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إستخدام تقنيات الذكاء الاصطناعي في إدارة المشاريع

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**Research Title**

**Uses of Artificial Intelligence Techniques in Project Management**

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### **Executive Summary**

This research proposal addresses qualitative research on the impacts of AI on project management in Riyadh City. Basically, the research focuses on decision-making, cost-saving, and overall project efficiency as areas that can be impacted by AI. Through a literature review design, this research work will adopt a thematic analysis method to draw meaningful conclusions and recommendations on the phenomenon. The research this research proposal presents two hypotheses linked to the adoption of AI in project management and answers the research question. Therefore, when the research work will be completed, the hypotheses will be confirmed to be true or nullified.

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## **Introduction**

In the field of project management, there has been a transformative shift, which is driven by the rapid evolution of technology and the increased adoption and integration of artificial intelligence (AI) technology (Shafaamri, 2023). According to Xiang et al. (2021), Artificial intelligence (AI) is defined by its ability to mimic human intelligence and decision-making, which makes it a game-changer in project management and related operations. Since many industries are reaping the benefits associated with Artificial Intelligence (AI), such as optimized operations, there is a need to consider integrating Artificial Intelligence (AI) into increased operations, such as decision-making and optimization of activities.

## **Research Aims and Objectives**

The following are the research aims:

1. Assessing the existing literature on project management to identify organizations' challenges and limitations when managing complex projects.
2. Examining the applications of AI in various project management operations, ranging from automating daily and routine tasks to leveraging machine learning for predictive analysis and decision-making support.
3. Assessing the impact of AI-driven project management, focusing on efficiency and cost-saving attributes to feature whether AI can lead to faster project completion and resource optimization or not.
4. Exploring how AI technologies can improve decision-making processes in project management, with particular attention to risk assessment and strategic planning.

## **Research Problem**

This research explores the following research question; "How can Artificial Intelligence (AI) technology be effectively utilized in project management in Riyadh City to enhance efficiency, productivity, and decision-making?" This is a critical issue in the context of project management since it brings Artificial Intelligence and project management together. Project management alone is regarded as a pivotal domain in business management as it enables managers and leaders to execute projects efficiently to meet deadlines and make informed decisions to impact firms' competitiveness, profitability, and sustainability.

## **Importance and Objectives of the Research**

Understanding the importance of integrating AI technology into project management is crucial for several reasons. Firstly, it realizes enhanced efficiency and productivity by automating repetitive tasks, optimizing resource allocation, and facilitating better decision-making. Ultimately, this efficiency and productivity in project execution is realized. Similarly, integrating AI in project management helps improve decision-making through the AI's ability to analyse huge datasets to provide project managers with valuable and understandable insights. From this, managers make informed decisions since they can easily identify potential risks and put forth suitable strategies to change the circumstances.

## **Research Objectives**

This research, therefore, has the following objectives:

To examine and pinpoint potential application areas of AI in project management in Riyadh City, including forecasting, which results from predictive analytics, communication, and undertaking routine tasks.

To gauge the impact of AI technology on project delivery and efficiency.

To present insights and recommendations based on the research findings on the successful integration of AI in project management.

### **Research Hypotheses**

This study formulated the following hypotheses:

Hypothesis 1: The adoption of AI in project management positively impacts project efficiency and the costs involved.

Hypothesis 2: AI-driven project management succeeds due to enhanced decision-making and risk assessment, which allows for better solutions.

### **Literature Review**

Researchers have identified AI as a new field of study; hence, an elaborate exploration has been conducted into various aspects of the topic. Therefore, this research work conducts a review of the literature based on six streams, which are directly linked to the research question and can unleash maximum insights into the research problems. These six literature streams include understanding AI, predictive analysis using AI, resource allocation using AI, decision support systems on AI, AI-driven communication and collaboration tools, and risk assessment and mitigation using AI. The study will adopt journals and peer-reviewed articles on AI to explore the literature stream mentioned above.

#### **Understanding AI**

According to Teixeira et al. (2023), Artificial Intelligence (AI) is defined as a field of computer science that focuses on creating systems and algorithms that can perform tasks that have been limited to human intelligence and ability. For example, activities such as learning from experiences and understanding natural language have been all along left to human intelligence but are now capable due to the advent of AI technologies.

Understanding AI dates to the 1950s when an increased exploration of computer science and mathematics resulted in the development of algorithms and models that could mimic human cognitive processes (Ma et al., 2023). As a result of these models and algorithms, early AI, which relied on a rule and took advantage of predetermined logic for its actions, was born. The first AI was realized in 1956, arising from the Dartmouth Workshop, where researchers foretold AI's future to enable machines to simulate any intellectual activity. However, the development of AI experienced various challenges, such as periods of reduced funding and enthusiasm due to unrealistic expectations, which hindered the research in the early 1950s. The 21st century marked a serious exploration of AI technology, and it began to flourish. This was aided by the advancements in computational power and the development of machine learning techniques.

#### **Predictive Analysis Using AI**

The ever-changing project management landscape has presented the integration of predictive analytics, particularly Artificial Intelligence (AI)-driven predictive analysis. Therefore, AI-driven predictive analysis has emerged as a critical game-changer in handling complex projects. In research conducted by Davenport and Harris (2019), predictive analytics has the potential to revolutionize project management practices when effectively used and driven by AI. This means that AI is a powerful tool that enables project managers to anticipate and mitigate potential risks. Furthermore, by anticipating

and mitigating risks, project managers can be able to prevent risks from escalating into serious problems for their firms and projects.

### **Optimizing Resource Allocation Using AI-driven Project Management Systems**

Resource allocation is one of the matters in project management that holds a pivotal duty in the success of projects. This aspect ensures effective project management and plays a critical role in determining a project's success or failure. This means that resource allocation is perceived to be perfect whenever a project becomes successful and vice versa. According to Afzal et al. (2021), efficient resource allocation in a project ensures that tasks are completed on time, within budget, and to the required quality standards for the project's overall success. As described by Rajasekaran, Parthiban & Nizam (2020), Artificial Intelligence (AI)--driven resource allocation models have proven to be powerful tools that enhance how project managers allocate and manage resources. In return, AI-driven models used in resource allocation enhance project management by considering project requirements, available resources, and skillsets needed in the project for the correct division of tools, finances, and human resources to reduce project delays and improve project efficiency.

### **AI-powered Decision Support Systems used in Project Management**

According to MacKenzie (2023), project management has integrated Artificial Intelligence (AI) and decision support systems (DSS) to realize accuracy and effective decision-making processes for competitive edge and risk management. Lin, Zeeshan & Ghasem-Aghaee (2018) explored this integration by examining AI-powered decision support systems, with closer consideration of the role of AI role in bolstering project management. In their study, these authors revealed that AI empowers decision-makers with a robust tool for data-driven insights, thus tailoring their decisions for accuracy in solutions. It is worth noting that these AI-driven systems adopt and make use of the potential of wide datasets to provide practical recommendations, resulting in more effective decisions across all areas of project management.

### **Project Communication and Collaboration through Artificial Intelligence (AI)**

In a study by Sodr , Chatten & Liddell (2023), it is mentioned that communication and collaboration among project stakeholders are key for the overall project success. Verma & Tewari (2017) also highlighted his importance by mentioning how AI aids in ensuring effective communication and collaboration among project stakeholders. This means that communication and collaboration tools offered by AI technology surpass those adopted in traditional project management approaches. This literature stream, therefore, explores the significance of AI tools in enhancing communication and collaboration in projects due to the automation of communication systems, real-time monitoring and communicating project status, and elevation of project coordination.

### **Automating Routine Communication Tasks**

Communication activities that are routines are perceived to consume a lot of time for project managers and other stakeholders. Verma & Tewari (2017) indicated that AI can help streamline and automate these tasks to save time. For example, chatbots and virtual assistants can be adapted to respond to and efficiently handle routine queries. On top of this, these AI-driven systems can also provide information to project team members and even schedule meetings, making project managers focus on other strategic and complex needs for better project outcomes. Bansal & Kumar (2023) mentions that automation of communication channels saves time and minimizes the risk of human errors in communication.

### **Real-Time Updates on Project Status**

Throughout the project lifecycle, Sarajcev et al. (2022) highlighted that there should be consistent communication and updates on the project's progress. However, this activity becomes tiresome and inaccurate, majorly characterized by inaccurate data and communication errors. However, Wurzer (2023) found that AI has demonstrated the ability to meet the need for timely and accurate updates on project progress. This is because AI tools can analyse data from various project management systems, identify key milestones, and automatically generate status reports and alerts, which can then be delivered to all stakeholders through automated emails. In so doing, AI realized timely delivery of up-to-date insights into project progress to stakeholders, allowing quick and informed decisions based on the latest project information.

### **Enhanced Coordination in Project**

Just like communication, coordination is central to the successful delivery of project management goals. Therefore, boosted coordination is a necessity in project management. AI offers a wealth of capabilities to boost coordination through increased communication enabled by well-designed virtual platforms. Therefore, AI-driven algorithms can analyse communication patterns, identify potential bottlenecks, and suggest improvements in workflow to boost coordination. Furthermore, Santos et al. (2023) featured that AI-powered systems can facilitate collaboration by providing project team members with unified access to project data, schedules, and documentation either through automated or traditional means. Through this, all project team members will be working on a common understanding that reduces the likelihood of miscommunication, misalignment, or project activities.

### **Risk Assessment and Mitigation through AI-enabled Systems**

Regardless of the dynamic nature of project management, risk assessment and mitigation ensure the successful delivery of projects on time and within budget since they identify and clear many risks that would otherwise affect the project (Holzmann, Zitter & Peshkess, 2022). The pioneering research conducted by Kusiak & Zheng (2019) shows the transformative ability of Artificial Intelligence (AI) to change the way project risks are identified, assessed, and addressed. The researchers posit that AI technology can predict potential risks and propose effective mitigation strategies, thereby reducing the frequency and severity of challenges within a project.

### **AI's Role in Risk Assessment**

Rosa et al. (2023) assessed the application of AI models in risk assessment and confirmed that AI adopts a data-driven approach ranging from historical project data, patterns, and real-time variables to point out potential risks. This means that AI is far from the traditional risk assessment methods that rely on subjective judgments, as AI makes predictions based on robust statistical analyses for more accurate and objective assessments.

### **Mitigation Strategy Proposals**

A study by Faustino et al. (2023) extends this understanding by featuring AI's capabilities, which go beyond risk identification to the formulation of mitigation strategies. It is mentioned that AI-driven models cannot foresee risks and suggest concrete and actionable steps to mitigate them effectively based on the available resources. By considering factors such as project scope, resource availability, and historical performance, AI exposes project managers to comprehensive toolkits that enable them to effectively address potential issues.

### **Reduced Frequency and Severity of Project Issues**

Nevoso et al. (2023) pointed out the profound nature of the impacts of AI-driven risk assessment and mitigation in project management, which includes predicting risks and offering well-informed mitigation strategies. This means that project managers can mitigate problems before they escalate into critical issues that can involve heavy investments. In other words, AI-driven risk management helps reduce project setbacks' frequency and minimizes their severity. In the long run, project managers realize smoother project execution and enhanced outcomes.

### **The Potential of AI in Project Management**

Researchers such as Simos et al. (2023) underscore the transformative powers of AI in project management compared to the conventional approach to risk management, which was often reactive. These authors assert that with AI's predictive capabilities, project managers can adopt a proactive stance, identifying and mitigating risks before they impact project progress, forming advantages over the conventional approaches to project risk management.

### **Research Gap**

These literature streams have identified several research gaps that need to be addressed in the context of AI adoption in project management. Despite many explorations of AI-driven project management activities, there is a need to clear the air on how Artificial Intelligence (AI) technology can be used in project management to enhance efficiency, productivity, and decision-making for overall project success. Therefore, this research explores this area to address the gap by contributing to the existing scope of knowledge.

### **Research Methodology**

In this research work, the researcher will adopt a qualitative literature review study design, which is highlighted to be an effective method of synthesizing and drawing important insights into phenomena based on the existing scope of knowledge Ong & Uddin (2020). According to Akter (2023), this research design allows for the exploration and understanding of complex concepts and theories, such as the integration of AI in project management, by analyzing and synthesizing the existing qualitative literature in the field. Therefore, this research design was deemed fit for this research that seeks to gather qualitative data from the existing literature.

### **Research Philosophy**

According to Ahmed (2019), most of the research works that use qualitative literature review design consider interpretivism research philosophy. A study by Cheng & Zong (2023) iterates that interpretivism allows researchers to explore the various perspectives, insights, and experiences of individuals and organizations of a phenomenon for better understanding. Since this research seeks to understand and interpret human experiences contextualized in the existing literature, the interpretivism research philosophy is deemed fit to be used for the study.

### **Data Collection**

This study will adopt secondary qualitative data gathered from the literature review on topics related to the research question and research gap mentioned earlier. However, the study will use secondary data sources, such as scholarly articles, books, reports, and academic journals on Artificial Intelligence in the context of business project management. The researcher will consider sources published in academic sources, where Google Scholar and use peer-reviewed sources published from 2018 to 2023. Search terms like "AI-driven project management" and "AI and project success" will be

adopted for relevant sources. The researcher will conduct a systematic and comprehensive analysis of each source of information.

### **Sampling Technique and Size**

This research work will adopt a strategic sampling procedure where articles will be selected based on their relevance and reliability in the research. Due to the constraint time and resources for the research, the researcher will use a sample size of 10 articles on the use of AI technology in project management to explore the research question.

### **Data Analysis**

The researcher will adopt the use of thematic analysis to analyze the data and draw meaningful information from the qualitative data collected from the literature. According to Aliyeva (2023), thematic data analysis is a systematic approach to identifying, analyzing, and reporting patterns (themes) in the data collected to draw a comprehensive conclusion about the data. Six steps of thematic analysis will be followed such as data familiarization, drawing initial codes, developing themes, and conducting data synthesis.

### **Research Limitations**

This research is exposed to the following limitations: Bias research findings due to insufficient information on some industries. Additionally, publication bias exists in the study following the fact that the study will rely on published and readily accessible sources, which may introduce publication bias. On top of this, the research is exposed to quality limitations and challenges.

### **General Perception of Research Structure**

This research on the uses of AI technology in project management will be structured in the following manner:

#### **Research Title**

**Abstract** (will present a summary of the entire research, highlighting the research question, objectives, methodology and findings)

**Introduction Chapter** (will present the research background, highlighting the research's problem statement and how important the research findings will be)

**Literature Review Chapter** (Will use the six literature streams to explore the topic and present the findings)

**Research Methodology Chapter** (In this chapter, the researcher will present the research design (literature review), research philosophy (interpretivism), data collection methods (secondary qualitative data collection through literature review), and data analysis (thematic analysis))

**Data Presentation and Analysis** (The researcher will present the data collected from the literature review and conduct thematic data analysis for understanding and interpretation)

**Discussion Chapter** (the researcher will present a meaningful interpretation of the findings and what the data means based on the existing scope of literature)

**Conclusion and Recommendations** (In this section, the researcher will present a concise summary of the entire research work, iterating all aspects of the research for a recap)

**References** (All the relevant sources that are used in the study will be listed here after citing all applicable areas in the research report)

**Research Timeline**

| Task                           | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Complete proposal              | ✓      |        |        |        |        |        |        |        |
| Submit proposal                | ✓      |        |        |        |        |        |        |        |
| Allocated supervisor           | ✓      |        |        |        |        |        |        |        |
| Contact supervisor             | ✓      |        |        |        |        |        |        |        |
| Literature review              |        | ✓      | ✓      |        |        |        |        |        |
| Methodology chapter            |        |        |        | ✓      |        |        |        |        |
| Data Presentation and Analysis |        |        |        |        | ✓      |        |        |        |
| Data analysis                  |        |        |        |        | ✓      |        |        |        |
| Findings chapter               |        |        |        |        | ✓      |        |        |        |
| Discussion chapter             |        |        |        |        |        | ✓      |        |        |
| Conclusion                     |        |        |        |        |        |        | ✓      |        |
| Recommendations                |        |        |        |        |        |        | ✓      |        |
| Introduction                   |        |        |        |        |        |        | ✓      |        |

|                      |  |  |  |  |  |  |   |   |
|----------------------|--|--|--|--|--|--|---|---|
| Abstract             |  |  |  |  |  |  | ✓ |   |
| Complete first draft |  |  |  |  |  |  | ✓ |   |
| Rewrites             |  |  |  |  |  |  |   | ✓ |
| Complete final draft |  |  |  |  |  |  |   | ✓ |
| Submission           |  |  |  |  |  |  |   | ✓ |

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**Thank you.**