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Article

Bridging the Adoption Gap: A Conceptual Analysis of Knowledge Management Technologies in the UAE Construction Industry

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Abstract: The construction industry in the United Arab Emirates (UAE) remains burdened by challenges in Knowledge Management (KM) systems despite the rapid development and advancement of digital technologies. This paper discusses the main reasons for the low integration of KM technology in companies, despite significant government investment, organizations' awareness of KM, and greater availability of technology. By highlighting recent literature (2020-2024) and integrating KM theory, socio-technical systems, and Technology-Task Fit (TTF), the authors introduce the KM Technology Adoption Triangle as a new conceptual framework that explains the systemic misalignment preventing adoption. Specifically, three major sources of resistance identified through the findings are interdependent: (i) the struggle of digital systems to express tacit knowledge; (ii) socio-organizational limitations such as cultural complexity, low digital literacy, and transient project structures; and (iii) poor match between technology and task, leading to a lack of perceived usefulness. Concurrently, the framework offers a theoretical contribution by bringing together scattered parts of the KM and construction management literature. It also provides practical support to companies, policymakers, and researchers focused on the UAE to improve KM technology integration. Finally, the paper outlines directions for future research and policy recommendations to realize a sustainable, knowledge-centric digital transformation in the construction sector.

Keywords: Knowledge Management (KM); digital transformation; construction industry; UAE; technology adoption; tacit knowledge; BIM; digital twins; socio-technical systems; technology (task fit).

1. Introduction

The construction industry is undergoing rapid digital transformation driven by increasing project complexity, growing global competition, and the demand for more efficient project delivery. Emerging technologies such as Building Information Modeling (BIM), cloud-based collaboration platforms, Artificial Intelligence (AI), and mobile applications have transformed how project information is captured, stored, and shared throughout the project lifecycle. These technologies are increasingly viewed as enablers of Knowledge Management (KM), supporting communication, coordination, and decision-making among geographically dispersed project stakeholders [1], [2].

Despite these advancements, the adoption of KM technologies within the construction industry remains inconsistent. While many construction organizations have invested in digital solutions, their integration into routine project activities continues to be limited, particularly in developing and rapidly growing construction markets. In the United Arab Emirates (UAE), significant investments in digital infrastructure and smart city initiatives have accelerated the availability of advanced technologies; however, construction firms continue to face challenges in embedding KM technologies into daily work processes [3], [4]. Existing studies identify workforce diversity, fragmented project structures, and varying levels of digital readiness as key obstacles to effective implementation [5], [6].

Most previous studies explain the adoption gap through technical and organizational barriers, including inadequate training, interoperability issues, limited management support, and resistance to change [7], [8]. While these factors provide valuable insights, they offer only a partial explanation of the problem. Construction projects operate in dynamic and knowledge-intensive environments where much of the knowledge required for successful project delivery is experiential, context-specific, and developed through practice. Consequently, the challenge may not be solely technological or organizational but also epistemological in nature.

Construction knowledge is largely tacit and is frequently exchanged through observation, mentoring, informal communication, and collaborative problem-solving on project sites [9]. Unlike explicit knowledge, tacit knowledge is difficult to articulate, codify, and store within digital systems. As a result, many KM technologies are effective in managing structured information such as documents, schedules, and models but are less capable of capturing experiential insights, judgment, and contextual understanding [10], [7], [11]. This creates a fundamental mismatch between the nature of construction knowledge and the design of many digital KM solutions.

The challenge is particularly significant in the UAE construction industry, which is characterized by multicultural project teams, high workforce mobility, and project-based organizational structures. These conditions encourage informal knowledge-sharing practices and increase the risk of knowledge loss when projects are completed or personnel leave organizations [4], [5]. Although recent studies have examined various barriers to digital transformation, there remains limited understanding of how knowledge characteristics, organizational conditions, and technology-related factors interact to influence KM technology adoption.

Therefore, this paper presents a conceptual analysis of KM technology adoption in the UAE construction industry. Drawing upon recent literature and integrating knowledge management theory, socio-technical systems theory, and Technology-Task Fit (TTF), the study argues that the adoption gap arises from a systemic misalignment between knowledge characteristics, organizational readiness, and technology-task fit. Based on this analysis, the paper proposes the KM Technology Adoption Triangle as a conceptual framework to explain the persistent underutilization of KM technologies and to guide future digital transformation initiatives in the construction sector.

2. Literature Review

KM has undergone significant evolution in recent years, driven by digital transformation initiatives across industries, including construction. Digital technologies are considered one of the main factors in dealing with the complexities of project environments by enabling the easy capture, structuring, and dissemination of knowledge. However, the peculiar nature of knowledge, organizational culture, and operational dynamics makes it challenging to adopt KM technologies typical of the construction sector. At the same time, this review draws on the latest scholarship and aims to provide both a theoretical and contextual basis for understanding the gap in the adoption of KM technologies in the construction industry in the UAE. The review was structured around three themes: (1) KM theory and the tacit-explicit knowledge distinction, (2) technology-enabled KM in construction, and (3) regional contextual factors in the UAE.

2.1 Knowledge Management Theory and the Nature of Construction Knowledge

The distinction between tacit and explicit knowledge is an essential aspect of the KM literature. Notably, tacit knowledge is difficult to communicate or codify. Rather, it is an intuitive, context-dependent form of expertise that practitioners gain through practice. On the other hand, explicit knowledge is organized, documented, and easily transferable. The tacit-explicit dichotomy significantly affects KM technology design and use, especially in industries where the former holds sway. Building on this, recent studies reveal that construction remains a tacit knowledge-dependent industry, as the sector relies heavily on on-site decision-making, situational judgement, informal communication, and experiential learning [9]. The bulk of this knowledge is taught through observation, mentoring, and direct experience with the physical work rather than through formal digital systems. This is where knowledge resides in practice, embedded in action, not easily codified, and consequently difficult to capture digitally.

Moreover, researchers have identified epistemological attributes as a major factor contributing to the non-implementation of KM initiatives in construction. For example, foremen, engineers, and workers in the construction sector typically resolve their day-to-day issues through personal experience and informal networks, which, in turn, curb the use of digital repositories or structured KM systems. Serenko [11] argued that although organizations continue to invest in KM technologies, their effectiveness ultimately depends on how well such tools recognize and facilitate tacit knowledge processes. In recent years, the interface between digital technologies and tacit knowledge has attracted increasing scholarly attention. Alreshidi et al. [2] examined collaborative BIM environments and revealed that although BIM tools effectively support the sharing of explicit knowledge, they provide limited support for the socialization processes through which tacit knowledge is exchanged. Similarly, Hosseini et al. [7] found that many digital KM tools are capable of documenting and retrieving formal knowledge but often fail to capture experiential insights, improvisations, and context-specific knowledge generated during project execution. Collectively, these studies suggest that the construction industry's knowledge base differs substantially from sectors where KM technologies have been more successfully adopted. Consequently, the predominance of tacit knowledge presents a structural challenge for digital KM systems, which are primarily designed to manage explicit knowledge, thereby contributing to the adoption gap examined in this study.

2.2 KM Technologies and Their Capabilities in Construction

Over the past decade, there has been an increase in the development of digital tools aimed at facilitating KM activities within the construction industry. Technologies such as BIM, cloud-based collaboration systems, AI-driven platforms, digital twins, and immersive technologies (e.g., Augmented Reality [AR] and Virtual Reality [VR]) have been developed to support knowledge processes. According to the literature, these technologies possess both strengths and limitations in facilitating knowledge creation, sharing, and utilization. Deng et al. [1] reviewed the role of information and communication technologies in construction over a fifteen-year period and found that digital tools are particularly effective in supporting explicit knowledge processes, including information storage, document management, and structured communication. These technologies improve data accessibility, reduce information redundancy, and support more systematic decision-making. BIM, in particular, has emerged as a central KM tool due to its ability to integrate multidisciplinary project information within a shared digital environment.

Nevertheless, the literature also indicates that many KM technologies remain limited in their ability to support tacit knowledge processes. For example, AI and machine learning applications have demonstrated considerable potential for knowledge extraction, pattern recognition, and predictive analytics [12], [13]. However, their effectiveness depends heavily on the availability of structured and high-quality data. Given that much construction knowledge is informal, experiential, and undocumented, AI systems often struggle to capture expert judgement and context-specific insights. Similar limitations have been identified in cloud-based BIM environments. Alreshidi et al. [2] reported that while cloud-BIM platforms improve information accessibility and real-time collaboration, they continue to face challenges related to inconsistent data entry, low user participation, and difficulties in incorporating informal knowledge into structured digital systems.

Digital twins have emerged as another promising technology for supporting KM in construction. Opoku et al. [14] identified technological, organizational, and contextual factors as key drivers of digital twin adoption and highlighted their potential to support real-time analysis and knowledge-based decision-making. Likewise, Omrany et al. [15] emphasized that digital twins can support lifecycle-wide information management but require high levels of organizational readiness and change management. Related studies on automation and digitalization further suggest that while such technologies enhance efficiency and process quality, they provide limited support for tacit aspects of construction work, including coordination, experiential learning, and collaborative problem-solving [16]. Collectively, these findings indicate that current digital technologies are highly effective for managing explicit knowledge but remain less capable of supporting tacit knowledge processes, thereby reinforcing the KM technology adoption gap in construction.

2.3 Barriers to Digital Knowledge Management in Construction

A considerable body of recent literature has identified socio-organizational and technical factors as obstacles to the adoption of KM technologies. Hosseini et al. [7] provided one of the most comprehensive investigations, emphasizing that organizational culture, the absence of a clear KM strategy, resistance to change, and inadequate digital literacy contribute significantly to the poor implementation of KM initiatives. Their findings reinforce the view that technology adoption is not solely dependent on technological capabilities but is also strongly influenced by human behaviour, motivation, and trust-based relationships. Similarly, Daniel et al. [8] identified several interconnected barriers, including interoperability issues, inadequate training, weak data governance, and insufficient management support. Their findings suggest that successful technology adoption requires the development of organizational capabilities rather than merely acquiring digital tools.

Furthermore, Zhang et al. [17] employed the Technology–Organization–Environment (TOE) framework to demonstrate that digital transformation in construction is influenced by organizational culture, management support, resource availability, and technology fit. Their findings were further supported by Khan et al. [18], who argued that organizational capabilities and digital maturity are critical determinants of successful KM implementation. Likewise, Galić et al. [19] observed that the fragmented and project-based nature of construction often disrupts knowledge continuity, thereby limiting the effectiveness of KM technologies. Collectively, these studies indicate that barriers to KM technology adoption are systemic and arise from the interaction of technological, organizational, and environmental factors rather than from isolated challenges.

2.4 KM Adoption in the UAE Construction Industry

The UAE construction industry offers a unique environment characterized by rapid growth, a diverse workforce, and ambitious national digital transformation initiatives. Despite substantial government investments in smart technologies and digital infrastructure, recent studies indicate that organizational adoption of digital technologies remains uneven. Marzouk and Abubakr [3] found that variations in organizational culture, managerial perceptions, and investment priorities contribute to differing levels of digital readiness among construction firms in the Middle East, including the UAE. Similarly, Zaher et al. [4] observed that although the UAE is a regional leader in technology deployment, construction organizations continue to experience challenges in integrating digital technologies into KM processes.

A distinctive characteristic of the UAE construction sector is its project-based and highly mobile workforce. Abdullah et al. [5] noted that differences in cultural backgrounds and digital competencies make it difficult to implement standardized KM practices across organizations. High employee turnover and reliance on temporary labor further complicate knowledge retention, reducing the effectiveness of digital KM systems that depend on sustained user engagement. Likewise, Naji et al. [6] identified digital skills, leadership commitment, and IT infrastructure as critical enablers of successful digital transformation within UAE construction firms. Their findings suggest that without strong managerial support and clearly defined implementation processes, KM technologies are unlikely to become embedded in daily work practices.

These challenges are particularly noteworthy given the UAE's involvement in large-scale digitally enabled developments such as Expo City Dubai, Masdar City, and major transportation infrastructure projects. While such initiatives demonstrate strong national commitment toward digital transformation and smart construction practices, the effective integration of KM technologies across project stakeholders remains uneven. This suggests that technological investment alone does not guarantee successful knowledge capture, sharing, and reuse throughout project lifecycles.

Collectively, these studies indicate that KM technology adoption challenges in the UAE are influenced not only by technological factors but also by organizational, cultural, and workforce-related conditions. This highlights the need for a theoretical framework that simultaneously considers knowledge characteristics, organizational readiness, and technology-task alignment, which forms the basis of the conceptual framework proposed in this study.

3. Theoretical Foundations:

KM technologies are evaluated on their functional and operational aspects, as well as on theoretical grounds, including the nature of knowledge, the socio-technical characteristics of organizations, and the compatibility between technologies and work tasks. To provide a conceptual clarification on the non-utilization of KM technologies in the UAE construction industry, this section reviews three theoretical bases: (1) the Socialization, Externalization, Combination, and Internalization (SECI) knowledge creation model, (2) socio-technical systems theory, and (3) TTF views. Correspondingly, these three theories jointly illuminate the misunderstandings in knowledge and organization that result in an adoption gap.

3.1 The SECI Knowledge Creation Model: Tacit-Explicit Knowledge Dynamics

The SECI model, proposed by Nonaka and Takeuchi [20], is one of the most influential frameworks in knowledge management research and continues to inform contemporary discussions on knowledge creation and digital transformation. The model conceptualizes knowledge creation as a dynamic spiral involving four modes of knowledge conversion: socialization (tacit-to-tacit), externalization (tacit-to-explicit), combination (explicit-to-explicit), and internalization (explicit-to-tacit). Through these interconnected processes, organizations continuously create, transfer, and apply knowledge across different levels of practice.

Recent KM literature confirms the continued relevance of the SECI model in digital transformation contexts. Deng et al. [1] observed that contemporary KM technologies, including BIM, cloud platforms, and AI-based systems, primarily support the combination mode, whereby explicit knowledge is organized, integrated, and reused. These technologies may also partially facilitate internalization through digital visualization, simulation, and training environments. However, they remain comparatively weak in supporting socialization and externalization, which depend heavily on interpersonal interaction, shared experiences, observation, and the articulation of tacit insights. Such processes are inherently difficult to digitize because they rely on context-specific experiences and human interpretation.

This limitation is particularly significant in construction environments, where project execution depends heavily on tacit knowledge. Critical knowledge relating to coordination, risk management, sequencing, and problem-solving is frequently exchanged through informal communication, experience-sharing, and collaborative interactions on construction sites. Hosseini et al. [7] argued that these forms of knowledge rarely become embedded within digital systems. Similarly, Alreshidi et al. [2] reported that although collaborative BIM platforms are effective for managing explicit project information, they often fail to capture the richness of tacit knowledge generated through design discussions, informal meetings, and site coordination activities. This observation supports Serenko's [11] argument that digitalization does not fundamentally alter the epistemological nature of knowledge creation.

Therefore, from a SECI perspective, the KM technology adoption gap can be understood as a consequence of the disproportionate emphasis placed on explicit knowledge management. As construction projects continue to rely heavily on tacit knowledge processes, digital KM technologies are often unable to align with natural knowledge flows, reducing their perceived usefulness and limiting long-term adoption within the industry.

3.2 Socio-Technical Systems Theory: Digital Transformation as a Human-Technology Interaction

Socio-technical systems theory provides a complementary perspective by emphasizing that organizational performance emerges from the interaction between technical subsystems, such as tools, processes, and technologies, and social subsystems, including people, culture, relationships, and organizational norms. The theory suggests that technological interventions are effective only when they are aligned with the social environments in which they operate. In the context of KM, this implies that technologies must be compatible with the behavioural, cultural, and organizational dynamics through which knowledge is created and shared. Recent research on digital construction strongly supports this view. Begić et al. [16] argued that barriers to digitalization in construction stem not from technological limitations alone but from weak alignment between technologies and socio-organizational environments. Similarly, Zhang et al. [17] found that successful digital transformation depends on organizational readiness, leadership support, workforce capabilities, and an innovation-oriented culture. Consequently, even advanced KM technologies may fail when they are not effectively integrated into organizational practices.

One factor contributing to socio-technical misalignment in the UAE construction industry is the highly diverse workforce, which comprises individuals with different linguistic backgrounds and varying levels of digital literacy. Abdullah et al. [5] noted that such diversity makes the implementation of standardized KM practices particularly challenging. In addition, the temporary nature of construction project teams reduces incentives for long-term knowledge codification and limits the development of stable KM practices. Zaher et al. [4] further observed that the social realities of construction—informal communication, project-based governance, and workforce mobility—often conflict with the structured and formalized requirements of digital systems. Likewise, Hosseini et al. [7] reported that construction personnel frequently prioritize immediate problem-solving over formal knowledge documentation, creating a gap between system expectations and actual work practices.

Furthermore, socio-technical studies emphasize that technology adoption is influenced by perceived usefulness, ease of use, and the availability of organizational support. Many UAE construction firms introduce KM technologies without sufficient preparation, training, or workflow integration, resulting in fragmented implementation and inconsistent usage. From a socio-technical perspective, therefore, KM adoption challenges are rooted not only in technological limitations but also in organizational culture, workforce characteristics, and the project-based nature of the construction industry.

3.3 Technology Task Fit and Organizational Readiness

According to the Technology-Task Fit (TTF) perspective, technology is adopted when the capabilities of a digital tool align with the tasks users are expected to perform. In other words, regardless of technological sophistication, adoption is unlikely unless users perceive that the technology meaningfully enhances task execution. Recent construction studies have applied the TTF perspective to technologies such as BIM, cloud platforms, and digital twins. Alreshidi et al. [2] demonstrated that BIM adoption is often hindered when modelling activities are perceived as disconnected from site-based workflows. Similarly, Daniel et al. [8] identified technical barriers and interoperability challenges as major sources of friction between system capabilities and user requirements. Torres et al. [21] further observed that digital twins are most effective in environments characterized by well-defined data flows and strong integration with operational tasks.

The TTF perspective is particularly relevant for explaining the KM technology adoption gap in the UAE construction industry. In many cases, digital KM tools are implemented as supplementary systems rather than being fully embedded within project workflows. As a result, employees often perceive digital documentation as an additional burden rather than a tool that enhances task performance, leading them to rely on informal communication channels instead [19]. This mismatch between technology functions and work practices contributes to low user engagement and limited adoption.

Beyond TTF, organizational readiness also plays a critical role in technology adoption. Drawing on the Technology–Organization–Environment (TOE) framework, Zhang et al. [17] highlighted the importance of organizational culture, resource availability, leadership support, training, and strategic alignment in enabling digital transformation. Likewise, Naji et al. [6] identified digital skills, managerial commitment, and IT infrastructure as essential prerequisites for successful digital implementation in UAE construction organizations. Although many firms express strong interest in digital transformation, limited organizational capabilities often hinder the effective implementation of KM systems. Consequently, the gap between technological aspirations and organizational readiness provides an important explanation for why many KM initiatives fail to achieve sustained adoption.

4. Findings of the Conceptual Analysis:

The analysis of the reviewed literature identified four interrelated themes that explain the persistent under-adoption of KM technologies in the UAE construction industry. These themes emerged through the synthesis of recent studies and theoretical perspectives discussed in the preceding sections.

4.1 Epistemological Misalignment: Tacit Knowledge vs. Digital KM Systems

The first conceptual challenge arises from the fundamental mismatch between the epistemic nature of construction knowledge and the explicit-knowledge orientation of most KM technologies. As highlighted in the literature, advanced digital systems such as BIM, cloud platforms, and AI-driven knowledge systems are effective in managing structured and explicit information but remain limited in their ability to capture the tacit, experiential, and context-dependent knowledge that dominates construction practice [7], [9], [11]. From the perspective of the SECI model [20], digital systems primarily support combination (explicit-to-explicit) processes, whereas construction knowledge is largely generated through socialization (tacit-to-tacit) and externalization (tacit-to-explicit). These knowledge conversion modes depend heavily on interpersonal interaction, shared experiences, observation, and embodied cognition, all of which are difficult to codify and digitize. Consequently, this epistemological divide suggests that even advanced KM technologies can only provide partial representations of the construction knowledge environment.

Additionally, the UAE's construction sector's misalignment is further complicated by the workforce's multicultural and multilingual characteristics. Communication among workers on the site often takes the form of informal communication, gestures, and shared situational awareness rather than formal documentation, further enhancing the tacit nature of knowledge sharing. For instance, non-English-speaking workers, who make up the majority of the construction workforce in the UAE, will likely opt for verbal and/or visual communication, with even less incentive to use digital KM systems.

This knowledge gap results in several repercussions:

As a result, the adoption gap can, in part, be attributed to KM technologies' inability to depict and support the tacit knowledge processes that underpin routine construction practice.

4.2 Socio-Organizational Complexities and Cultural Resistance

The second challenge concerns the socio-organizational context in which the KM technologies have been implemented. According to the socio-technical systems theory, the adoption of technology will not be successful unless there is proper interaction between technical tools and users' social structures, norms, and behaviors. Recent studies have revealed that organizational culture, leadership support, and workforce readiness are among the most important factors that decisively impact digital transformation outcomes in construction. Furthermore, construction teams, particularly in the UAE, heavily depend on face-to-face communication, joint problem-solving, and trust built through relationships. The usual practice of workers in their search for information is to turn to their coworkers or supervisors rather than to digital repositories. Notably, this preference is rooted in the culture and tradition that have given rise to the perception of verbal communication as immediate and, hence, the easiest way to communicate.

Hosseini et al. [7] emphasized that digital KM systems are often perceived as bureaucratic and time-consuming, leading users to bypass them because they are not aligned with the realities of construction work. For many practitioners, documentation is viewed as a managerial requirement rather than a valuable knowledge asset, resulting in incomplete or low-quality digital inputs. The linguistic diversity of the UAE construction workforce, combined with varying levels of digital literacy, further exacerbates these challenges. Workers from South Asia, the Middle East, and Africa bring different cultural communication practices and technological competencies, making the implementation of standardized KM systems particularly difficult [5]. Consequently, digital KM tools, which are often designed for highly literate and technologically proficient users, may not adequately accommodate the needs of such a diverse workforce.

The constant launch of new tools without user training or integration into the workflows causes "innovation fatigue." Employees would question the effectiveness of any new technologies if the previously presented tools were either discarded or inadequately supported. This type of resistance is exhibited by construction companies that use technology only when necessary, namely when clients insist on it, or regulators are pressing, rather than as a long-term strategy aimed at KM. These socio-organizational dynamics reinforce the technology adoption gap and the weakened integration of KM-related technologies.

4.3 Project-Based, Temporary Structures and Knowledge Fragmentation

The third challenge stems from the temporary and project-based nature of construction organizations. Unlike many manufacturing and service industries, construction firms typically assemble and dissolve project teams as projects begin and conclude. This temporary organizational structure hinders knowledge continuity and limits the institutionalization of digital KM practices. Furthermore, short-term contracts, high expatriate mobility, and extensive subcontracting result in frequent workforce turnover, causing valuable knowledge to be lost before it can be documented and shared. Zaher et al. [4] observed that employee turnover remains a significant barrier to the implementation of KM initiatives in the Gulf construction sector, including the UAE. Consequently, knowledge generated during projects is often lost when teams disband, leading to repeated mistakes and persistent inefficiencies.

In addition, construction is a highly fragmented industry involving multiple stakeholders, including subcontractors, consultants, suppliers, and clients, each possessing different levels of digital capability and varying attitudes toward KM. Marzouk and Abubakr [3] argued that significant disparities in digital readiness among project participants in the Middle East create challenges for implementing shared digital platforms and coordinated KM practices. This fragmentation complicates the use of technologies such as BIM and digital twins, which depend on consistent data contributions from multiple actors. When participation is uneven or incomplete, the value of these systems declines, reducing incentives for continued use.

Construction projects in the UAE also operate under tight schedules, budget constraints, and intense client expectations. Under such conditions, project teams often prioritize immediate production objectives over long-term KM activities such as documentation, reflection, and training [19]. As a result, temporary project structures create an environment in which knowledge capture and reuse are frequently deprioritized, posing a significant challenge to the effective adoption of KM technologies.

4.4 Technology-Task Misalignment and Limited Perceived Usefulness

The fourth conceptual barrier concerns the misalignment between KM technologies and the tasks performed within construction environments. According to Technology-Task Fit (TTF) theory, technology adoption occurs when digital tools enable users to perform their tasks more effectively and efficiently. In many construction settings, however, KM technologies do not align well with natural work practices, resulting in low perceived usefulness. Activities such as electronic documentation, data entry, and system updates are often viewed as additional administrative burdens rather than value-adding tasks, particularly in fast-paced project environments where immediate responsiveness takes precedence over record-keeping.

Alreshidi et al. [2] found that cloud-based BIM platforms frequently encounter adoption challenges because they are not fully integrated with day-to-day site operations. BIM information must be continuously updated to reflect site conditions, and discrepancies between digital models and actual project activities can undermine user confidence and reduce system usage. Similarly, Naji et al. [6] identified inadequate training and limited digital competencies as major predictors of poor technology adoption outcomes within UAE construction organizations. When users do not perceive immediate benefits from a system or lack the skills required to utilize it effectively, they are more likely to rely on familiar informal practices. Furthermore, many KM technologies continue to depend on desktop-based access and structured data-entry processes, limiting their suitability for dynamic construction site environments. As a result, the mismatch between technological capabilities and operational requirements contributes significantly to the underutilization of KM systems.

4.5 Interplay of Themes: A Systemic Adoption Gap

The approach to the adoption gap is not through one barrier but rather the combination of misalignments in epistemology, organization, structure, and technology:

- ✓ Knowledge-intensive environments turn off systems for explicit knowledge and vice versa.
- ✓ Informal communication channels supported by socio-cultural norms are more preferred than digital documentation for sharing knowledge.
- ✓ Project-based organizational structure does not support long-term KM institutionalization.
- ✓ The mismatch between technology and task leads to low perceived usefulness and user acceptance.

These factors come together uniquely in the UAE context due to the workforce's diversity, the urgency of the project, and varying levels of digital readiness. These intricate misalignments among the factors suggest that simply upgrading the technology will be insufficient for the interventions. Instead, a conceptual approach that combines the characteristics of knowledge, organizational readiness, and task-technology fit will be necessary.

5. Discussion and Development of the KM Technology Adoption Triangle

Building upon the four findings identified in the conceptual analysis, this study proposes the KM Technology Adoption Triangle as an integrative framework for understanding the persistent under-adoption of KM technologies in the UAE construction industry. The framework argues that successful KM technology adoption depends on the alignment of three interrelated dimensions: Knowledge Characteristics, Organizational Readiness, and Technology-Task Fit.

5.1 Knowledge Characteristics

The first dimension reflects the balance between tacit and explicit knowledge within construction environments. Because construction knowledge is largely experiential, context-dependent, and socially embedded, KM technologies must support not only the management of explicit information but also mechanisms for capturing and sharing tacit knowledge.

5.2 Organizational Readiness

The second dimension refers to the organizational conditions necessary for technology adoption, including leadership commitment, organizational culture, digital competencies, and knowledge-sharing practices. Even advanced KM technologies are unlikely to succeed in environments lacking the necessary organizational support and readiness.

5.3 Technology-Task Fit

The third dimension concerns the degree to which KM technologies support the actual tasks performed by construction professionals. Adoption is more likely when digital tools are seamlessly integrated into existing workflows, provide immediate value to users, and reduce rather than increase operational burdens.

5.4 Interaction Between Dimensions

The framework proposes that KM technology adoption is achieved when these three dimensions are aligned. Weakness in any single dimension may reduce adoption effectiveness regardless of strengths in the other dimensions. Consequently, organizations should adopt a holistic approach that simultaneously addresses knowledge characteristics, organizational readiness, and technology-task fit when implementing KM technologies.

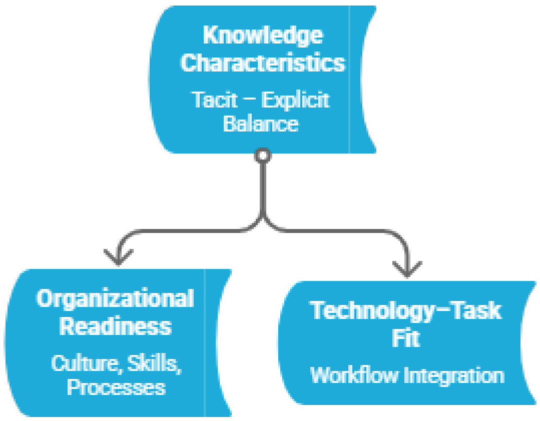

Figure 1 Research Framework

Interpretation

- ➢ Each box represents a necessary dimension for KM adoption.
- ➢ Those elements are bidirectional related:
  - o Knowledge ↔ Organization
  - o Organization ↔ Task Fit
  - o Knowledge ↔ Technology
- ➢ A successful KM technology adoption, achievable only when all dimensions are aligned.

6. Conclusion:

This study examined the persistent under-adoption of Knowledge Management (KM) technologies in the UAE construction industry despite significant advances in digital technologies and strong governmental support for digital transformation. The conceptual analysis identified three interrelated factors that contribute to this adoption gap: the epistemological mismatch between tacit construction knowledge and digitally codified systems, organizational readiness challenges associated with culture, leadership, and workforce capabilities, and the misalignment between KM technologies and the practical requirements of construction tasks. These findings indicate that KM technology adoption is not merely a technological issue but a systemic challenge shaped by the interaction between knowledge characteristics, organizational conditions, and technology-task fit. To address this issue, the study proposed the KM Technology Adoption Triangle, which integrates these three dimensions into a unified framework for understanding and improving KM technology adoption in construction environments. The study contributes to the KM and construction management literature by providing a systems-level perspective that extends beyond traditional technology-centric explanations of adoption. Practically, the framework offers guidance for construction organizations and policymakers in designing digital transformation initiatives that are better aligned with knowledge-sharing processes, organizational readiness, and project workflows. Nevertheless, this study is limited by its conceptual nature and reliance on existing literature, and the proposed framework has yet to be empirically validated. Future research should therefore examine the framework through surveys, interviews, case studies, or structural equation modelling across different construction contexts. Overall, the study highlights that successful KM technology adoption requires a balanced alignment between knowledge characteristics, organizational readiness, and technology-task fit, thereby providing a foundation for more effective and sustainable digital transformation in the UAE construction industry. The relevance of the proposed framework is particularly evident in the UAE, where large-scale smart city developments and infrastructure megaprojects require effective knowledge integration across diverse and temporary project teams.

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