CONCEPTUAL FRAMEWORK OF TECHNOLOGY ACCEPTANCE FACTORS INFLUENCING EFFECTIVE SPACE MANAGEMENT

Khalid Suhail Almas Mohamed Aldhaheri[1], Mohd Hafizal Ishak[2*]

[1,2]Faculty of Technology Management and Business, University Tun Hussein Onn, Malaysia,

*Corresponding E-mail: mhafizal@uthm.edu.my

ABSTRACT

Objective: To develop a conceptual framework that explores the behavioral intention to adopt technology for effective space management and performance measurement in higher education institutions, using the UTAUT model.

Research Method: This study employs a conceptual and theoretical approach, integrating constructs from the Unified Theory of Acceptance and Use of Technology (UTAUT) with relevant technological applications such as IWMS, CAFM, and IoT-based tools. It also incorporates Top Management Support as a moderating variable to examine its influence on technology adoption behavior.

Findings: The proposed framework identifies four critical factors which are Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions as primary drivers of technology acceptance. Top Management Support plays a pivotal moderating role in enhancing motivation, ensuring resource allocation, and aligning institutional goals, thereby facilitating successful technology implementation for space management.

Originality: This study advances existing literature by integrating a widely accepted technology acceptance model (UTAUT) with real-world applications in campus space management. It uniquely positions Top Management Support as a strategic moderator and provides a practical roadmap for digital transformation in higher education facility operations.

Keywords: Space Management, Technology Acceptance, Higher Education, UTAUT, IWMS, CAFM, IoT, Top Management Support, Behavioral Intention, Performance Measurement.

1. INTRODUCTION

The rapid growth of the global population and the continuous increase in student enrolment have significantly heightened the demand for educational infrastructure particularly space in higher education institutions (HEIs) (Salihu, 2020; Ogunode, Akinjobi & Musa, 2022). This rising demand has led to the consistent expansion of HEIs worldwide. Efficient and effective use of space is, therefore, essential not only to support educational expansion but also to reduce operational costs and enhance institutional productivity (Attaran, Attaran & Kirkland, 2019).

In the United Arab Emirates (UAE), this challenge is especially pronounced. HEIs are under mounting pressure to accommodate growing student populations and modernize their infrastructure to meet increasing academic and administrative demands (Salihu, 2020; Ogunode et al., 2022). Despite substantial investments in physical infrastructure and technology, many institutions continue to face space utilization issues—such as underused classrooms, inefficient scheduling, and rising operational expenses related to energy, maintenance, and cleaning (Ngambi, 2011; Saaid et al., 2018; Bellini et al., 2020). These inefficiencies are often the result of inadequate space planning, lack of stakeholder coordination, and limited adoption of data-driven space management systems (Wong, Ge & He, 2018; Morrison-Smith & Ruiz, 2020).

Addressing these issues requires the adoption of innovative, technology-based space management solutions. Technological tools can enhance campus planning through automation, real-time analytics, and improved coordination across academic and administrative functions (Iqbal et al., 2018). However, the success of these technologies depends largely on user acceptance and the institution's readiness to embrace digital transformation (Alyammahi, 2018; Chen et al., 2021).

The Unified Theory of Acceptance and Use of Technology (UTAUT) provides a useful theoretical lens for examining the factors influencing technology adoption. This model emphasizes the roles of performance expectancy, effort expectancy, social influence, and facilitating conditions in shaping users' behavioral intentions (Ursavaş, 2022; Tandon, 2021; Dash & Sahoo, 2021). Despite its broad application across sectors, UTAUT remains underutilized in the context of space management in UAE HEIs.

Contextual variables also play a crucial role in shaping technology adoption outcomes. Factors such as organizational culture, resistance to change, and user demographics including age, experience, and income can significantly influence the willingness to adopt new systems (Alrawi et al., 2020; Tavitiyaman, Tsang & Lam, 2021). Furthermore, insufficient top management support and unclear digital strategies hinder the successful integration of space management technologies (Alsayyari et al., 2019; Shaqrah & Almars, 2022).

Compounding the issue, many UAE institutions lack a unified roadmap for technology integration in campus planning. Space management practices remain fragmented, with no standardized framework guiding the implementation of digital solutions (Al Hashmi, 2018; Mandeli, 2019). Although sectors such as transportation and healthcare in the UAE have embraced digital transformation, HEIs lag behind due to limited empirical studies that investigate the relationship between technology acceptance and space management effectiveness (Alyammahi, 2018; Yassin & Al Naqbi, 2022).

The urgency for institutional reform is amplified by the UAE's national development agenda, particularly Abu Dhabi Vision 2030, which emphasizes operational excellence through innovation and digital transformation (Ashour, 2020; Yassin & Al Naqbi, 2022). However, without structured frameworks that align user acceptance with technological capabilities, such efforts risk failure. Cultural dynamics in the UAE such as fears of job displacement among both nationals and expatriates, perceived inequity, and general resistance to organizational change can further complicate adoption efforts (Dickson, 2019; Kirk & Napier, 2009). In educational settings, critical determinants for technology adoption include perceived usefulness, ease of use, accessibility, and the influence of peers and supervisors (AlHamad, 2020). Addressing these factors is essential to foster acceptance and successful implementation.

Despite the potential of digital solutions to improve space utilization in higher education, the absence of an integrated framework to guide their adoption remains a major barrier in the UAE. This study seeks to fill this gap by developing a conceptual framework that combines technology acceptance factors with effective space management principles. Such a framework can assist UAE HEIs in optimizing space usage, reducing operational inefficiencies, and aligning infrastructure use with strategic educational goals.

2. LITERATURE REVIEW

2.1 EFFECTIVENESS OF SPACE MANAGEMENT FOR HIGHER EDUCATION INSTITUTIONS

Space management is a critical component of operational efficiency in higher education institutions (HEIs), particularly in large and resource-intensive

environments. When poorly managed, physical space can become a significant cost burden, indirectly affecting institutional budgets due to increased energy use, maintenance, and repair costs (Ibrahim, Yusoff & Bilal, 2012). Since the 1960s, scholars and practitioners have increasingly recognized the importance of space optimization in institutional settings, regardless of whether facilities are in use during core operating hours or not.

Ibrahim, Yusoff, Martin, and Sidi (2011) emphasize that space usage influences the cost of other operations that larger space consumption leads to higher operational expenditures. Inefficiently used spaces result in waste and increased utility and maintenance costs. However, adapting to evolving space needs remains a slow process, particularly in publicly funded HEIs where administrative flexibility is limited and shifts in operational culture occur gradually.

Despite the frequent claim by HEIs of classroom space shortages, Ibrahim et al. (2012) reveal that institutions often fail to fully utilize their existing facilities. Many campuses do not optimize resource use during evenings, weekends, or academic breaks. In some cases, physical spaces are shared with external entities for research or community engagement, further complicating internal scheduling and planning.

Effective space management, however, continues to face numerous challenges. According to Mohanty, Prasanna, Neema, and Davis (2002), barriers include vague or narrowly defined performance targets, absence of reliable data on room capacity and usage patterns, and inconsistent or fragmented measurement methods across institutions. Furthermore, many HEIs lack user involvement in space planning policies, leading to disconnection between space users and decision-makers.

Despite these challenges, space utilization can be significantly improved through structured and data-driven strategies. Ibrahim et al. (2012) argue that optimal space utilization occurs when room bookings exceed 56% and occupancy rates surpass 75%, which they define as ideal benchmarks for institutional effectiveness. Carmona, de Magalhães, and Hammond (2021) offer a complementary perspective by outlining four interconnected processes essential for effective public space management: regulation, maintenance, resource reinvestment, and planned interventions. Regulation determines access, acceptable behavior, and conflict resolution within shared spaces. Maintenance ensures that infrastructure remains fit for purpose, while continuous reinvestment supports the renewal and upgrading of facilities. These processes require strategic planning and adequate funding—both recurring and capital expenditures (De Magalhães & Trigo, 2017).

In the context of UAE HEIs, these principles are particularly relevant given the region's rapid expansion of educational infrastructure under national strategies such as the Abu Dhabi Vision 2030. Effective space management thus necessitates not only physical oversight but also robust coordination mechanisms among internal departments and external stakeholders (Kumar-Nair & Landman, 2022). As traditional "command-and-control" governance models give way to more collaborative, "enabling" forms of institutional management, strategic alignment and cross-functional coordination become imperative. Thus, space management in UAE higher education institutions must evolve from a reactive, fragmented process into a proactive, integrated system. This involves aligning operational planning with empirical benchmarks, engaging end users in decision-making, and leveraging technology for real-time data and analytics. Doing so will not only reduce costs but also enhance the overall quality of educational delivery and institutional sustainability.

2.2 SPACE MANAGEMENT CHALLENGES

Effective space management plays a critical role in the operational efficiency and sustainability of higher education institutions (HEIs). When executed properly, it allows institutions to optimize the use of existing resources, reduce unnecessary expenditure, and improve the overall functionality and user experience of academic environments (Bellini et al., 2020). However, many HEIs continue to struggle with

significant space management challenges due to outdated planning processes, siloed data systems, and a lack of integrated digital solutions.

One of the primary issues is ineffective planning, often resulting from poor data quality or a complete lack of real-time information on space usage. Many institutions lack accurate records of room capacities, actual usage rates, and equipment availability, which are critical inputs for informed decision-making (Wong, Ge & He, 2018; Morrison-Smith & Ruiz, 2020). This information gap can lead to the underutilization of teaching and administrative spaces, scheduling conflicts, and duplication of resources, all of which contribute to increased operational costs and reduced institutional efficiency.

Another major challenge is the diversity of stakeholder needs and priorities. Students, faculty, administrators, and facility managers often have conflicting requirements regarding space allocation, usage hours, and infrastructure development (Van Woezik et al., 2019). Without a coordinated approach that addresses these competing interests, institutions may find it difficult to implement consistent and equitable space management strategies. For instance, faculty may prioritize dedicated office space or research labs, while students may require more flexible, collaborative learning environments. Balancing these needs within limited campus footprints adds a layer of complexity to space planning.

In the context of the UAE, these challenges are exacerbated by the absence of strategic roadmaps and underdeveloped institutional frameworks for space management (Al Hashmi, 2018). Many HEIs operate without standardized policies or benchmarks for assessing space utilization, leading to inconsistent practices across departments and campuses. Moreover, rapid expansion and infrastructure investments in the UAE's higher education sector have often outpaced the development of accompanying space management policies, resulting in misalignment between physical assets and academic needs.

While other sectors in the UAE, such as healthcare and transportation, have successfully leveraged digital technologies to enhance operational planning and efficiency, similar advancements in HEI space management have been limited. Despite growing interest in smart campus solutions and digital transformation, there is a lack of empirical research exploring the role of technology acceptance in improving space management outcomes in UAE HEIs (Alyammahi, 2018). As a result, many institutions have yet to capitalize on the potential benefits of data-driven tools such as occupancy sensors, scheduling software, and integrated facility management platforms.

Additionally, institutional resistance to change, insufficient technical expertise, and limited collaboration between IT departments and academic planners further hinder the adoption of modern space management solutions (Alrawi et al., 2020; Tavitiyaman, Tsang & Lam, 2021; Morrison-Smith & Ruiz, 2020). The lack of trained personnel who can interpret data and translate insights into actionable space planning strategies also contributes significantly to planning inefficiencies (Wong, Ge & He, 2018; Van Woezik et al., 2019).

The challenges facing space management in UAE HEIs are multifaceted and systemic, involving data inadequacies, conflicting stakeholder interests, weak governance structures, and a widening technology adoption gap (Al Hashmi, 2018; Alyammahi, 2018; Yassin & Al Naqbi, 2022). Addressing these challenges requires not only increased investment in digital infrastructure but also the development of a comprehensive conceptual framework that integrates technology acceptance models such as UTAUT with strategic institutional planning processes (Ursavaş, 2022; Dash & Sahoo, 2021; Chen et al., 2021).

Only through such an integrated and evidence-based approach can UAE HEIs begin to realize the full potential of optimized, cost-effective, and user-centered space utilization, ultimately enhancing the educational experience and ensuring long-term institutional sustainability (Bellini et al., 2020; Elumalai et al., 2021; Ashour, 2020).

2.3 DIGITAL TECHNOLOGIES DRIVING SPACE MANAGEMENT IN HEIs

The application of Integrated Workplace Management Systems (IWMS), Computer-Aided Facility Management (CAFM) tools, and IoT-enabled solutions has revolutionized how higher education institutions (HEIs) manage and optimize physical spaces. These technologies provide real-time data, analytical insights, and automated functionalities that significantly enhance the effectiveness of space utilization strategies. IWMS platforms, for example, offer comprehensive solutions by integrating various aspects of facilities management such as space planning, maintenance, and asset tracking into a centralized system. This integration allows decision-makers to align spatial resources with institutional goals more accurately and responsively (Lahtinen et al., 2022).

Similarly, CAFM tools provide spatial data visualization, occupancy tracking, and scheduling functionalities that support informed decision-making in day-to-day operations. By digitizing floor plans and providing real-time updates on room usage and maintenance needs, CAFM platforms help facilities managers identify underutilized areas and reallocate resources more effectively (Goyal & Pitt, 2007). These systems also facilitate the coordination of support services and reduce manual interventions, ultimately minimizing operational costs and inefficiencies (Nawari & Cloonan, 2017).

The role of IoT-enabled solutions has further enhanced the precision and responsiveness of space management. Sensors embedded in buildings can collect data on occupancy, temperature, lighting, and energy consumption, enabling adaptive and responsive facility management. IoT technologies make it possible to monitor space utilization dynamically and to make real-time adjustments based on actual user behavior rather than static schedules or estimations (Zhang, Cheng & Boutaba, 2010). For example, smart scheduling systems can automatically allocate rooms based on predicted demand patterns and usage history, thereby improving space efficiency and reducing environmental impact (Mathews, 2018).

When combined, IWMS, CAFM, and IoT platforms create a synergistic ecosystem that supports the strategic optimization of campus space. These technologies not only streamline administrative processes but also contribute to sustainability objectives and enhance the user experience by providing comfortable, well-managed learning environments (Ahmed, Nawari & Kuenzi, 2020). In the context of HEIs in the UAE, where educational infrastructure development is a strategic priority, leveraging these digital tools is essential for achieving operational excellence and long-term cost savings.

2.4 TECHNOLOGY AND SPACE MANAGEMENT

The integration of technology into organizational operations has significantly reshaped how institutions manage their physical resources. In the United Arab Emirates (UAE), this transformation is particularly evident across sectors such as healthcare, transportation, and education. As higher education institutions (HEIs) strive to improve operational efficiency and sustainability, the adoption of space management technologies has become a strategic imperative. According to Alyammahi (2018), the effective deployment of technology enhances management practices and improves the overall work environment by enabling better resource planning, real-time monitoring, and data-informed decision-making.

Technological innovations in space management offer numerous potential benefits for HEIs. These include reducing time spent commuting between facilities, improving the quality and functionality of shared workspaces, supporting environmentally sustainable operations, and enhancing work-life balance for staff and students (Chen et al., 2021; Tan, 2019). For instance, digital systems that automate room bookings, track space utilization in real time, and provide central dashboards can significantly streamline operations. However, the full realization of these advantages depends heavily on the successful adoption and sustained utilization of such technologies.

The adoption of technology in HEIs is influenced by various interrelated factors, including individual attitudes, technological infrastructure, and institutional readiness. User acceptance plays a pivotal role in determining whether technological systems will be effectively integrated into daily operations. Meuter et al. (2000) emphasized that factors such as perceived ease of use, convenience, and system reliability directly shape users' willingness to engage with new technologies. Within the context of HEIs, these perceptions are also affected by the availability of training, organizational support, and clarity of institutional policies (Chen et al., 2021).

To better understand the dynamics behind technology adoption, researchers frequently draw on theoretical models such as the Unified Theory of Acceptance and Use of Technology (UTAUT). This framework, initially developed by Venkatesh et al. (2003), has been widely applied in educational research to analyze user behavior. UTAUT identifies four primary constructs that influence individuals' behavioral intentions and actual technology use: performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy refers to the degree to which users believe that using a technology will improve their job performance. Effort expectancy reflects the perceived ease associated with the use of the technology. Social influence involves the extent to which individuals perceive that important others expect them to use the system. Facilitating conditions relate to the degree to which users believe that an adequate organizational and technical infrastructure exists to support the system (Ursavaş, 2022; Tandon, 2021; Dash & Sahoo, 2021).

In the UAE, HEIs are increasingly exploring digital solutions such as Integrated Workplace Management Systems (IWMS), Computer-Aided Facility Management (CAFM) platforms, and Building Information Modeling (BIM) tools to optimize space usage. These technologies allow for centralization of data, predictive maintenance, automated scheduling, and dynamic space reconfiguration planning (Wong, Ge & He, 2018; Bellini et al., 2020). Nevertheless, the adoption of such technologies often faces obstacles. Institutional resistance to change, limited technical skills among users, and weak collaboration between IT departments and campus planners are among the common barriers that hinder successful implementation (Alrawi et al., 2020; Tavitiyaman, Tsang & Lam, 2021).

In addition to these operational challenges, contextual factors such as organizational culture, leadership engagement, demographic variables, and the level of perceived personal benefit also influence technology adoption outcomes (Alsayyari et al., 2019; Yassin & Al Naqbi, 2022). Without addressing these socio-organizational elements, even well-designed systems may remain underutilized or misaligned with institutional goals. While technological innovation holds significant promise for transforming space management practices in higher education, its success is closely tied to human and institutional factors. Understanding and applying technology acceptance frameworks such as UTAUT, alongside targeted strategies that promote user engagement and organizational alignment, are essential for enhancing the effectiveness of space management in UAE HEIs.

2.5 TECHNOLOGY ACCEPTANCE FACTORS INFLUENCING EFFECTIVE SPACE MANAGEMENT

Technology acceptance in effective space management is shaped by several key factors derived from the Unified Theory of Acceptance and Use of Technology (UTAUT). In the context of higher education institutions, the adoption of advanced tools such as Integrated Workplace Management Systems (IWMS), Computer-Aided Facility Management (CAFM) software, and Internet of Things (IoT)-enabled smart systems has become increasingly vital. These technologies play a central role in optimizing space utilization, lowering operational costs, and improving the overall efficiency of campus facilities. Within the context of technology acceptance, this study identifies four key

factors influencing effective space management, along with one mediating factor, as outlined below:

Firstly, Performance Expectancy (PE) refers to the degree to which users believe that using these technologies will enhance their job performance. Systems such as IWMS and CAFM can streamline scheduling, automate space audits, and improve allocation efficiency. As a result, these tools contribute to tangible benefits such as cost reduction and better utilization of physical infrastructure (Tandon, 2021; Dash & Sahoo, 2021; Ursavaş, 2022).

Secondly, Effort Expectancy (EE) pertains to the perceived ease of use of these technologies. Such as a cloud-based IWMS that is user-friendly and requires minimal effort to operate, it is more likely to be adopted by staff and administrators. Key elements such as intuitive interfaces, reduced training requirements, and ease of navigation are critical to improving user acceptance (Shaqrah & Almars, 2022; Ursavaş, 2022).

Thirdly, Social Influence (SI) plays an essential role in determining technology adoption. It reflects the extent to which individuals perceive those important figures such as peers, supervisors, or institutional policymakers that believe they should use the technology. For example, when higher education leadership supports the use of IoT-based occupancy sensors or digital room booking systems, it reinforces the perceived necessity and legitimacy of these tools (Tavitiyaman et al., 2021).

In addition, Facilitating Conditions (FC) refer to the availability of the necessary infrastructure and organizational support to enable effective use of the technologies. These conditions include IT support services, training programs, system accessibility, and reliable hardware. A lack of such foundational elements can hinder the adoption and effective use of even the most sophisticated space management systems (Shaqrah & Almars, 2022).

Moreover, Top Management Support is identified in this study as a mediating factor that significantly influences the relationship between the aforementioned acceptance factors and the successful implementation of space management technologies. When institutional leadership is committed to the adoption process by providing strategic guidance, allocating resources, and fostering a supportive culture, staff are more motivated to engage with the technologies and align with institutional goals (Alsayyari et al., 2019; Mandeli, 2019). These interconnected elements which are performance expectancy, effort expectancy, social influence, facilitating conditions, and top management support collectively shape technology acceptance in the context of space management. Addressing each of these dimensions is essential for the successful deployment, utilization, and long-term integration of digital solutions within higher education institutions.

2.6 BEHAVIOURAL INTENTION OF TECHNOLOGY ACCEPTANCE RESULTING IN EFFECTIVE SPACE PERFORMANCE

In higher education institutions (HEIs), the behavioral intention to accept and use technology plays a crucial role in achieving effective space performance. As these institutions face increasing pressure to optimize physical infrastructure and respond to growing operational costs, the adoption of digital tools such as Integrated Workplace Management Systems (IWMS), Computer-Aided Facility Management (CAFM), and Internet of Things (IoT)-enabled systems has become essential. However, the effectiveness of such technologies largely depends on the users' behavioral intention, which refers to their willingness and readiness to embrace and actively use these systems.

The Unified Theory of Acceptance and Use of Technology (UTAUT) identifies several key constructs that influence behavioral intention. One of the most influential is performance expectancy, which refers to the extent to which users believe that a particular technology will help them perform their job more efficiently. In the context of space management, this might involve using software to automate room bookings,

track real-time occupancy, or generate utilization reports. When staff members perceive that these systems contribute to task efficiency, reduce scheduling conflicts, or lower operational costs, their intention to adopt the technology is strengthened (Tandon, 2021; Dash & Sahoo, 2021; Ursavaş, 2022).

Effort expectancy also significantly affects behavioral intention. This factor reflects the perceived ease of use of a system. When technologies are intuitive, require minimal training, and integrate well into existing workflows, users are more likely to adopt them. For example, a cloud-based IWMS platform with a user-friendly interface and automated functions would likely receive more positive user responses compared to a cumbersome legacy system (Shaqrah & Almars, 2022; Ursavaş, 2022).

Another influential factor is social influence, which relates to how much individuals feel that important stakeholders such as supervisors, peers, or governing authorities expect them to use the technology. In HEIs, where institutional culture and peer endorsement play a strong role in shaping behavior, the perceived expectations of others can significantly drive or hinder technology adoption. If faculty or administrative leaders actively promote space management tools, others are more likely to follow suit (Tavitiyaman et al., 2021).

Facilitating conditions, which encompass the organizational and technical infrastructure that supports system use, are equally critical. The availability of user training, IT support, and adequate hardware can greatly ease the transition to new technologies. When users feel that their institution provides sufficient resources and support, their confidence and motivation to adopt the technology are enhanced (Shaqrah & Almars, 2022).

In addition to these factors, top management support emerges as a key mediating variable. Leadership commitment influences both resource allocation and user engagement. When senior management prioritizes digital transformation, allocates budgets for technological upgrades, and communicates a clear vision, it cultivates a climate of trust and motivation among employees. This, in turn, strengthens the behavioral intention to use space management technologies (Alsayyari et al., 2019; Mandeli, 2019).

Effective space performance, which is measured through metrics such as utilization rates, frequency rates, and occupancy rates, depends on the successful deployment and consistent use of these digital tools (Desjardins, Hohl & Delmelle, 2020). When behavioral intention is strong, technology is more likely to be embraced across the institution, resulting in improved scheduling efficiency, better allocation of resources, and reduced operational costs. Therefore, behavioral intention serves as the critical link between technological potential and actual performance outcomes in space management within higher education institutions.

3. FORMULATION OF CONCEPTUAL FRAMEWORK

This study proposes a conceptual framework that integrates the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology Acceptance Model (TAM), while incorporating context-specific moderating variables relevant to higher education institutions (HEIs) in the UAE. The moderating variable is top management support that influence the core constructs of UTAUT: performance expectancy, effort expectancy, social influence, and facilitating conditions. These core constructs, in turn, shape behavioural intention to use technology, ultimately affecting the effectiveness of space management.

The theoretical foundation of the proposed framework is grounded in the constructs identified by UTAUT, which have been widely validated in studies on technology adoption (Kemp et al., 2019; Chua, Rezaei & Jambulingam, 2018). In developing this framework, relevant elements were adapted from prior research on technology acceptance (Sargent, Hyland & Sawang, 2012; Chua, Rezaei, Gu, Oh & Jambulingam, 2018) and space management effectiveness (Lok, Opoku & Baldry, 2018; Carmona, 2021). These adaptations allow the framework to address the unique

challenges faced by UAE HEIs and provide a structured approach for analyzing the relationship between technology adoption and space utilization outcomes. Figure 1 presents the proposed research conceptual framework.

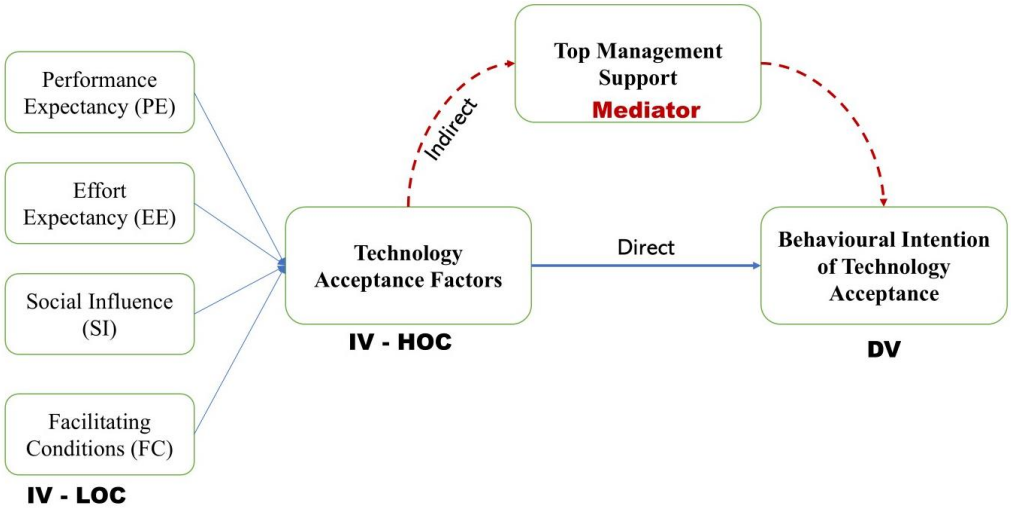

Figure 1: Proposed conceptual framework

Figure 1 presents a conceptual framework that explores the determinants of the Behavioral Intention of Technology Acceptance in the context of effective space management within higher education institutions. The framework is grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT). On the left, four independent variables include Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC), which collectively represent Technology Acceptance Factors. These factors are categorized under two constructs: IV LOC (Lower Order Constructs) and IV HOC (Higher Order Construct). These acceptance factors have a direct effect on the Behavioural Intention of Technology Acceptance, which serves as the dependent variable (DV).

In addition, the framework introduces Top Management Support (TMS) as a mediating variable. This mediator exerts an indirect influence on the relationship between technology acceptance factors and behavioural intention, suggesting that institutional leadership plays a crucial role in enabling and reinforcing the successful adoption of technology for space performance. The inclusion of TMS as a mediator is grounded in prior research that emphasizes the importance of leadership commitment in shaping organizational readiness and influencing individual acceptance of technology. Top management can provide vision, allocate resources, and create a supportive climate that bridges strategic objectives with operational execution (Ifinedo 2011; Dong et al. 2009). Therefore, TMS is positioned as a key enabler that enhances the impact of acceptance factors on users' behavioural intentions by reinforcing organizational alignment and support.

4. CONCLUSIONS

This review has highlighted the increasing significance of effective space management in higher education institutions, particularly within the context of the UAE's rapidly evolving academic and infrastructural landscape. As campuses contend with growing student populations, limited physical resources, and rising operational costs, digital transformation through the adoption of technologies such as Integrated Workplace Management Systems (IWMS), Computer-Aided Facility Management (CAFM), and IoT-enabled solutions emerges as a strategic imperative. The review

underscores that the successful implementation of these technologies relies heavily on user acceptance, organizational culture, and institutional support structures.

By synthesizing insights from the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology Acceptance Model (TAM), this study proposes a conceptual framework that captures the dynamic interplay between performance expectancy, effort expectancy, social influence, and facilitating conditions—moderated by factors such as top management support and demographic influences. Despite the growing interest in technology-driven campus management, empirical studies exploring this integration remain limited in the UAE context.

This review thus contributes to the academic discourse by identifying critical theoretical and practical gaps, paving the way for future research that can empirically test and refine the proposed framework. For policymakers and institutional leaders, the findings offer a foundation to design strategic initiatives that align space planning with technological innovation and institutional objectives, ultimately fostering more sustainable, efficient, and user-centred campus environments.

ACKNOWLEDGEMENT

The authors express their sincere gratitude to UTHM for granting permission to conduct this research and facilitate the publication of its findings.

REFERENCES

Ahmed, A., Nawari, N., & Kuenzi, T. (2020). Smart campus: A framework for intelligent space management using IoT. Journal of Building Performance, 11(2), 129–140.

Ahmed, K., Nawari, N., & Kuenzi, M. (2020). Integrating IoT and BIM for sustainable campus facility management. Journal of Information Technology in Construction (ITcon), 25, 123–137. https://doi.org/10.36680/j.itcon.2020.009

Al Hashmi, N. (2018). Evaluating the effectiveness of campus planning in UAE higher education institutions. International Journal of Educational Management, 32(6), 1051–1067. https://doi.org/10.1108/IJEM-10-2017-0302

Al Hashmi, S. (2018). Implementing educational technology in higher education institutions: A review of technologies, stakeholder perceptions, frameworks, and metrics. Education and Information Technologies, 23(3), 1–15.

AlHamad, A. Q. (2020). Factors influencing technology adoption in higher education. International Journal of Educational Technology in Higher Education, 17(1), 1–15.

Alrawi, K., Alrawi, A., & Alrawi, H. (2020). Investigating organizational challenges to innovation: Evidence from the UAE higher education sector. International Journal of Innovation Science, 12(4), 423–438. https://doi.org/10.1108/IJIS-10-2019-0108

Alrawi, K., Alrawi, R., & Hamdan, A. (2020). Barriers to digital transformation in higher education institutions: A Middle Eastern perspective. Education and Information Technologies, 25(6), 5121–5142. https://doi.org/10.1007/s10639-020-10246-7

Alrawi, K., et al. (2020). Organizational culture and its impact on technology adoption in higher education. International Journal of Educational Management, 34(1), 1–15.

Alsayyari, A., et al. (2019). Barriers to technology adoption in higher education institutions. Education and Information Technologies, 24(3), 1–15.

Alsayyari, A., Singh, G., & Afshan, G. (2019). Organizational culture and technological innovation adoption in higher education: The mediating role of perceived usefulness and attitude. International Journal of Emerging Technologies in Learning (iJET), 14(21), 118–134. https://doi.org/10.3991/ijet.v14i21.11075

Alyammahi, A. (2018). Implementing educational technology in higher education institutions: A review of technologies, stakeholder perceptions, frameworks, and metrics. Education and Information Technologies, 23(3), 1–15.

Alyammahi, A. (2018). Smart campus transformation in UAE universities: Challenges and opportunities. Journal of Information Technology Education: Research, 17, 365–386. https://doi.org/10.28945/4105

Alyammahi, A. (2018). The role of digital transformation in improving organizational effectiveness in the UAE's higher education institutions. International Journal of Management Research and Reviews, 8(2), 23–32.

Ashour, S. (2020). Abu Dhabi Vision 2030: Operational excellence through innovation and digital transformation. International Journal of Governmental Studies, 5(2), 1–10.

Ashour, S. (2020). Higher education reform in the UAE: Towards innovation and digital transformation. International Journal of Educational Development, 77, 102244. https://doi.org/10.1016/j.ijedudev.2020.102244

Attaran, M., Attaran, S., & Kirkland, D. (2019). The need for digital workplace: Increasing workforce productivity in the information age. International Journal of Enterprise Information Systems, 15(1), 1–23.

Bellini, E., et al. (2020). Space utilization and management in higher education institutions: A case study. Facilities, 38(1/2), 1–14.

Bellini, E., Gori, E., Pira, S. L., & Santucci, F. M. (2020). Smart campus: An analysis of innovative university space management. International Journal of Sustainable Development and Planning, 15(3), 309–320. https://doi.org/10.18280/ijsdp.150302

Bellini, F., Camanzi, L., Marasco, A., & Terkaj, W. (2020). Smart campus: Fostering the community awareness through an intelligent environment. Journal of Ambient Intelligence and Humanized Computing, 11, 419–433. https://doi.org/10.1007/s12652-019-01288-0

Carmona, M. (2021). The place-shaping continuum: A theory of urban design process. Journal of Urban Design, 26(1), 1–23. https://doi.org/10.1080/13574809.2020.1732521

Carmona, M., de Magalhães, C., & Hammond, L. (2021). Public space governance and management in the 21st century. Journal of Urban Design, 26(3), 307–330. https://doi.org/10.1080/13574809.2021.1886407

Chen, J., et al. (2021). Factors influencing the adoption of educational technology in higher education. Educational Technology Research and Development, 69(2), 1–20.

Chen, J., Xu, H., & Zhang, C. (2021). User acceptance of smart campus technologies in higher education: An application of the UTAUT model. Education and Information Technologies, 26(2), 1447–1465. https://doi.org/10.1007/s10639-020-10303-1

Chen, Y., Li, C., & Chen, S. (2021). Understanding the determinants of digital transformation in higher education institutions: The UTAUT perspective. Sustainability, 13(12), 6582. https://doi.org/10.3390/su13126582

Chua, B. L., Rezaei, S., & Jambulingam, M. (2018). Elucidating the constructs of a technology adoption model for independent restaurants. International Journal of Contemporary Hospitality Management, 30(3), 1296–1314. https://doi.org/10.1108/IJCHM-07-2016-0374

Chua, B. L., Rezaei, S., Gu, M. L., Oh, Y. J., & Jambulingam, M. (2018). Predicting online purchase intentions with UTAUT and TTF in an emerging economy. Journal of Hospitality and Tourism Technology, 9(4), 378–396. https://doi.org/10.1108/JHTT-11-2017-0124

Dash, S., & Sahoo, D. (2021). Digital transformation in higher education: Role of UTAUT model. Journal of Educational Technology Systems, 50(1), 35–58. https://doi.org/10.1177/00472395211010184

Dash, S., & Sahoo, D. (2021). Exploring patient's intention towards e-health consultation using an extended UTAUT model. Health Policy and Technology, 10(2), 1–10.

Dash, S., & Sahoo, D. (2021). Technology acceptance and user behavior: Application of UTAUT model in Indian higher education. Journal of Applied Research in Higher Education, 13(1), 126–143. https://doi.org/10.1108/JARHE-07-2019-0180

De Magalhães, C., & Trigo, S. (2017). Contracting out public services: Local government outsourcing and the regulation of public space. Urban Studies, 54(13), 3078–3097. https://doi.org/10.1177/0042098016661251

Desjardins, M. R., Hohl, A., & Delmelle, E. M. (2020). Space–time modeling of facility utilization in higher education: A case study of a university campus. Applied Geography, 115, 102141. https://doi.org/10.1016/j.apgeog.2019.102141

Dong, L., Neufeld, D., & Higgins, C. (2009). Top management support of enterprise systems implementations. Journal of Information Technology, 24(1), 55–80.

Dickson, M. (2019). Cultural dynamics and technology adoption in the UAE. Middle East Journal of Culture and Communication, 12(1), 1–15.

Elumalai, K. V., Sankaranarayanan, B., John, J. A., Menon, N., & Alqahtani, M. (2021). Smart education in UAE: A study on strategies and impacts of digital infrastructure in universities. Education and Information Technologies, 26(6), 6783–6804. https://doi.org/10.1007/s10639-021-10534-w

Goyal, R., & Pitt, M. (2007). Determining the role of innovation management in CAFM implementation in facilities management. Facilities, 25(1/2), 48–60. https://doi.org/10.1108/02632770710716979

Ibrahim, M. R., Yusoff, W. Z. W., & Bilal, K. (2012). Space utilization efficiency in higher education institutions: A case study. Journal of Facilities Management, 10(2), 102–114. https://doi.org/10.1108/14725961211218752

Ibrahim, M. R., Yusoff, W. Z. W., Martin, D., & Sidi, H. (2011). Space utilization in higher education institutions: A case of a Malaysian university. International Education Studies, 4(1), 121–128. https://doi.org/10.5539/ies.v4n1p121

Iqbal, S., et al. (2018). Adoption of technology in higher education: A case study. Journal of Educational Technology Systems, 47(1), 1–20.

Ifinedo, P. (2011). An empirical analysis of factors influencing Internet/e-business technologies adoption by SMEs in Canada. International Journal of Information Technology & Decision Making, 10(04), 731–766.

Kemp, E., Palmer, A., & Stojanovic, T. (2019). Toward an understanding of technology adoption in higher education: The role of UTAUT and institutional factors. British Journal of Educational Technology, 50(3), 1185–1202. https://doi.org/10.1111/bjet.12771

Kirk, D., & Napier, N. K. (2009). Cultural dynamics and technology adoption in the UAE. Journal of Business Ethics, 89(1), 1–15.

Kumar-Nair, V., & Landman, K. (2022). The enabling state and institutional transformation: Rethinking governance in UAE universities. International Journal of Educational Development, 90, 102553. https://doi.org/10.1016/j.ijedudev.2022.102553

Lahtinen, J., Nenonen, S., & Nissinen, K. (2022). Integrated workplace management system (IWMS) and organizational performance in higher education. Journal of Corporate Real Estate, 24(1), 103–122.

Lahtinen, M., Haahtela, T., & Jylhä, T. (2022). Strategic space management through integrated workplace management systems (IWMS) in higher education. Facilities, 40(13/14), 834–853. https://doi.org/10.1108/F-08-2021-0084

Lok, L., Opoku, A., & Baldry, D. (2018). Managing higher education space: A review of the literature. Facilities, 36(7/8), 360–373. https://doi.org/10.1108/F-01-2017-0006

Mandeli, N. (2019). Rethinking urban planning in the Gulf: The case of Saudi Arabia. Cities, 90, 134–141. https://doi.org/10.1016/j.cities.2019.01.029

Mandeli, N. (2019). Technology adoption in higher education: A review of the literature. Journal of Educational Technology Systems, 47(1), 1–20.

Mathews, J. (2018). Smart building technologies for sustainable campus development. Sustainability, 10(2), 392.

Mathews, M. (2018). IoT-enabled smart campus: Bridging physical and digital learning environments. Smart Learning Environments, 5(1), 1–14. https://doi.org/10.1186/s40561-018-0078-8

Meuter, M. L., Ostrom, A. L., Bitner, M. J., & Roundtree, R. (2000). Self-service technologies: Understanding customer satisfaction with technology-based service encounters. Journal of Marketing, 64(3), 50–64. https://doi.org/10.1509/jmkg.64.3.50.18024

Mohanty, B., Prasanna, K., Neema, M. N., & Davis, P. (2002). Space management practices in educational institutions: An overview. Facilities, 20(7/8), 269–275. https://doi.org/10.1108/02632770210426710

Morrison-Smith, S., & Ruiz, J. (2020). Challenges and barriers in virtual teams: A literature review. SN Applied Sciences, 2(6), 1096. https://doi.org/10.1007/s42452-020-2801-5

Nawari, N. O., & Cloonan, T. M. (2017). BIM-integrated sustainable facility management for universities. Computing in Civil Engineering 2017: Data, Sensing, and Analytics, 40–47. https://doi.org/10.1061/9780784480823.006

Nawari, N., & Cloonan, C. (2017). Building information modeling and facility management: A case study. Procedia Engineering, 196, 1051–1056.

Ngambi, H. C. (2011). The relationship between leadership and employee morale in higher education. African Journal of Business Management, 5(3), 762–776.

Ogunode, N. J., Akinjobi, F. N., & Musa, A. (2022). Funding of public universities in Nigeria: Challenges and solutions. European Multidisciplinary Journal of Modern Science, 5, 1–10. EMJMS

Saaid, A. M., Ismail, A., & Yusof, N. (2018). Space utilization model for higher education institutions. IOP Conference Series: Materials Science and Engineering, 429, 012102.

Salihu, M. J., Ramadneh, N. M., & Rashid, R. A. A. (2020). Higher education, globally, is at a critical juncture. Open Journal of Social Sciences, 8(6), 1–12.

Sargent, J., Hyland, P., & Sawang, S. (2012). Factors influencing the adoption of information technology in higher education. Journal of Information, Communication and Ethics in Society, 10(4), 210–224. https://doi.org/10.1108/14779961211261003

Shaqrah, A. A., & Almars, A. A. (2022). Factors affecting the adoption of technology in higher education institutions. Journal of Educational Technology & Society, 25(1), 1–10.

Tan, C. W. (2019). Adoption of smart technology in higher education: Drivers and challenges. Journal of Information Technology Education: Research, 18, 315–336. https://doi.org/10.28945/4381

Tandon, A. (2021). Examining the technology acceptance model using UTAUT in Indian higher education: A cross-sectional study. Education and Information Technologies, 26, 5939–5959. https://doi.org/10.1007/s10639-021-10572-5

Tandon, U. (2021). Using the UTAUT model to understand students' usage of e-learning systems in developing countries. Education and Information Technologies, 26(1), 1–20.

Tavitiyaman, P., Tsang, N. N. Y., & Lam, C. Y. (2021). Technology acceptance of hotel employees in the era of COVID-19: An integration of protection motivation theory and UTAUT. International Journal of Hospitality Management, 95, 102938. https://doi.org/10.1016/j.ijhm.2021.102938

Tavitiyaman, P., Tsang, N., & Lam, T. (2021). The influence of organizational culture on technology adoption in higher education. Journal of Hospitality, Leisure, Sport & Tourism Education, 28, 100304.

Tavitiyaman, P., Tsang, N., & Lam, W. (2021). Organizational factors affecting e-learning adoption in universities. The International Journal of Management Education, 19(1), 100439. https://doi.org/10.1016/j.ijme.2021.100439

Ursavaş, Ö. F. (2022). Conducting technology acceptance research in education. Springer.

Ursavaş, Ö. F. (2022). Determinants of smart education technology adoption: The moderating role of culture in UTAUT. Technology, Pedagogy and Education, 31(1), 33–50. https://doi.org/10.1080/1475939X.2021.1979406

Ursavaş, Ö. F. (2022). Integration of technology in education: The role of UTAUT model. Education and Information Technologies, 27(1), 1291–1312. https://doi.org/10.1007/s10639-021-10620-0

Van Woezik, T., Braat-Eggen, P., Visscher, C., & van den Dobbelsteen, A. (2019). User-centered university space management: Lessons learned from participatory design. Journal of Corporate Real Estate, 21(3), 160–178. https://doi.org/10.1108/JCRE-02-2019-0010

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425–478. https://doi.org/10.2307/30036540

Wong, J. K. W., Ge, J., & He, S. X. (2018). Application of BIM and big data for campus space management: A case study. Automation in Construction, 86, 255–266. https://doi.org/10.1016/j.autcon.2017.11.004

Wong, J. K. W., Ge, J., & He, S. X. (2018). Digitization in facilities management: A literature review and future research directions. Automation in Construction, 89, 110–126. https://doi.org/10.1016/j.autcon.2017.12.006

Wong, J. K. W., Ge, J., & He, S. X. (2018). Enhancing building information modeling competency of facility managers: A knowledge management approach. Facilities, 36(3/4), 157–175.

Yassin, S. A., & Al Naqbi, R. A. (2022). Institutional culture and technology adoption in UAE universities: An empirical study. Journal of Educational Technology Systems, 50(2), 212–229. https://doi.org/10.1177/00472395211021702

Yassin, S. A., & Al Naqbi, W. (2022). Strategic alignment in UAE universities: A study on policy and planning for smart transformation. Higher Education Policy, 35(2), 314–335. https://doi.org/10.1057/s41307-020-00191-2

Yassin, S. M., & Al Naqbi, S. (2022). AI adoption and educational sustainability in higher education in the UAE. Journal of Artificial Intelligence in Education, 32(1), 1–15.

Zhang, Y., Cheng, S., & Boutaba, R. (2010). Cloud computing: State-of-the-art and research challenges. Journal of Internet Services and Applications, 1(1), 7–18. https://doi.org/10.1007/s13174-010-0007-6