



**Factors Influencing AI-Based Project
Management and Its Outcomes
In Industrial Engineering Firms**

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Research Problem

- Development of AI in different Industries is increasing.
- AI in project management remains in its early stages of development.
- Significant challenges in design, standardization, and implementation, particularly in practical applications.

Practitioner Insights (Saudi Arabia)

Based on the researcher's own experience in Saudi design and consultancy engineering firms and informal discussions with project directors, project managers, and CEOs.

Research Main Questions

1. What factors influence the utilization of AI-based project management?
2. What are the outcomes of AI-based project management?
3. How does AI-based project management mediate the relationship between influencing factors and project outcomes?

Research Objectives

01 Identify & Evaluate

Key factors influencing AI tool utilization in project management within design and consultancy engineering projects.

02 Analyze Direct Influence

The direct influence of these factors on the outcomes of AI-based project management.

03 Examine Mediation

How AI-based project management mediates the relationship between influencing factors and project outcomes.

04 Describe Distribution

AI utilization and outcomes across different organizational types, sizes, and participant demographics.

05 Propose Recommendations

Actionable, practical, grounded recommendations to enhance AI-based PM practices in the Saudi design and design and consultancy sector.

Study Importance

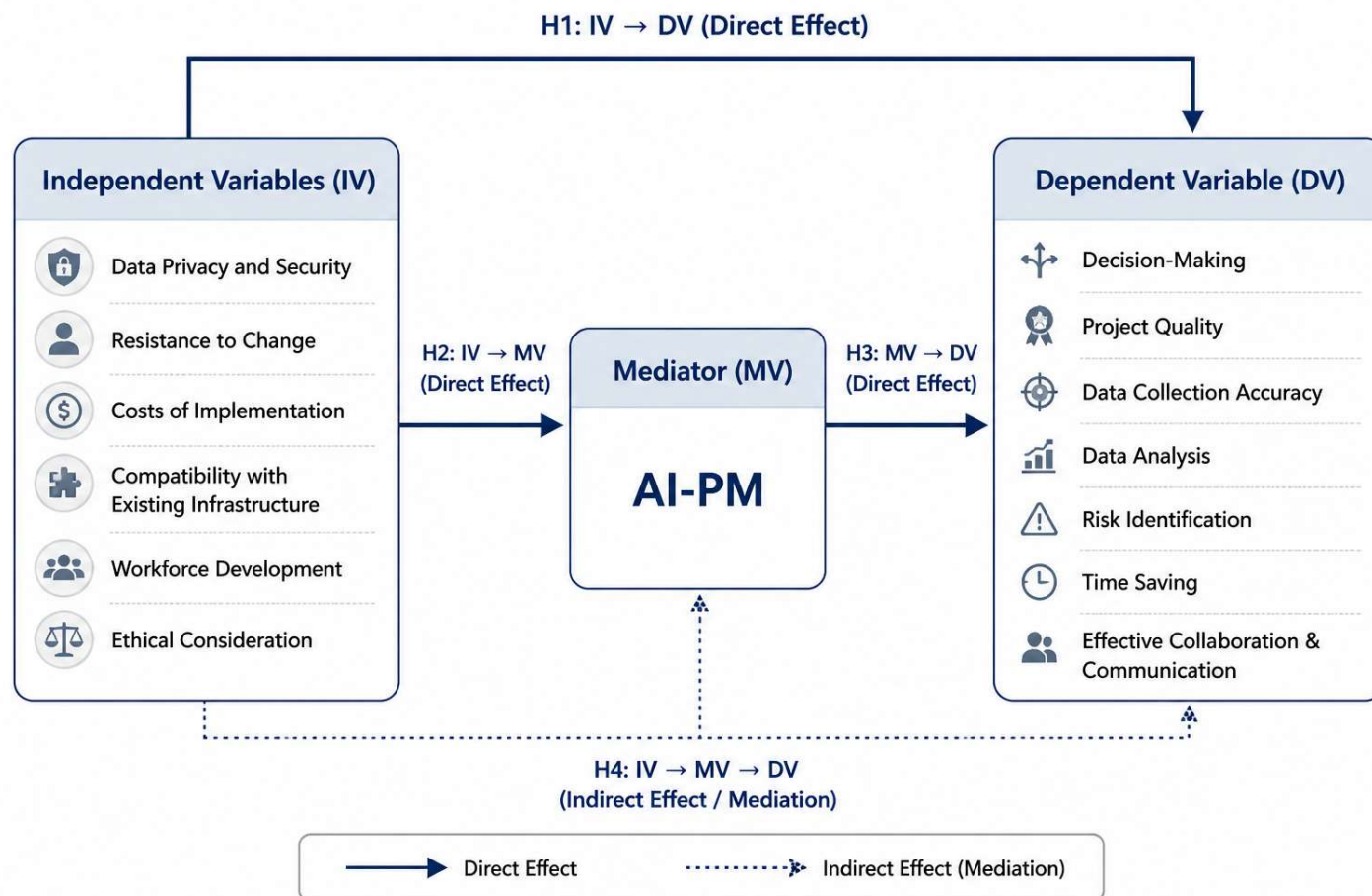
Scientific Importance

- This study fills a critical gap in academic literature by literature by identifying and measuring the Influencing Influencing factors.
- This study addresses that gap by quantifying the effects effects of applying AI and measuring its impact on key on key variables.

Practical Importance

- Companies must prioritize practical AI utilization to achieve strategic objectives and stay competitive.
- Understanding the factors contributing to successful and sustainable AI implementation is critical for organizations seeking to maximize project outcomes.
- This study provides actionable insights enabling organizations to integrate AI effectively, ensuring long-term value in design and consultancy engineering projects.

Theoretical Framework & Previous Literature Review



Continue-Theoretical Framework & Previous Literature Review

Literature Review: Gaps & Contributions

A review of 63 key studies on AI in project management, classified into four categories, reveals three primary research gaps that this study directly addresses.

1. Literature Review Focused on the Relationship Between Independent Variables and Dependent Variables
2. Literature Review Focused on the Relationship Between Independent Variables and Mediating Variables
3. Literature Review Focused on the Relationship Between Mediating Variables and Dependent Variables
4. General AI & Project Management Literature Review



Gap 1: Limited Design & Consultancy Consultancy Focus

- Most research examines AI in construction (Al-Ghamdi & Darman, 2022), manufacturing (Tubman, 2022), healthcare (Ruiz, 2020), and finance (Khatib et al., 2016).
- There is a noticeable lack of studies analyzing AI's impact specifically on design and consultancy engineering projects in Saudi Arabia.



Gap 2: No Integrated Mediation Model

- Many studies focus either on AI utilization barriers or AI's impact on outcomes, but few comprehensively link both.
- No prior study presents a structured model integrating independent factors, AI-factors, AI-based PM as mediator, and dependent project outcomes (Odejide & Edunjobi, 2024; Mahmood et Mahmood et al., 2023; Ruiz, 2020).



Gap 3: Insufficient Context-Specific Specific Guidance

- Most studies offer general insights without without practical recommendations tailored tailored to specific industries.
- Ethical considerations, regulatory compliance (PDPL, SDAIA), and organizational resistance in project-based based sectors are not well documented documented (Weng, 2023; Sahadevan, 2023; 2023; Mahmood et al., 2023).

(Methodology)

Research Design

- Concurrent triangulation mixed-methods design (Creswell & Plano Clark, 2017/2018).
- Quantitative and qualitative data collected simultaneously Sep–Nov 2025, analyzed in parallel, parallel, integrated via systematic triangulation.

Instruments

5-point Likert questionnaire measuring 6 IVs, AI-PM AI-PM mediator, 7 DVs, demographics, and open-ended items.

Semi-structured interview guide aligned with all variable types. Both validated via expert review and pilot testing (Cronbach's $\alpha > 0.70$ throughout).

Sample

- n=103 questionnaire respondents (GPower validated: validated: $f^2=0.15$, power=0.95, min. n=68).
- and n=10 saturation interviews from Saudi design/consultancy professionals.
- Including project directors, managers, engineers, and AI and AI specialists.

Analysis

- SPSS descriptives, correlations, and regressions; AMOS AMOS two-step SEM (CFA validation then path/bootstrap path/bootstrap mediation);
- Thematic analysis with 18 predefined codes; integrating integrating SEM paths and qualitative themes.

Key Findings

Hypothesis	Main result	Variance %	Conclusion	Notes
H1	Influencing factors →→ project outcomes	24%	Supported.	H1 was strongly supported; the six organizational factors jointly explained 23.5% of the variance in project outcomes.
H2	Influencing factors →→ AI-based project management	25%	Supported.	H2 was strongly supported; the six factors jointly explained 25.2% of variance in AI-based PM adoption.
H3	AI-based project management →→ project outcomes	60%	Very strongly supported.	H3 was very strongly supported; AI-based PM alone explained 60.0% of variance in project outcomes, making it the strongest main effect in the model.
H4	Mediation effect through AI-based project management	85%	Full mediation supported.	H4 was fully supported; AI-based PM fully mediated the relationship between the organizational factors and project outcomes.

1. The quantitative results showed that infrastructure compatibility and workforce development were the strongest predictors of AI-based project management utilization.
2. The qualitative also confirmed the Quantitative findings.
3. The effect of the (organizational) influencing factors on project outcomes is mostly indirect.

Practical Recommendation

- Building AI-ready infrastructure,
- Developing employee skills and managing implementation strategically.
- Organizational change requires systems, people, policies, and leadership support.
- Organizations should pay close attention to data governance, ethical use, and compliance with Saudi regulations such as PDPL and SDAIA requirements.

اشكرکم علی حسن استماعکم
Thank You