Advanced and Sustainable Technologies
ASET
E-ISSN 2976-2294
Volume 5, No 1, June 2026 [181-193]

Integrating Mobile Apps into University Leadership: Evidence from Palestinian Universities

Mohammed K. Mahamda[1]*, Mohd Sofian Mohammad Rosbi[1], and Samah Iriqat[2]

[1]Department of Business, Faculty of Business and Communication, Universiti Malaysia Perlis, UniCITI Campus, Perlis, Malaysia.
[2]Center for Educational Research and Development, Ministry of Education and Higher Education, Ramallah, Palestine.

Received 26 November 2025, Revised 8 January 2026, Accepted 26 January 2026

ABSTRACT

Digitalization and the accelerating shift toward integrating digital tools into management and leadership systems in higher education institutions have been intensified following the outbreak of COVID-19. Smartphones and mobile applications played a vital role in digital transformation, serving as effective tools for university leaders and administrators to enhance decision-making, communication, and stakeholders' engagement. In the Palestinian context, political instability, infrastructure readiness, and limited digital skills have been identified as constraints on the effective use of mobile applications in leadership practices. This study aims to examine the level of integration of mobile applications into university leadership in Palestinian universities. A qualitative approach was adopted to address the study objective by conducting semi-structured interviews with university IT directors who support presidents, deans, and administrative units. The study examined how mobile applications are incorporated into leadership practices across seven Palestinian universities. Data were analyzed thematically using an inductive–deductive approach. The study revealed that there's a clear digital divide among Palestinian universities regarding the integration of mobile applications into leadership practices. While institutions are advancing toward full integration, others remain at early or fragmented stages. Greater collaboration among Palestinian universities is needed to adopt a unified strategy for using mobile applications to enhance transparency, efficiency, and accountability, thereby supporting sustainability in the higher education sector. Further research is recommended across different cultural contexts, using mixed-methods research methodologies.

Keywords: Digital Leadership, Mobile Applications, Palestinian Universities.

1. INTRODUCTION

Digital leadership is a methodical approach that emphasizes the strategic and intentional aspects of digital integration and involves leaders actively using technology to impact educational outcomes.

Digital technology has become one of the most influential drivers of economic growth and development worldwide [1]. Digital tools like smartphones have improved the communication process between humans. They are reducing the distances, saving time and effort. While SDG 4 of the Sustainable Development Goals (SDGs) emphasized enhancing the quality of education. New initiatives and technological solutions are essential to offer new opportunities for a high-quality lifestyle and to encourage lifelong learning for everyone [2]. Mobile applications are contributing to achieving that goal by disseminating knowledge and expertise among stakeholders in the higher education sector in an innovative and modern way.

*Corresponding author: mohammedmahamda@studentmail.unimap.edu.my

Today, leaders in higher education increasingly rely on mobile applications to communicate, monitor, and make decisions. Mobile applications make it possible for communication to occur whenever the leaders want to, in a variety of settings. Given that communication does not always have to take place in the university leadership building, and does not have to follow set schedules [3]. Globally, people are becoming increasingly dependent on their mobile phones, integrating them into their everyday lives [4]. Recently, educational institutions have begun to use mobile applications to improve the learning environment in higher education since it benefits stakeholders and leadership and facilitates the management process [5].

Following the declaration of COVID-19 as a global pandemic, economic production was disrupted, leading to financial losses, layoffs, and declining sales. In organizational contexts, remote work, virtual operations, and digital leadership were widely adopted [6]. Palestinian universities face severe political and socioeconomic challenges [7], including mobility constraints that hinder leaders and administrative staff from accessing campuses regularly. In this context, mobile applications offer a practical solution to enhance communication between the university leadership and stakeholders cost-effectively, activate operational processes, exchange data, and digitally sign official documents, rather than relying on hard copies.

Although research on digital leadership in higher education is expanding, there remains a significant gap regarding how higher education institutions integrate mobile applications into leadership and administrative processes, particularly in terms of development patterns, thematic clusters, and the geographic distribution of knowledge production [8]. Moreover, despite numerous studies, it remains unclear how and why users adopt mobile apps specifically and information technology solutions more broadly [9]. This study examines how IT directors at Palestinian universities perceive, utilize, and evaluate the integration of mobile applications into leadership processes, drawing on the Unified Theory of Acceptance and Use of Technology (UTAUT) [10]. The study addresses the following research questions:

1. To what extent are mobile applications currently integrated into leadership processes at Palestinian universities?
2. What factors (cultural, organizational, Technological) enable or inhibit university leaders' adoption of mobile applications?
3. How do university leaders perceive the impact of mobile apps on communication, stakeholder engagement and institutional agility?
4. What recommendations do IT directors propose for scaling and sustaining mobile-based tools in Palestinian HEIs?

1.1 LITERATURE REVIEW

1.1.1 Digital Leadership

Digitalization has become a significant element of university management systems, impacting stakeholders [11]. Leadership refers to the process of motivating followers to achieve an organization's objectives. Advancements in technology have substantially transformed how leaders perform their roles [17]. Integrating mobile applications into university leadership activities facilitates the transition toward digital leadership.

Digital Leadership Skills are increasingly valued across digital organizations. Digital organizations are those that extensively employ emerging digital technologies to enhance operational efficiency, engage stakeholders, expand market knowledge, and develop new business models. The concept of "Digital Leadership" or "Digital Ability" refers to achieving information and communication technology ICT-related goals through the strategic alignment of human resources and ICT utilization [18].

Technology leadership emphasizes leaders' positive attitude toward encouraging employees to adopt and use technology in the workplace. In contrast, mobile technology integration refers to the use of portable digital devices, such as computers, tablets, smartphones, and notebooks, for communication, entertainment, and work [19].

1.1.2 Mobile Applications

Mobile applications have influenced university procedures, operations, and organizational structure by introducing new management practices into the academic work environment [12]. Mobile phones are widely regarded as tools for accessing digital resources [13], representing a feasible strategy for advancing electronic educational management and remote learning processes [14]. Currently, mobile technologies align well with educational strategic objectives [15]. Mobile applications, commonly referred to as apps, are software programs designed to provide services that meet users' needs and preferences on mobile devices [16].

A. Hinze et al. (2023) investigated the use of mobile applications in teaching and research within higher education by administering an online questionnaire to faculty members, staff, and postgraduate research students at a university in New Zealand. The survey aimed to identify which mobile apps were used, for what purposes, and which barriers hindered their adoption. During 2016–2017, a 29-question survey was conducted and completed by 269 respondents, representing more than 20% of the possible sample. The findings revealed that academics and students primarily use mobile applications for communication, document storage and data sharing. while usage for in-field research and in-class teaching activities remained unexpectedly low [20].

Hmoud and Salah (2023) examined factors influencing employees' intentions to use mobile learning in Jordanian and Palestinian higher education institutions. Data were collected through an online survey administered at two universities in Jordan and Palestine. The results indicated that compatibility, complexity, effort expectancy, and attitudes toward adoption significantly influenced employees' willingness to use mobile learning. These findings provide valuable guidance for developers and educational institutions seeking to design and implement comprehensive mobile learning systems that support the effective adoption of m-learning applications [21].

Obaid (2025) explored digital leadership in educational settings, addressing issues that require effective communication in information technology within institutions. Although digital transformation in academia is increasingly critical, its success depends on both technological infrastructure and leadership capabilities. The study aimed to synthesize existing knowledge on digital leadership in academia and identify directions for future research. A systematic literature review of 50 peer-reviewed articles published between 2019 and 2024 was conducted. The findings emphasized that relational capital, connectivity, sound governance, and effective leadership remain key determinants of successful collaborative outcomes [22].

Abdallah et al. (2024) examined the factors influencing institutions' decisions to adopt mobile cloud computing by proposing a comprehensive model incorporating seven established technological factors, along with emerging variables such as social influence and service quality. Data were collected from 210 students and faculty members at An-Najah National University in Palestine. The study assessed how mobile cloud computing enhances service quality through usability, ease of use, and facilitating conditions that improve perceived utility [23].
Al-Rousan and Ababneh (2025) investigated the impact of digital leadership, specifically digital leader skills, digital strategy, and digital knowledge, on institutional excellence within the Social Security Corporation, with business intelligence serving as a moderating variable. Using a questionnaire-based descriptive-analytical approach, data were collected from a sample of 377 employees. Statistical analyses, including multiple, simple, and hierarchical regression analyses

in SPSS, demonstrated that digital leadership significantly influences institutional excellence, with business intelligence serving as a moderating factor. The study recommended prioritizing training, skill development, and the adoption of business intelligence applications [24].

El-Holy and Hamad (2025) explored the availability of digital leadership in Palestinian universities and its relationship with exceptional performance. Using a descriptive-analytical methodology, data were collected via a validated questionnaire administered to 298 administrative staff members from Palestine University, Al-Aqsa University, Al-Azhar University, and the Islamic University, selected through stratified random sampling. The findings indicated that both digital leadership and exceptional performance were perceived as moderate. A statistically significant correlation ($r = 0.783$) was identified between digital leadership and exceptional performance in Palestinian higher education institutions [25].

Building academic capacity to effectively utilize digital technologies in teaching, administrative, and management functions should be incorporated into higher education policy to enhance productivity [26]. In contemporary educational environments, the strategic adoption of digital technologies and mobile applications is essential to strengthen campus support services and achieve the Sustainable Development Goals (SDGs) [27].

Previous studies on digital leadership have predominantly relied on quantitative research methodologies, particularly questionnaire-based surveys, to investigate the phenomenon. However, the literature indicates a persistent and significant communication gap among academic departments, administrative units, and students regarding smartphone application use. This gap suggests that the current e-services provided by Palestinian universities remain inadequate and require substantial improvement [34]. Furthermore, existing research reveals that the adoption and practical implementation of digital leadership within Palestinian higher education institutions remain limited. A gap persists between the philosophy of digital leadership and practice, highlighting the need for further empirical investigation to address this deficiency and enrich the existing body of knowledge [35,36].

In response to these gaps, the present study adopts a qualitative research approach to bridge both methodological and knowledge shortcomings identified in prior research. By exploring digital leadership practices in greater depth and context, this study seeks to contribute original insights to the literature. It proposes a novel research model that advances understanding of digital leadership at both the local and global levels.

1.1.3 Significance of the Mobile Apps and Crisis-driven Adoption

In the Palestinian context, both public and private institutions have faced persistent internal and external crises. Political, economic, and social challenges have significantly affected institutional performance and leadership capacity during periods of instability. Consequently, Palestinian institutions must strive to adopt effective tools for managing crises and bridging the knowledge gap regarding the benefits and challenges of virtual leadership, particularly in conflict-affected and unstable regions such as Palestine during the COVID-19 pandemic [28].

Globally, mobile applications have transformed management systems by serving as communication tools that enhance efficiency, transparency, and governance, thereby supporting institutional sustainability [32]. Accordingly, integrating mobile applications into Palestinian university leadership is both critical and necessary to overcome political and economic constraints and to strengthen the long-term sustainability of higher education institutions.

2. MATERIAL AND METHODS

This study employed a qualitative research approach to investigate the phenomenon within its natural context. Data were collected directly from individuals with firsthand experience of the phenomenon and subsequently analyzed and interpreted to achieve the research objectives [29].

2.1 Research Design and Approach

A qualitative research design was adopted as it enables in-depth exploration of phenomena within their real-life contexts by drawing on the perceptions and experiences of individuals directly involved. This approach is particularly suitable when the aim is to understand meanings, interpretations, and experiences associated with a specific phenomenon within a defined context.

2.2 Sampling Strategy

Information-rich cases were selected using a purposive sampling strategy. Seven Palestinian universities were chosen to ensure institutional diversity, including both public and private higher education institutions. The participating universities were represented by their information technology (IT) directors or managers. The selected institutions were: Al-Quds University, Palestine Technical University–Kadoorie, Al-Quds Open University, An-Najah National University, Birzeit University, Arab American University (AAUP), and Zaytoonah University of Science and Technology.

2.3 Participants Demographics

The study involved 7 participants, of whom 2 were female and 5 were male. All participants held either a doctoral or a master's degree in information and communication technology or a closely related field, ensuring a strong technical and strategic understanding of the issues examined in this research.

2.4 Data Collection Tool

Semi-structured interviews were employed as the primary data collection tool. The interview protocol was developed based on the study's research questions and guided by the Unified Theory of Acceptance and Use of Technology (UTAUT) framework. The protocol was reviewed and validated by a panel of three experts with extensive experience in educational research, strategic planning, and quality assurance in higher education. Their feedback was incorporated to enhance the clarity, relevance, and comprehensiveness of the interview questions.

2.5 Data Collection Procedures

Following the development of the research topic and interview protocol, seven individual interviews were conducted. After confirming the protocol's reliability, potential participants were contacted, and the study's purpose was clearly explained. Informed consent was obtained, and interview appointments were scheduled at times convenient for the participants.

Each face-to-face interview lasted between 45 and 60 minutes. To ensure methodological rigor, the researchers avoided leading questions and clarified participants' responses to achieve shared understanding. All information provided by participants was treated with strict confidentiality and used exclusively for scientific research purposes.

2.6 Data analysis

Thematic analysis was employed to analyze the qualitative data derived from interview transcripts, supported by MAXQDA 24 software [30]. The analysis process involved two primary stages: vertical analysis (coding) and horizontal analysis (categorization). Following the identification of initial categories, relationships among categories were examined to derive overarching themes and generate the final analytical report. The process was done in accordance with the hybrid inductive-deductive model:

1. Familiarization: Transcription Reading.
2. Initial Coding (Vertical Analysis): Obtaining initial coding from the data.
3. Theme Development (Horizontal Analysis): Coding themes for potential themes and sub-themes, using both data (inductive) insights and UTAUT concepts (deductive).
4. Theme review and refinement: verifying that the themes were relevant to the coded extracts and to the data as a whole.
5. Defining and Naming Themes: Finalizing the thematic map.
6. Report Production: Writing the analysis.

2.7 Ethical Considerations

Strict ethical standards were adopted: Informed consent was obtained from each participant, and each was informed that the right to withdraw was guaranteed. Confidentiality was ensured by anonymizing all individual and institutional details in the analyzed data. The audiotape or transcript is safely stored on a password-protected device. The data will be used exclusively for the study.

2.8 Research Model

This research proposes a conceptual framework (Figure 1) examining the relationship between the integration of mobile applications and university leadership practices, with a focus on their contribution to Sustainable Development Goal 4 (Quality Education). The UTAUT model provides the theoretical foundation for analyzing factors influencing the integration and use of mobile applications within university leadership contexts.

Figure 1: Research Model.

3. RESULTS AND DISCUSSION

In-depth interviews were conducted with IT directors from seven Palestinian universities to generate the study's thematic findings. Four main themes were identified through an inductive–deductive thematic analysis guided by the Unified Theory of Acceptance and Use of Technology (UTAUT) framework. These themes reflect shared, convergent, and context-specific perspectives on how mobile applications are integrated into university leadership practices. They also capture participants' experiences, perceived benefits, challenges, and the meanings associated with the integration process. The following table shows the main themes, sub-themes, and illustrative quotes.

3.1 Main Themes

Based on the data, four major themes emerged (Table 1), reflecting the experiences and perspectives of the IT directors in Palestinian universities.

Table 1: The main themes, sub-themes, and illustrative quotes.

Main Themes	Sub-Themes	Illustrative Quotes
A. Various Levels of Integration	1. Complete Integration	"Al-Quds University adopted a university application... employees can submit vacations, request financial statements, and upload formal letters for approval." (IT Director, Al-Quds University)
	2.Additional/Supplementary Integration	"We don't have a separate leadership app, but we wish to develop one... We use Teams, Outlook, WhatsApp." (IT Director, Birzeit University)
	3.Weak/Unofficial Integration	"Leadership has only WhatsApp groups... The HRM system is only on the web, not connected to mobile." (IT Director, PTU)
B. Risk and Efficiency Trade-off	1. Perceived Benefits (Efficiency)	"Saves time, easy to use, enhances decision-making, reduces paper waste, helps overcome political challenges." (Various Participants)
	2. Perceived Risks & Concerns	"Privacy and security concerns (like WhatsApp). trust degree is an issue." (IT Director, An-Najah University)
C. Institutional Flexibility and Transparency	1. Enhanced Agility & Decision-Making	"Mobile apps enable rapid communication and decision-making during unexpected events." (IT Director, An-Najah University).
	2. Improved Transparency & Access	"The mobile application... enhances transparency... allows you to get any employee's contact without request." (IT Director, Al-Quds University)
D. Obstacles and Enablers	1. Key Enablers	"A well-defined digital strategy... strong top-level leadership support... reliable technological infrastructure." (Synthesis from data)
	2. Main Barriers	Resistance to change... financial constraints... outdated legacy systems... gaps between security policy and practice." (Synthesis from data)

A. Varying Levels of Integration: from platforms to Full Integration

The integration of mobile applications into university leadership practices varies significantly across Palestinian universities. This variation depends on institutional strategy, digital capacity, readiness, organizational culture, vision, and leadership priorities. Based on the findings, Palestinian universities can be classified into three categories according to their level of mobile application integration.

A.1 Full Integration of Mobile Applications

In this category, mobile applications function as dedicated institutional platforms that support governance, reduce paper-based processes, and enable fully digital administrative workflows. These applications are integrated into core university systems, supporting leadership and administrative decision-making. Examples include financial reporting, leave requests, and approval processes, all managed digitally through mobile platforms. This level of integration was observed at Al-Quds Open University, Arab American University (AAUP), and Al-Quds University.

A.2 Supplementary Integration of Mobile Applications

In this category, mobile applications serve as complementary tools that support existing systems rather than replacing them. Universities such as An-Najah National University and Birzeit University rely on mobile access to university portals and financial systems (e.g., Zajel at An-Najah and Ritaj at Birzeit). However, leadership communication primarily depends on widely used applications such as WhatsApp, Zoom, and Microsoft Teams. Although these tools enhance communication and responsiveness, they do not constitute a dedicated leadership platform. IT directors at both institutions expressed aspirations to develop specialized leadership applications. As noted by one Birzeit IT director: "We do not have a separate leadership application, but we aim to develop one."

A.3 Weak Integration and Informal Adoption of Mobile Applications

This category reflects fragmented and unofficial use of mobile applications, as observed at Palestine Technical University–Kadoorie (PTUK) and Al-Zaytoonah University of Science and Technology (ZUST). Core systems such as Human Resource Management (HRM) remain accessible primarily on desktop computers, while mobile use is limited to informal communication via WhatsApp. This reliance highlights a pronounced digital divide in leadership practices across Palestinian universities.

B. Risk Versus Efficiency

The integration of mobile applications into leadership practices involves balancing efficiency and risk. Participants emphasized that mobile applications save time, enhance decision-making, support administrative processes, reduce paper consumption, and facilitate workflow continuity during political crises and mobility restrictions. These tools enable universities to operate in the face of uncertainty and disruption.

However, concerns regarding data security, reliability, and trust were consistently raised. Applications such as WhatsApp, while widely used, are perceived as insecure for formal institutional communication. These concerns highlight the need for robust digital governance frameworks to foster a secure digital culture that supports sustainability.

C. Institutional Flexibility and Transparency

Mobile applications contribute to institutional flexibility and transparency by accelerating decision-making processes, simplifying administrative procedures, and enhancing communication between leaders and staff. Participants emphasized improved access to information and streamlined authority workflows. An IT director from Al-Quds University described mobile applications as "an effective tool for enhancing administrative procedures, such as vacation and leave approvals."

D. Obstacles and enablers: Promoting a strategic plan for participants explains the benefits of integrating mobile apps into the leadership process over time.

Key Enablers:

- A well-defined digital strategy and vision in line with institutional objectives.
- Strong top-level leadership support.
- Reliable technological infrastructure.

Main Barriers:

- Staff or leadership resistance to change.
- Restrictions on human and financial resources.
- outdated legacy systems that are difficult to integrate with mobile applications.
- Disparities between practice and policy, particularly with regard to digital security.

3.2 Discussion

The findings indicate substantial variation in mobile application integration across Palestinian universities. Institutions such as Al-Quds University, Al-Quds Open University, and Arab American University consider the full integration of mobile applications into leadership practices, where employees can submit leave requests and receive approvals via a special mobile application developed for this purpose, which is considered it sustainable tool for leadership practices. Other universities like Birzeit University and An-Najah National University, mobile applications like WhatsApp, and Zoom are utilized as complementary apps for enhancing the leadership processes and linked to the universities' portal, but they are not the core system, as mentioned by IT directors in both universities, “we don’t have a specific leadership application, but we certainly plan to develop one”. And finally, in other universities like Palestinian Technical University (PTU) and Al-Zaytoonah University of Jordan (ZUST), the integration of mobile apps is fragmented. Reliance on WhatsApp creates a digital divide between WhatsApp chat and desktop processes.

Palestinian universities face challenges, including financial constraints, limited human resources, resistance to change, outdated systems, and security concerns. Nevertheless, opportunities exist for enhanced inter-university collaboration and coordination to establish a unified digital leadership strategy that supports resilience, infrastructure readiness, and sustainability.

3.3 Alignment and Contradiction with UTAUT and Literature

The results are highly congruent with the central tenets of the UTAUT model. Performance Expectancy (Usefulness) is considered high because participants have reported benefits in terms of efficiency, cost savings, and crisis management. Effort Expectancy (Ease of use) has been identified, even constrained by legacy systems. Social Influence and Facilitating Conditions are highly important; when support structures are in place (such as the AAUP and Al-Quds support structures), implementation progress is enhanced.

Nevertheless, there appears to be a contradiction or an extension of the traditional UTAUT concerning risk perceptions. Within stable settings, security could be moderately important. In the Palestinian context, anxieties with regard to data privacy, as well as the reliability of applications such as "WhatsApp," run deep, representing a strong inhibiting factor, establishing itself alongside the theme of institutional insecurity. It suggests the need for a corresponding adjustment to technology acceptance theories in risk-averse settings.

The digital divide among universities (Theme A) is a direct manifestation of the literature on context-based challenges. Universities with a clearer digital vision and stronger support are moving ahead, while others are stuck with informal tools, underscoring a deficiency in leadership capacity.

3.4 Implications for Policy, Practice, and Future Research: A Quadruple Perspective

In fact, the implications section can be broken down using the Quadruple model (University, Industry, Government, Civil Society) to relate to the scaling of mobile leadership.

- **University Practice:** Universities need a shift from ad hoc integration to strategic integration. “Prioritize Integration Over Innovation” – working on making those systems mobile-friendly as part of existing ERP/HRM systems, which is an easier task for many, compared to the development of new apps. Training programs in “digital leadership” for university administrators play an important role in overcoming resistance.
- **Industry Partnership:** Tech firms could collaborate with universities to develop secure, affordable, and flexible mobile solutions suitable for limited budgets. This could include university-initiated research and developments geared at meeting particular regional needs, like offline capabilities when connectivity is poor.
- **Governmental Policy:** A digital leadership framework and funding structure should be implemented nationally by the Ministry of Education and Higher Education to encourage collaboration between universities and to embed digital strategy elements into accreditation standards, as proposed by the idea of a "unified strategy."
- **The practices of Civil Society (Community & Culture):** Engaging staff, students, and broader community members are essential to "Bridge the Digital Trust Gap." This can include open communication about data use, allowing user design input, and illustrating the benefits. This is key when realizing the importance of increasing "awareness and culture" required by IT directors.

Future research should employ mixed-methods approaches to examine relationships between mobile leadership integration and institutional performance, and to explore AI-enabled mobile leadership systems.

4. CONCLUSIONS

The current research aimed to explore four research questions related to mobile integration for universities in Palestine. The findings reveal:

1. Integration to varying degrees, ranging from complete (Al-Quds University, AAUP) to ancillary (Birzeit and An-Najah) and piecemeal and unofficial (PT, Al-Zaytoonah).
2. Key enabling factors: strong digital strategy and strong infrastructure. The critical barriers include resistance to change, financial and human resource capacity constraints, legacy systems, and security risks.
3. Mobile applications positively impact communication efficiency, stakeholder engagement, and institutional flexibility.
4. Scaling digital leadership requires national coordination, integration-focused strategies, leadership training, and security frameworks [31]

Mobile application integration is critical for overcoming political constraints and mobility challenges in Palestine. Mobile apps are changing management systems worldwide, serving as a communication tool to promote transparency, efficiency, and governance, thereby enhancing the sustainability of universities [32]. According to the study's findings, Palestinian universities have a clear digital gap in integrating mobile apps into leadership. The degree of integration varies among these universities; some, like Al-Quds University, Al-Quds Open University, and Arab American University, have full integration, while others, like Birzeit University and An-Najah National University, use mobile apps as supplementary sources connected to their university

portal and they are looking forward to developing a unique mobile app for their leadership practices.

In contrast, the other universities, Palestinian Technical University (PTU) and Al-Zaytoonah University of Science and Technology (ZUST), have a weak integration of mobile apps into leadership practices, with only WhatsApp used for communication.

Adopting a strategy for integrating mobile apps and actions that are related to each other. In PTU and ZUST cases, those adopting mobile apps informally reinforce the perception that these digital tools are not important due to a lack of a clear strategy. More collaboration among Palestinian universities is needed to adopt a unified strategy towards using mobile applications to enhance transparency, efficiency, and accountability to accomplish sustainability in the higher education sector. Furthermore, there should be deep coordination and communication between the Ministry of Education, the Higher Education, and Palestinian universities to enhance the leadership systems in these universities for better governance by adopting mobile applications to achieve sustainability.

5. RECOMMENDATIONS

Based on the study findings, the following recommendations contribute to enhancing universities' sustainability in the Palestinian context.

- **For Universities:** Adopting systematic approaches for digital leadership instead of using software for enhancing sustainability randomly.
- **For Trust Building:** There is a digital trust gap, and it is essential to bridge it by increasing transparent communication about data protection, providing continuous training, and establishing clear security policies.
- **For Policymakers:** Prioritizing integration over innovation by linking current systems, such as HRM (human resource management) or ERP (enterprise resource planning), to user-friendly mobile interfaces would be more advantageous for most universities than creating whole new platforms.
- **For Collaboration:** Developing a unified strategy towards digital leadership in collaboration with the main stakeholders.

ACKNOWLEDGEMENTS

The authors would like to thank Universiti Malaysia Perlis and the participating Palestinian universities for their continuous support of scientific research. The successful completion of this study was made possible through their commitment to academic excellence and research development.

REFERENCES

[1] Alam, G. M., Forhad, Md. A. R. The impact of accessing education via smartphone technology on education disparity—a sustainable education perspective. Sustainability, vol 15, issue 14 (2023) pp.10979.

[2] Serafini, P. G., Moura, J. M. D., Almeida, M. R. D., Rezende, J. F. D. D. Sustainable development goals in higher education institutions: A systematic literature review. Journal of Cleaner Production, vol 370 (2022) pp.133473.

[3] Altassan, M. A. Enhancing leadership effectiveness through technology in educational institutions. Cogent Business & Management, vol 12, issue 1 (2025) pp.2544983.
[4] Naveed, Q. N., Choudhary, H., Ahmad, N., Alqahtani, J., Qahmash, A. I. Mobile learning in higher education: A systematic literature review. Sustainability, vol 15, issue 18 (2023) pp.13566.
[5] Salhab, R., Daher, W. University students' engagement in mobile learning. EJIHPE, vol 13, issue 1 (2023) pp.202–216.
[6] Lin, Q. Digital leadership: A systematic literature review and future research agenda. European Journal of Innovation Management, vol 28, issue 6 (2025) pp.2469–2488.
[7] Diab, A.-K. M. Transforming adversity into strategic success: Management approaches in Palestinian higher education. Administrative Sciences, vol 15, issue 11 (2025) pp.425.
[8] Olabiyi, O. J., Vuuren, C. J. V., Du Plessis, M., Xue, Y., Zhu, C. Digital academic leadership in higher education institutions: A bibliometric review based on Citespace. Education Sciences, vol 15, issue 7 (2025) pp.846.
[9] Al-Shamaileh, O., Sutcliffe, A. Why people choose apps: An evaluation of the ecology and user experience of mobile applications. International Journal of Human-Computer Studies, vol 170 (2023) pp.102965.
[10] Aljanazrah, A., Yerousis, G., Hamed, G., Khlaif, Z. N. Digital transformation in times of crisis: Challenges, attitudes, opportunities and lessons learned from students' and faculty members' perspectives. Front. Educ., vol 7 (2022) pp.1047035.
[11] Ghamrawi, N., Tamim, R. M. A typology for digital leadership in higher education: The case of a large-scale mobile technology initiative (using tablets). Educ Inf Technol, vol 28, issue 6 (2023) pp.7089–7110.
[12] Jurayev, T. N. The use of mobile learning applications in higher education institutes. Adv. Mobile Learn. Educ. Res., vol 3, issue 1 (2023) pp.610–620.
[13] Mouzaneh, M., Harun, Z., Jamil, N. M-learning in promoting green building awareness in Palestine. IOP Conf. Ser.: Mater. Sci. Eng., vol 1092, issue 1 (2021) pp.012050.
[14] Pogrebinskaya, E. A., Fursova, P. V., Akhyadov, E. S.-M. Leadership competency formation in management students using mobile learning technologies. vol 9 (2021).
[15] Criollo-C, S., Guerrero-Arias, A., Jaramillo-Alcázar, Á., Luján-Mora, S. Mobile learning technologies for education: Benefits and pending issues. Applied Sciences, vol 11, issue 9 (2021) pp.411.
[16] Derawi, M., Dalveren, G. G. M., Cagiltay, N. E. Mobile application software requirements specification from consumption values. Electronics, vol 12, issue 7 (2023) pp.1592.
[17] Khurniawan, A. W., & Supriadi, D. The impact of digital leadership on digital transformation in university organizations: An analysis of students' views. Перспективы науки и образования, issue 1 (67) (2024) pp.677–690.
[18] Antonopoulou, H., Halkiopoulos, C., Barlou, O., Beligiannis, G. N. Associations between traditional and digital leadership in academic environment: During the COVID-19 pandemic. Emerg Sci J, vol 5, issue 4 (2021) pp.405–428.
[19] Omar, M. N., Ismail, S. N. Mobile technology integration in the 2020s: The impact of technology leadership in the Malaysian context. Universal Journal of Educational Research, vol 8 (2020) pp.1874–1883.
[20] Hinze, A., Vanderschantz, N., Timpany, C., Cunningham, S. J., Saravani, S.-J., Wilkinson, C. A study of mobile app use for teaching and research in higher education. Tech Know Learn, vol 28, issue 3 (2023) pp.1271–1299.
[21] Hmoud, A. Y. R., Salah, O. H. Adoption of mobile learning in higher education: An investigation of employees' perspectives. From Industry 4.0 to Industry 5.0: Mapping the Transitions (2023) pp.877–890.
[22] Obied, A. S. Digital leadership in the academic environment: A systematic literature review. Social Sciences & Humanities Open, vol 11 (2025) pp.101542.
[23] Abdallah, N., Abdallah, O. Exploring key factors influencing the adoption of mobile cloud computing in higher education: Case study at An-Najah University. INT J INSTRUCTION, vol 17, issue 3 (2024) pp.695–714.

[24] Al-Rousan, M. A., Ababneh, A. W. The impact of digital leadership on institutional excellence in the Jordanian social security corporation: Business intelligence as a moderating variable. Future Bus J, vol 11, issue 1 (2025) pp.94.
[25] El-Holy, A. A., Hamad, M. H. The degree of digital leadership practice and its relationship to the level of outstanding performance in Palestinian universities. Journal of Educational and Psychological Studies, vol 19, issue 1 (2025) pp.27–47.
[26] Kelder, J.-A., Crawford, J., Al Naabi, I., To, L. Enhancing digital productivity and capability in higher education through authentic leader behaviors: A cross-cultural structural equation model. Educ Inf Technol, vol 30, issue 12 (2025) pp.17751–17767.
[27] Al-Shaer, N. M., et al. Digital transformation in higher education for achieving sustainable development goals in conflict zones: A case study of An-Najah National University. Front. Hum. Dyn., vol 7 (2025) pp.1585538.
[28] Salhab, M. A. F. The level of effectiveness of virtual leadership in Palestinian government institutions during crisis: A case study covid-19 pandemic. Journal of Business and Economic Development, vol 10, issue 3 (2025) pp.114-134.
[29] Dzogovic, S. A., Bajrami, V. Qualitative research methods in science and higher education. Journal Human Research in Rehabilitation, vol 13, issue 1 (2023) pp.156–166.
[30] Rädiker, S., Gizzi, M. C. The practice of qualitative data analysis: Research examples using MaxQDA. vol 2 (2024).
[31] World Bank & Agence Française de Développement (AFD). Nimble impact evaluation of African higher education centers for excellence (ACE) program. World Bank (2023).
[32] Subbarao, A., et al. Digital transformation in higher education: Enhancing support services through mobile apps. High Tech. Innov. J., vol 6, issue 2 (2025) pp.584–597.
[33] Salahat, H. M., Hasasneh, Taqatqa, S. N. A proposed electronic system for a smartphone to improve communication between academics, administrators, and students at Palestinian universities: Palestine Ahliya University as a case study. Journal of Engineering Sciences and Information Technology, vol 4, issue 1 (2020) pp.70-82.
[34] Azgheibi, R. M. T. The degree of employment of digital leadership in Palestinian universities from the point of view of academics. College of Basic Education Research Journal, vol 19, issue 4 (2023) pp.391-410.
[35] Mazhar, O. Y. Digital leadership in Palestinian universities. Sustainability in the Light of Governance and Artificial Intelligence Applications (2025) pp.19.
[36] Al-Qawasmi, M. A. The role of agile administrative leadership in enhancing the effectiveness of digital transformation in Palestinian higher education institutions. Arado Business Journal (2026) pp.71-96.

Conflict of interest statement: The authors declare no conflict of interest.

Author contributions statement: Conceptualization, Mohammed K. Mahamda; Methodology, Mohammed K. Mahamda; Software, Samah Iriqat; Validation, Samah Iriqat; Formal Analysis, Samah Iriqat; Investigation, Mohammed K. Mahamda, Resources, Mohammed K. Mahamda; Data Curation, Samah Iriqat; Writing – Original Draft Preparation, Mohammed K. Mahamda, Writing – Review & Editing, Mohd Sofian Mohammad Rosbi; Visualization, Mohammed K. Mahamda; Supervision, Mohd Sofian Mohammad Rosbi.

Declaration of Generative AI Use: During the preparation of this work, the authors used AI tool to improve readability and language. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.