving project outcomes and revealed the importance of organizational culture as a potential moderator. While the study confirmed several hypotheses, it also uncovered areas requiring further exploration. The findings align with Saudi Arabia's Vision 2030 and provide practical insights for advancing project performance through digital innovation.

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# Appendix

# **The Impact of Artificial Intelligence on Project Management in Saudi Arabia: A Case Study on Red Sea Global Company in Jeddah**

**Dear Participant,**

This questionnaire is part of a research study titled **“The Impact of Artificial Intelligence on Project Management in Saudi Arabia: A Case Study on Red Sea Global Company in Jeddah.”** The purpose of this study is to explore the role of artificial intelligence in enhancing various aspects of project management, including planning, execution, monitoring, and overall project success. Your participation will help provide valuable insights into the current use and effectiveness of AI tools in the Saudi project environment. All responses will be kept strictly confidential and used solely for academic purposes. The survey should take approximately 5–7 minutes to complete.

**Thank you for your time and valuable input.**

## **Section 1: Demographic Information**

### **1. Job Title**

- Project Manager
- Team Leader
- Engineer
- IT Specialist
- Other

## 2. Years of experience in Project Management

- Less than 2 years
- 2–5 years
- 6–10 years
- More than 10 years

### Section 2: Study's variables

Please indicate your level of agreement with the following statements (1 = Strongly Disagree, 5 = Strongly Agree):

#### Section A: AI Adoption (Independent Variable)

| Phrases                                                                      | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|------------------------------------------------------------------------------|----------------|-------|---------|----------|-------------------|
| 1. My organization is actively implementing AI tools in project management . |                |       |         |          |                   |
| 2. I am familiar with AI-based tools used in our projects                    |                |       |         |          |                   |

|                                                                  |  |  |  |  |  |
|------------------------------------------------------------------|--|--|--|--|--|
| 3. AI technologies are integrated into daily project processes . |  |  |  |  |  |
| 4. The decision to adopt AI is supported by top management       |  |  |  |  |  |

### Section B: Project Planning Effectiveness (Dependent for H1)

| Phrases                                                            | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--------------------------------------------------------------------|----------------|-------|---------|----------|-------------------|
| 5. Project planning has become more accurate due to AI tools       |                |       |         |          |                   |
| 6. AI helps in identifying realistic project timelines             |                |       |         |          |                   |
| 7. AI facilitates better estimation of project costs and resources |                |       |         |          |                   |

|                                                                          |  |  |  |  |  |
|--------------------------------------------------------------------------|--|--|--|--|--|
| 8. AI use in planning helps reduce uncertainty and improve documentation |  |  |  |  |  |
|--------------------------------------------------------------------------|--|--|--|--|--|

### Section C: Execution & Monitoring Efficiency (Dependent for H2)

| Phrases                                                           | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|-------------------------------------------------------------------|----------------|-------|---------|----------|-------------------|
| 9. AI helps track real-time project progress effectively          |                |       |         |          |                   |
| 10. Resource allocation during execution is improved through AI   |                |       |         |          |                   |
| 11. AI tools support faster issue detection and resolution        |                |       |         |          |                   |
| 12. Monitoring dashboards based on AI enhance team responsiveness |                |       |         |          |                   |

### Section D: Project Success (Dependent for H3)

| Phrases                                                              | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|----------------------------------------------------------------------|----------------|-------|---------|----------|-------------------|
| 13. Projects using AI are more likely to achieve goals within scope  |                |       |         |          |                   |
| 14. AI adoption contributes to project stakeholder satisfaction      |                |       |         |          |                   |
| 15. AI-enabled projects are more likely to meet deadlines and budget |                |       |         |          |                   |
| 16. Project performance is improved through AI-based reporting       |                |       |         |          |                   |

### Section E: Organizational Culture (Moderator for H3)

| Phrases                                                                  | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--------------------------------------------------------------------------|----------------|-------|---------|----------|-------------------|
| 17. Our organization encourages digital transformation and AI adoption   |                |       |         |          |                   |
| 18. There is openness to change and innovation in project processes      |                |       |         |          |                   |
| 19. Project teams are trained and supported in using AI tools            |                |       |         |          |                   |
| 20. Collaboration and information sharing are common in our work culture |                |       |         |          |                   |

**Thank you for your cooperation with us.**

## الملخص العربي

تتناول هذه الدراسة تأثير تبني تقنيات الذكاء الاصطناعي على ممارسات إدارة المشاريع في المملكة العربية السعودية، من خلال دراسة حالة لشركة البحر الأحمر العالمية في جدة. وتهدف إلى تقييم مدى تأثير أدوات الذكاء الاصطناعي على تخطيط المشاريع، وتنفيذها، ومراقبتها، ونجاحها بشكل عام. وقد تم اعتماد منهج كمي باستخدام استبيان منظم وُزِعَ على مديري المشاريع والمهندسين والمتخصصين في تقنية المعلومات. وقد أظهرت النتائج أن تبني الذكاء الاصطناعي يعزز بشكل كبير من دقة تخطيط المشاريع وكفاءة تنفيذها. كما أكدت الدراسة وجود علاقة ارتباط إيجابية بين أدوات الذكاء الاصطناعي ونسب نجاح المشاريع. وأشارت كذلك إلى أن الثقافة التنظيمية تلعب دورًا تعديليًا في تقوية العلاقة بين تنفيذ الذكاء الاصطناعي ونتائج المشاريع. وتُبرز هذه النتائج الإمكانيات التحولية للذكاء الاصطناعي في مجال إدارة المشاريع، وتدعم دمجها بما يتماشى مع رؤية المملكة العربية السعودية 2030. وتقدم الدراسة توصيات للمنظمات وصناع القرار والباحثين للاستفادة من مزايا الذكاء الاصطناعي في بيئات المشاريع المستقبلية.

**الكلمات المفتاحية:** الذكاء الاصطناعي، إدارة المشاريع، نجاح المشروع، التخطيط والتنفيذ، الثقافة التنظيمية، المملكة العربية السعودية، شركة البحر الأحمر العالمية، رؤية 2030.

**عنوان البحث**

**تأثير الذكاء الاصطناعي على إدارة المشاريع في المملكة العربية السعودية: دراسة حالة على شركة البحر الأحمر العالمية في جدة**

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**2025**