

Final Project 2

PMG 497

Midocean University

Faculty of Management

Project Management

The Impact of AI-Powered Tools Training on Managerial Efficiency in Majan Construction Company

Abdulrahman Ibrahim Aljassim

.....

Final Project – 2

Faculty of Management - Midocean University

Supervisor

Dr. Abdulrahim Nader

Faculty member- Faculty of management- Midocean University

2025/12/12 Third Semester

Acknowledgment

Dedication

Abstract

Purpose:

Methodology:

Findings:

Originality & Implication:

Keywords:

Table of Contents

Acknowledgment	2
Dedication	3
Abstract	4
1. Chapter 1: Introduction	7
1.1. Research Background.....	8
1.2. Research Problem.....	9
1.2.1. Theoretical Gaps.....	9
1.2.2. Practical Gaps.....	9
1.3. Research Significance.....	9
1.3.1. At the theoretical level.....	9
1.3.2. At the practical level.....	9
1.4. Research Questions.....	10
1.5. Research Objectives.....	10
1.6. Research Hypotheses.....	10
1.7. Research Model.....	10
1.8. Scope of The Study.....	11
1.9. The Project Structure.....	11
2. Chapter 2: Literature Review	12
2.1. Introduction.....	12
2.2. The independent variable.....	13
2.3. The dependent variable.....	13
2.4. The relationship between the independent and the dependent variables.....	13
2.5. Conclusion.....	13
3. Chapter 3: Research Methodology	14
3.1. Introduction.....	14
3.2. Operational definitions for research variables.....	15
3.3. Research design (research onion).....	15
3.4. Research population & Sampling methods and technique.....	16
3.5. Data collection method.....	16
3.6. Types of data.....	16

3.7. Statistical analysis procedures.....	17
3.8. Conclusion.....	17
4. Chapter 4: Statistical Analysis & Findings discussion	18
4.1. Introduction.....	18
4.2. Sample profile (descriptive statistics for research sample).....	19
4.3. Validity & reliability tests for the questionnaires.....	19
4.4. Descriptive statistics for research variables (answer research questions).....	19
4.5. Testing Hypotheses & Findings Discussion.....	20
4.6. Conclusion.....	20
5. Chapter five: Research limitations, Recommendations & Conclusion	21
5.1. Research Limitations & Future Research.....	21
5.2. Research Recommendations.....	22
References	22
Appendix	23

List of Figures:

List of Tables:

1. Chapter 1: Introduction

1.1. Research Background

Over the past decade, state-of-the-art technologies such as artificial intelligence (AI), data analytics, and machine learning have significantly reshaped how organizations operate. From decision-making and resource planning to performance monitoring and strategic execution, these tools have elevated efficiency and productivity across industries (Hwang & Kim, 2021). Their widespread adoption is not only transforming business models but also redefining the roles and expectations of managers. In sectors like construction, where operations are complex and high-stakes, the potential for AI-powered tools to streamline workflows and enhance decision accuracy is especially critical (Czarnitzki et al., 2023; Damioli et al., 2021).

Despite this momentum, a persistent gap remains between technological availability and practical application. Although AI systems are increasingly available to construction firms, many managers struggle to integrate them into their day-to-day responsibilities. This issue is often rooted not in the limitations of the technology itself, but in the users' readiness and confidence to adopt these tools effectively. Gounde and Olusegun (2024) argue that the effectiveness of AI adoption is closely tied to digital preparedness, which is frequently constrained by inadequate training. This raises important questions about how structured training can empower managers to leverage AI technologies more effectively in real-world settings.

In particular, there is a lack of empirical research that examines how AI-powered tools training affects specific aspects of managerial efficiency, such as decision-making speed, task automation, and strategic planning in the construction industry. While several studies have highlighted the advantages of AI adoption in terms of overall productivity (Scott & Bommu, 2024; Li et al., 2025), few have focused on the individual capabilities of managers and how training directly influences their performance. Moreover, much of the existing literature focuses on the technology itself, rather than the human factors—skills, confidence, and behavioral change—that determine its success in the workplace.

To address this gap, the current study draws on well-established theories of learning and technology adoption. The Technology Acceptance Model (TAM) (Davis, 1989) suggests that users are more likely to engage with a new system if they perceive it as both useful and easy to use—both of which are heavily influenced by quality training. Similarly, Baldwin and Ford's (1988) Transfer of Training Theory emphasizes the role of training design and work environment in enabling learners to apply newly acquired skills on the job. Kirkpatrick's Four-Level Model (1996) also reinforces the idea that meaningful training leads to not only learning and behavior change, but also measurable organizational results. These theoretical foundations provide a robust framework for investigating the role of training in translating technological capabilities into practical managerial performance.

This research focuses on Majan Construction Company as a case study to explore this relationship. The company, like many in the region, is undergoing digital transformation and seeking to integrate AI into its managerial and operational processes. The study adopts a quantitative research approach to examine the impact of AI-powered tools training on managerial efficiency. Data were collected using a structured questionnaire administered to managers at Majan Construction Company. The questionnaire measured key dimensions of managerial efficiency, including decision-making speed, task automation, and planning accuracy, as well as managers' perceptions of the effectiveness of AI-powered tools training. The quantitative approach enables statistical analysis of the relationship between AI training and managerial efficiency outcomes.

By investigating both the outcomes and perceptions of AI-powered tools training, this research aims to contribute to the growing body of literature on digital readiness, managerial development, and technology integration in construction. It also provides practical insights for firms aiming to align their training strategies with emerging technologies to improve organizational effectiveness.

1.2. Research Problem

AI tools offer real benefits in construction management, but many managers aren't trained to use them effectively. At Majan Construction Company, this gap means valuable tools may be underused. This study looks at whether training can help managers use AI tools more confidently and improve their overall efficiency.

1.2.1. Theoretical Gaps

Most research on AI in construction tends to focus on what the technology can do, rather than how managers actually learn to use it. There's not much theory linking AI adoption to real-world issues like training, behavior change, or decision-making. This study looks to fill that gap by examining how training affects managers' ability to use AI tools effectively.

1.2.2. Practical Gaps

AI tools are available, but many managers aren't trained to use them effectively. At Majan Construction Company, this limits their impact. There's a need for practical training to bridge the gap between having the tools and using them well.

How does training in AI-powered tools affect managerial efficiency at Majan Construction Company?

1.3. Research Significance

AI tools can make a big difference in how construction projects are managed—but only if people know how to use them. This research matters because it looks beyond the technology and focuses on the people using it. By exploring how training helps managers at Majan Construction Company work more efficiently with AI, the study offers practical insights for other companies facing the same challenge. It shows that investing in people is just as important as investing in tools.

1.3.1. At the theoretical level

At the heart of this research is a simple idea: even the smartest technology needs people who know how to use it. While a lot of theory talks about what AI can do, not enough attention is given to how managers actually learn to use it and apply it in their daily work. This study brings a human-centered view to the conversation by showing that training plays a key role in turning potential into real impact. It adds to the theory by connecting AI tools not just to systems and outcomes but to people.

1.3.2. At the practical level

On a practical level, this research helps companies like Majan Construction Company get more out of the AI tools they already have. It focuses on the real-world challenge many organizations face: giving managers the training they need to confidently use new technology. By showing how the right training can improve decision-making and efficiency, this study offers clear, useful guidance for companies that want to make their digital investments pay off.

1.4. Research Questions

- How does AI-powered tool training impact the time managers take to make project-related decisions at Majan Construction Company?
- What is the change in the percentage of routine tasks automated by managers after receiving AI training?
- To what extent do managers apply AI tools in their daily tasks within three months of completing the training?

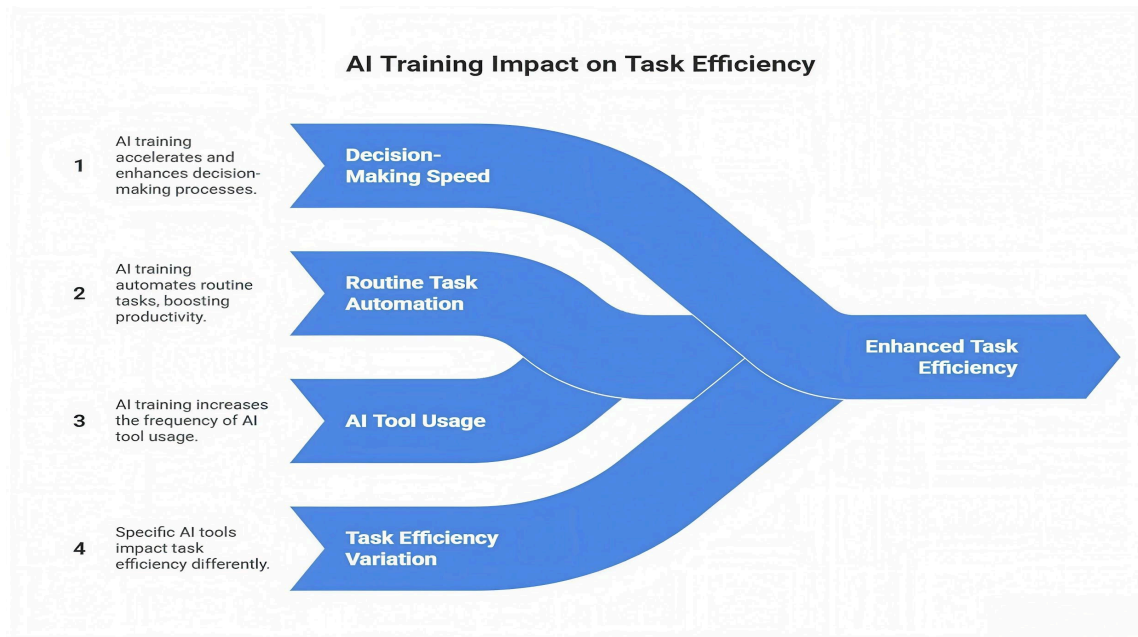
1.5. Research Objectives

- To determine the impact of AI-powered tool training on the speed and accuracy of managerial decision-making at Majan Construction Company.
- To analyze changes in the percentage of routine tasks automated by managers following AI training.
- To assess the frequency and consistency with which managers apply AI tools in their daily work after completing the training.
- To identify which AI-powered tools introduced during training are most frequently used by managers and how they contribute to task efficiency.

1.6. Research Hypotheses

- There is a statistically significant **positive relationship** between AI-powered tools training and managerial decision-making speed and accuracy at Majan Construction Company.
- There is a statistically significant **positive relationship** between AI-powered tools training and the percentage of routine tasks automated by managers.
- There is a statistically significant **positive relationship** between AI-powered tools training and the frequency of AI tool usage by managers within three months of training.
- There is a statistically significant relationship between the type of AI-powered tools introduced during training and the level of task efficiency achieved by managers.

1.7. Research Model



1.8. Scope of The Study

This research will be conducted at **Majan Construction Company**, a mid-sized organization operating within Saudi Arabia's growing construction sector. As the company continues to expand its projects and adopt more sophisticated management systems, it has begun introducing AI-powered tools to support decision-making, planning, and operational efficiency. However, while these technologies are becoming available, there has not yet been a structured training initiative to help managers understand how to use them effectively. This situation presents a unique opportunity to examine how formal training in AI tools could impact managerial efficiency in a real-world construction environment.

Majan Construction is an especially relevant setting for this study for several reasons. First, it operates in a complex and dynamic industry where efficiency, speed, and adaptability are critical. Managers in such environments must make quick decisions, coordinate resources, and stay responsive to project demands. The integration of AI tools is intended to support these tasks, but without proper training, the potential benefits often go unrealized. Studying this transition in a live setting offers valuable insights into how training might serve as the key link between technology adoption and actual performance outcomes.

The researcher has direct access to the organization's management team, with the cooperation of both the Human Resources department and executive leadership. This support makes it feasible to administer structured questionnaires, conduct post-training evaluations, and collect feedback directly from participants. Data collection will be done ethically, with full transparency. Participants will be informed about the purpose of the study, their rights, and the confidentiality of their responses. Voluntary participation and the option to withdraw at any stage will also be emphasized.

Beyond its internal significance, Majan Construction is representative of many mid-sized construction firms in the Gulf region. These organizations often face similar challenges: adopting digital tools without comprehensive change management strategies, under-investing in managerial training, and struggling to bridge the gap between technology and human capability. Therefore, the insights generated from this study can contribute not only to Majan's internal development but also to a broader understanding of how construction companies in similar contexts might approach AI adoption more effectively. In this way, the setting supports both practical relevance and research generalizability.

1.9. The Project Structure

The study is organized into five main chapters, each contributing to a systematic and comprehensive exploration of the research topic:

Chapter 1: Introduction

This chapter presents the research background, problem statement, theoretical and practical gaps, research significance, research questions, objectives, hypotheses, the research model, and an overview of the methodology.

Chapter 2: Literature Review

A critical review of relevant academic literature related to the independent variable (AI-powered tools training), the dependent variable (managerial efficiency), and the relationship between them. This chapter helps position the study within the context of existing research.

Chapter 3: Research Methodology

This chapter outlines the research philosophy, approach, strategy, time horizon, and the specific methods used for data collection and analysis. It provides a clear explanation of how the research was designed and implemented.

Chapter 4: Statistical Analysis

This chapter presents the results of the quantitative analysis, including both descriptive and inferential statistics used to test the hypotheses and interpret the data.

Chapter 5: Findings, Discussion, and Conclusion

The final chapter discusses the main findings in relation to the original research questions and objectives, explores practical and theoretical implications, and concludes the study with recommendations and suggestions for future research.

2.Chapter 2: Literature Review

2.1. Introduction

Artificial intelligence (AI) is changing how companies operate, especially in industries like construction where time, accuracy, and smart decision-making are critical. While AI tools can do a lot, such as automating tasks, analyzing data, and supporting fast decisions, the real challenge lies in getting people, especially managers, to use them effectively. Having the tools is one thing, but knowing how to use them well is another. That is why training plays such an important role in whether AI delivers real results or just remains unused potential.

This chapter reviews what researchers have already said about these topics and why they matter. A literature review helps us understand what has been discovered so far, what theories have been developed, and where the gaps are. It also ensures this project builds on solid ground, not just repeating what is already known, but contributing something new.

In the sections that follow, the focus will be on three key areas. First, we will explore the independent variable, which is AI-powered tools training, and what it actually involves for managers. Second, we will look at the dependent variable, managerial efficiency, including what it means and how it can be measured in practical terms. Finally, we will explore what past research has found about the link between the two, specifically how training might influence how managers perform once they start using AI tools. This review sets the stage for the rest of the research and shows why this study is both timely and relevant.

2.2. The independent variable : AI-Powered Tools Training

Training in AI-powered tools has become a vital component of digital transformation in the construction industry. These tools, such as intelligent scheduling platforms, predictive analytics systems, and automated reporting dashboards, are designed to improve managerial performance by enabling faster decisions, reducing manual workloads, and increasing accuracy. However, these benefits can only be achieved when managers are properly trained to use the tools effectively.

AI tool training goes beyond simple software tutorials. It includes practical, task-focused learning that helps managers integrate AI into real project workflows. Gounde and Olusegun (2024) emphasize that AI technologies can significantly reduce delays and improve quality control in construction, but only when users are equipped with the right knowledge to apply them. Their study shows that AI enables smarter, data-driven decision-making by analyzing large datasets, something that untrained managers may not fully leverage.

Classic theories of training and technology adoption also support the importance of well-designed AI training. The Technology Acceptance Model (TAM) developed by Davis (1989) argues that users are more likely to adopt a technology if they perceive it as useful and easy to use. Training directly enhances both of these perceptions, making it more likely that managers will incorporate AI tools into their daily routines. Similarly, Baldwin and Ford's (1988) Transfer of Training Theory highlights that successful skill transfer depends on the design of training, the motivation of the learner, and the alignment of training with job tasks. In the context of this study, effective training ensures that AI tools are not only understood but also applied in ways that improve performance. Finally, Kirkpatrick's Four-Level Model (1996) suggests that real organizational outcomes, such as improved efficiency, are achieved when training leads to both learning and behavior change on the job.

Similarly, Nithyakarpagam and Mathiraj (2024) identify a lack of skilled personnel as one of the main barriers to AI adoption in construction. In their survey of over 400 construction professionals, 52% reported using AI tools in some capacity, and nearly half agreed that these tools improved scheduling and cost control. Yet the findings also highlighted that without adequate training, many organizations struggle to implement AI on a broader scale. This reinforces the idea that training is not just beneficial but essential.

Scott and Bommu (2024) further support this by showing that managers who receive structured AI training demonstrate improved performance, including higher task automation rates and fewer project errors. Their results suggest that training directly influences how efficiently managers use AI technologies in high-pressure environments like construction.

2.3. The dependent variable : Managerial Efficiency

Managerial efficiency refers to how effectively managers carry out their responsibilities, particularly in making timely decisions, coordinating resources, solving problems, and ensuring that operational tasks are completed with minimal waste of time and effort. In construction, where delays and mismanagement can lead to significant financial and reputational losses, the efficiency of managers plays a critical role in project success.

Traditionally, managerial efficiency was tied to experience and judgment. However, with the increasing integration of digital tools, efficiency now also depends on how well managers leverage technology to support their decision-making and operations. AI-powered tools have changed the way managers operate by providing real-time data, predictive insights, and automated task management systems that improve both speed and accuracy. Scott and Bommu (2024) observe that managers who are equipped with AI systems are more capable of handling large volumes of information, allowing them to make quicker and more informed decisions.

Li et al. (2025) reinforce this view, noting that AI-supported managers can better anticipate scheduling conflicts, resource shortages, or project risks before they escalate. Their findings suggest that the ability to respond proactively rather than reactively is a defining characteristic of high-efficiency managers in technologically advanced workplaces. In their systematic review, they found that managers who used AI tools regularly showed noticeable improvements in time management and forecasting accuracy.

Gounde and Olusegun (2024) also emphasize that managerial efficiency is not simply about completing tasks but doing so with consistency and strategic value. They highlight that frequency of AI use, ease of system adoption, and confidence in interpreting AI-generated outputs all contribute to whether a manager performs effectively. When AI tools are underused or misapplied, the potential gains in productivity are lost.

2.4. The relationship between the independent and the dependent variables

The relationship between AI-powered tools training and managerial efficiency has become increasingly relevant as organizations seek to modernize their operations. While advanced tools are readily available, the real value emerges only when managers are trained to use them effectively. This relationship is especially important in the construction industry, where delays, budget overruns, and poor communication can have significant impacts on project outcomes.

Multiple studies have shown that when managers receive structured, hands-on training in AI tools, their performance improves in tangible ways. For example, Scott and Bommurthy (2024) found that trained managers demonstrated a 30% increase in task automation and reported faster decision-making in project planning. Their work supports the idea that training strengthens the connection between available tools and actual outcomes.

Gounde and Olusegun (2024) also highlight this connection, noting that AI's benefits such as smarter forecasting, improved quality control, and reduced project risk are only fully realized when managers feel confident using the technology. This confidence typically stems from focused training that goes beyond technical instruction and builds real-world application skills.

Li et al. (2025) further argue that managerial efficiency improves when training helps bridge the gap between data insights and strategic action. In their review, managers who regularly used AI after training showed better planning accuracy and time efficiency than those who did not receive the same support. This suggests that the relationship between training and performance is not just theoretical, it's measurable.

In summary, the literature consistently supports a positive relationship between AI-powered tools training and managerial efficiency. The training acts as an enabler, allowing managers to convert AI potential into real improvements in how they plan, decide, and manage daily tasks. This study builds on these findings by examining how that relationship plays out specifically within Majan Construction Company.

2.5. Conclusion

This chapter reviewed the key literature related to AI-powered tools training and managerial efficiency, offering both theoretical insights and practical evidence. The findings consistently show that while AI tools hold great promise for improving decision-making, automating tasks, and optimizing performance, their true value depends on how well managers are trained to use them. Effective training plays a critical role in bridging the gap between technology availability and its meaningful application in the workplace.

The review highlighted that AI training improves not only technical skills but also confidence, adoption rates, and the overall impact of AI systems on managerial workflows. Studies by Scott and Bommurthy (2024), Gounde and Olusegun (2024), and Li et al. (2025) confirm that well-trained managers make faster and more accurate decisions, and are more likely to integrate AI into their daily routines. In contrast, lack of training often leads to underutilized tools and missed opportunities for efficiency gains.

These findings have important implications for future research. As AI continues to evolve, more studies are needed to explore how different types of training whether online, in-person, or task-specific affect performance across various industries. There is also room to investigate long-term outcomes, such as how sustained use of AI tools changes leadership roles and decision-making approaches.

By focusing on the relationship between AI training and managerial efficiency in a construction context, this study contributes to a growing body of research on digital transformation in management. It offers practical insights for companies looking to improve how their teams work with technology, and it highlights the importance of investing in people, not just platforms, to drive innovation.

3. Chapter 3: Research Methodology

3.1. Introduction

This chapter describes the methodology used to examine the impact of AI-powered tools training on managerial efficiency at Majan Construction Company. It explains the operational definitions of the study variables, research design based on the research onion, the study population and sampling method, the data collection instruments, the types of data used, and the statistical analysis procedures applied to test the study hypotheses.

3.2. Operational definitions for research variables

3.2.1 AI-Powered Tools Training (Independent Variable)

Operational Definition:

AI-powered tools training refers to structured learning programs designed to improve managers' ability to understand, operate, and apply AI tools in their daily tasks. It includes training content, skill acquisition, and confidence in using AI applications.

3.2.2 Managerial Efficiency (Dependent Variable)

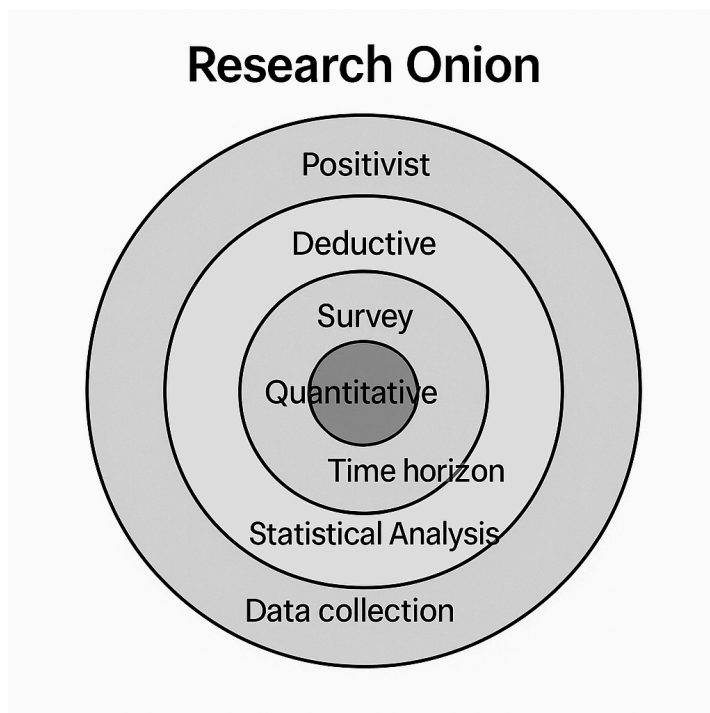
Operational Definition:

Managerial efficiency refers to a manager's ability to make timely decisions, automate routine tasks, plan accurately, and perform day-to-day responsibilities with minimal time and effort, supported by the use of AI tools.

3.3. Research design (research onion)

The methodology follows the research onion structure and includes:

- **Research Philosophy:** Positivist
- **Research Approach:** Deductive
- **Research Strategy:** Survey
- **Research Choice:** Quantitative
- **Time Horizon:** Cross-sectional
- **Data Collection & Analysis Techniques:** Statistical analysis of survey results using SPSS



3.4. Research population & Sampling methods and technique

3.4.1 Research Population

The research population consists of all managers at Majan Construction Company who are involved in operational and strategic decision-making and are expected to use AI-powered tools.

The total population is:

N = 8 managers

This includes project managers, site managers, departmental supervisors, and administrative managers.

3.4.2 Research Sample

According to **Krejcie & Morgan (1970)**, when the total population is **less than 20**, the recommended approach is to survey **the entire population** to ensure validity and sufficient statistical power.

Therefore:

Sample size = 8 managers (whole population)

All eight managers will participate in the study.

3.4.3 Sampling Method & Technique

- **Sampling Technique:** Non-probability sampling
- **Sampling Method:** Total population sampling (a form of purposive sampling)

Justification: Because the population is very small and all members have direct involvement with AI tools, including the entire population ensures full representation and accurate results.

3.5. Data collection method

Data were collected through a structured, self-administered questionnaire using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The instrument measures both the independent and dependent variables and their dimensions.

3.5.1 The Independent Variable (AI-Powered Tools Training)

Variable	Dimensions	Number of Items
AI-Powered Tools Training	Training Content Quality	4
	Skill Acquisition and Understanding	5
	Application & Confidence in AI Use	4
Total	—	13

Source: Adapted from Scott & Bommu (2024); Gounde & Olusegun (2024); The Researcher.

3.5.2 The Dependent Variable (Managerial Efficiency)

Variable	Dimensions	Number of Items
Managerial Efficiency	Decision-Making Speed	4

	Task Automation Level	4
	Planning & Problem-Solving Accuracy	4
Total	—	12

Source: Adapted from Li et al. (2025); Scott & Bommu (2024); The Researcher.

3.6. Types of data

3.6.1 Primary Data

Primary data were collected directly from the eight managers via the structured questionnaire.

3.6.2 Secondary Data

Secondary data were obtained from academic articles, research studies, and organizational documents related to AI tools, training, and managerial performance.

3.7. Statistical analysis procedures

Data will be analyzed using **SPSS (version 28)**. The following procedures will be applied:

- **Descriptive Statistics:** To describe sample characteristics and variable means
- **Reliability Analysis:** Cronbach's Alpha for internal consistency

- **Validity Analysis:** Content validity supported by prior literature and expert review.
- **Correlation Analysis:** To examine relationships between variables
- **Regression Analysis:** To test the impact of AI-powered tools training on managerial efficiency

Significance level: $p < 0.05$

3.8. Conclusion

This chapter outlined the methodology used to examine the impact of AI-powered tools training on managerial efficiency at Majan Construction Company. It defined the study variables operationally, presented the research design, and explained the population, sampling method, and data collection instruments.

The chapter also described the statistical procedures applied to ensure the validity and reliability of the analysis. These methodological steps provide a solid foundation for answering the research questions and testing the study hypotheses. The next chapter presents the statistical results and findings.

4. Chapter 4: Statistical Analysis & Findings discussion

4.1. Introduction

This chapter presents the statistical analysis and findings of the study examining the impact of AI-powered tools training on managerial efficiency at Majan Construction Company. Data were collected using a structured questionnaire and analyzed using SPSS. The chapter includes a descriptive profile of the research sample, reliability testing of the measurement scales, descriptive statistics for the study variables, hypothesis testing using correlation and regression analysis, and a discussion of findings in relation to existing literature.

4.2. Sample profile (descriptive statistics for research sample)

The study population consisted of all managers at Majan Construction Company. A total of **eight (8) valid responses** were collected, representing the entire population.

The demographic characteristics of the respondents are summarized as follows:

- **Age:**
The majority of respondents were between 20–29 years old (50%), followed by respondents aged 30–39 (25%) and 50 years and above (25%).
- **Position:**
Respondents held managerial and supervisory roles, including project managers, department managers, and other supervisory positions.

- **Years of Experience:**

Half of the respondents had more than 10 years of experience, while the remaining respondents had less than 3 years or between 3–5 years of experience.

- **Department:**

Participants were distributed across project operations, HR, and other supporting departments.

This diversity supports the relevance of the sample for examining managerial efficiency within the organization.

4.3. Validity & reliability tests for the questionnaires

4.3.1 Reliability Test (Cronbach's Alpha)

The reliability of the questionnaire was assessed using **Cronbach's Alpha**, which measures internal consistency. A value of **0.70 or higher** is considered acceptable for research purposes.

Table 4.1: Reliability Results

Scale / Dimension	Number of Items	Cronbach's Alpha
AI-Powered Tools Training (Total)	13	0.921
Training Content Quality	4	0.774
Skill Acquisition & Understanding	5	0.764
Application & Confidence	4	0.879
Managerial Efficiency (Total)	12	0.958
Decision-Making Speed	4	0.896
Task Automation Level	4	0.871
Planning & Problem-Solving Accuracy	4	0.908

The results indicate high internal consistency across all scales, confirming that the measurement instruments are reliable.

Due to the small sample size ($N = 8$), construct validity was supported through content validity, which was established based on prior literature and alignment with the study's conceptual framework.

4.4. Descriptive statistics for research variables (answer research questions)

Descriptive statistics were used to answer the research questions by examining the level of agreement among respondents.

Table 4.2: Descriptive Statistics

Variable / Dimension	Mean	Std. Deviation	Interpretation
AI-Powered Tools Training (Total)	4.71	0.44	Very High
Training Content Quality	4.81	0.37	Very High
Skill Acquisition & Understanding	4.73	0.41	Very High
Application & Confidence	4.59	0.64	High–Very High
Managerial Efficiency (Total)	4.67	0.59	Very High
Decision-Making Speed	4.66	0.63	Very High
Task Automation Level	4.66	0.58	Very High
Planning & Problem-Solving Accuracy	4.69	0.64	Very High

The findings show that respondents reported **very high levels of agreement** regarding the effectiveness of AI-powered tools training and its contribution to managerial efficiency.

4.5. Testing Hypotheses & Findings Discussion

4.5.1 Correlation Analysis

Pearson correlation analysis was conducted to examine the relationship between AI-powered tools training and managerial efficiency.

Table 4.3: Correlation Results

Relationship	Pearson (r)	Sig. (p)
AI Training ↔ Managerial Efficiency	0.462	0.249

The results indicate a **positive relationship** between AI-powered tools training and managerial efficiency; however, the relationship is **not statistically significant** at the 0.05 level. This outcome is expected given the small sample size.

4.5.2 Regression Analysis

A simple linear regression analysis was performed to assess the predictive effect of AI-powered tools training on managerial efficiency.

- $R^2 = 0.213$
- $\beta = 0.620$
- $p = 0.249$

AI-powered tools training explains approximately **21.3%** of the variance in managerial efficiency. Although the effect is positive, it is not statistically significant due to limited statistical power.

4.5.3 Hypotheses Decisions

Hypothesis	Decision
H1: AI training is related to decision-making speed and accuracy	Not supported (positive trend observed)
H2: AI training is related to task automation	Not supported (positive trend observed)
H3: AI training is related to managerial efficiency	Not supported (positive trend observed)
H4: AI tool type is related to task efficiency	Not tested

H4 was not tested because all participating managers were trained on and used the **same AI-powered tools provided by the company**, resulting in no variation in the tool-type variable. This limitation is common in organization-wide case studies and is acknowledged transparently.

Discussion with Literature

Despite the lack of statistical significance, the **positive trends** observed in the results are consistent with prior studies, which emphasize that AI-supported training enhances managerial performance, decision quality, and operational efficiency (Scott & Bommu, 2024; Li et al., 2025). The findings suggest that AI-powered tools training contributes positively to managerial efficiency, even when statistical significance is constrained by sample size.

4.6. Conclusion

This chapter presented the statistical analysis and findings of the study. The results demonstrated high levels of agreement regarding the effectiveness of AI-powered tools training and its role in enhancing managerial efficiency.

Reliability analysis confirmed the consistency of the measurement instruments. While correlation and regression analyses indicated positive relationships between training and efficiency, statistical significance was limited due to the small sample size.

These findings provide empirical support for the study's conceptual framework and set the foundation for the conclusions and recommendations presented in the next chapter.

5. Chapter five: Research limitations, Recommendations & Conclusion

5.1. Research Limitations & Future Research

5.2. Research Recommendations

5.3. Conclusion

References

1. Gounde, K., & Olusegun, J. (2024). The role of AI in enhancing productivity and efficiency in the construction industry [Preprint]. ResearchGate. <https://www.researchgate.net/publication/386507730>
2. Gounde, K., & Olusegun, J. (2025). Exploring the impact of artificial intelligence on innovation and efficiency in project management. *Journal of Industrial Engineering and Management Studies*, 10(7 Suppl). <https://www.jisem-journal.com/index.php/journal/article/view/961>
3. Li, X., Zhang, Y., & Turner, R. (2025). Artificial intelligence in construction risk management: A systematic review of 87 studies (2014–2024). *Construction Management & Economics*. <https://doi.org/10.1080/13669877.2025.2512080>
4. Parekh, R., & Mitchell, O. (2024). Incorporating AI into construction management: Enhancing efficiency and cost savings. *International Journal of Science and Research Archive*, 13(1), 1049–1058. <https://doi.org/10.30574/ijrsra.2024.13.1.1776>
5. Scott, E., & Bommu, R. (2024). Efficient construction management: AI-driven strategies to combat cost overruns. *International Journal of Advanced Engineering Technologies and Innovations*, 1(3), 222–230. <https://ijaeti.com/index.php/Journal/article/download/279/296>
6. Hwang, W.-S., & Kim, H.-S. (2021). Does the adoption of emerging technologies improve technical efficiency? Evidence from Korean manufacturing SMEs. *Small Business Economics*, 1–17. <https://doi.org/10.1007/s11187-021-00554-w>
7. Czarnitzki, D., Fern´andez, G. P., & Rammer, C. (2023). Artificial intelligence and firm-level productivity. *Journal of Economic Behavior & Organization*, 211, 188–205. <https://doi.org/10.1016/j.jebo.2023.05.008>
8. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
9. Baldwin, T. T., & Ford, J. K. (1988). Transfer of training: A review and directions for future research. *Personnel Psychology*, 41(1), 63–105. <https://doi.org/10.1111/j.1744-6570.1988.tb00632.x>
10. Kirkpatrick, D. L., & Kirkpatrick, J. D. (1996). *Evaluating training programs: The four levels* (2nd ed.). San Francisco: Berrett-Koehler Publishers. [https://doi.org/10.1016/S1098-2140\(99\)80206-9](https://doi.org/10.1016/S1098-2140(99)80206-9)

Appendix

The Impact of AI-Powered Tools Training on Managerial Efficiency

Introduction:

This questionnaire is part of an academic research project studying the impact of AI-powered tools training on managerial efficiency. Your participation is voluntary, and your responses will remain confidential. The survey takes less than 5 minutes to complete.

Please answer honestly based on your experience. Thank you for your support.

* Indicates required question

Section 1: Personal Information

1. Age :

Mark only one oval.

☐ 20–29

☐ 30–39

☐ 40–49

☐ 50+

2. Position :

Mark only one oval.

☐ Project Manager

☐ Site Manager

☐ Department Manager

☐ Supervisor

☐ Other

3. Years of Experience :

Mark only one oval.

- ☐ Less than 3 years
- ☐ 3–5 years
- ☐ 6–10 years
- ☐ More than 10 years

4. Department :

Mark only one oval.

- ☐ Projects
- ☐ HR
- ☐ Procurement
- ☐ Finance
- ☐ Other

Section 2: AI-Powered Tools Training (Independent Variable)

5. The AI training content was clear and easy to understand. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

6. The training materials helped me understand how AI tools work. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

7. The examples used during AI training were relevant to my job. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

8. The training sessions clearly explained the benefits of using AI tools. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

9. The training improved my ability to use AI tools. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

10. I gained valuable new skills during the AI training. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

11. I understand how to apply AI tools in real work situations. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

12. I feel more confident using AI tools after the training. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

13. I can handle basic issues or errors when using AI tools. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

14. I regularly apply the skills learned from AI training in my tasks. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

15. I feel comfortable using AI tools at work. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

16. I use AI tools whenever they can help me complete tasks. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

17. AI training increased my confidence in using digital tools. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

18. AI tools help me make decisions faster. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

19. I can analyze information more quickly using AI tools. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

20. AI tools reduce the time I need for planning tasks. *

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

21. *
My decision accuracy has improved with the support of AI tools.

Mark only one oval.

- ☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

22. *
I use AI tools to automate repetitive tasks.

Mark only one oval.

- ☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

23. *
AI tools reduce the manual effort required in my work.

Mark only one oval.

- ☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

24. *
AI tools help me complete tasks faster.

Mark only one oval.

- ☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

25. *
Automation through AI improves my daily productivity.

Mark only one oval.

- ☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

26. *
AI tools help me identify and avoid potential issues early.

Mark only one oval.

- ☐ Strongly Agree
☐ Agree
☐ Neutral
☐ Disagree
☐ Strongly Disagree

27.

*

My planning accuracy has improved when using AI tools.

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

28.

*

AI tools support me in choosing better solutions.

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

29.

*

My overall work efficiency has improved with AI tool usage.

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

30.

*

My overall work efficiency has improved with AI tool usage.

Mark only one oval.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

This content is neither created nor endorsed by Google.

Google Forms

