

Artificial Intelligence Adoption and Project Management Success in the UAE Construction Sector

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Chapter 1: Introduction

1.1 Research Background

Construction is one of the largest industries in the world, but it is also one of the least digitized. For decades its output per worker has grown more slowly than in manufacturing or services, and it has not seen the same productivity gains that changed those sectors (Regona et al., 2022). A lot of this comes down to project management. Construction projects are big, and they involve many different stakeholders at once. Even after years of improving project management methods, teams still deal with cost overruns, late schedules, and quality problems (Project Management Institute [PMI], 2021).

Other industries have moved faster. Finance and retail took up digital tools early to stay competitive (Rogers, 2003), while construction has been slow to catch up. AI is now a normal part of automation and decision-making in many fields, but it is only starting to appear in construction work (Abioye et al., 2021). Because of this, more researchers and project managers are turning to AI to try to close the performance gap.

Recent studies point to several ways AI could help. These include machine-learning tools for cost estimation and scheduling, generative design, and computer-vision systems for safety monitoring (Abioye et al., 2021). Most research on technology adoption builds on the Technology Acceptance Model (TAM). Davis (1989) argued that two things decide whether people adopt a new tool: how useful they think it is, and how easy they think it is to use. Venkatesh et al. (2003) later expanded this into the UTAUT framework, which adds social influence and facilitating conditions. Researchers now use both models to study how project-based organizations take up AI.

The existing research still has clear gaps. Most of it is conceptual and focuses on what AI could do, rather than showing that it actually improves project results (Abioye et al., 2021; Regona et al., 2022). The empirical evidence is also mostly from Western markets. The Gulf Cooperation Council (GCC), and the United Arab Emirates (UAE) in particular, has received little attention, even though a lot of construction happens there. Another problem is that adoption theory is rarely tested against the outcomes project managers actually track: cost, schedule, quality, and stakeholder satisfaction. So there is not enough evidence yet to say that adopting AI leads to measurable benefits.

This gap matters even more in the UAE. Construction there is closely tied to large economic plans, from Etihad Rail to Dubai's 2040 Urban Master Plan. In its National Strategy for Artificial Intelligence 2031, the UAE Government (2017) named construction and infrastructure as key areas for AI-driven productivity. On the ground, though, much of the sector still runs on traditional subcontracting and scattered project data. Before PMO leaders and project managers invest heavily in

AI, they need evidence that it pays off. This makes the UAE construction market a useful and under-studied place to test technology-adoption theories.

This study brings together established project success criteria and technology-adoption theory to look at how AI affects project management success in the UAE construction sector.

1.2 Research Problem

TAM (Davis, 1989) and UTAUT (Venkatesh et al., 2003) were built for stable office settings. Construction projects are different. They are temporary, often disorganized, and involve many stakeholders. In construction, simply using a piece of software does not mean the project succeeded. Success is usually judged by cost, schedule, quality, and stakeholder satisfaction (PMI, 2021). Adoption theories, though, rarely test their main ideas, such as perceived usefulness, against these kinds of project outcomes.

In practice, UAE construction firms have very little to guide their AI investment decisions. Vendors and industry blogs advertise big efficiency gains, but there is almost no independent, peer-reviewed evidence that AI actually improves construction outcomes in the UAE (Regona et al., 2022).

This leaves one main question unanswered: to what extent does AI adoption actually affect project management success in the UAE construction sector?

1.3 Research Significance

On the theory side, this study applies TAM and UTAUT to project-level outcomes instead of just individual intentions to use a tool (Venkatesh et al., 2003). It also adds empirical data from the UAE, which is useful because most existing studies come from North America, Europe, and East Asia (Abioye et al., 2021; Regona et al., 2022).

On the practical side, the findings can help UAE construction firms make better-informed investment decisions by showing which project management tasks, such as risk monitoring or scheduling, benefit most from AI. Policymakers can also use this sector-specific evidence when designing regulations and incentives for national digital transformation programs.

1.4 Research Questions

- Main Question: To what extent does the adoption of artificial intelligence influence project management success in the UAE construction sector?
- Sub-Question 1: To what extent does the perceived usefulness of AI adoption influence project cost performance in UAE construction projects?
- Sub-Question 2: To what extent does the perceived ease of use of AI adoption influence schedule adherence in UAE construction projects?
- Sub-Question 3: What is the relationship between organizational facilitating conditions for AI adoption and stakeholder-rated project success in UAE construction projects?

1.5 Research Objectives

1. To examine the impact of perceived usefulness of AI adoption on project cost performance in the UAE construction sector.
2. To assess the influence of perceived ease of use of AI adoption on schedule adherence in the UAE construction sector.
3. To investigate the relationship between organizational facilitating conditions for AI adoption and stakeholder-rated project success in the UAE construction sector.
4. To determine the overall relationship between AI adoption and project management success in the UAE construction sector.

1.6 Research Hypotheses

- H1: There is a statistically significant positive relationship between the perceived usefulness of AI adoption and project cost performance.
- H2: There is a statistically significant positive relationship between the perceived ease of use of AI adoption and schedule adherence.
- H3: There is a statistically significant positive relationship between organizational facilitating conditions for AI adoption and stakeholder-rated project success.
- H4: There is a statistically significant positive relationship between overall AI adoption and project management success.

1.7 Research Model

The model links the three AI adoption dimensions to three project management success measures. The proposed relationships are:

- Perceived Usefulness will positively affect Cost Performance (H1).
- Perceived Ease of Use will positively affect Schedule Adherence (H2).
- Facilitating Conditions will positively affect Stakeholder-Rated Project Success (H3).
- Overall AI Adoption will positively affect Overall Project Management Success (H4).

1.8 Research Methodology

This study takes a positivist approach and uses deductive reasoning to test existing theories (Saunders et al., 2019). The main method is a quantitative, cross-sectional survey given to project management staff in UAE construction firms.

There is no public list of these professionals, so the study uses purposive sampling. It targets PMO staff, planning engineers, and project managers at large consultancies and contracting firms who can see both how technology is used and how projects turn out. The aim is at least 100 usable responses. That is enough for a multiple regression with three independent variables, with some margin for incomplete answers.

The questionnaire has three sections:

1. Demographics: firm size, role, experience, and project type, used as control variables.
2. AI adoption: adapted from the validated scales in Davis (1989) and Venkatesh et al. (2003), reworded to focus on AI-enabled project management tools rather than information systems in general.
3. Project management success: cost, schedule, and stakeholder-rated success, based on criteria from Atkinson (1999) and the Project Management Institute (2021).

All main items use a five-point Likert scale. Using scales that have already been tested helps with content validity. A pilot test will catch any unclear wording before the survey goes out, and internal consistency will be checked with Cronbach's alpha, using the usual 0.70 cut-off. Taking part is voluntary and anonymous, and no commercially sensitive or personally identifying data will be collected.

The analysis has two stages. First, descriptive statistics describe the sample and how the responses are spread out. Then inferential analysis, using Pearson correlation and multiple regression, tests the hypotheses. H1, H2, and H3 are tested through their own regression coefficients, and H4 uses composite scores for overall adoption and overall success.

1.9 Scope of the Study

The study looks only at large consultancy and contracting firms in the UAE construction sector, mainly those working on mixed-use and infrastructure projects in Abu Dhabi and Dubai. These firms are among the earliest AI adopters in the region (Regona et al., 2022), which makes them a sensible group to study.

1.10 The Suggested Project Structure

The rest of this project has four more chapters. Chapter 2 reviews the literature on AI adoption and project success. Chapter 3 explains the methodology and data collection. Chapter 4 presents the descriptive and inferential results. Chapter 5 discusses the findings in light of the literature and gives recommendations.

Chapter 2: Literature Review

2.1 Introduction

This study sits between two well-developed research areas: technology adoption and project management success. Each has a large body of literature and established models. The two are rarely combined, though, and almost never in the context of construction in the Gulf.

2.2 The Independent Variable: AI Adoption

In this study, "AI adoption" means how far organizations and their staff take up and use AI-enabled tools. Davis (1989) based the Technology Acceptance Model (TAM) on two main factors: perceived usefulness (whether people think a tool will improve their job performance) and perceived ease of use (how much effort they

think it will take to use). Davis did not just propose these ideas; he tested them. He ran a field study with 112 IBM Canada employees using email systems, and a lab study with 40 people using business software. In both, perceived usefulness was more strongly linked to actual use than ease of use was ($r = .63$ vs. $r = .45$ in the field study), which is why later research often treats usefulness as the more important factor.

Venkatesh et al. (2003) later combined TAM with seven other models, including innovation diffusion and social cognitive theory, to build UTAUT. UTAUT sets out four factors behind adoption: performance expectancy, effort expectancy, social influence, and facilitating conditions (the organizational and technical support available). It also adds moderators such as age, gender, experience, and whether use is voluntary. The model worked well, explaining about 70% of the variance in behavioral intention in the authors' own longitudinal tests.

Because these models were made for regular office settings, it is worth checking whether they hold up in construction. The early evidence looks positive. Vitente et al. (2024) applied TAM and the Information Systems Success Model to Building Information Modeling (BIM) adoption in Qatar. Using structural equation modeling on survey data from architects, engineers, and contractors, they found that usefulness and ease of use mattered, but so did organizational factors like financial readiness and innovativeness. This supports the idea that UTAUT's facilitating conditions are important in Gulf construction.

In construction, AI usually shows up as generative design, predictive maintenance, computer-vision safety monitoring, and machine-learning scheduling (Abioye et al., 2021). Regona et al. (2022) ran a PRISMA review and found that construction AI mostly targets resource allocation, risk prediction, and planning. Adoption is held back, though, by limited data, organizational caution, and low digital literacy among workers. Since Regona's review draws on already-published studies, it shows where adoption is happening more than what it actually delivers.

Closer to this study's focus, Iqbal et al. (2026) looked at the UAE directly. Instead of treating all barriers as equal, they ranked the governance, technological, and organizational obstacles facing UAE construction supply chains. This study goes the other way: rather than asking what blocks AI adoption, it asks what happens when adoption works.

2.3 The Dependent Variable: Project Management Success

There is no single agreed definition of project success. The traditional one is the "iron triangle" of time, cost, and quality. Atkinson (1999) argued that this view is too narrow, since a project can meet all its cost and time targets and still be seen as a failure if stakeholders are unhappy or the organization gains nothing from it. Pinto and Slevin (1987) focused more on how a project is run than on what it delivers, pointing to success factors like top management support and regular

feedback. The PMI (2021) now brings these views together, measuring success through cost, schedule, quality, stakeholder satisfaction, and the benefits actually realized.

This study follows the broader PMI view and breaks success into three measurable parts: cost performance, schedule adherence, and stakeholder-rated project success. How success is measured matters a lot. Cost and schedule look objective, but they depend on baseline estimates that may be off. Stakeholder success is more subjective and has to be gathered through surveys. As Atkinson (1999) noted, these measures are not interchangeable, since a project can do well on one and poorly on another. To keep the measures consistent, this study collects all three from survey respondents rather than mixing survey data with project records.

2.4 The Relationship Between the Variables

There is still very little direct evidence linking AI adoption to project success. Technology adoption and project outcomes have each been studied a lot on their own, but the link between them through AI is mostly theoretical so far. TAM and UTAUT suggest that strong facilitating conditions and high perceived usefulness lead to more use of a technology (Davis, 1989; Venkatesh et al., 2003). More use of specialized AI tools should, in theory, lead to tighter schedules and better cost estimates (Abioye et al., 2021). In fact, expected cost and time savings are the main reason firms adopt these tools in the first place (Regona et al., 2022).

Most current research, though, shows technical capability rather than real organizational benefit. Lagos et al. (2024), for example, used machine learning to predict schedule deviations across 164 projects with high accuracy (an R-squared of 0.96). That shows an algorithm can predict schedules well, but it does not show that firms using the algorithm actually finish their projects on time.

This gap between what AI can do in theory and what it delivers in practice, especially in the UAE, is the basis for Hypotheses 1 through 4.

2.5 Conclusion

The literature offers solid models for why people adopt technology and clear frameworks for judging project success. Recent studies from Qatar and the UAE suggest these adoption theories carry over reasonably well to Gulf construction. Research that connects the two is still scarce. Most studies either list barriers to adoption or show that AI works technically, without linking it to project results. Whether AI actually improves cost, schedule, and stakeholder outcomes for UAE construction firms is still an open question.

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