

Midocean University

College of Management

Master of Project Management



**The Impact of Artificial Intelligence Technologies on the
Efficiency of Engineering Project Management in the Emirate of
Dubai, United Arab Emirates.**

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Year:

2026

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DEDICATION

I dedicate this research to my beloved family, whose love and support have been the source of my inspiration and strength throughout my academic journey.

To my dear parents, who instilled in me the values of diligence and perseverance from an early age, and whose continuous support and encouragement have been the light guiding my path.

To my beloved wife, who has been my partner and supporter at every step of this journey, I dedicate this achievement in appreciation of her efforts, sacrifices, and endless patience.

To my esteemed professors, who provided me with valuable knowledge, advice, and guidance, and who have been the best mentors and teachers.

And to everyone who contributed to guiding and supporting me, whether professors or colleagues, I extend my sincere gratitude and appreciation.

ACKNOWLEDGEMENT

First and foremost, all praise and gratitude are due to Allah for His guidance and blessings in enabling the completion of this work.

The researcher would like to express his sincere thanks and deep appreciation to the supervisors of this thesis:

Professor Dr. Al-Faisal Abdul Hamid

and Professor Dr. Fayez Jarad

for their valuable academic guidance, constructive advice, and continuous supervision throughout the preparation of this thesis. Their scientific expertise and insightful opinions had a significant impact on directing and enriching this research, which greatly contributed to presenting it in its intended form.

The researcher also extends his sincere gratitude and appreciation for their patience, support, and encouragement, praying to Allah to reward them with the best reward and to bless their knowledge and efforts.

Abstract

This study investigates the impact of Artificial Intelligence (AI) technologies on the efficiency of engineering project management in Dubai, United Arab Emirates. A quantitative research approach was employed, using a 220 structured questionnaire distributed. The study examined seven key dimensions using statistical analyses, including Pearson correlation, Cronbach's Alpha, descriptive statistics, ANOVA, and regression, all were applied to evaluate the relationships between AI adoption and project management efficiency. Results indicate that all dimensions received high levels of agreement, demonstrating a positive perception of AI's role in enhancing project management efficiency. Regression analysis confirmed a strong positive effect of AI adoption on project performance ($R = 0.863$, $R^2 = 0.744$), with decision-making, technical capabilities, and digital infrastructure identified as the most significant predictors. The findings provide evidence-based insights to support the adoption of AI-driven practices and inform strategic recommendations for organizations aiming to optimize engineering project outcomes in Dubai.

Keywords: Artificial Intelligence, Engineering Project Management, Project Efficiency, Dubai, Digital Transformation, AI Adoption.

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List of Abbreviation:

Abbreviation	Phrase
UAE	United Arab Emirates
AI	Artificial Technology
ML	Machine learning
CV	Computer Vision
TAM	Technology Acceptance Model
DOI	Diffusion of Innovation
PMBOK	Project Management Body of Knowledge
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
BIM	Building Information Modelling
SPSS	Statistical Package for the Social Sciences
DI	Digital Infrastructure
TC	Technical Capabilities
HC	Human Competencies
PM	Project Management

DM	Decision Making
PP	Project Performance
CB	Challenges and barriers
ANOVA	One-way Analysis of Variance

Chapter One

General Research Approach

Introduction:

In the last few decades, the United Arab Emirates (UAE) had a great transformation, since the early 1960s the Emirati economy has been based on the export of fossil fuels, but now it is known around the world as a place where the other sectors of economy are growing, new ideas are being developed, and big infrastructure projects are being built (Al Jaber, 2019). The key part of this transformation was the country's investment in engineering and construction projects that help the economy and drive national development goals (Arafat, Zhang, & Al-Mutawakel, 2017). Transport networks, energy infrastructure, real estate developments, and public service facilities all these sectors were covered by these projects. They are all meant to help the UAE reach its long-term goals for sustainable growth and global competitiveness (Federal Competitiveness and Statistics Centre, n.d.).

The UAE government's planning frameworks, like Vision 2021 and longer-term economic plans, stress innovation, diversification, and long-lasting infrastructure. This shows a strong commitment to improving the quality of public services and built environments (UAE Government, n.d.).

Over the last 50 years, Dubai has been developing rapidly, transforming from an area of trade to an internationally recognized hub for tourism, finance and worldwide infrastructure (Arafat, Zhang, & Al-Mutawakel, 2018). Today, the Dubai skylines especially tallest buildings in the world Burj Khalifa, is an iconic place to many architectural monuments, which is an example of what the country has built and what it stands for (Aldred, 2010). Dubai Metro was one of the major urban investments in Dubai, it is used to connect the major urban districts together and to move thousands of daily commuters (Keilo & Montagne, 2012).

Collaboration between various stakeholders such as government agencies, consulting firms, construction companies and technology partners were the

reason behind this new chapter in Dubai's history by designing, planning and implementation of engineering projects. This demonstrates the multi-disciplinary nature of modern engineering work being performed in Dubai (Ochieng, Price, & Moore, 2014).

Construction projects usually face a number of challenges during their execution. These are not potential issues, but real problems that project managers deal with on a daily basis. One of the main challenges is dealing with many stakeholders who often have different goals and expectations, which makes coordination more difficult (Onum et al., 2024).

Types of challenges (Adewumi & Ogunlana, 2024):

Type of Challenges	Description
Coordination challenges	Communication challenges between subcontractors and stakeholders.
Resource management challenges	Problems with managing materials, workers, and project resources efficiently.
Scheduling challenges	Problems in coordinating tasks and meeting deadlines.
Decision-making challenges	Lack of information or experience makes it difficult to make timely and accurate decisions.

Table (1 .1) Types of Challenges

Overcoming the challenges is an important part of project management. It usually involves identifying the problem, understanding its cause, and taking the right action to solve it. Good communication, proper planning, and teamwork is the best way to overcome these challenges. In addition, using modern tools and technologies can help reduce many of these issues and improve overall project performance (Adewumi & Ogunlana, 2024).

Construction projects are often exposed to various risks that can affect their success. Unlike challenges, which are current issues faced during project execution, risks are circumstances or occurrences that could have a favorable or unfavorable impact on project goals. To reduce risks' effects on time, money, and quality, one must be aware of them (Royal Institution of Chartered Surveyors,2015).

Understanding risks is important for project managers because it allows them to get ready in advance and reduce any problem that might happen. Identifying risks early can prevent delays, cost overruns, technical problems, or coordination failures (Doloi, 2013).

Types of risks:



Figure (1.1): Types of Risks.

Financial risks include pricing variation, budget overruns, while time risks include project schedules and delays. Technical risks include design mistakes and quality problems while human risks include teamwork problems and

shortage of skills, all of these risks can affect the project efficiency (Doloi, 2013).

Risks are classified by project size, type (building, engineering, infrastructure), or implementing organization (public, private) (Ogunsanmi, Salako, & Ajayi, 2011).

Schneiderbauer and Ehrlich (2004) classified risk sources into:

- Natural: Natural disasters and weather phenomena.
- Technical: Equipment failure or design defects.
- Organizational: Modifications to rules or policies.
- Human: Poor coordination or a lack of skills.

According to the Hong Kong Institute of Bankers (2025), the risk management steps are done by:

- Identify all possible dangers.
- Determine the impact of risks.
- Response Planning: Create plans to reduce adverse effects.
- Monitoring and Control: Keep an eye on new or changing risks and make sure mitigation strategies are applied.

Importance of Modern Project Management

As each project becomes larger and includes more complexity, the traditional methods of project management are struggling with the level of responsiveness or planning that are needed to achieve optimal results. Project teams really need to use structured project management methods and combine them with tech solutions to keep up with today's performance demands (Menon, 2024).

Project management is in charge of planning, organizing, monitoring, and closing a project. It gives a structured set of steps to make sure that the goals of the project are met within the limits of time, cost, quality, and scope (Al Hajj &

Sayers, 2014). Being able to finish projects on time and within budget, in the past was often seen as a sign of success. This perspective has changed over time to include more comprehensive criteria, such as stakeholder satisfaction, quality of deliverables, and alignment with strategic objectives (Cole, 2017).

For example, a transportation infrastructure project may be considered successful not only when it is completed within its designated budget and timeline, but also when it improves user experience, reduces obstruction, and supports economic activity in the region. These kinds of success criteria increase the expectations on engineering projects in fast-growing economies like the UAE (Khan et al., 2025).

As engineering projects got more complicated, the encouragement for more adoption of modern management methods that go beyond planning and control. These practices often include integrating data systems, performance monitoring, risk assessment tools, and collaborative platforms that ease the real-time communication among stakeholders (Mbadugha, Ikeotuonye, & Idoko, 2024). In Dubai, the public and private sectors have invested in digital platforms that support data merging and cross-organizational visibility, this makes it easier to analyze data and make decisions (Alshehhi, Mat Sidek, & Rozali, 2024). In these situation, digital transformation projects have become very important for improving performance have become key enablers of performance improvement and flexible operations (Cosa & Torelli, 2024).

One of the most important technological trends that is changing the project management criteria is the Artificial Intelligence. AI is the term for computer systems that can do things that are usually done by human, like learning from data, finding patterns, making predictions, and helping people make decisions (Khaleel et al., 2023). AI systems can be simple or very advanced, like machine learning or deep learning models, which can process large amounts of data and give predictions or recommendations.

The addition of AI tools and applications in engineering and construction management has the ability to improve project planning, enhance risk forecasting, make better use for resources, and reduce uncertainty across project workflows (Gudibandi, 2025).

From early ruled-based systems till today, AI technologies have evolved to have more advanced machine learning, computer vision, and predictive analytics that allow them to process large amounts of data and extract valuable insights (Pham & Pham, 1999). An automated routine computation AI system was used in early research in engineering, meanwhile today; AI systems extended far beyond that, providing support for increasingly sophisticated tasks such as real-time monitoring, safety risk detection, and recommendations (Olabiya et al., 2025).

The usage of machine learning in engineering projects can evaluate historical data to assess potential risks to schedule or costs. Similarly, Computer Vision can analyze images on-site images to identify safety hazards and any deviations from design specifications (Pang, Li, & Al-Hussein, 2024). When project managers face potential challenges, predictive analytics can be integrated for weather forecasts, expected material delivery dates, and labor productivity indicators; those will let project managers make decisions proactively instead of reacting after a challenge has occurred (Amiri & Tavana, 2025).

The application of AI is especially relevant to large, complicated projects where traditional analysis is not only slow, but limited. Since the expectations from project stakeholders in Dubai can be very demanding with a very tight timeline, using AI technologies is an advantage for companies looking for improved efficiencies in their operations and performance results (Al-Harthy & Al-Majed, 2025). There have been many ways that AI has been utilized throughout a project lifecycle in engineering; from planning/scheduling, to cost estimation, to risk assessment, to quality inspection and finally to measurement of performance after project completion (Alhasan & Alawadhi, 2024).

This study depends on prior studies to explore if the usage of AI technology has improved the efficiency of engineering project management practices in the Emirate of Dubai. This research will analyze the application of AI in improving the key performance indicators related to project success such as: cost control, schedule adherence, risk management, and resource allocation. The outcome of this research is to provide project managers and decision makers with practical guidance on how they can successfully implement and utilize AI technologies within their engineering project management systems to achieve reliable and efficient project deliverables.

AI Applications and Impact in Engineering Projects:

AI technologies are no longer limited to academic research only; they are widely used in the industry to improve engineering project outcomes, decreasing human error, and fasten decision-making processes (Khaleel et al., 2023). In Dubai, AI tools provide many benefits to the efficiency, accuracy, and resource optimization to the large-scale projects that often involve multiple contractors, tight schedules, and high budgets.

Examples of AI Techniques and Applications in Construction Projects:



Figure (1.2): AI Techniques and Applications in Construction Projects.

One of the most used AI applications in project management is machine learning. It examines future results by analyzing project data from the past. For example, ML can be used by a construction company managing a multi-billion-dirham urban development project to detect possible past timetable delays based on material supply timeframes, seasonal labor changes, and subcontractor performance (Alhasan & Alawadhi, 2024). These predictions will enable project managers to deliver successful projects through allocating resources, adjusting schedules, and minimizing potential risks (Hughes et al., 2025).

Another AI technology that is being used increasingly in construction sites is computer vision. Computer vision systems can identify safety hazards, detect any difference in design, and track construction progress in real time using cameras and drones (Alshehhi, Mat Sidek, & Rozali, 2024). For example, in Dubai; AI-powered picture analysis helps in early detection of structural differences and any potential safety hazard in high-rise building, enabling the implementation of corrective measures before these problems get worse. This application not only improve quality control but also improves occupational safety. (Alzoubi et al., 2025).

AI is also used in budget control and predictive cost estimation. Traditional budgeting techniques mostly rely on human judgement, which can result in errors, particularly in big projects with many contractors and suppliers (Zivari Afzal & Karimimoshaver, 2025). AI can produce more accurate cost estimation by combining a number of factors, such as labor productivity, market prices, and material availability (Pham & Pham, 1999). These skills enable financial decision-making at both the strategic and operational levels, avoid budget overruns, and streamline procurement procedures (Zivari Afzal & Karimimoshaver, 2025).

AI also affects the risk management aspect of engineering project uncertainty due to environmental conditions, supervisory changes, and uncertainty due to

stakeholder coordination. AI applications can identify risks associated with these types of uncertainties by learning from past projects data, industry reports, and any new or current construction site data to suggest ways to avoid or reduce project risks (Khaleel et al., 2023). For example, a project can be delayed due to bad weather could cause an investment to be flagged as possibly experiencing additional costs in the future because of supply or demand issues in the construction industry. AI provides managers with better options for addressing issues earlier rather than waiting to solve an issue after it occurs by providing predictive analytics to improve risk assessments (Alzoubi et al., 2025).

By integrating AI applications with digital platforms; project teamwork and communication can be enhanced. Multiple stakeholders including engineers, project managers, contractors, and clients are allowed to access real time data and insights from any location by using cloud-based AI systems (Alhasan & Alawadhi, 2024). This centralized data method reduces misunderstandings, and facilitates quicker decision-making. For example, a real-time dashboard might include safety alarms, budget status, and schedule changes, enabling project managers to quickly modify plans and distribute resources effectively.

The increasing use of AI in big projects is shown by real-world examples in Dubai, example the Dubai Metro project, AI predictive models was applied AI-based predictive models to improve construction timelines and minimize traffic disturbance while meeting tight deadlines. Similar to this, AI tools were employed in Burj Khalifa maintenance and operations projects, to track building systems, predict maintenance needs, and maximize energy use (Salim, 2026). These uses highlight AI's adaptability, showing that it may be used for long-term project management and operation in addition to building (Alshehhi, Mat Sidek, & Rozali, 2024).

AI technology goes beyond enhancing operational efficiency, it is done by improving the quality of decision-making allowing businesses to more

effectively assess trade-offs between cost, time, and quality. Large datasets, simulations, and predictive analytics can now be used to influence decisions that were previously based on experience (Kabir et al., 2025). For example, AI can suggest the best order for construction tasks, minimizing idle time, avoiding resource conflicts, and maximizing the usage of labor and equipment (Khaleel et al., 2023).

Dubai's digital transformation goal also fits with the adoption of AI tools, which highlight the usage of upcoming technologies to create smarter, advanced, more sustainable and intelligent urban environment (UAE Government, n.d.). Engineering companies and government authorities can support sustainable practice, minimize waste, and improve the infrastructure delivery quality by integrating AI into project management procedures (Adebay, 2025).

Overall, AI integration into engineering project management in Dubai, is a significant technological and methodological advancement. AI improves the effectiveness, dependability, and sustainability of big projects by automating repetitive processes, offering actionable insights, and facilitating predictive decision-making.

Study Problem:

In large engineering projects, AI tools is a very useful as it can be used to improve planning, reduce waste, and support better decision-making. In Dubai, it is very noticed that many organizations are using modern management techniques and digital technologies in their work. Engineering project management faces many challenges, despite the developments, challenges such as delays in project schedules, and difficulties in coordinating resources among the different stakeholders involved in the project. (Adebay, 2025).

Therefore, there is a growing need to examine the role of AI technologies in improving the efficiency of engineering project management in Dubai and to understand how these technologies can contribute to better project outcomes

Study Objectives:

The main goal of this research is to explore how AI technologies are being applied in engineering project management in Dubai and evaluate their impact on efficiency.

The study sets the following objectives to achieve this goal:

1. To understand how AI is currently used in engineering project management.
2. To examine how AI implementation is supported by digital infrastructure in projects.
3. To explore how technical capabilities affect the effective use of AI.
4. To identify the role of human competence in successfully integrating AI.
5. To see how AI improves project management activities such as planning, scheduling, and risk management.
6. To study how better decision-making impacts overall project performance.
7. To evaluate the overall effect of AI on improving the efficiency of engineering projects.
8. To identify the main challenges and barriers faced when adopting AI in engineering projects.

For example, a project manager using AI-driven predictive scheduling can quickly determine when a delay in the supply of the concrete delivery will affect the upcoming construction tasks.

Study Importance:

Scientific Importance

This study makes several important contributions to the academic field. Since there is limited research related to Dubai's engineering sector talking about using AI tool in engineering projects, this research adds practical evidence on how AI technologies affect engineering projects efficiency. Adoption of AI has been studied in business and IT context, but engineering projects face unique challenges such as multi-stakeholder coordination, complicated technical needs and high financial stakes (Venkatesh & Bala, 2008).

Second, the research presents a conceptual framework that combine technology adoption theories and project management efficiency measures. This framework offers both theoretical insights and useful guidelines to future academic researchers studying AI integration in complex project environment.

Third, by concentrating on Dubai, a city known by its big engineering projects that search for creative solutions, this study closes a research gap. Also, the results could guide similar urban infrastructure projects around the world.

Practical Importance

From a practical point of view, the study provides the project managers, engineer, and organizational leaders useful information. AI technologies provide a number of benefits:

- Automation of repetitive tasks: Staff members can focus on strategic decision by having a routine scheduling and reporting that can be handled automatically.

- Data analysis and predictive insights: identifying resources obstruction, predict delays, and detect patterns can be done by AI that can process large datasets.
- Real-time monitoring and decision support: Dashboards and AI enable managers to react to issues immediately.
- Improved project performance: AI optimizes timelines, minimize costs, improves risk management, and maximizes resource efficiency.

For example, AI-based system may continuously track supply delivery, labour productivity, and monitor crane usage during the construction of a multi-level commercial project in Dubai. This enables the project team to detect any inefficiencies and avoid schedule overruns.

Research Questions:

Main Research Question

To what extent do AI technologies enhance the efficiency of engineering project management in Dubai?

This question allows the study to explore the impact of AI on project management performance, including cost control, schedule adherence, risk management, and resource utilization.

Sub-Research Questions

1. What is the role of AI technologies in improving project planning and scheduling in engineering projects?
2. How do AI technologies contribute to cost control and efficient resource allocation in engineering project management?
3. How does the use of AI enhance risk management and decision-making in engineering projects?

4. What are the main challenges facing the adoption of AI technologies in engineering project management in Dubai?

These research questions evaluate the AI impact on projects from different dimensions, considering technical, organizational, and human factors in project management.

Research Hypotheses:

Main Hypothesis

- AI adoption positively impacts the efficiency of engineering project management in Dubai.

Sub-Hypotheses

- The use of AI technologies has a significant positive effect on cost control in engineering projects in Dubai.
- The use of AI technologies has a significant positive effect on schedule performance and timely project delivery in engineering projects in Dubai.
- The use of AI technologies has a significant positive effect on risk identification and risk management in engineering projects in Dubai.
- The use of AI technologies has a significant positive effect on resource allocation and utilization in engineering projects in Dubai.
- The use of AI technologies has a significant positive effect on decision-making quality in engineering project management in Dubai.
- Organizational readiness and technical capabilities significantly influence the successful implementation of AI in engineering project management in Dubai.

Theoretical Framework of the Study:

The theoretical framework integrates three key models to explain how AI adoption influences project management efficiency.

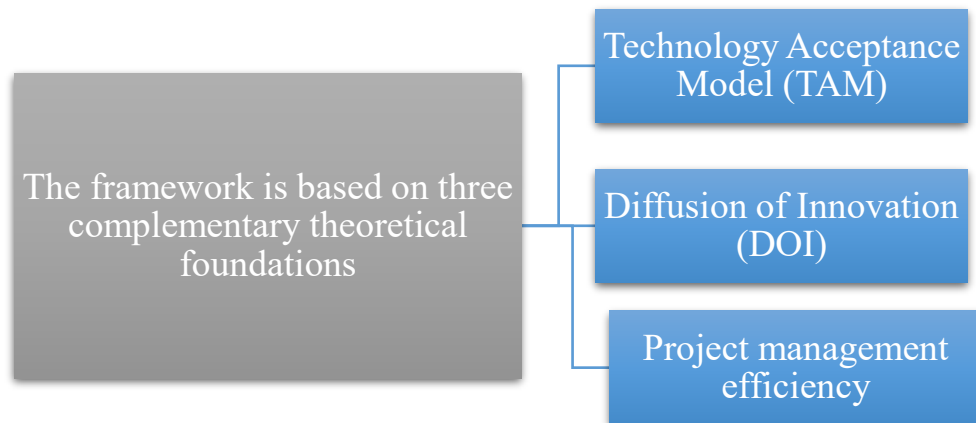


Figure (1.3): Models of Theoretical Framework of the study.

1. Technology Acceptance Model (TAM)

TAM investigates adoption choices made by individual based perceived usefulness and perceived usability (Davis, 1989).

- **Perceived Usefulness:** When engineers and project managers believe AI improves task performance, they adopt it. For example, AI technologies can help managers to predict delays and optimize workflow, which has a direct impact on project deadlines and quality. (Davis et al., 1989).
- **Perceived Ease of Use:** AI systems are more likely to be accepted if they are easy to use. If AI was integrated in a complex way without training may make them difficult to use, hinder use, while supportive training programs and user-friendly dashboards encourage adoption (Venkatesh & Bala, 2008).

2. Diffusion of Innovation (DOI) Theory

DOI explains how organizations adopt and spread any new technologies (Rogers,2003).

The adoption factors include:

- **Relative Advantage:** Faster reporting and predictive analytics can be offered by AI, because AI has better improvements over traditional methods (Guo & Huang, 2024).
- **Compatibility:** AI must be compatible with current company practices for easier integration.
- **Complexity:** Simpler AI applications have higher chances to be adopted than complicated systems (Moore & Benbasat, 1991).
- **Trialability and Observability:** Other teams are more likely to adopt AI if it shows positive results on early projects; as pilot projects and visible success increase adoption rates.

3. Project Management Efficiency Framework (PMBOK)

Decision making, cost, schedule, quality, risk, and coordination, are evaluated by PMBOK effectively (PMI, 2025).

Those frameworks are supported by AI by

- **Predictive Analytics:** AI predict quality problems, delays, and cost overruns (PMI, 2025).
- **Automated Resource Allocation:** AI is used in optimizing workers, machines, and materials in real time (PMI, 2025).
- **Real-Time Monitoring Dashboards:** Providing managers with ongoing information on the status of the project (Alhasan & Alawadhi, 2024).

Integrated Framework of the Study:

The study investigates AI adoption at the individual, organizational, and project levels by integrating TAM, DOI, and PMBOK. PMBOK evaluates efficiency results, DOI describes overall organizations adoption, and TAM concentrates on individual adoption. Together, they show how AI improves project performance and why different projects and organizations may adopt it differently (Davis et al., 1989; Rogers, 2003; PMI, 2025).

Conceptual Research Model:

- **Independent Variable:** AI adoption in engineering project management.
- **Dependent Variable:** Project management efficiency in Dubai.

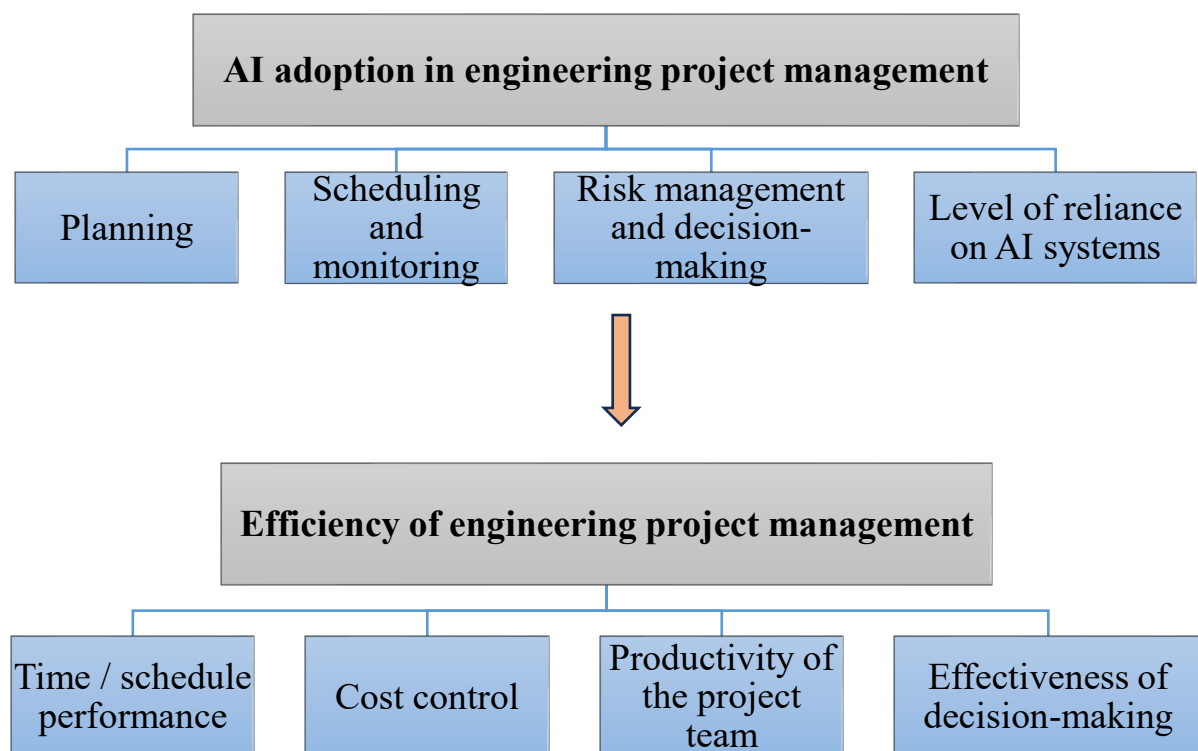


Figure (1.4): Conceptual Research Model of the Study.

According to the conceptual research model, implementing AI improves planning, scheduling, risk management, resource allocation, and decision-making, all of which increase project efficiency. AI can automatically reassign activities to avoid schedule delays or optimize material use, showing a clear connection between adoption and increased productivity (Khaleel et al., 2023).

Conclusion of the Chapter:

This chapter explain the use of AI in engineering project management in Dubai. The problem statement highlights the current challenges, including cost overruns, schedule delays, and communication difficulties. The objective, research questions, and hypothesis clarify the study goal. Theoretical framework integrates TAM, DOI, PMBOK, showing using AI from people, organizations and projects point of view.

Finally, the conceptual research model links AI adoption to project management efficiency.

Chapter 2

Literature Review

Introduction:

This chapter include previous research on AI applications in project management. Both English and Arabic studies are examined, focusing on four dimensions: Project Management Efficiency, Engineering & Construction Projects, Risk Management and Decision-Making, and Planning, Scheduling & Resource Allocation. The summary of this chapter is to highlighting research gaps, and identifying areas for future studies.

English Studies:

AI in Project Management Efficiency

A study done by Hossain et al., 2024 aimed to investigate how AI technologies affect project management efficiency in Bangladesh. He used mixed methodology; quantitative analysis for numerical data; qualitative interviews with project managers and case studies. The results for this study showed that using AI tools reduced project timelines by 20%, costs by 15%, improved resource allocation efficiency by 30%, and overall project performance by 35%. He recommended that using AI systems make better project monitoring.

Another study done by Khaleel et al., 2023, the goal for the study was exploring AI applications in engineering projects in Libya. Analyzing AI technology example machine learning, Artificial Neural Network, genetic algorithms and fuzzy logic was the methodology way in this study. The finding of this study proved that AI improve multiple dimensions in project efficiency resulting in the recommendation of using AI tools in engineering projects to optimize the outputs.

A similar idea was presented by Elfirjani & Abughalia, 2025, aiming to experiment AI tools in improving engineering project management performance. By using quantitative surveys of project managers and engineers as the methodology part of this study. Results showed that Machine Learning

used by 60% of PMs, Predictive Analytics 55%; AI helped reduce cost overruns (45%) and schedule delays (50%), saving 55% on project overheads. Implement AI tools to enhance project management effectiveness was the recommendation for this study.

However, not all studies reported fully positive results. A different point of view was presented Hashimzai & Mohammadi, 2024, whose study purpose was to review AI integration in project management: trends, applications, and barriers. Using systematic literature review following PRISMA guidelines, the results showed many obstacles and challenges facing using AI tools like resistance to change, skills shortage, data quality issues. AI mainly applied in planning, risk assessment, scheduling, and resource allocation. So, at the end of the study the researcher suggested overcoming adoption barriers through training, change management, and better data quality.

Summary of this section: Despite some challenges related to AI implementation, the results and recommendations for all those studies showed that using AI tools increase the efficiency in engineering projects.

AI in Engineering & Construction Projects

A study by Gudibandi (2025) examined the use of AI in construction project management. The study used a qualitative analysis of project data to understand how AI is applied in real projects. The results showed that if AI tools were used in early stage it will help in improving planning and monitoring, optimizing resource usage, reduce costs, and detect risks. Based on these findings, the study suggested using AI tools early, giving better training for staff, and improving digital infrastructure.

Another study by Adebayo et al. (2025) focused on the development of AI in construction project management and explored future trends. The study used a structured literature review of academic databases for the methodological way.

The outcomes for this study showed that AI applications were used practically rather than being experimental, especially in areas such as planning, monitoring, and control. Based on this, the study suggested that future research should focus more on the practical usage and adoption of AI in real projects.

Summary of this section: These studies proved that AI plays an important role in improving construction project management. It helps in better planning, and monitoring for engineering projects, while also reducing costs and detecting risks early. In addition, the results of the last study highlighted that AI is no longer experimental, but is now being used in practical ways in real projects.

AI in Risk Management and Decision-Making

A study by Su and Ayob (2025) aimed to examine the influence of AI on project success. Their methodology was based on using a systematic review of 61 academic studies to better understand the role of AI in project management. The findings showed that AI improves many dimensions in the project example accurate forecasting, speeds up decision-making, and supports project risk management. Based on this, the study suggested the need for more testing of AI-based project management models.

Another study by Algallaf and Alfelfel (2025) explored the role of AI in sustainable project management. The study methodology based on analysis of narrative and thematic literature review. The results showed that AI enhances overall project management practices. Based on these findings, the researchers suggested integrating sustainability standards into AI-based project systems.

Similarly, Chen et al. (2025) study goal was to evaluate the use of AI in decision-making in big engineering projects. The study relied on case studies and interviews with project managers. The findings indicated that AI plays an important role in risk assessment, and decision-making. Therefore, the study

suggested implementing AI decision-support systems, especially in critical stages of projects.

A study by Zivari Afzal and Karimimoshaver (2025) examined how AI can help construction projects manage risks and make better decisions. They depended on reviewing previous research and consulted experts to design an AI-based framework for predicting and handling risks in real time. The study showed that using AI improves decision-making, reduces delays, and helps control unexpected costs. They recommended that construction companies adopt AI tools, ensure their teams are trained to use them, and invest in systems that provide real-time data for smarter risk management.

Summary of this section: The studies show that AI has a big impact on risk management and decision-making in engineering projects. It helps make forecasts more accurate, supports faster and smarter decisions, and makes it easier to identify and manage risks. AI also contributes to better cost control and more effective decision-making.

AI in Planning, Scheduling & Resources

A study by Dayalan (2025), aimed to explore how AI can help schedule complex projects. The researchers used a simulation model with AI scheduling algorithms to do this. The results showed that AI reduced project delays by 18% and improved task prioritization. The results of the study suggested applying AI scheduling tools in complex projects.

Another study by Sun and Zhou (2026) investigated the impact of AI on resource allocation efficiency. The methodology of the study was done by using a comparative study of historical project data. The findings indicated that resource utilization improved by 30% when AI allocation algorithms were used. The researchers recommended to use AI applications in planning systems.

While, Tran, and Nguyen (2024) study aim is to focus on monitoring projects using AI. The study used a mixed-methods technique, including quantitative project KPIs and qualitative interviews with project managers. The study results showed that real-time monitoring helped managers make early adjustments, reducing schedule risks. The study suggested integrating AI monitoring tools in large-scale engineering projects.

Similarly, Haider and Akomodi (2025) wanted to find out how AI and predictive analytics can help improve construction project scheduling. They studied past construction projects and applied different AI models to analyse schedules and resource use. Their findings showed that AI can get over delays, identify conflicts in resources early, and make better planning decisions. Based on these results, they suggested that construction companies use AI tools together with existing scheduling software to make projects run more smoothly and efficiently.

Finally, Torres et al. (2025) studied the role of AI in integrated project planning systems. Through case studies of multi-department engineering projects, they found that AI integration improved collaboration, reduced errors, and optimized schedules. They recommended using AI-integrated planning platforms to enhance overall project performance.

Summary of this section: These studies show that AI plays an important role in improving planning, scheduling, and resource management in engineering and construction projects. AI helps reduce delays, prioritize tasks better, use resources more efficiently, and supports real-time monitoring.

Arabic Studies:

AI in Project Management Efficiency

A study by Jaber and Al-Ghanem (2025) looked at how AI is used in building design and construction in Jordan. The researcher's methodology was about reviewing previous studies about AI in this field. They found that AI helps create more innovative designs, supports environmentally friendly practices, and makes site management easier and more efficient. Based on these findings, the study recommended using AI more in planning and carrying out construction projects.

Similarly, Alhasan and Alawadhi (2024) studied how AI affects construction project management by collecting responses from professionals in the field. The results of the study showed that AI helps improve communication and coordination between stakeholders, speeds up data processing, and makes it easier to predict risks. The study also suggested the need for clear digital transformation strategies and stronger regulations to support the use of AI in the industry.

Summary of this section: These studies show that AI can really improve how construction projects are managed. It helps with better design, better coordination between teams, and more accurate risk prediction. This makes planning and execution more effective, while also supporting sustainability. The studies also highlight that using AI properly needs good training and clear digital strategies to get the best results

AI in Engineering & Construction Projects

First, Mohammed, Abdel Fattah, and Kamel (2025) studied how AI can help in planning and managing schedules. They combined a literature review with an analytical approach and used 4D BIM technology as their methodological way. The study found that AI makes tasks run more smoothly, reduces conflicts

between activities, allows real-time monitoring, and lowers human mistakes. Based on these results, the researchers recommended using cloud-based AI tools that work together with scheduling systems.

Followed by a study done by Al Zawaida (2024) that looked at different AI techniques to improve construction project performance. The study used a combination of surveys and data analysis. The results showed that AI helps control costs, improves scheduling accuracy, and optimizes resource allocation. The researcher recommended investing in AI training and integrating AI technology into project management practices.

While, Al Arsan and Al Hiyari (2021) examined how AI is used in Jordanian engineering projects. They used descriptive-analytical questionnaires to collect data. The study found that AI helps improve decision-making, forecasting, and managing resources. Based on these results, the researchers suggested introducing awareness and training programs to make AI adoption easier for project teams.

Finally, Mousa (2025) focused on using AI and machine learning to predict project performance in Libyan road maintenance projects. The study found that AI-based prediction models are more accurate than traditional methods. Based on these results, the researcher recommended integrating predictive analytics into project planning to improve efficiency and reduce potential risks.

Summary of this section: These studies show that AI plays an important role in making engineering and construction projects more efficient. AI helps improve planning, scheduling, and resource management, while also supporting better decision-making and more accurate predictions. The research highlights that to fully benefit from AI, project teams need proper training, effective technology integration, and collaborative platforms that allow smooth communication and coordination.

AI in Risk Management and Decision-Making

Al-Faisal and Al-Azab (2024) explored how artificial intelligence can help in risk management and negotiation. The study used a qualitative method, analyzing case studies from business environments to know how AI tools can enhance risk assessment processes. The results showed that AI can help managers know the upcoming risks better and support better decision making. Based on these results, the researchers recommended using AI-tools to improve risk management practices and strengthen negotiation strategies within organizations.

In addition, Al-Taei et al. (2026) focused on the impact of AI on decision-making. Using both methodological ways involving surveys and data analysis from several organizations, the study found that AI improves the speed and accuracy of decision-making processes. The recommendation for this study is integrating AI in decision making to enhance organizational efficiency and ensure more reliable and data-informed management decisions.

Summary of this section: These studies show that AI is essential for managing risks and making decisions in engineering projects. It helps use resources more efficiently, reduces delays, improves task prioritization, and strengthens project control, especially in large and complex projects. Based on these findings, the studies suggest using AI tools to support project planning and smarter decision-making.

AI in Planning, Scheduling & Resources

The study by Othman (2026) looked at how AI can help improve the management of engineering projects. The main goal was to see if AI could make project planning more accurate, use resources more efficiently, and help teams manage risks better. To do this, the researcher studied real engineering projects that used AI tools and compared how things worked with and without AI. The

results showed that AI helped make project schedules better, reduced mistakes, improved decision-making, and made projects run more easily. Othman (2026) recommended that companies invest in digital infrastructure, train engineers to use AI properly, create clear policies for using AI, make sure project data is accurate, and have rules to ensure AI is used safely in project management.

While, Khalid et al. (2024) aimed to examine how AI-driven risk management can improve sustainable decision-making, focusing on the impact of perceived environmental responsibility. To do this, they surveyed 428 senior managers in the construction sector and analyzed the responses using structural equation model. The results showed that AI tools significantly help managers make better and more sustainable decisions, and that considering environmental responsibility further strengthens this effect. Based on these findings, the authors recommended that organizations adopt AI-enabled risk management systems and include environmental responsibility considerations to support more informed and effective decision-making.

Similarly, Orfahli (2025) explored how artificial intelligence can be combined with BIM to improve scheduling and resource allocation in construction projects using a real case study. The study showed that using AI helps create more accurate schedules, improves how labor is assigned, and reduces the chances of delays and cost overruns.

Summary of this section: These studies show that AI has a strong positive impact on planning, scheduling, and resource management in engineering projects. It helps with better risk assessment, allows proactive allocation of resources, reduces cost and time overruns, and improves adherence to deadlines.

Research Gaps:

- Few studies testing AI impact over time.
- There haven't been much good studies done in Arabic regions.
- Lack of integrated AI adoption frameworks.
- Need for studies linking AI performance to sustainability and environmental outcomes.

Benefits derived from the previous studies include:

- AI helps improve project performance by enabling predictive and data-driven project management methods.
- AI tools improve risk management by noticing potential risks early and make better decision-making.
- AI technologies improve resource allocation and reduce project delays by having a better scheduling process.
- AI improve decision-making by analysing large amounts of project data and providing real-time insights.
- AI using supports digital transformation strategies and improves organizational readiness for advanced technologies.

What makes this thesis distinctive:

This study is different from many previous studies because it focuses specifically on engineering projects in Dubai, UAE.

While many studies examine AI adoption in project management in general, fewer studies focus on the Middle East region or on Dubai's engineering sector.

This research also combines technology adoption theories with professional project management frameworks. It links AI adoption with the efficiency dimensions identified in the PMBOK.

Therefore, the study provides valuable insights into how AI technologies can improve project management efficiency in a rapidly developing and highly digitalized environment such as Dubai.

Conclusion of this chapter:

This chapter showed multiple studies on the application of Artificial Intelligence in project management and engineering projects. The studies showed that AI technologies proved to make an enhancement to project efficiency, better risk management, improved scheduling and resource planning, and stronger decision-making processes.

Both English and Arabic studies confirmed the positive effect of AI in different ways. However, this studies also revealed gaps, especially regarding Dubai's engineering sector, highlighting the need for a focused examination that links AI adoption to established project management efficiency measures.

Overall, this review provides a theoretical foundation for the current study and supports its relevance and contribution.

Chapter Three

Study Methodology

Introduction:

This chapter describe the methodology used in this study by examining how AI technologies affect engineering project management effectiveness in Dubai, UAE. The methodology outlines the research design, data gathering techniques, and analytical processes that ensure the study's objectives are systematically addressed.

Research methodology:

The research approach was quantitative, which involved collecting measurable and comparable data to empirically evaluate the impact of AI on the efficiency of project management. The main tool for data collection was a structured questionnaire that captured respondents' perceptions of key project performance metrics, such as cost, time, scope, resource allocation, decision-making, risk management, and stakeholder satisfaction.

After collecting the needed data, it was analyzed using statistical methods to ensure correlation and to evaluate the relationships between AI implementation and project management efficiency.

Research Community:

In this study, the research community consists of engineering project managers and professionals involved in project management in the Emirates of Dubai, UAE, because these individuals plan, execute, and monitor engineering projects, and are therefore in a position to share their perspectives on the use and impact of AI technologies in project management.

Sample size and determination:

To ensure that the participants represent a range of project types, sizes, and organizational contexts, a random sample was selected from this population.

A structured questionnaire that was converted into an electronic form using google drive, and then the electronic link was sent to the targeted sample through social media applications. The questionnaire gathered the responses of 235 respondents and after careful analysis 220 respondents made up the final sample.

This sampling strategy ensures that the data collected is representative of the population and relevant to the objectives of the study so that the findings can be used to assess the relationship between AI technologies and project management efficiency.

The sample was distributed according to the demographic characteristics, as shown below:

Variable	Statement	Frequency	PERCENTAGE (%)
GENDER	Male	190	86.4%
	Female	30	13.6%
	Total	220	100%

Table (3.1) Distribution of Samples by Gender

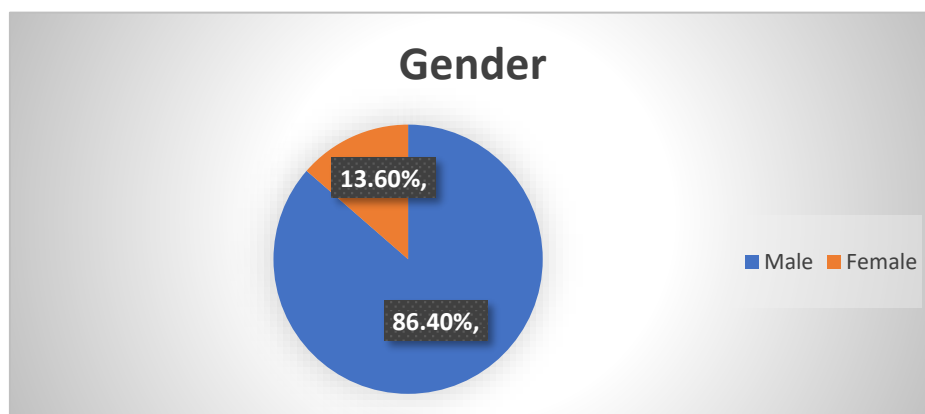


Figure (3.1): The distribution of sample according to gender

Table and Figure (3.1) show that the majority of participants were male (86.4%), while females represented 13.6% of the sample.

Variable	Statement	Frequency	PERCENTAGE (%)
AGE GROUP	Less than 30 years	75	34.1%
	30–39 years	90	40.9%
	40–49 years	35	15.9%
	50 years and above	20	9.1%
	Total	220	100%

Table (3. 2) Distribution of Samples by Age Group.

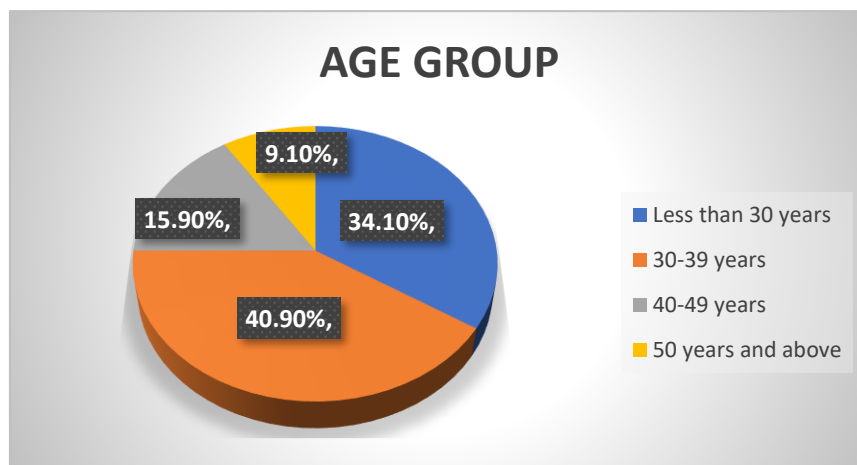


Figure (3.2): The distribution of sample according to age group

Table and Figure (3.2) show that the majority of respondents fell within the 30 to 39-year range (40.9%), with those under 30 years old (34.1%) following, suggesting that the sample mainly consists of professionals in the early and mid-career stages.

Variable	Statement	Frequency	PERCENTAGE (%)
YEARS OF EXPERIENCE	Less than 5 years	53	24.1%
	5–10 years	77	35%
	11–15 years	63	28.6%
	More than 15 years	27	12.3%
	Total	220	100%

Table (3. 3) Distribution of Samples by Years of Experience.

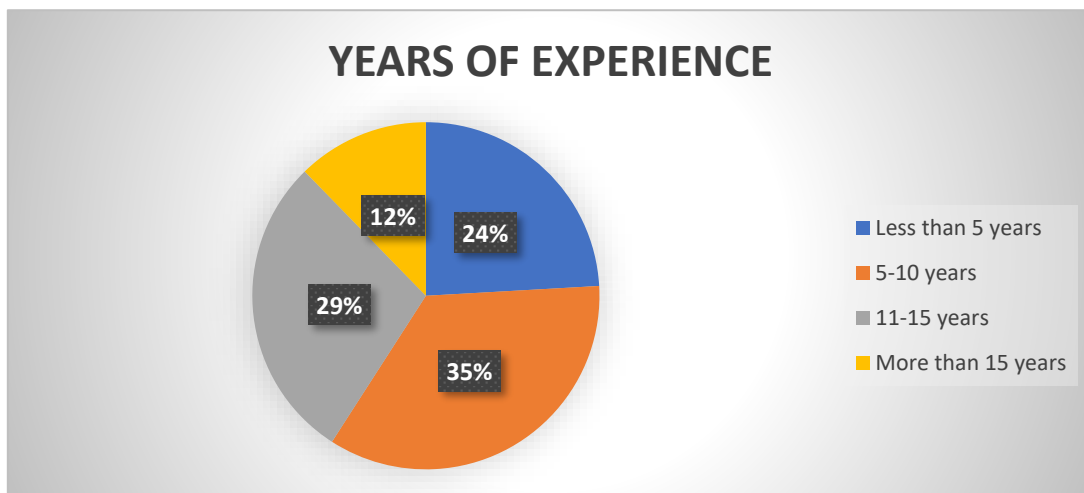


Figure (3.3): The distribution of sample according to years of experience

Table and Figure (3.3) show that the majority of respondents were between 5 and 10 years of experience (35%), followed by those with 11–15 years (28.6%), indicating a workforce with considerable experience.

Variable	Statement	Frequency	PERCENTAGE (%)
JOB TITLE	Engineer	88	40%
	Project Manager	85	38.6%
	Consultant	23	10.5%
	Executive Manager	24	10.9%
	Total	220	100%

Table (3. 4) Distribution of Samples by Job Title.

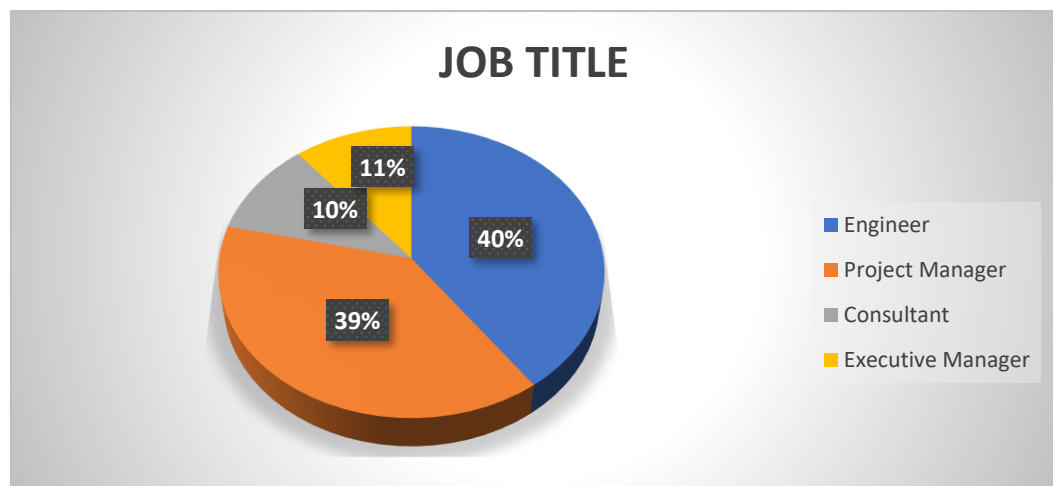


Figure (3.4): The distribution of sample according to job title

Table and Figure (3.4) show that the engineers constituted the largest group (40%), closely followed by project managers (38.6%), whereas consultants and executive managers accounted for smaller proportions.

Overall, all tables and charts indicate that the sample is well aligned with the professional structure of engineering project environments and provides an appropriate representation for the objectives of this study.

Data Collections procedures:

To collect the required data and achieve the objectives of the study, a questionnaire was selected as the primary data collection instrument due to its ease of administration, cost efficiency, ability to capture diverse data, and suitability for producing accurate and reliable results. Prior to large-scale distribution, the questionnaire was pilot tested on a small group of participants to assess its clarity, effectiveness, and reliability. After data collection, the responses were systematically analysed and the results were generated using SPSS (Statistical Package for the Social Sciences) statistical software. (Landau & Everitt, 2004).

Steps for Developing the research instrument:

First step: The researcher identified the main objective of the study as determining the impact of AI technologies on the efficiency of engineering project management in Dubai, UAE.

Step Two: Defining the Measurement Dimensions of the Research Instrument

The measurement dimensions of the research instrument were organized into three main sections:

- 1- Demographic characteristics (gender- age group- years of experience- job title).
- 2- Screening Questions (Current employment in engineering project management in Dubai and employment sector).

3- Study Dimensions: The study examines the impact of schedule pressure on project performance, consisting of seven main dimensions:

- First dimension: digital Infrastructure and consists of four statements.
- Second dimension: technical capabilities and consists of four statements.
- Third dimension: human competencies and consists of four statements.
- Fourth dimension: applications of AI in project management and consists of five statements.
- Fifth dimension: decision-making quality (mediating variable) and consists of four statements.
- Sixth dimension: Project Performance Efficiency (Dependent Variable) and consists of five statements.
- Seventh dimension: challenges and barriers to the adoption of AI and consists of five statements.

Step Three: Formulating the Initial Questionnaire Items

After defining the measurement dimensions of the questionnaire, the items were drafted by reviewing the theoretical framework and examining instruments used in previous studies similar to the current research. Each item was then formulated to align with the specific objectives of the corresponding dimension, ensuring clarity and adherence to the procedural definitions of each measurement domain.

Step Four: Scaling Responses for the Main Dimensions

The responses to the main dimension items were measured using a five-point Likert scale: Strongly Agree – Agree – Neutral – Disagree – Strongly Disagree, with scores assigned as 5, 4, 3, 2, and 1, respectively.

Step Five: Developing the Instructions for the Research Instrument

The questionnaire instructions were carefully prepared to inform participants about the purpose of the study. The instructions ensured that the items were clear, appropriate for the respondents' level, and that the information related to the study variables was presented in a simple and understandable manner. Additionally, participants were assured of the privacy and confidentiality of the information they provided.

Step Six: Finalizing and Administering the Questionnaire

The questionnaire was finalized and prepared for distribution to the targeted sample. It was converted into an electronic form using Google Drive and the electronic link was then sent to the participants through social media applications to facilitate easy access and completion.

Validity of the Research Instrument

1) Validity of the Study Instrument (Expert Validation):

The researcher presented the initial version of the questionnaire to an expert (Dr. Nadia Emam) a professor at High Institution of Public Health, Alexandria University. This expert reviewed and evaluated the questionnaire (see Appendix) and was asked to provide her feedback regarding the accuracy of the items in measuring the intended objectives, the clarity of their wording, the relevance of each item to its respective dimension, and the adequacy of the items in covering all aspects of the main study variables. Additionally, the expert was invited to suggest any necessary modifications, such as rephrasing, deleting, or adding items. Based on the observations and recommendations of the expert, the researcher implemented the agreed-upon adjustments recommended by the expert. Consequently, the initial questionnaire was revised

and finalized, and the final version of the questionnaire is included in the Appendix.

2) Internal Consistency Validity of the Study Instrument:

A pilot study was conducted to evaluate the clarity, validity, and reliability of the research instrument before distributing the final questionnaire. The pilot test involved 50 respondents selected from the target population.

The purpose of the pilot study was to ensure that the questionnaire items were clearly understood and to assess the internal consistency validity of the constructs using Pearson correlation analysis between each item and the total score of its respective construct.

The results of the Pearson correlation analysis indicated that all questionnaire items were positively and significantly correlated with their corresponding total scores. The correlation coefficients exceeded the acceptable threshold of 0.30, indicating that the items demonstrate acceptable internal consistency validity and are appropriate for inclusion in the final questionnaire, as shown in the table:

DIMENSION	ITEM	CORRELATION WITH TOTAL (r)	SIG.
Digital Infrastructure	DI.1	0.740	<0.001
	DI.2	0.874	<0.001
	DI.3	0.771	<0.001
	DI.4	0.636	<0.001
Technical Capabilities	TC.1	0.911	<0.001
	TC.2	0.825	<0.001

	TC.3	0.863	<0.001
	TC.4	0.767	<0.001
Human Competencies	HC.1	0.862	<0.001
	HC.2	0.740	<0.001
	HC.3	0.792	<0.001
	HC.4	0.591	<0.001
Applications of AI in Project Management	PM.1	0.678	<0.001
	PM.2	0.871	<0.001
	PM.3	0.757	<0.001
	PM.4	0.780	<0.001
	PM.5	0.757	<0.001
Decision-Making Quality (Mediating Variable)	DM.1	0.632	<0.001
	DM.2	0.420	<0.001
	DM.3	0.439	<0.001
	DM.4	0.656	<0.001
Project Performance Efficiency (Dependent Variable)	PP.1	0.358	<0.001
	PP.2	0.623	<0.001
	PP.3	0.824	<0.001
	PP.4	0.347	<0.001
	PP.5	0.798	<0.001
Challenges and Barriers to the Adoption of AI	CB.1	0.701	<0.001
	CB.2	0.482	<0.001
	CB.3	0.719	<0.001
	CB.4	0.731	<0.001
	CB.5	0.660	<0.001

Table (3. 5) Pearson Correlation between Variables.

The results presented in table (3.5) indicate that all items are positively correlated with their respective construct totals, with correlation coefficients

ranging from 0.347 to 0.911. All correlations were statistically significant at $p < 0.05$ or better.

These findings confirm that the questionnaire items exhibit acceptable internal consistency validity, as all correlation values exceed the recommended minimum threshold of 0.30. Therefore, none of the items were removed, and all items were retained for the final data collection phase of the study.

3) Reliability:

To ensure the internal consistency and reliability of the research instrument, Cronbach's Alpha coefficient was calculated for each dimension of the questionnaire. The pilot test involved 50 respondents selected from the target population, as shown in the table:

DIMENSIONS	ITEMS	CRONBACH'S ALPHA	NUMBER OF ITEMS
Digital Infrastructure	DI1, DI2, DI3, DI4	0.735	4
Technical Capabilities	TC1, TC2, TC3, TC4	0.862	4
Human Competencies	HC1, HC2, HC3, HC4	0.739	4
Applications of AI in Project Management	PM1, PM2, PM3, PM4, PM5	0.824	5
Decision-Making Quality (Mediating Variable)	DM1, DM2, DM3, DM4	0.913	4

Project Performance Efficiency (Dependent Variable)	PP1, PP2, PP3, PP4, PP5	0.766	5
Challenges and Barriers to the Adoption of AI	CB1, CB2, CB3, CB4, CB5	0.774	5
ALL DIMENSIONS		0.921	31

Table (3. 6) Cronbach's Alpha Between Study Variables.

The results in table (3.6) indicate that most dimensions exhibit acceptable to good reliability, with Cronbach's Alpha values ranging from 0.735 to 0.913. For the overall questionnaire, Cronbach's Alpha was 0.921 across all 31 items, indicating excellent internal consistency. This confirms that the questionnaire is a highly reliable instrument for measuring the constructs of this study.

4) Correction Criterion

The following section presents the analysis of the study variables based on the responses collected from the participants. For each dimension of the study, the mean, standard deviation, relative weight, general tendency, and level of importance were calculated.

The Likert five-point scale (1 = Strongly Disagree to 5 = Strongly Agree) was used to measure participants' perceptions.

Subsequently, the level of importance for each dimension was determined according to the following criteria:

- 1.00 – 1.79 → Very Low
- 1.80 – 2.59 → Low

- 2.60 – 3.39 → Medium
- 3.40 – 4.19 → High
- 4.20 – 5.00 → Very High

DIMENSION	MEAN	GENERAL TENDENCY	RELATIVE WEIGHT (%)	LEVEL/ IMPORTANCE
Digital Infrastructure	3.92	Agree	78.4	High
Technical Capabilities	3.60	Agree	72.0	High
Human Competencies	3.45	Agree	69.0	High
Applications of AI in Project Management	3.70	Agree	74.0	High
Decision-Making Quality (Mediating Variable)	3.92	Agree	78.4	High
Project Performance Efficiency (Dependent Variable)	3.85	Agree	77.0	High
Challenges and Barriers to the AI Intelligence	3.80	Agree	76.0	High

Table (3. 7) General Tendency, Relative Weight, and Levels between Study Dimensions.

The analysis of the study variables, as presented in the table (3.7), indicates a generally positive perception among respondents across all study dimensions. From Table (3.7), which shows the relative weight (%) for each level across the dimensions, it is evident that most participants' responses fall within the High and Very High categories. This suggests that participants have a favourable evaluation of the variables included in the study.

Correction Criteria table:

MEAN RANGE	GENERAL TENDENCY	RELATIVE WEIGHT (%)	LEVEL/IMPORTANCE
1.00 – 1.79	Strongly Disagree	20 – 35.8	Very Low
1.80 – 2.59	Disagree	36 – 51.8	Low
2.60 – 3.39	Neutral	52 – 67.8	Medium
3.40 – 4.19	Agree	68 – 83.8	High
4.20 – 5.00	Strongly Agree	84 – 100	Very high

Table (3. 8) Correction Criteria for all Study Dimensions.

Similarly, Table (3.8), which summarizes the mean, general tendency, relative weight, and level for each dimension, reinforces this finding. All dimensions recorded means above 3.40, corresponding to a high level according to the correction criteria. The highest mean was observed in the DM and DI dimensions (Mean = 3.92, Relative Weight = 78.4%), reflecting strong agreement among respondents regarding these aspects.

Overall, the results highlight that the participants consistently rated all dimensions positively, indicating the relevance and importance of these

variables in the context of the study. This provides a clear foundation for further analysis and discussion of the study findings.

Study Scope and Limitations:

Geographical scope limitation: This study is operated in the UAE, which is limited to engineering project management organizations operating in the UAE, with a particular focus on projects conducted in Dubai.

Human scope limitation: Engineers, project managers, and project management specialists who work on engineering projects and are directly involved in the use or administration of AI tools in project management are included in this study.

Time scope limitation: Information gathered during the distribution and completion of the questionnaire in 2026 is included in this study.

Subject scope limitation: This study is limited to examining the effect of AI adoption on the effectiveness of engineering project management. This study does not cover any technological, organizational, or external factors that could affect project performance.

Statistical Analysis Methods:

After collecting the required data through the questionnaire, the responses were coded and entered into the Statistical Package for Social Sciences (IBM SPSS Version 31) for statistical analysis. Several statistical methods were used in order to achieve the objectives of the study and answer the research questions. These methods include the following:

1. Frequencies and percentages were used to describe the characteristics of the study sample, including gender, age, educational level, years of experience, organization type, and type of client.

2. Pearson correlation coefficient was used to test the internal consistency of the research instrument by examining the correlation between each item and the total score of its respective dimension.
3. Cronbach's Alpha coefficient was calculated to assess the reliability and stability of the study instrument.
4. Arithmetic means and standard deviations were used to analyse the responses of the participants. In addition, the relative weight, level, and ranking of each item were calculated in order to interpret the level of agreement among respondents.
5. One-way Analysis of Variance (ANOVA) was applied to test the research hypotheses and identify whether there are statistically significant differences between the study variables.

Chapter Four

Data Analysis, Results, and Recommendations

Introduction:

This chapter presents the results derived from the statistical analysis of the data collected through the 220 questionnaires in order to answer the research questions of the study. It also examines the testing of the research hypotheses. In addition, the chapter highlights the main findings and provides a number of recommendations and suggestions.

Data Analysis and Results:

The analysis of the study variables was conducted by calculating the arithmetic means, standard deviations, results, relative weights, levels, and ranks for each statement within each dimension.

This section presents a description of the study variables as follows:

First: Digital infrastructure:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
DI.1	220	1.00	5.00	3.8273	1.04562
DI.2	220	1.00	5.00	4.0227	.95775
DI.3	220	1.00	5.00	3.7909	1.04331
DI.4	220	1.00	5.00	3.6182	1.11431
Valid N (listwise)	220				

Figure (4.1): Descriptive statistics of digital infrastructure variables.

Statement	Mean	Std. Deviation	Relative Weight %	Result	Level	Rank
DI.1: My organization has an advanced digital infrastructure that supports the implementation of AI systems.	3.827	1.046	76.55	Agree	High	2
DI.2: Project data are stored digitally in an organized and analyzable manner.	4.023	0.958	80.45	Agree	High	1
DI.3: The organization relies on integrated cloud-based systems for project management.	3.791	1.043	75.82	Agree	High	3
DI.4: Real-time data collection systems are available within projects.	3.618	1.114	72.36	Agree	High	4

Table (4. 1) Mean, Standard Deviation, Relative Weight, Levels, and Ranks for Digital Infrastructure Variables.

The results presented in table and figure (4.1) show the analysis of the Digital Infrastructure (DI) dimension based on the arithmetic means, standard deviations, relative weights, levels, and ranks of the statements.

The findings indicate that all statements of the DI dimension recorded high levels of agreement, with arithmetic means ranging between 3.618 and 4.023 and relative weights ranging from 72.36% to 80.45%, which fall within the high level according to the adopted evaluation criteria.

Statement DI.2 ranked first with the highest mean value ($M = 4.023$) and a relative weight of 80.45%, indicating that respondents strongly agreed with this statement compared to the other items. Statement DI.1 ranked second with a mean of 3.827 and a relative weight of 76.55%, followed by DI.3 with a mean of 3.791 and a relative weight of 75.82%.

Finally, DI.4 ranked last with a mean value of 3.618 and a relative weight of 72.36%, although it still reflects a high level of agreement among respondents.

Second: Technical capabilities:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
TC.1	220	1.00	5.00	3.4409	1.13522
TC.2	220	1.00	5.00	3.5682	1.11850
TC.3	220	1.00	5.00	3.4818	1.13662
TC.4	220	1.00	5.00	3.5682	1.11850
Valid N (listwise)	220				

Figure (4.2): Descriptive statistics of technical capabilities variables.

Statement	Mean	Std. Deviation	Relative Weight %	Result	Level	Rank
TC.1: The organization has specialized technical expertise in the field of AI.	3.441	1.135	68.82	Agree	High	4
TC.2: AI tools can be easily integrated with the current project management systems.	3.568	1.119	71.36	Agree	High	1
TC.3: AI-supported project management platforms or software are available within the organization.	3.482	1.137	69.64	Agree	High	3
TC.4: Adequate technical support is available to implement AI solutions.	3.568	1.119	71.36	Agree	High	1

Table (4. 2) Mean, Standard Deviation, Relative Weight, Levels, and Ranks for Technical Capabilities Variables.

Table and Figure (4.2) present the descriptive analysis of the technical capabilities (TC) dimension through the calculation of arithmetic means, standard deviations, relative weights, levels, and ranks.

The results show that all statements within this dimension achieved high levels, with mean values ranging from 3.441 to 3.568 and relative weights ranging from 68.82% to 71.36%, which fall within the high level according to the adopted scale.

Statements TC.2 and TC.4 ranked first with the highest mean value ($M = 3.568$) and a relative weight of 71.36%, indicating a higher level of agreement among respondents toward these statements. Statement TC.3 ranked third with a mean value of 3.482 and a relative weight of 69.64%.

Statement TC.1 ranked last with a mean value of 3.441 and a relative weight of 68.82%, although it still reflects a high level of agreement.

Third: Human competencies:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
HC.1	220	1.00	5.00	3.3864	1.19389
HC.2	220	1.00	5.00	3.9545	.97818
HC.3	220	1.00	5.00	3.4227	1.15408
HC.4	220	1.00	5.00	3.7091	1.04986
Valid N (listwise)	220				

Figure (4.3): Descriptive statistics of human competencies variables.

Statement	Mean	Std. Deviation	Relative Weight %	Result	Level	Rank
HC.1: Project managers receive training on the use of AI tools.	3.386	1.194	67.73	Neutral	Moderate	4
HC.2: Employees demonstrate readiness to adopt AI technologies	3.955	0.978	79.09	Agree	High	1
HC.3: The organization provides continuous training programs in the field of AI.	3.423	1.154	68.45	Agree	High	3
HC.4: Employees possess an appropriate level of digital and AI literacy.	3.709	1.050	74.18	Agree	High	2

Table (4. 3) Mean, Standard Deviation, Relative Weight, Levels, and Ranks for Human Competencies Variables.

Table and Figure (4.3) present the descriptive analysis of the human competencies (HC) dimension by calculating the arithmetic means, standard deviations, relative weights, levels, and ranks of the statements.

The results indicate varying levels of agreement among respondents regarding the statements of the HC dimension. The arithmetic means ranged between 3.386 and 3.955, while the relative weights ranged between 67.73% and 79.09%.

Statement HC.2 ranked first with the highest mean value ($M = 3.955$) and a relative weight of 79.09%, reflecting a high level of agreement among respondents. This was followed by HC.4, which ranked second with a mean of 3.709 and a relative weight of 74.18%, indicating a high level as well.

Statement HC.3 ranked third with a mean value of 3.423 and a relative weight of 68.45%, also reflecting a high level of agreement. In contrast, HC.1 ranked last with a mean value of 3.386 and a relative weight of 67.73%, indicating a moderate level and a neutral tendency among respondents.

Fourth: Applications of AI in Project Management:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
PM.1	220	1.00	5.00	3.7409	1.05604
PM.2	220	1.00	5.00	3.9091	.97499
PM.3	220	1.00	5.00	3.8227	1.00702
PM.4	220	1.00	5.00	3.9545	.96407
PM.5	220	1.00	5.00	3.7273	1.03729
Valid N (listwise)	220				

Figure (4.4): Descriptive statistics of applications of AI in project management variables.

Statement	Mean	Std. Deviation	Relative Weight %	Result	Level	Rank
PM.1: AI is used to predict potential project risks.	3.741	1.056	74.82	Agree	High	4
PM.2: AI supports schedule forecasting and helps reduce project delays.	3.909	0.975	78.18	Agree	High	2
PM.3: AI contributes to improving the accuracy of cost estimation.	3.823	1.007	76.45	Agree	High	3
PM.4: AI enhances the efficiency of resource allocation and management.	3.955	0.964	79.09	Agree	High	1
PM.5: Intelligent modeling and simulation techniques are used in project planning.	3.727	1.037	74.55	Agree	High	5

Table (4. 4) Mean, Standard Deviation, Relative Weight, Levels, and Ranks for Project Management Variables.

Table and Figure (4.4) present the descriptive analysis of the AI in project management (PM) dimension by calculating the means, standard deviations, relative weights, levels, and ranks for all statements.

The results show that all statements in the PM dimension received a high level of agreement from respondents. Mean values ranged between 3.727 and 3.955, and relative weights ranged from 74.55% to 79.09%, indicating that participants generally perceive the Project Management dimension positively.

Statement PM.4 ranked first with the highest mean ($M = 3.955$) and a relative weight of 79.09%, suggesting it is the most emphasized aspect in this dimension. Statement PM.5 ranked last with a mean of 3.727 and a relative weight of 74.55%, though it still reflects a high level of agreement.

Fifth: Decision-Making Quality (Mediating Variable):

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
DM.1	220	1.00	5.00	3.7273	1.03729
DM.2	220	1.00	5.00	4.0818	.88758
DM.3	220	1.00	5.00	4.0000	.93144
DM.4	220	1.00	5.00	3.9000	.96467
Valid N (listwise)	220				

Figure (4.5): Descriptive statistics of applications of decision-making quality variables.

Statement	Mean	Std. Deviation	Relative Weight %	Result	Level	Rank
DM.1: AI contributes to enhancing data-driven decision making	3.727	1.037	74.55	Agree	High	4
DM.2: AI improves the accuracy of project related decisions.	4.082	0.888	81.64	Agree	High	1
DM.3: AI reduces uncertainty in complex projects.	4.000	0.931	80.00	Agree	High	2
DM.4: AI supports proactive decision making rather than reactive decision making.	3.900	0.965	78.00	Agree	High	3

Table (4. 5) Mean, Standard Deviation, Relative Weight, Levels, and Ranks for Decision-Making Quality Variables.

The descriptive analysis of the decision making (DM) dimension in table and figure (4.5) shows the mean values, standard deviations, relative weights, levels, and ranks for all statements.

The results indicate a high level of agreement among respondents regarding the DM dimension. Mean scores ranged from 3.727 to 4.082, and relative weights ranged between 74.55% and 81.64%, reflecting a positive perception.

Statement DM.2 ranked first with the highest mean ($M = 4.082$) and relative weight (81.64%), suggesting it is the most important aspect within this dimension. Statement DM.1 ranked last with a mean of 3.727 and relative weight of 74.55%, although it still reflects a high level of agreement.

Sixth: Project Performance Efficiency (Dependent Variable)

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
PP.1	220	1.00	5.00	4.0727	.88322
PP.2	220	1.00	5.00	3.9045	.97221
PP.3	220	1.00	5.00	3.7182	1.03042
PP.4	220	1.00	5.00	3.9273	.94322
PP.5	220	1.00	5.00	3.7091	1.03231
Valid N (listwise)	220				

Figure (4.6): Descriptive statistics of project performance efficiency variables.

Statement	Mean	Std. Deviation	Relative Weight %	Result	Level	Rank
PP.1: AI contributes to reducing delays in project execution.	4.073	0.883	81.45	Agree	High	1
PP.2: AI helps reduce cost overruns.	3.905	0.972	78.09	Agree	High	3
PP.3: AI enhances the productivity of project teams.	3.718	1.030	74.36	Agree	High	4
PP.4: AI improves coordination among	3.927	0.943	78.55	Agree	High	2

multiple project stakeholders.						
PP.5: AI increases the success rate of large-scale projects.	3.709	1.032	74.18	Agree	High	5

Table (4. 6) Mean, Standard Deviation, Relative Weight, Levels, and Ranks for Project Performance Efficiency Variables.

Table and Figure (4.6) show the descriptive analysis of the Project Performance Efficiency (PP) dimension, including means, standard deviations, relative weights, levels, and ranks for all statements.

The results reveal a high level of agreement among respondents. Mean scores ranged from 3.709 to 4.073, and relative weights ranged from 74.18% to 81.45%, indicating that respondents generally perceive this dimension positively.

Statement PP.1 ranked first with the highest mean ($M = 4.073$) and relative weight (81.45%), reflecting its importance as perceived by participants. Statement PP.5 ranked last with a mean of 3.709 and relative weight of 74.18%, although it still indicates a high level of agreement.

Seventh: Challenges and Barriers to the Adoption of AI:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
CB.1	220	1.00	5.00	3.5091	1.15664
CB.2	220	1.00	5.00	3.7000	1.05163
CB.3	220	1.00	5.00	3.1591	1.20772
CB.4	220	1.00	5.00	3.6636	1.12892
CB.5	220	1.00	5.00	3.5364	1.14419
Valid N (listwise)	220				

Figure (4.7): Descriptive statistics of challenges and barriers to the adoption of AI variables.

Statement	Mean	Std. Deviation	Relative Weight %	Result	Level	Rank
CB.1: High costs represent a barrier to the adoption of AI.	3.509	1.157	70.18	Agree	High	4
CB.2: A lack of specialized competencies constitutes a major challenge.	3.700	1.052	74.00	Agree	High	1
CB.3: Resistance to change exists within the organization.	3.159	1.208	63.18	Neutral	Moderate	5
CB.4: Data security concerns pose challenges to the implementation of AI.	3.664	1.129	73.27	Agree	High	2
CB.5: Regulatory or legislative issues hinder the implementation of AI solutions.	3.536	1.144	70.73	Agree	High	3

Table (4. 7) Mean, Standard Deviation, Relative Weight, Levels, and Ranks for Challenges and Barriers Variables.

Table and Figure (4.7) show the descriptive analysis of the Challenges and Barriers to the Adoption of Artificial Intelligence (CB) dimension, including arithmetic means, standard deviations, relative weights, levels, and ranks for all statements.

The results indicate a generally high level of agreement for most statements. Mean scores ranged from 3.159 to 3.700, while relative weights ranged from 63.18% to 74.00%.

Statement CB.2 ranked first with the highest mean ($M = 3.700$) and relative weight (74.00%), indicating strong agreement among respondents. Statement CB.3 ranked last with the lowest mean ($M = 3.159$) and relative weight (63.18%), reflecting a moderate level and a neutral tendency toward this statement.

Correlation coefficient:

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.863 ^a	.744	.738	.29677

a. Predictors: (Constant), DM_Mean, HC_Mean, PM_Mean, DI_Mean, TC_Mean

Figure (4.8): Correlation coefficient between the study variables.

The model summary results indicate that the correlation coefficient (R) is 0.863, which reflects a strong positive relationship between the independent variables (digital infrastructure, technical capabilities, human competencies, project management, and decision making) and the dependent variable Project Performance.

The coefficient of determination ($R^2 = 0.744$) shows that approximately 74.4% of the variance in project performance can be explained by the independent variables included in the model. The remaining 25.6% of the variance may be attributed to other factors not included in this study.

Furthermore, the adjusted R^2 value of 0.738 confirms the strength and adequacy of the regression model in explaining the variation in the dependent variable.

ANOVA Test Interpretation:

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	54.783	5	10.957	124.400	<.001 ^b
	Residual	18.848	214	.088		
	Total	73.631	219			

a. Dependent Variable: PP_Mean

b. Predictors: (Constant), DM_Mean, HC_Mean, PM_Mean, DI_Mean, TC_Mean

Figure (4.9): ANOVA test for all study variables.

The ANOVA results indicate that the regression model is statistically significant. The calculated F-value is 124.400, with a significance level of $p < 0.001$, which is lower than the standard significance level of 0.05.

This result confirms that the regression model is statistically significant and that the independent variables (digital infrastructure, technical capabilities, human competencies, project management, and decision making) collectively have a significant effect on Project Performance.

Therefore, the regression model is considered appropriate and reliable for predicting the dependent variable.

Regression Coefficients Interpretation:

Coefficients ^a							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.292	.188		-.1552	.122	
	DI_Mean	.242	.043	.573	20.994	<.001	.360
	TC_Mean	.305	.035	.811	15.136	<.001	.335
	HC_Mean	.415	.032	.309	20.473	<.001	.609
	PM_Mean	.265	.026	.379	10.270	<.001	.879
	DM_Mean	.778	.038	.719	20.561	<.001	.979

a. Dependent Variable: PP_Mean

Figure (4.10): Regression Coefficients test for all study variables.

The regression analysis results indicate that all independent variables (digital infrastructure, technical capabilities, human competencies, project management, and decision making) have significant positive effects on project performance (PP) with significance levels $p < 0.001$.

Among them, decision making is the strongest predictor ($\beta = 0.719$), followed by technical capabilities ($\beta = 0.811$) and digital infrastructure ($\beta = 0.573$).

This suggests that effective decision-making, strong technical capabilities, and adequate digital infrastructure are critical factors in improving project performance, while human competencies and project management also contribute positively but to a slightly lesser extent.

All VIF values are below 5, confirming the absence of multicollinearity, which indicates that the model is statistically reliable.

Hypotheses Testing Summary:

The regression analysis results confirm that the adoption of AI technologies has a significant positive impact on the efficiency of engineering project management in Dubai. All predictors (digital infrastructure, technical capabilities, human competencies, project management, and decision making) were found to significantly contribute to project performance at $p < 0.001$.

Specifically:

- Project Management (cost control, schedule, risk, resources) and decision-making show strong influence on project efficiency.
- Digital infrastructure, technical capabilities, and human competencies also positively affect project efficiency, reflecting the importance of organizational readiness for AI implementation.

Thus, the main hypothesis and all sub-hypotheses are supported.

Research Recommendations:

Based on the findings of this study, the following recommendations are suggested to enhance the efficiency of engineering project management in Dubai through the adoption of AI technologies:

1. Enhance digital infrastructure: Organizations should invest in upgrading their digital infrastructure, including high-speed networks, cloud platforms, and advanced data management systems, to fully support AI applications.
2. Develop technical capabilities: Employees should receive continuous training and upskilling in AI tools, software applications, and emerging technologies to strengthen technical capabilities within project teams.
3. Strengthen human capital: Implement programs to improve skills, knowledge, and experience of staff in both AI adoption and project management practices. Encourage certifications and workshops to build a more capable workforce.
4. Optimize project management practices: Adopt AI-driven project management systems for cost control, scheduling, risk assessment, and resource allocation. This will improve accuracy, efficiency, and timely delivery of projects.

5. Improve decision-making quality: Utilize AI analytics and predictive models to support evidence-based, timely, and strategic decision-making in engineering projects.
6. Promote change behaviour: Develop clear change management strategies to ensure smooth adoption of AI technologies. This includes raising awareness, providing incentives, and encouraging acceptance of AI-related innovations among employees.

Future Research Recommendations:

- Investigate the long-term impact of AI on project success metrics, such as cost savings, quality, and stakeholder satisfaction.
- Explore sector-specific AI adoption strategies in engineering projects.
- Examine the integration of AI with complementary technologies like Internet of Things (IoT), Building information modelling (BIM), and big data analytics for enhanced project performance.

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Appendix

Subject:

Request for Arbitration of Research Questionnaire

Dear Dr. Nadia Emam Abou EL Ela,

I hope this email finds you well. I am writing to inform you that I am a student at Midocean University - College of Management, specializing in a Master's degree in Project Management. I am currently conducting research titled " The Impact of Artificial Intelligence Technologies on the Efficiency of Engineering Project Management in the Emirate of Dubai, UAE " as part of my master's program requirements in Project Management.

I am reaching out to request your expertise in reviewing and validating the survey designed for my research. Attached is a copy of the survey, and I kindly ask you to review it and provide your insights and suggestions regarding the accuracy and appropriateness of the statements in measuring the study's objectives.

Additionally, I would appreciate any recommendations for modifications, whether it be rephrasing, removing, or adding new statements.

Thank you very much for your time and effort. I look forward to receiving your valuable feedback.

Sincerely,

Mohammed Osama Khattab

Master of Project Management

College of Management, Midocean University

252001826@st.midocean.edu.km

Dear Eng. Mohammed Osama Khattab,

I have carefully reviewed your questionnaire entitled "The Impact of Artificial Intelligence Technologies on the Efficiency of Engineering Project Management in the Emirates of Dubai, United Arab Emirates."

I would like to commend you on the quality of your work. The questionnaire is well structured, clearly aligned with the objectives of the study, and demonstrates a strong understanding of both artificial intelligence applications and engineering project management practices.

The questionnaire only requires one minor modification, which has been clearly indicated in the attached file.

I encourage you to make this small revision and proceed confidently with your data collection.

Best wishes for the successful completion of your Master's research.

Kind regards,
Dr. Nadia Emam
Alexandria University.
26-12-2025



الاستبيان

بسم الله الرحمن الرحيم

السيد/.....المحترم،

السلام عليكم ورحمة الله وبركاته،

أود إبلاغكم بأني طالب في جامعة ميدأوشن - كلية الإدارة - تخصص ماجستير في إدارة المشاريع، وأعمل حالياً على بحث بعنوان " أثر توظيف تقنيات الذكاء الاصطناعي على كفاءة إدارة المشاريع الهندسية في إمارة دبي – دولة الإمارات العربية المتحدة"، كجزء من متطلبات درجة الماجستير في إدارة المشاريع. ونظراً لأهمية آرائكم القيمة، أرجو منكم التفضل بالإجابة على هذا الاستبيان. وأؤكد لكم أن إجاباتكم ستكون محل تقدير كبير وستعامل بسرية تامة، ولن تُستخدم إلا لأغراض البحث العلمي. لذا، أرجو أن تكون إجاباتكم دقيقة وصادقة قدر الإمكان للمساهمة في تحقيق نتائج دقيقة.

شاكر لكم حسن تعاونكم،

المشرفين

محمد أسامة خطاب

د. الفيصل عبد الحميد محمد

طالب ماجستير إدارة المشاريع

د. فايز علي جراد

كلية الإدارة، جامعة ميدأوشن

كلية الإدارة، جامعة ميدأوشن

252001826@st.midoccean.edu.km

Questionnaire

Dear Mr. / Ms.,

I would like to inform you that I am a student at Midocean University – College of Management, specializing in a Master's degree in Project Management. I am currently conducting research titled "The Impact of Artificial Intelligence Technologies on the Efficiency of Engineering Project Management in the Emirate of Dubai, UAE" as part of the requirements for the master's program in Project Management.

Given the importance of your opinions, I kindly request you to complete this survey. I assure you that your responses will be highly valued and treated with utmost confidentiality, used solely for the purpose of academic research.

Therefore, I hope your answers will reflect the reality as closely as possible to contribute to achieving accurate results. Thank you for your cooperation.

Sincerely,

Mohammed Osama Khattab

Supervisors

Master of Project Management

Dr. Al-faisal Abul Hamid

Candidate

Dr. Fayez Ali Jad

College of Management, Midocean
University

College of Management, Midocean
University

Demographic Information

1. Gender:

- ☐ Male
- ☐ Female

2. Age Group:

- ☐ Less than 30 years
- ☐ 30–39 years
- ☐ 40–49 years
- ☐ 50 years and above

3. Years of experience:

- ☐ Less than 5 years
- ☐ 5–10 years
- ☐ 11–15 years
- ☐ More than 15 years

4. Job title:

- ☐ Engineer
- ☐ Project Manager
- ☐ Consultant
- ☐ Executive Manager
- ☐ Other: _____

Screening Questions

1. Are you currently working in the field of engineering project management within the Emirate of Dubai?

- ☐ Yes
- ☐ No

2. Which sector do you currently work in?

- ☐ Infrastructure projects
- ☐ Real estate development
- ☐ Smart city initiatives
- ☐ Government entity
- ☐ Engineering consultancy firm
- ☐ Contracting company
- ☐ Other: _____

Study Statements

Please indicate your level of agreement with the following statements using the scale below:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

Kindly place a checkmark [✓] in the box that reflects your opinion.

No	Statements	1	2	3	4	5
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Digital Infrastructure						

DI.1	My organization has an advanced digital infrastructure that supports the implementation of AI systems.	☐	☐	☐	☐	☐
DI.2	Project data are stored digitally in an organized and analyzable manner.	☐	☐	☐	☐	☐
DI.3	The organization relies on integrated cloud-based systems for project management.	☐	☐	☐	☐	☐
DI.4	Real-time data collection systems are available within projects.	☐	☐	☐	☐	☐
No	Statements	1	2	3	4	5
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Technical Capabilities						
TC.1	The organization has specialized technical expertise in the field of AI.	[]	[]	[]	[]	[]
TC.2	AI tools can be easily integrated with the current project management systems.	[]	[]	[]	[]	[]
TC.3	AI-supported project management platforms or software are available within the organization.	[]	[]	[]	[]	[]
TC.4	Adequate technical support is available to implement AI solutions.	[]	[]	[]	[]	[]
No	Statements	1	2	3	4	5

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Human Competencies						
HC.1	Project managers receive training on the use of AI tools.	[]	[]	[]	[]	[]
HC.2	Employees demonstrate readiness to adopt AI technologies.	[]	[]	[]	[]	[]
HC.3	The organization provides continuous training programs in the field of AI.	[]	[]	[]	[]	[]
HC.4	Employees possess an appropriate level of digital and AI literacy.	[]	[]	[]	[]	[]
No	Statements	1	2	3	4	5
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Applications of Artificial Intelligence in Project Management

PM.1	AI is used to predict potential project risks.	☐	☐	☐	☐	☐
PM.2	AI supports schedule forecasting and helps reduce project delays.	☐	☐	☐	☐	☐
PM.3	AI contributes to improving the accuracy of cost estimation.	☐	☐	☐	☐	☐
PM.4	AI enhances the efficiency of resource allocation and management.	☐	☐	☐	☐	☐
PM.5	Intelligent modeling and simulation techniques are used in project planning.	☐	☐	☐	☐	☐
No	Statements	1	2	3	4	5

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Decision-Making Quality (Mediating Variable)						
DM.1	AI contributes to enhancing data-driven decision making	[]	[]	[]	[]	[]
DM.2	AI improves the accuracy of project related decisions.	[]	[]	[]	[]	[]
DM.3	AI reduces uncertainty in complex projects.	[]	[]	[]	[]	[]
DM.4	AI supports proactive decision making rather than reactive decision making.	[]	[]	[]	[]	[]
No	Statements	1	2	3	4	5
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Project Performance Efficiency (Dependent Variable)

PP.1	AI contributes to reducing delays in project execution.	[]	[]	[]	[]	[]
PP.2	AI helps reduce cost overruns.	[]	[]	[]	[]	[]
PP.3	AI enhances the productivity of project teams.	[]	[]	[]	[]	[]
PP.4	AI improves coordination among multiple project stakeholders.	[]	[]	[]	[]	[]
PP.5	AI increases the success rate of large-scale projects.	[]	[]	[]	[]	[]
No	Statements	1	2	3	4	5
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Challenges and Barriers to the Adoption of Artificial Intelligence

C&B.1	High costs represent a barrier to the adoption of AI.	☐	☐	☐	☐	☐
C&B.2	A lack of specialized competencies constitutes a major challenge.	☐	☐	☐	☐	☐
C&B.3	Resistance to change exists within the organization.	☐	☐	☐	☐	☐
C&B.4	Data security concerns pose challenges to the implementation of AI.	☐	☐	☐	☐	☐
C&B.5	Regulatory or legislative issues hinder the implementation of AI solutions.	☐	☐	☐	☐	☐

Thank you for your participation in this study. Your contribution is highly valuable in supporting scientific research and enhancing the understanding of the impact of artificial intelligence technologies on the efficiency of engineering project management in the Emirate of Dubai.

All collected data will be treated with strict confidentiality and will be used exclusively for academic purposes as part of the requirements of the master's thesis.

Mohammed Osama Khattab

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Candidate

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المستخلص

تهدف هذه الدراسة إلى استكشاف تأثير تقنيات الذكاء الاصطناعي على كفاءة إدارة المشاريع الهندسية في إمارة دبي، دولة الإمارات العربية المتحدة. تم اعتماد المنهج الكمي في البحث من خلال توزيع استبيان منظم على 220 من مديري المشاريع والمهنيين العاملين في إدارة المشاريع الهندسية في دبي. ركزت الدراسة على سبعة أبعاد رئيسية وتم استخدام التحليل الإحصائي، بما في ذلك معامل بيرسون، ألفا كرونباخ، الإحصاءات الوصفية، اختبار ANOVA، والانحدار لتقييم العلاقة بين تبني الذكاء الاصطناعي وكفاءة إدارة المشاريع. أظهرت النتائج أن جميع الأبعاد سجلت مستويات عالية من الاتفاق، مما يعكس تصورات إيجابية حول دور الذكاء الاصطناعي في تحسين كفاءة إدارة المشاريع. وأكد تحليل الانحدار وجود تأثير إيجابي قوي لتبني الذكاء الاصطناعي على أداء المشاريع $R = 0.863$ ، $R^2 = 0.744$ ، مع تحديد جودة اتخاذ القرار، والقدرات التقنية، والبنية التحتية الرقمية كأهم العوامل المؤثرة. تقدم هذه النتائج رؤى علمية عملية لدعم اعتماد ممارسات قائمة على الذكاء الاصطناعي وتقديم توصيات استراتيجية للمنظمات التي تهدف إلى تحسين نتائج المشاريع الهندسية في دبي.

الكلمات المفتاحية: الذكاء الاصطناعي، إدارة المشاريع الهندسية، كفاءة المشاريع، دبي، التحول الرقمي، تبني الذكاء الاصطناعي.

جامعة ميدأوشن

كلية الإدارة

ماجستير إدارة المشاريع



أثر توظيف تقنيات الذكاء الاصطناعي على كفاءة إدارة المشاريع الهندسية في إمارة دبي،
دولة الإمارات العربية المتحدة.

إعداد الطالب/ محمد أسامة خطاب

الرقم الأكاديمي/ 252001826

إشراف/

د. الفیصل عبد الحمید

د. فايز جراد

العام الدراسي:

2026