INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 16, Issue 5, (2026) E-ISSN: 2222-6990

AI-Powered Cloud Platform and Employee Job Performance in the Construction Industry: A Conceptual Framework

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DOI Link: http://dx.doi.org/10.6007/IJARBSS/v16-i5/28125

Published Date: 15 May 2026

Abstract

The construction industry is undergoing significant digital transformation, driven by the increasing adoption of advanced technologies such as artificial intelligence (AI)-powered cloud platforms to improve operational efficiency, workforce coordination, and project delivery. As construction projects become more complex and data-intensive, organizations are increasingly relying on AI-enabled cloud solutions to support real-time decision-making and enhance employee performance. However, despite this growing momentum, the successful adoption of such technologies remains inconsistent, largely due to variations in technological readiness and organizational preparedness. Addressing this gap, this conceptual paper proposes a framework that examines how key technological factors—namely technological complexity, system compatibility, and perceived relative advantage—influence employee job performance through AI-powered cloud platform adoption readiness. The framework conceptualizes adoption readiness as a mediating mechanism that explains how technological conditions translate into workplace performance outcomes. The novelty of this study lies in integrating technology adoption readiness with employee job performance within the construction context, thereby extending existing digital transformation and technology acceptance literature from a social science perspective. By focusing on employee-level performance implications, this paper contributes theoretically to the emerging discourse on AI-enabled work systems. It offers practical insights for construction firms, technology providers, and policymakers seeking to strengthen digital readiness and workforce effectiveness. Future empirical research is recommended to validate and refine the proposed framework across different organizational and industrial settings.

Keywords: Employee Job Performance, Artificial Intelligence, Cloud Platform, Technological Complexity, System Compatibility, Relative Advantage

Introduction

The construction industry has traditionally been recognized as a labor-intensive sector that has been relatively slow in adopting advanced digital technologies compared with other industries (Wang *et al.*, 2024). However, in recent years, increasing project complexity, rising demands for operational efficiency, and the need for improved safety and precision have accelerated the industry's digital transformation (Parekh & Mitchell, 2024). Organizations are increasingly integrating emerging technologies such as Artificial Intelligence (AI), cloud computing, Building Information Modeling (BIM), automation, and intelligent construction systems to improve project delivery and organizational performance (Kosaraju, 2024).

Among these technological advancements, the AI-powered cloud platform has emerged as one of the most significant innovations reshaping construction operations (Chandra & Deep, 2024). By integrating AI capabilities with cloud-based infrastructure, such platforms enable real-time data processing, centralized information access, predictive analytics, and automated decision support (Prabhakaran, 2024). This technological integration supports more efficient workflow management, enhances communication across departments, and improves coordination among project stakeholders (Sanodia, 2024). As a result, construction firms can streamline operational processes, reduce human error, and improve project execution efficiency (Vanam, 2025).

More importantly, the adoption of the AI-powered cloud platform has direct implications for employee job performance, which remains a critical determinant of organizational success in the construction sector (Purohit, 2025). Construction projects require continuous coordination among engineers, project managers, site supervisors, procurement teams, and administrative personnel (Zahoor, 2023). In this context, the AI-powered cloud platform facilitates faster access to project information, supports complex calculations, improves task scheduling, and enables timely decision-making (Rinkey & Bhatia, 2023). These capabilities contribute to both task performance—the effective completion of core job responsibilities—and contextual performance, which includes collaboration, adaptability, and proactive problem-solving within teams (Borra, 2024).

At the national level, countries such as China have accelerated the integration of AI-powered cloud technologies into construction activities to support rapid urbanization and large-scale infrastructure development (Wang *et al.*, 2024). The use of AI for predictive maintenance, resource optimization, quality monitoring, and safety management demonstrates how digital transformation is becoming strategically important for enhancing both project outcomes and workforce productivity (Gowda *et al.*, 2024). In addition, these technologies align with broader sustainability goals by supporting green construction practices, minimizing waste, and improving resource allocation efficiency (Liu, 2025).

Despite these advancements, the construction industry has not yet fully realized the potential of the AI-powered cloud platform, particularly in understanding how technological infrastructure and employee capability jointly influence job performance (Pitkar & Ambapkar, 2025). Existing studies have primarily focused on the technical benefits of AI adoption, with comparatively limited attention given to the human and organizational dimensions, especially within the context of employee performance improvement in construction settings

(Kumar, 2024). This creates an important research gap in the social science and organizational behavior literature (Vlist *et al.*, 2023).

The novelty of this research lies in its integration of technological and human performance perspectives through an action research framework (Prabhakaran, 2024). Specifically, the study examines how improvements in AI-powered IT resources and infrastructure, together with AI-based skills and knowledge development, influence employee job performance in the construction industry (Zahoor, 2023). By linking technology adoption factors with workplace behavior and performance outcomes, this research contributes to the social science field by extending understanding of digital transformation from a socio-technical perspective (Kosaraju, 2024). Furthermore, the proposed conceptual framework offers both theoretical insight and practical guidance for construction organizations seeking to enhance workforce performance through AI-enabled systems (Wang *et al.*, 2024).

Overall, this study positions the AI-powered cloud platform not merely as the technological tool but as the strategic enabler of organizational capability, employee effectiveness, and sustainable competitive advantage in the evolving construction landscape (Parekh & Mitchell, 2024; Sanodia, 2024).

Problem Statement

The construction sector under tremendous pressure to modernize and operate efficiently has lagged in adopting advanced digital technologies such as the AI-powered cloud platform (Taiwo *et al.*, 2024) which could greatly enhance employee job performance by providing seamless workflows, real-time information access and data-driven decision-making processes (Santos & Jocson, 2024) due to identified research-practice gaps constraining realization of benefits (Corbin *et al.*, 2024) this includes knowledge, evidence and practice knowledge related gaps that limit full exploitation potential of AI-powered cloud platform in boosting employee job performance in construction sector (Ghimire *et al.*, 2023).

Firstly, knowledge gap exists on how previous studies have provided insights on how the AI-powered cloud platform might be strategically accepted to boost employee job performance across sectors none such study focused on similar aspects within construction industry contexts to include IT infrastructure readiness and employee abilities for technologies, similarly studies noted how construction workers operating in fast paced tasks with physically demanding tasks can easily interact with the AI-powered cloud platform. Secondly, there is an evidence gap regarding the effectiveness of the AI-powered cloud platform in boosting employees' job performance in construction contexts. However, existing literature stresses potential benefits of digital solutions with terms projects management benefits research ignores impact on improving job task efficiency, reducing tasks-related errors and enhancing communication among employees; also existing evidences may demonstrate different outcomes supporting effectiveness of digital solution while others might not support the notion owing employee skepticism or perception of complexities or irrelevance towards routine jobs (Necula *et al.*, 2024). These contradictions give rise to skepticism among practitioners and policy makers, undermining confidence in investing in and adopting AI (Umar *et al.*, 2024) and may reduce the rollout of the technologies. An empirical understanding is needed of how the AI-powered cloud platform performs on construction sites and how employees' perceptions influence its adoption (Regona *et al.*, 2023). Thirdly,

there is a significant practical knowledge gap regarding how to deploy the AI-powered cloud platform on a construction site (Mishra *et al.*, 2024). Much of the existing literature is theoretical or focused on generalized frameworks but fails to acknowledge the practical problems (Jackson & Tseyi, 2024).

The researcher needs to address these deficiencies so that the AI-powered cloud platform can effectively enhance employee job performance in construction (Zulu *et al.*, 2023). Future research should address the strategic, evidence-based, and practical dimensions of AICP adoption, as well as the complexity, compatibility, and relative advantage of AI-powered cloud platform (Liu, 2025). By bridging these gaps, the construction industry can benefit from the digital transition and remain competitive in a technology-driven economy. (Acharya *et al.*, 2023).

Research Objectives

The primary goal of this research project is to present a preliminary model explaining how the AI-powered cloud platform has been adopted in the construction industry for improving employee job performance. This model focuses on three key elements, namely technological complexity, system compatibility, and relative advantage. It is expected that this study will provide a conceptual model explaining how these variables influence employee job performance at construction sites. This model can guide future empirical studies aimed at examining how AI-powered cloud platform can be implemented at construction sites.

Literature Review

AI-powered Cloud Platform

The AI-powered cloud platform has recently emerged as a technology that can improve job performance in the construction industry by enhancing real-time communication, predictive analysis, and dynamic data management. These technologies help handle large-scale data in projects and improve the effectiveness of resource allocation, as required for large-scale projects (Wang *et al.*, 2024). Integration of Artificial Intelligence with cloud services improved operational workflows through automation and intelligent monitoring systems. Continuous deployment of code and decision-making frameworks becomes much easier with artificial intelligence. Recent studies have found that cloud-supported AI frameworks help improve safety, schedules, and quality in real time, leading to better job performance by construction site employees (Wu, 2023).

The AI-powered cloud platform not only automates tasks but also provides a platform for building industry-specific tools, such as Conversational AI for BIM, to help frontline employees interact with the projects more naturally (Bello *et al.*, 2024). On the other hand, democratization of AI through the cloud enables small and medium construction enterprises to access advanced machine learning tools and predictive solutions that were previously reserved for large organizations. (Purohit 2025). At a broader level, the concept of “Big AI” has emerged, understood as an infrastructural force comprising AI-powered cloud platforms that serve as both computational infrastructure and the ecosystem for AI deployment in the construction sector (Vlist *et al.*, 2023).

Technology Complexity

One of the most common barriers to adopting the AI-powered cloud platform in construction is complexity. Technological complexity is the degree to which it is difficult for users to learn or use technology. This complexity arises from fragmented construction processes, multiple stakeholders, and the lack of a standardized workflow, making it challenging to integrate AI-driven solutions into construction projects (Singh *et al.*, 2023). There are challenges on the end-user side, such as unfamiliarity with AI-driven tools. Typically, workers in physical or non-digital roles lack exposure to or experience with software applications that enable physical interactions with a system, which increases the learning curve and makes it difficult for them to adopt or switch to the new system (Cisterna *et al.*, 2024).

There are no well-defined, AI-powered infrastructure and policy in place that can be applied across sectors, resulting in standardization and integration issues across different technologies (Shin & Won, 2023). Construction projects are implemented in areas with minimal digital penetration and where existing systems are not compatible with newer cloud-based AI applications (Santos & Jocson, 2024). Different types of data quality issues exist within construction firms – including big data problems. Construction companies lack the necessary data, hindering advanced analytics and predictive modeling (Wang *et al.*, 2024).

Construction professionals themselves sometimes do not understand how the AI solution would work or what the responsibilities would be. There are concerns around algorithmic transparency and user control (Ghimire *et al.*, 2023). The institutional-level complexity in the industry, due to contractual fragmentation among various actors and stakeholders, hinders the smooth adoption of AI technologies within construction companies (Ainamo & Peltokorpi, 2024).

Construction is an industry on the outside, where most innovation comes from outside construction itself. The technological solutions developed by technology firms are not entirely aligned with user needs on a construction site (Na *et al.*, 2023).

System Compatibility

System compatibility refers to how well an AI system aligns with an organization's existing tools, management style, or practices. Compatibility plays a crucial role in determining the successful adoption of AI-powered cloud platforms in construction. If AI solutions do not support easy integration with legacy systems or existing Building Information Modeling Systems or Platforms, then the AI-powered cloud platform may not be adopted by practitioners due to potential workflow disruption. Compatibility means the smooth transitioning of operations when using AI-based tools within different construction project types and when decentralizing data. Industries rely on decentralization and various software applications/tools, thus ensuring the smooth functioning of cloud-powered platforms is important.

The literature underscores that incompatibility is a major concern, as some AI-powered cloud platform is developed in silos without considering cross-platform compatibility and data-sharing standards within construction projects (Chandra & Deep, 2024). The successful deployment of AI-enabled cloud platforms depends not only on technical capability but also on how well the align with construction firms' organizational culture and digital readiness

(Bello *et al.*, 2024). Incompatibility can lead to duplication of work, rework, or even complete rejection of the tool by project teams that use highly specific tools and ways of working (Sanodia, 2024).

In fact, design methodologies focused on modularity and microservice patterns are increasingly considered best practices for achieving platform compatibility within cloud environments (Kosaraju, 2024). Cloud service providers are increasingly offering APIs and middleware services custom-built for the construction industry to ease friction in AI system data exchange with existing enterprise resource planning (ERP) systems (Kumar, 2024). Yet, many small and medium-sized construction firms struggle with compatibility due to inadequate IT infrastructure and integration know-how (Vlist *et al.*, 2023)

Relative Advantage

Relative advantage reflects the user's perception of how much better or more effective the proposed new technology is compared with the current practice if they start using it. In the construction industry, an AI-based cloud platform offers benefits in improved efficiency, cost savings, and enhanced communication when effectively integrated with project management systems (Parekh & Mitchell, 2024). The AI-powered cloud platform helps optimize workflows and automate routine tasks, which leads to better operations and quicker decision-making across various construction phases (Chapagain *et al.*, 2024).

Furthermore, it enables predictive analysis, which helps manage risk and improve scheduling, thereby reducing delays and improving resource allocation (Obiuto *et al.*, 2024). Besides, the AI-powered cloud platform enables real-time data visualization and integration, leading to better decision-making, which engineers working on project sites perceive as a significant advantage over traditional methods (Wang *et al.*, 2024). This perceived advantage is clear when projects are large and complex, requiring agile decision-making, which cloud-based AI offers (Borro, 2024).

Moreover, the studies reveal that firms using the AI-powered cloud platform achieve time and cost savings, as well as sustainability gains, through improved resource estimates and energy-efficient practices (Egbuhuzor *et al.*, 2024). It can offer multifaceted benefits, as the AI-powered cloud platform is considered a strategic asset (Weerakoon *et al.,* 2024).

AI-powered Cloud Platform Readiness

The AI-powered cloud platform readiness refers to the extent to which an organization has technological, structural, and cultural preparedness to adopt artificial intelligence systems at scale. For the construction industry, it requires more than software- it needs infrastructure, data quality, stakeholder engagement, and strategic alignment (Santos & Jocson, 2024). The study across Southeast Asian industries suggests that most firms remain at an early-phase readiness, with reading levels between 3 and 4 on NASA's Technology Readiness Level metric (Dinmohammadi, 2023). Despite certain advancements, the lack of skilled personnel and infrastructure, as well as the use of low-quality data, continues to hinder scalable AI adoption in AEC (Tehrani *et al.*, 2024).

Particularly in AEC, readiness depends on the ability to prepare and manage data, especially from Building Information Modeling systems. One review outlines the challenge of converting

IFC formats into AI-suitable structures and points to intermediate data readiness in the sector (Du *et al.*, 2024). They propose AI-driven data-mesh frameworks that support data structuring and scalability to improve decision-making in infrastructure projects (Mishra *et al.*, 2024).

Organizational and leadership readiness are equally important. For example, the public construction sector in Iran would have areas where leadership support and digital strategies are clearer, leading to higher AI readiness. However, these areas tend to face lower readiness due to regulatory or financial hurdles (Uğural *et al.*, 2024). After a pan-ASEAN legal review, the researcher finds that Singapore is well prepared, owing to its comprehensive policy framework and government-sponsored innovation hubs, which contrast with the lower enforcement potential observed in countries without defined AI laws (Labanieh *et al.*, 2024).

For full-scale deployment, construction organizations should prioritize technological readiness and address the ethical, organizational, and workforce aspects (Kochkina *et al.*, 2024). The researcher proposes a readiness framework with dimensions including infrastructure availability, data availability, team capability, regulatory alignment, and ethics. It is suggested that individual elements are essential to making successful AI pilot programs a sustainable reality.

Employee Job Performance

The AI-powered cloud platform improved employee job performance across industries, including construction, through automation and real-time access to information. For instance, the project management role shows a 50%+ increase in job performance due to AI implementation (Valeriya *et al.*, 2024). This is due to its ability to automate routine tasks, digitize documentation, and accelerate information flow. Moreover, construction planning tools embedded with AI enable workers to anticipate delays and adjust plans in real time, thereby enhancing task efficiency (Umar *et al.*, 2024).

Employee performance is directly proportional to engagement at work; studies suggest that AI can enhance employee engagement levels by providing customized training materials. In addition, the AI-powered cloud platform can identify workers' mood at work, helping employers implement corrective measures that foster a motivated workforce (Fitri *et al.*, 2023). When the AI-powered cloud platform is paired with structured reviews of worker performance, it offers employees a better understanding of performance metrics, leading to better personal/career growth, which ultimately reflects in positive team outcomes (Necula *et al.*, 2024). Furthermore, cloud-enabled devices enable real-time information sharing between site workers and off-site managers, reducing delays and enabling faster decision-making (Qosidah & Susilo, 2024).

AI-powered cloud platform's contribution to employee job performance is maximized when there is strong change leadership and a positive work culture (Gusti *et al.,* 2024). Organizations that incorporate AI into the broader digital transformation strategy—through worker development, ethics, and trust in the organization—can achieve longer-term improvements in job performance. On construction-specific applications, for example, real-time defect detection and predictive site monitoring applications help workers focus on higher-value tasks and reduce errors and rework. Collectively, these studies indicate that the

AI-powered cloud platform can improve workforce performance when the right organizational practices are in place (Wu, 2023).

Conceptual Framework

Technological complexity, system compatibility, and perceived relative advantage of an innovation are among the key technological factors influencing the adoption of the AI-powered cloud platform. High technological complexity can steepen the learning curve and raise implementation costs, thereby impeding its adoption by construction firms (Pathak & Bansal, 2025). System compatibility is critical to determining whether a technology should be integrated into a firm's processes to enhance employee job performance. Similarly, perceived relative advantage influences organizations' decision-making regarding the AI-powered cloud platform: the greater the innovation's superiority over existing practice, the more likely the firm is to adopt it (Jatmiko & Imronudin, 2023).

AI-powered cloud platform readiness pertains to an organization's readiness across technical, managerial, and human resource dimensions to successfully utilize the AI-powered cloud platform (Santos & Jocson, 2024). Construction organizations that possess the necessary infrastructure, digital maturity, and leadership support are more likely to overcome barriers such as employee resistance, data integration issues, and cost constraints (Uğural *et al.,* 2024). When AI-powered cloud platform readiness is achieved, organizations can fully leverage AI tools to automate repetitive tasks, improve real-time decision-making, and enhance communication—leading directly to higher employee job performance (Victor, 2023).

Hence, based on this discussion, the following propositions were formulated:

P1: There is a significant relationship between technological complexity and AI-powered cloud platform readiness.
P2: There is a significant relationship between system compatibility and AI-powered cloud platform readiness.
P3: There is a significant relationship between relative advantage and AI-powered cloud platform readiness.
P4: There is a significant relationship between AI-powered cloud platform readiness and employee job performance.

Based on these testable propositions, the conceptual framework of the study is shown in figure 1 below.

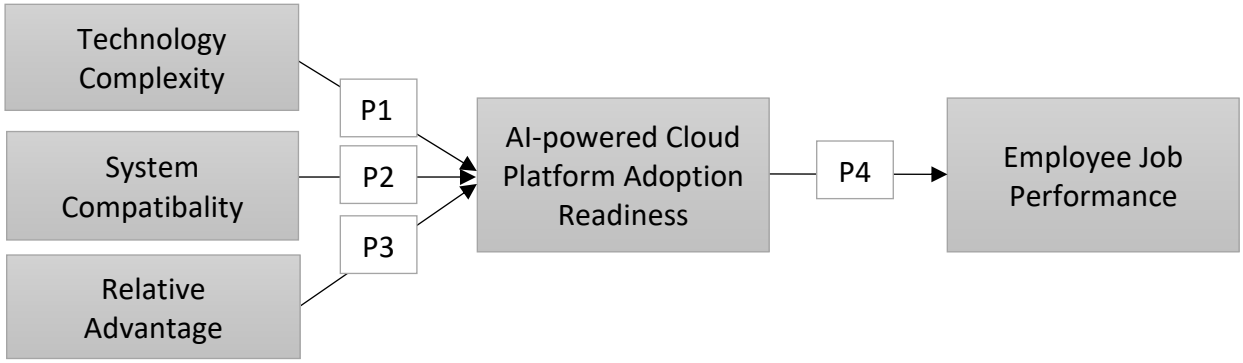

Figure 1: Conceptual Framework

Conclusion

The ongoing digital transformation of the construction industry is increasingly shaped by the integration of AI-powered cloud platform, which offer significant potential for enhancing employee job performance, project efficiency, and decision-making quality. However, successful implementation hinges on addressing key technological factors—namely technological complexity, system compatibility, and perceived relative advantage. The study's conceptual framework establishes that these constructs are not only critical to AI-powered cloud platform readiness but also serve as predictors of how effectively such technologies can impact workforce outcomes.

Empirical insights from related research highlight that AI-powered platform readiness—defined by infrastructure, employee capabilities, and organizational strategy—is a necessary condition for realizing job performance benefits. Organizations that fail to align technological innovation with employee support systems often experience limited return on investment and slower adoption rates. Thus, for construction firms to thrive in a competitive, tech-driven market, strategic emphasis must be placed on simplifying AI-powered cloud platform complexity, ensuring cross-system compatibility, and clearly communicating the advantages of AI-powered cloud platform adoption.

In conclusion, the study provides a roadmap for construction stakeholders to evaluate and enhance their AI-powered cloud platform readiness with the ultimate goal of improving employee job performance. Future research should further validate the proposed framework through empirical testing in diverse construction environments and extend its application to related technologies such as digital twins and augmented reality.

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