

Acceptance of Digital Transformation for Agile Project Management among Contractors of Sustainable Facilities in UAE: A proposed framework

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ABSTRACT

The United Arab Emirates (UAE) is at the forefront of integrating digital transformation within its construction sector, particularly emphasizing sustainable development. The convergence of digital tools, Agile project management methodologies, and sustainable construction practices is reshaping how contractors approach project execution. This paper will explore the Acceptance of Digital Transformation for Agile Project Management among Contractors of Sustainable Facilities in UAE. The construction industry is undergoing a rapid digital transformation, with agile project management (APM) methodologies playing a crucial role in enhancing efficiency, adaptability, and sustainability. This study explores the acceptance and adoption of digital transformation tools among contractors managing sustainable facilities in the UAE. Using the Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) theory, the research identifies key factors influencing contractors' willingness to integrate digital technologies such as Building Information Modeling (BIM), Artificial Intelligence (AI), cloud computing, and Internet of Things (IoT) into agile project management frameworks. To augment and substantiate the existing body of research, this study endeavors to empirically validate the proposed conceptual framework and hypotheses. The study provides valuable insights for policymakers, industry leaders, and construction firms seeking to enhance digital transformation strategies, ensuring more efficient and sustainable project execution in the UAE's evolving construction landscape.

Keywords: – Digital Transformation, Agile Project Management, Contractors, Sustainable Facilities, UAE

INTRODUCTION

The construction industry remains a crucial driver of global economic growth and development, accounting for approximately 13% of the world's GDP in 2025. In the United Arab Emirates (UAE), the sector plays an even more significant role, serving as a backbone for the nation's economic diversification strategies. With a market value exceeding \$101 billion in 2025, the UAE construction industry is well-positioned to support national initiatives such as UAE Vision 2030, UAE Centennial 2071, and the Green Agenda 2030, which collectively aim to promote sustainable development, improve quality of life, and reduce dependence on oil revenues (Abiodun et al., 2023; Ahmad, 2024). These national strategies underscore the growing emphasis on smart infrastructure and green building practices, placing increasing pressure on the construction industry to adopt digital transformation tools and innovative project management methodologies that align with global sustainability goals (Alami & El Idrissi, 2022; Alassafi et al., 2024).

In the context of the UAE's construction industry, digital transformation has introduced innovative tools and processes that enhance project management efficiency, reduce costs, and improve overall project outcomes (Dabash, 2023). The adoption of Building Information Modeling (BIM), for example, has revolutionized how construction projects are planned, designed, and executed, offering a collaborative platform that integrates various stakeholders throughout the project lifecycle.

One of the major barriers to digital transformation is the lack of digital skills and technical expertise among contractors. This skills gap, particularly prevalent among small and medium-sized enterprises (SMEs), hinders

the widespread adoption of tools such as Building Information Modelling (BIM), Internet of Things (IoT) devices, and data analytics platforms (Abdou & Zaazou, 2019). According to the UAE Ministry of Economy, SMEs represent approximately 94% of companies in the country and over 70% of employment in key sectors, including construction (MoE, 2023). SMEs form a significant part of the UAE’s construction ecosystem but often lack the resources to invest in digital infrastructure and employee training programs (Adeosun et al., 2022). Consequently, there is a growing divide between larger, resource-rich firms that are early adopters of technology and smaller firms that struggle to remain competitive.

Furthermore, the cost of digital transformation is a critical obstacle for many contractors. Implementing advanced technologies requires substantial initial investment, covering software licenses, hardware upgrades, and workforce training. For companies operating on thin profit margins, these costs can be prohibitive (Ahmad & Alammary, 2022). Unlike in other sectors where digital transformation has been supported by targeted subsidies and incentives, sectors such as healthcare and energy in the UAE have benefited from strategic government initiatives like the National Health IT Strategy and Energy Efficiency Funding Programs that provide financial and technical support for technology adoption (UAE Cabinet, 2022). The UAE construction sector lacks sufficient financial mechanisms to offset these high upfront costs.

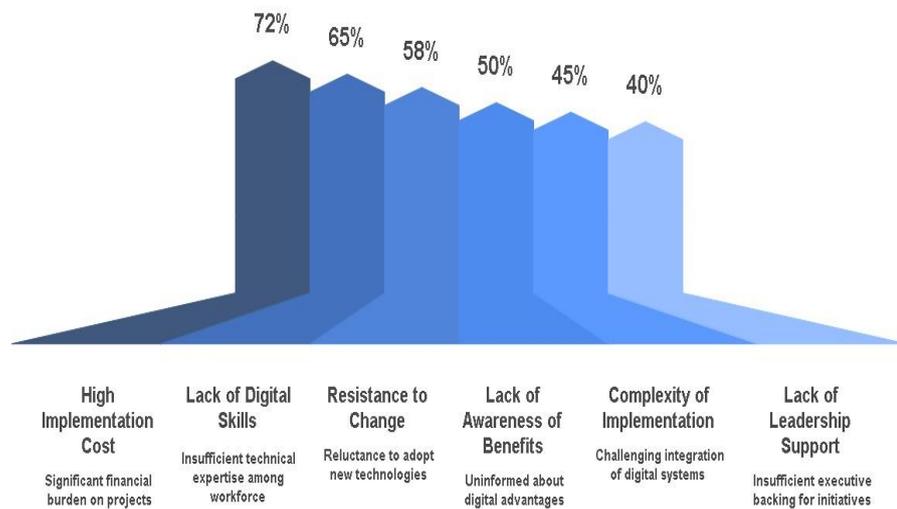


Figure 1: Key Barriers to Digital Transformation Adoption in the UAE Construction Industry

Source: Adapted from Adeosun et al. (2022); Ahmad & Alammary (2022); Alami & El Idrissi (2022)

To conceptualize these relationships, the study adopts the Technology–Organization–Environment (TOE) framework (Tornatzky & Fleischer, 1990), a widely used model for analysing the multi-dimensional drivers of technology adoption in complex industries. This framework is particularly suitable for the construction sector, where adoption decisions are shaped not only by the perceived usefulness of technology but also by organizational capabilities and external institutional pressures.

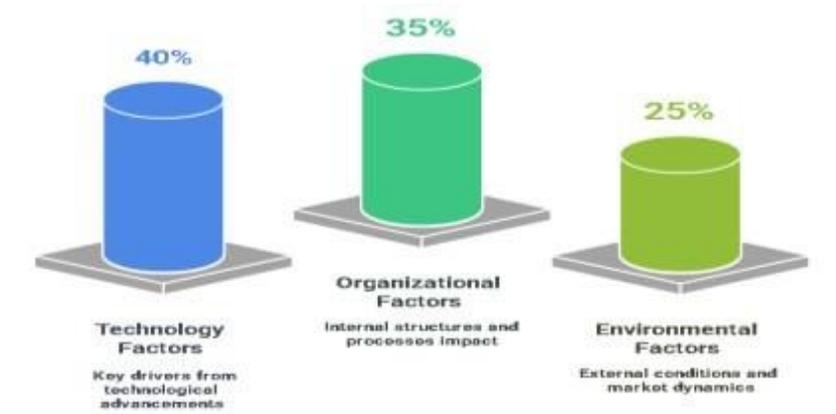


Figure 1.1: Influence of Technology, Organizational, and Environmental Factors on Digital Transformation

Source: Adapted from [Adebowale & Agumba \(2023\)](#); [Alieva & Powell \(2023\)](#); [Alassafi et al. \(2024\)](#).

This study is particularly relevant in the context of the UAE's broader sustainability and innovation agenda. As the nation continues to invest in sustainable infrastructure and smart cities, the construction sector must evolve to meet these expectations. Digital transformation plays a crucial role in achieving these goals, enabling contractors to reduce waste, optimize resource use, and enhance project performance. For instance, IoT-enabled smart sensors can monitor energy consumption in real-time, allowing for better resource management and reducing a building's carbon footprint ([Alassafi et al., 2024](#)). One of the key targets under the UAE Energy Strategy 2050 includes achieving 40% improvement in building energy efficiency by 2050, a goal that is contingent on digital-enabled monitoring and operational control technologies (UAE Ministry of Energy, 2023). However, without widespread adoption of these technologies, the industry will struggle to meet the ambitious targets set by the UAE government.

Theoretical Literature and Hypothesis Development

The literature review approach was used in this study since its objective is to acceptance of digital transformation for agile project management among contractors of sustainable facilities in UAE: A proposed framework . The research paper also discusses the ramifications of digital transformation, as well as recommendations and future trends.

The construction industry in the United Arab Emirates (UAE)

The construction industry in the United Arab Emirates (UAE) is undergoing a profound transformation as it seeks to integrate digital technologies into traditional project management practices. Despite the recognized benefits of digital transformation, such as enhanced efficiency, improved communication, and optimized resource management, its adoption among contractors remains inconsistent and slow, with studies indicating that only 45% have fully integrated digital tools while the remaining 55% either partially adopted or continue to rely on manual processes ([Oke et al., 2023](#)). This adoption lag becomes more apparent when compared to sectors like healthcare and energy in the UAE, which have seen faster digital uptake due to dedicated policy incentives and targeted funding ([Alami & El Idrissi, 2022](#)). This gap in adoption, driven by a combination of organizational, technological, and environmental factors, poses significant challenges to the industry's growth and to achieving sustainability goals defined by national strategies such as the UAE Green Agenda 2030, Energy Strategy 2050, and Vision 2021.

Economically, the UAE remains one of the fastest-growing economies in the MENA region, with the construction sector playing a pivotal role in national development. In recent years, construction-related activities have contributed over 8% to the UAE's GDP, with the industry valued at approximately \$101 billion in 2023. This growth is expected to continue, fueled by significant infrastructure projects tied to the UAE Vision 2021, Expo 2020 legacy projects, and the UAE Centennial 2071 Plan ([Abiodun et al., 2023](#)). However, while these projects offer ample opportunities for innovation, contractors often continue to rely on traditional project management methodologies due to institutional inertia, limited technological readiness, and a lack of incentivizing regulatory mechanisms ([Adebowale & Agumba, 2023](#)). The persistence of conventional practices despite innovative opportunities can be explained through the lens of the Technology–Organization–Environment (TOE) framework, where organizational barriers and environmental readiness critically mediate technology adoption.

To visualize the gap in digital transformation adoption among contractors in the UAE, Figure 1.3 presents data from [Oke et al. \(2023\)](#), illustrating the percentage of contractors who have adopted digital tools fully, partially, or not at all. The data highlights the significant portion of contractors who are either in the early stages of adoption or have yet to begin integrating digital tools into their project management practices. This figure is based on secondary data and serves to underscore the urgent need for industry-wide transformation strategies that address varying levels of readiness

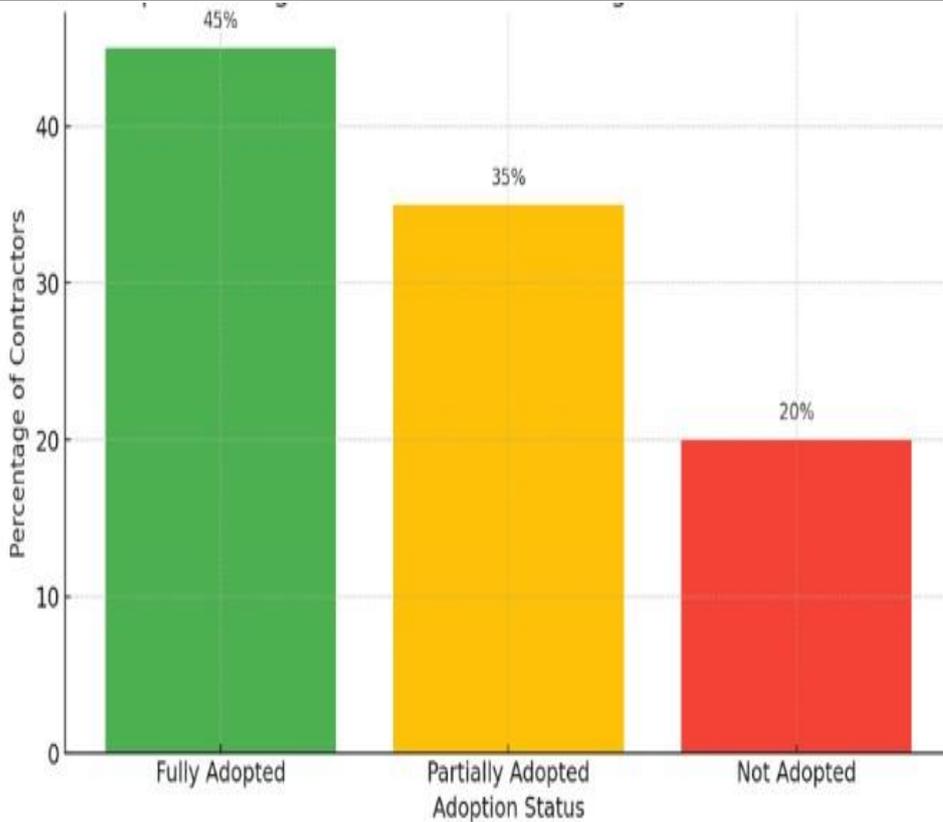


Figure 1: Adoption of digital transformation among contractors in the UAE

Source: [Oke et al. \(2023\)](#)

Digital Transformation

Refers to the integration of digital technologies into various aspects of an organization, fundamentally changing how it operates and delivers value to its stakeholders. In the construction industry, digital transformation involves adopting tools such as Building Information Modeling (BIM), project management software, Internet of Things (IoT) devices, and other technologies that enhance collaboration, improve decision making, and streamline project management processes ([Alassafi et al., 2024](#); [Ahmad, 2024](#)). However, digital transformation is not merely about implementing new technologies it also requires cultural and organizational change, with a shift in mindset toward embracing innovation, agility, and continuous improvement ([Ali Mohamad et al., 2023](#); [Alieva & Powell, 2023](#)). This transformation aims to increase efficiency, reduce costs, and improve the overall quality and sustainability of construction projects, aligning with the growing emphasis on green building practices and smart infrastructure development across the UAE ([Kolasani, 2023](#); [Alami & El Idrissi, 2022](#)).

Agile Project Management

Agile project management is an iterative approach to managing projects that emphasize flexibility, collaboration, and customer-focused delivery. Originally developed for software development, the agile methodology has been increasingly adopted in other industries, including construction. Agile project management is characterized by its iterative cycles, known as sprints, which allow project teams to rapidly develop and refine project components based on continuous feedback. This approach enables teams to adapt to changing project requirements and challenges more effectively than traditional, linear project management methods ([Noteboom et al., 2021](#)). In the construction industry, agile project management is used to enhance project responsiveness, improve stakeholder engagement, and deliver more customized and sustainable project outcomes ([Dabash, 2023](#)).

Sustainable Facilities

Sustainable facilities are buildings and infrastructure projects designed, constructed, and operated in ways that minimize their environmental impact, optimize resource use, and enhance the well-being of occupants and the surrounding community. These facilities incorporate principles of sustainability across various stages of their lifecycle, from the selection of materials to energy efficiency measures and waste management strategies. In the UAE, sustainable facilities are often guided by stringent government regulations and standards, such as the Estidama Pearl Rating System, which aims to promote sustainable development in alignment with the country's environmental goals (Hamani, 2019). The concept of sustainable facilities also includes the use of smart technologies and data-driven approaches to monitor and optimize building performance over time (Mohamed Hashim et al., 2022).

Contractors

Contractors in the construction industry are individuals or companies responsible for executing construction projects based on agreed-upon contracts with clients or developers. Their roles typically involve managing the construction process, coordinating with various stakeholders, ensuring compliance with regulatory requirements, and delivering the project within the specified time frame and budget. Contractors can range from large, multinational firms handling complex infrastructure projects to smaller companies focused on residential or commercial construction. In the context of this study, contractors are specifically those involved in the construction of sustainable facilities in the UAE, where they are increasingly expected to integrate digital transformation and agile project management practices into their operations to meet the demands of modern construction projects (Shalan & Algarni, 2020). These contractors play a crucial role in shaping the built environment and are key players in the drive towards more sustainable and technologically advanced construction practices in the region.

Hypotheses Development

Technological factors such as IT infrastructure, availability of digital tools, and technical expertise are fundamental to the adoption of digital transformation in construction. Studies by Alizadehsalehi & Yitmen (2023) indicate that construction companies with access to cutting-edge technologies, like digital twins and augmented reality for progress monitoring, are more likely to succeed in adopting digital strategies. Ahmad (2024) further emphasizes that firms equipped with robust technological capabilities can integrate complex digital tools more effectively, improving project outcomes and increasing operational efficiency. However, a lack of technological readiness, particularly in terms of infrastructure and employee training, hampers digital adoption, as observed in developing regions (Abdou & Zaazou, 2019). Thus, the availability and adequacy of technological resources within a firm positively influence the level of digital transformation adoption.

H1: Technology factors positively influence the adoption of digital transformation in construction projects.

Organizational culture plays a pivotal role in determining how well construction firms embrace digital transformation. As Alieva and Powell (2023) highlight, an innovative and adaptable organizational culture fosters a proactive approach toward technology adoption, making it easier for firms to integrate digital tools like BIM (Building Information Modeling) and IoT (Internet of Things) into their operations. Abiodun et al. (2023) add that organizations with leadership that encourages technological experimentation and learning are better positioned to adopt advanced digital systems. This positive cultural alignment enhances the likelihood of successful digital transformation. Conversely, firms with rigid, hierarchical structures and resistance to change, as identified by Bounfour et al. (2023), face significant barriers to adopting digital solutions. Therefore, it is hypothesized that an open, flexible, and innovation-driven organizational culture significantly drives digital transformation adoption in construction.

H2: Organizational culture positively influences the adoption of digital transformation in construction projects.

The structural and strategic composition of an organization, including its size, resources, and alignment with digital goals, significantly influences digital transformation adoption. Adebowale & Agumba (2023) found that larger construction firms with greater financial and technical resources are more likely to adopt digital tools

like BIM and cloud-based project management software. Moreover, firms that strategically align their goals with digital innovation demonstrate higher readiness for digital transformation (Abiodun et al., 2023). Organizational factors such as leadership commitment, cross-functional collaboration, and investment in digital infrastructure facilitate smoother transitions to digital workflows. Conversely, firms that lack these resources or fail to align their strategic goals with digital transformation struggle with fragmented and unsuccessful implementations. Hence, well-structured organizational frameworks with adequate resources and strategic foresight are hypothesized to positively influence digital transformation adoption.

H3: Organizational factors positively influence the adoption of digital transformation in construction projects.

External environmental factors, such as market competition, government regulations, and customer demands, play a crucial role in pushing construction firms toward digital transformation. Alami & El Idrissi (2022) argue that firms in highly competitive markets are more likely to adopt digital tools to maintain a competitive edge, while Alassafi et al. (2024) found that regulatory frameworks promoting sustainability, particularly in the UAE construction sector, compel firms to adopt technologies like BIM to meet green building standards. The growing demand for sustainable construction practices and environmental accountability also pressures firms to integrate digital tools that enable better project tracking and resource optimization. Thus, the external business environment, including regulatory and market-driven pressures, is hypothesized to positively influence digital transformation adoption in construction projects.

H4: Environmental factors positively influence the adoption of digital transformation in construction projects.

Empirical research strongly supports the hypothesis that the adoption of digital transformation enhances the sustainability of construction projects. Alizadehsalehi & Yitmen (2023) show that digital tools like BIM, IoT, and smart sensors enable real-time tracking of materials, energy use, and project progress, significantly reducing waste and improving resource optimization. Digital transformation facilitates the design and execution of sustainable construction practices, allowing firms to meet environmental standards and regulatory requirements. Ahmad (2024) highlights how AI-driven predictive models can forecast resource needs and energy consumption, leading to more efficient construction practices. Moreover, Abiodun et al. (2023) argue that digital adoption in construction aligns directly with sustainability goals by streamlining workflows and minimizing environmental footprints. Therefore, it is hypothesized that digital transformation adoption directly contributes to improving the sustainability of construction projects by enhancing energy efficiency, reducing waste, and optimizing resource use.

H5: Digital transformation adoption positively influences the sustainability of construction projects.

Organizational culture plays a significant role in shaping how firms adopt and implement digital transformation initiatives, particularly in the construction sector, where traditional practices and hierarchical structures often slow technological progress. The moderating effect of organizational culture on the relationship between technology, organizational, and environmental factors with digital transformation adoption has been widely discussed in the literature. Research suggests that while technology factors such as relative advantage, compatibility, perceived ease of use, and perceived usefulness provide the foundation for digital transformation, their successful adoption depends on an organization's cultural openness to innovation (Ali Mohamad et al., 2023).

Similarly, organizational factors such as digital leadership, employees' digital skills, and resistance to change are crucial in determining how effectively digital tools are integrated into construction projects. While digital leadership and employees' technical capabilities can facilitate adoption, resistance to change often hampers the transition. Studies indicate that organizations with a culture that fosters continuous learning, digital literacy, and leadership commitment to technological adaptation are more likely to overcome these challenges and achieve successful digital transformation (Bounfour et al., 2023). Conversely, rigid and hierarchical cultures tend to resist change, making it difficult to implement new digital solutions (Shalan & Algarni, 2020).

A supportive and innovation-driven culture enhances the impact of technology, organizational, and environmental factors by encouraging knowledge-sharing, reducing resistance to change, and fostering a proactive approach to digital adoption. In contrast, a resistant culture weakens the impact of these factors,

leading to slow or fragmented adoption of digital transformation initiatives (Adebowale & Agumba, 2023). Given the UAE's emphasis on sustainable construction and smart infrastructure, aligning organizational culture with digital transformation goals is essential for achieving industry-wide progress (Mohamed Hashim et al., 2022).

Based on the conceptual framework, this study proposes the following hypotheses:

H6: Organizational culture moderates the relationship between technology factors and digital transformation adoption, such that the impact of technology factors is stronger in firms with an innovation-driven culture and weaker in firms with a resistant culture.

H7: Organizational culture moderates the relationship between organizational factors and digital transformation adoption, such that the impact of organizational factors is stronger in firms with a culture that fosters digital leadership and employee adaptability.

H8: Organizational culture moderates the relationship between environmental factors and digital transformation adoption, such that the influence of competitive pressure and regulatory compliance is more pronounced in firms with a proactive and adaptive culture.

Change plays a crucial role in determining the extent to which firms adopt digital transformation initiatives. However, the effectiveness of these factors is largely influenced by the organizational culture in which they operate. A supportive, innovative-driven culture enhances the impact of organizational factors by fostering leadership commitment, encouraging employee adaptability, and reducing resistance to change, whereas a rigid, risk-averse culture can significantly hinder digital adoption (Ali Mohamad et al., 2023).

Digital leadership is widely recognized as a key driver of digital transformation, as leaders set the vision, allocate resources, and influence organizational attitudes toward new technologies. However, leadership effectiveness is often contingent on the prevailing organizational culture. Research suggests that in organizations where collaboration, flexibility, and continuous learning are emphasized, digital leadership can effectively facilitate transformation by encouraging experimentation and strategic risk-taking (Bounfour et al., 2023). Conversely, in organizations where hierarchical control and resistance to innovation dominate, even strong digital leadership may struggle to drive meaningful change (Shalan & Algarni, 2020).

Employees' digital skills also play a critical role in digital transformation, as the successful integration of new technologies requires a workforce that is proficient in digital tools. However, the extent to which employees embrace and apply these skills depends significantly on the organization's cultural environment. In adaptive and learning-oriented cultures, employees are more willing to upskill and adopt digital tools, leading to higher transformation success rates (Alieva & Powell, 2023). In contrast, organizations with a culture resistant to change may see employees reluctant to engage with digital training programs or unwilling to shift from traditional work processes (Adebowale & Agumba, 2023).

Resistance to change remains one of the most significant barriers to digital transformation, particularly in industries such as construction, where legacy processes and conventional project management practices are deeply ingrained. Organizational culture influences how resistance to change is managed and mitigated. A transformational and change-oriented culture fosters an environment where digital adoption is encouraged, and employees feel supported in navigating new workflows. In contrast, organizations with a rigid, bureaucratic culture often struggle with employee pushback, slowing or even derailing digital transformation efforts (Alizadehsalehi & Yitmen, 2023).

In the UAE construction industry, where sustainability and smart infrastructure development are becoming increasingly important, aligning organizational culture with digital transformation goals is essential. Government policies and competitive pressures are pushing firms toward digital adoption, but without a strong internal culture that promotes digital readiness, many organizations may fail to implement these changes effectively (Mohamed Hashim et al., 2022). A culture that supports collaboration, continuous learning, and openness to innovation ensures that digital leadership can effectively guide transformation, employees can develop the necessary digital competencies, and resistance to change is minimized.

Based on the conceptual framework, this study proposes the following hypothesis:

H9: Organizational culture moderates the relationship between organizational factors and digital transformation adoption, such that the impact of digital leadership, employees' digital skills, and resistance to change on digital transformation adoption is stronger in firms with an innovation-driven culture and weaker in firms with a resistant culture.

Organizational culture also influences how firms interpret and act upon external pressures. In construction companies with a culture that promotes collaboration, knowledge-sharing, and digital literacy, employees and leadership teams are more likely to recognize the benefits of digital transformation and invest in continuous improvement. In contrast, firms with a traditional or resistant culture may view external pressures as burdensome rather than opportunities for growth, leading to slow or inconsistent digital adoption (Alieva & Powell, 2023).

In the UAE’s construction sector, where sustainability and smart infrastructure development are becoming central priorities, aligning organizational culture with external digital transformation drivers is essential. Competitive market dynamics and stringent sustainability regulations create strong incentives for digital adoption, but only firms with an adaptive and technology-embracing culture can fully capitalize on these opportunities (Shalan & Algarni, 2020). Organizational leaders must foster an environment that encourages digital experimentation, supports employee upskilling, and integrates compliance-driven digital adoption into broader strategic objectives.

Based on the conceptual framework, this study proposes the following hypothesis:

H10: Organizational culture moderates the relationship between environmental factors and digital transformation adoption, such that the impact of competitive pressure and regulatory compliance on digital transformation adoption is stronger in firms with an innovation-driven culture and weaker in firms with a compliance-driven or resistant culture.

Table 1. Relevant studies to the research context

Author/Year	Title	FINDINGS
Dabash, 2023	The Implementation of Agile Project Management Using BIM Influences on the Construction Industry in The UAE Sector.	Demonstrated the positive impact of integrating BIM with Agile methodologies on project efficiency in the UAE.
Khansaheb's (2023)	The role of artificial intelligence in enhancing sustainability: The case of UAE smart cities.	Showcased the practical benefits of cloud-based platforms in enhancing construction project management.
El Khatib (2023)	Drafting a digital transformation strategy for project management sector—empirical study on UAE	Highlighted the efficiency and transparency gains from adopting digital tendering processes.
Smart Building Technologies (2024)	Digital Transformation Leading To Sustainability In The Landscape of UAE.	Emphasized the role of smart technologies in promoting sustainability and energy efficiency in construction.

Source(s): The study's authors

The Proposed Framework of the Research

The conceptual framework in this research emphasizes the relationships between key factors influencing digital transformation adoption in sustainable construction projects in the UAE. The framework focuses on technology factors, organizational factors, and environmental factors, with organizational culture as a moderating variable affecting the relationship between these factors and digital transformation adoption. This approach recognizes that while technology, organizational resources, and external pressures drive digital transformation, the extent to which they influence adoption depends significantly on the prevailing organizational culture.

Technological factors serve as the foundation for digital transformation adoption, as they determine the availability and usability of digital tools within construction firms. These include relative advantage, compatibility, perceived ease of use, and perceived usefulness of digital technologies such as Building Information Modeling (BIM), Artificial Intelligence (AI), the Internet of Things (IoT), and cloud-based project management systems. Prior research suggests that when digital tools are perceived as advantageous, easy to use, and compatible with existing workflows, construction firms are more likely to adopt them (Venkatesh et al., 2012). However, the impact of technology factors is not uniform across all organizations, as their effectiveness largely depends on the organizational culture that either supports or resists technological change (Alizadehsalehi & Yitmen, 2023).

Organizational factors, such as digital leadership, employees' digital skills, and resistance to change, significantly influence a firm's ability to integrate digital technologies into its operations. Leadership plays a crucial role in shaping digital transformation strategies, ensuring that resources are allocated, employees are trained, and digital adoption is prioritized (Adebowale & Agumba, 2023). Employees' digital skills determine how effectively organizations transition from traditional to digital workflows, while resistance to change can create barriers that delay or obstruct adoption. Organizational culture moderates these effects by either encouraging adaptability and innovation or reinforcing traditional, non-digital work practices. A culture that supports continuous learning and technological adaptation will likely facilitate a smoother digital transformation process, while a rigid culture may hinder adoption efforts (Bounfour et al., 2023).

Environmental factors, including competitive pressure and regulatory compliance, also play a crucial role in adoption of digital transformation. The UAE's construction sector operates within a highly regulated environment, with government mandates encouraging sustainable building practices and digital integration (Alami & El Idrissi, 2022). Regulatory compliance pressures firms to adopt digital tools that enhance efficiency, transparency, and sustainability. Similarly, market competition pushes firms toward digitalization to maintain competitive advantage, reduce costs, and improve project performance (Mohamed Hashim et al., 2022). However, the extent to which firms respond to these external pressures depends on their organizational culture. Firms with a proactive and innovation-driven culture are more likely to leverage regulatory requirements and competitive pressures as opportunities for transformation, whereas firms with a conservative culture may only implement digital tools to meet minimum compliance standards, rather than as a strategic initiative (Shalan & Algarni, 2020).

The role of organizational culture as a moderating factor is central to this research framework. While technology, organizational, and environmental factors drive digital transformation adoption, the organizational culture within a company determines how effectively these factors translate into actual implementation. A culture that fosters collaboration, digital literacy, and openness to innovation will strengthen the impact of these drivers, whereas a culture resistant to technological change may weaken or delay digital transformation efforts.

By eliminating digital transformation as a mediating variable and positioning organizational culture as the sole moderating factor, this framework provides a focused approach to understanding how internal and external drivers interact with company culture to influence digital transformation adoption in the UAE construction industry. The insights from this framework will support construction firms in developing strategies that align

technology investments, leadership practices, and market responses with an innovation-driven culture, ensuring smoother transitions toward digital project management and sustainability.

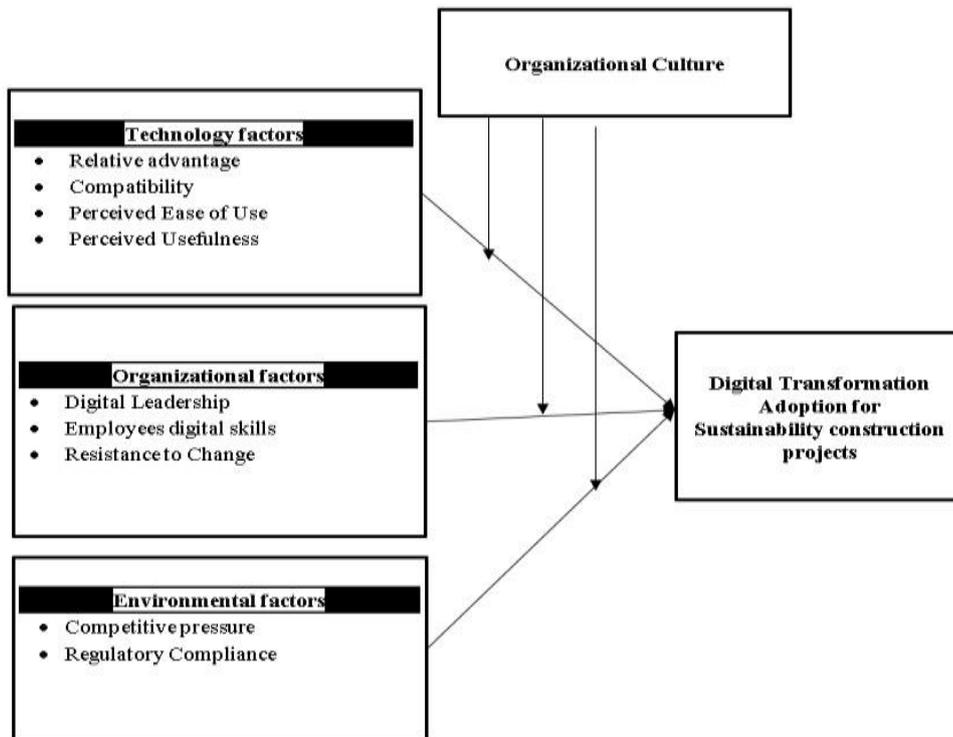


Figure 1. Research Framework 4. Research Gap

Despite the growing body of research on digital transformation, significant gaps remain in understanding its adoption in the UAE construction sector, particularly among contractors managing sustainable projects. The existing literature provides valuable insights into the role of technology, organizational culture, and environmental factors in adoption of digital transformation. However, most studies have focused on industries such as healthcare, education, and manufacturing, leaving the construction sector relatively underexplored. The construction industry presents unique challenges due to its reliance on multiple stakeholders, collaborative workflows, and project-based operations, which significantly impact the adoption of digital technologies. Furthermore, much of the existing research has been conducted in Western contexts, limiting its applicability to the UAE’s regulatory environment, market competition, and government-led sustainability initiatives.

Another key gap in the literature is the lack of empirical investigation into the role of organizational culture in adoption of digital transformation. While research suggests that an innovative-driven culture can facilitate digital adoption, the extent to which traditional hierarchies, risk aversion, and resistance to change hinder progress remains unclear. This gap is particularly pronounced in the UAE construction sector, where firms often operate within rigid organizational structures that may not be conducive to digital innovation. Moreover, the sector’s diverse workforce adds further complexity, as cultural and linguistic differences can influence the perception and implementation of digital tools. There is a need for further research to determine how organizational culture shapes the adoption of digital transformation and whether strategies such as leadership commitment and employee training can mitigate resistance to change.

Financial and technical barriers also pose a significant challenge to digital transformation in the UAE construction industry, particularly for small and medium-sized enterprises (SMEs). Most empirical studies highlight the advantages of digital transformation in large firms with abundant resources, but limited research examines the financial constraints and technical challenges faced by SMEs. Digital adoption requires significant investment in software, hardware, and employee training, and many SMEs struggle with these costs. Additionally, the shortage of digital expertise and skilled personnel in the region remains a pressing issue that has not been adequately addressed in construction-related studies. Given that SMEs constitute a substantial

portion of the UAE construction sector, further research is needed to identify solutions that can facilitate digital adoption among these firms, such as government incentives or industry-wide training programs.

While external pressures such as government regulations and market competition have been recognized as key drivers of digital transformation, there is limited empirical evidence on how these environmental factors influence adoption decisions among contractors in the UAE. The UAE government has introduced various policies promoting sustainable construction, such as the Estidama Pearl Rating System and Dubai's Green Building Regulations, yet it remains unclear how these policies impact contractors' willingness and ability to adopt digital tools like Building Information Modeling (BIM) and the Internet of Things (IoT). Research exploring this relationship is necessary to determine whether regulatory mandates are sufficient motivators for digital adoption or whether additional financial incentives and training programs are required. Understanding these dynamics will help policymakers design more effective interventions to support digital transformation in the construction sector.

Another underexplored area in literature is the link between digital transformation and sustainability in construction. While previous studies have acknowledged the potential of digital technologies to enhance sustainability outcomes, most of this research remains conceptual rather than empirical. There is a lack of quantifiable evidence demonstrating how digital tools contribute to reducing material waste, improving energy efficiency, and enhancing overall project sustainability. Additionally, the mediating role of digital transformation in linking organizational culture, technology readiness, and sustainability outcomes remains insufficiently examined. Empirical research is needed to determine how digital maturity influences sustainability performance in UAE construction projects and whether firms with higher levels of digital adoption experience measurable improvements in environmental impact and resource optimization.

DISCUSSION AND CONCLUSION

The integration of digital transformation with agile project management represents a significant shift in project management practices within the UAE construction industry. Agile project management, originally developed for the software sector, is characterized by its iterative approach, flexibility, and focus on collaboration and responsiveness to change (Ali Mohamad et al., 2023; Alieva & Powell, 2023). This methodology is increasingly relevant to the construction industry, where project requirements can change rapidly due to client demands, regulatory updates, or unforeseen environmental factors (Alassafi et al., 2024). By combining agility principles with digital tools such as Building Information Modeling (BIM), cloud-based collaboration platforms, and real-time project monitoring systems, construction projects in the UAE are better positioned to manage complexities, adapt to evolving conditions, and deliver outcomes that meet or exceed stakeholder expectations (Ahmad, 2024; Alami & El Idrissi, 2022). This approach not only enhances efficiency and adaptability but also supports the UAE's broader vision for smart and sustainable infrastructure development.

The UAE construction sector's focus on sustainability has further accelerated the adoption of digital transformation and agile project management. Sustainability in construction involves designing, building, and operating structures in ways that minimize environmental impact and enhance the quality of life for occupants and communities. The UAE government has been a strong advocate for sustainability, setting ambitious goals through initiatives like the UAE Vision 2021 and the UAE Green Agenda 2030, which emphasize sustainable development as a key pillar of the nation's future growth (Hamani, 2019). As a result, construction companies are increasingly required to incorporate sustainable practices into their projects, from using eco-friendly materials to optimizing energy efficiency and reducing waste.

The integration of digital transformation within Agile project management frameworks is gaining traction among contractors of sustainable facilities in the UAE. While the benefits in terms of efficiency, sustainability, and client satisfaction are clear, successful adoption hinges on organizational readiness, workforce capabilities, and supportive regulatory environments. Continued investment in training, technology, and process optimization will be crucial in realizing the full potential of this integration.

The UAE's strategic focus on smart cities and green infrastructure highlights the growing importance of technological innovation and digital transformation in the construction sector. Digital tools such as Building Information Modeling (BIM), Internet of Things (IoT), and artificial intelligence (AI) are increasingly recognized as key enablers for improving project efficiency, reducing costs, and achieving sustainability goals.

For example, IoT-enabled sensors allow real-time monitoring of construction processes, while BIM facilitates collaborative planning and resource optimization (Alassafi et al., 2024). These technologies not only enhance project management capabilities but also align with the UAE's long-term vision of building a smart, sustainable economy.

Despite these advancements, the construction industry in the UAE faces several challenges that hinder the widespread adoption of digital transformation. These challenges include high initial investment costs, a shortage of digital skills, resistance to change, and limited awareness of the potential benefits of digital tools, particularly among small and medium-sized enterprises (SMEs) (Adebowale & Agumba, 2023). SMEs, which constitute a significant portion of the construction ecosystem, often lack the financial resources and technical expertise to implement advanced digital solutions, creating a digital divide within the industry (Adeosun et al., 2022).

The UAE's economic environment provides both opportunities and challenges for digital transformation in the construction sector. According to World Bank data, the UAE's GDP growth has consistently outperformed regional averages, driven by robust investments in infrastructure, energy, and tourism. In 2024, the nation's GDP is projected to grow by 3.9%, bolstered by ongoing public spending on large-scale projects such as Etihad Rail, Abu Dhabi's urban expansion, and Dubai's Smart City Initiative (Abiodun et al., 2023). These projects present a strong business case for adopting digital tools, as they demand higher efficiency, accuracy, and sustainability compliance. Government policies also play a critical role in shaping the digital transformation landscape. For instance, the UAE Artificial Intelligence Strategy 2031 encourages the integration of AI across various sectors, including construction, to enhance productivity and reduce operational costs. Similarly, the Energy Strategy 2050 mandates energy efficiency and environmental sustainability in all new construction projects, further incentivizing the use of smart technologies like IoT for energy monitoring and BIM for lifecycle cost analysis (Hamani, 2019). However, while these policies create a conducive environment for innovation, the fragmented adoption of digital tools within the construction industry limits the realization of their full potential.

The construction sector's reliance on traditional workflows exacerbates these challenges. Studies indicate that 55% of contractors in the UAE still rely on manual processes for project management, leading to inefficiencies, cost overruns, and delays (Oke et al., 2023). This outdated approach is unsustainable in a competitive and increasingly digitalized global market. Digital transformation offers a pathway to address these inefficiencies by improving communication, reducing errors, and enabling real-time decision-making through data-driven insights (Ahmad, 2024). This study aims to examine the factors influencing digital transformation adoption within the UAE construction industry, focusing on organizational readiness, technological capabilities, and external drivers such as economic conditions and regulatory frameworks. By identifying the barriers and opportunities associated with digital transformation, the research seeks to provide actionable recommendations for accelerating the adoption of advanced technologies in the construction sector. Ultimately, the findings will contribute to enhancing project outcomes, promoting sustainability, and aligning the industry with the UAE's vision for a digitally advanced and resilient economy.

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