



Available Online at EScience Press  
**International Journal of Education Foundations**  
ISSN: 3078-7866 (Online), 3078-7858 (Print)  
<https://ijef.esciencepress.net>

## RESEARCH ARTICLE

## Perceived Challenges of ICT-Supported Knowledge Management in Tanzanian Higher Education Institution

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### Author's Contributions

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### Article History

Received: September 05, 2025; Accepted: October 17, 2025; Published: December 7, 2025.

### ABSTRACT

The integration of information and communication technologies (ICTs) into knowledge management (KM) is essential for effective knowledge processes in higher education; however, significant barriers continue to hinder optimal use in many African contexts. This study examines perceived barriers to ICT adoption and their impact on KM effectiveness in Tanzanian universities, applying the Technology Acceptance Model (TAM) as its analytical lens. A cross-sectional, mixed-methods design was employed, combining quantitative survey data from 350 students with qualitative insights from interviews, focus group discussions, and document reviews involving institutional stakeholders. Descriptive findings indicate that weak internet connectivity (72%), limited ICT infrastructure (65%), and frequent electricity disruptions (56%) were the most prevalent barriers, alongside outdated systems, inadequate technical support, and low digital competence. To test the relationship between barriers and KM effectiveness, a chi-square test of goodness of fit was conducted, revealing a statistically significant difference in the distribution of reported barriers,  $\chi^2(6, N = 350) = 412.57, p < .001$ . Poor internet connectivity and limited access to ICT resources were particularly predominant and exerted the strongest influence on KM outcomes, supporting  $H_1$  that perceived barriers significantly affect KM in Tanzanian higher education institutions. The findings indicate that these barriers reduce both perceived usefulness and perceived ease of use, slowing ICT adoption and encouraging reliance on informal alternatives, such as WhatsApp. The study recommends coordinated investment in ICT infrastructure, digital literacy programs, responsive technical support, and institutional ICT governance to enhance KM practices, foster innovation, and strengthen Tanzanian universities' role in global knowledge networks.

**Keywords:** ICT barriers; knowledge management; higher education; Tanzania; technology acceptance model

### INTRODUCTION

Information and Communication Technologies (ICTs) have become fundamental drivers of knowledge creation, storage, dissemination, and utilization in higher education institutions (HEIs). Within the framework of Knowledge Management (KM), ICTs act as enablers that facilitate the capture, organization, and sharing of institutional knowledge to enhance academic, administrative, and research effectiveness

(Romero-Ochoa et al., 2025; Dewah & Sibanda, 2022). Effective KM depends on the systematic integration of technological tools that promote collaboration among faculty, students, and institutional stakeholders (Adhikari & Shrestha, 2022). As universities worldwide continue to adopt digital technologies to optimize learning and research activities, ICTs have evolved from being supplementary aids to becoming essential

infrastructures for institutional competitiveness and innovation (Feng et al., 2025; Alghail et al., 2023).

Globally, the integration of ICT in higher education has undergone several phases, evolving from basic digitization to the use of advanced systems supporting knowledge-driven economies. During the early 2000s, KM systems were primarily limited to digital repositories and intranets. However, with advances in cloud computing, artificial intelligence (AI), and big data analytics, ICT-supported KM now encompasses learning management systems, institutional knowledge bases, and online collaboration platforms (Machado et al., 2022; Millidonis et al., 2024). The COVID-19 pandemic accelerated these transformations, forcing universities to reimagine knowledge processes through digital ecosystems (Adedoyin & Soykan, 2020). Consequently, ICT-based KM has become a core component of global strategies for achieving Sustainable Development Goal 4 on quality education (Antoninis et al., 2023). Yet, disparities in digital capacity between developed and developing regions have widened, exposing infrastructural, technical, and human resource limitations in Africa (Shao et al., 2023). In Sub-Saharan Africa, and particularly in Tanzania, ICT adoption in higher education remains uneven and constrained by contextual challenges. Although the Tanzanian higher education sector has grown rapidly, limited access to ICT infrastructure, unreliable internet connectivity, and inadequate power supply continue to hinder the full realization of ICT-supported KM (Lubuva et al., 2024; Fussy, 2025). Additional barriers, such as outdated institutional systems, low levels of digital literacy, and minimal technical support, further restrict the perceived usefulness and ease of use of ICTs (Kisanga & Kisanga, 2020; Ponera, 2023). These constraints have implications not only for technology adoption but also for the broader knowledge-sharing culture essential for innovation in universities (Omanyoo & Ndiege, 2025). While informal platforms such as WhatsApp have emerged as alternatives for information exchange, their usage often bypasses institutional frameworks, leading to fragmented knowledge flows and weak institutional memory (Mosha, 2025).

This study is grounded in the Technology Acceptance Model (TAM) developed by Davis (1989), which posits that two critical constructs Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) determine users' acceptance of technology. In higher education settings, infrastructural deficiencies, weak ICT support systems, and limited digital skills diminish both PU and PEOU,

discouraging users from engaging effectively with institutional ICT tools (Arakpogun et al., 2023; Guzman et al., 2021). Recent studies reaffirm that TAM remains relevant in examining how contextual factors influence ICT adoption and KM effectiveness in developing contexts (Yang, 2023; Karimi & Khawaja, 2025). Therefore, TAM provides a theoretical lens through which to analyze how Tanzanian university stakeholders perceive and respond to ICT-mediated KM processes, linking technological, human, and institutional dimensions.

Despite growing scholarly attention to digital transformation in higher education, there remains limited empirical evidence on how contextual barriers affect ICT-supported KM in Tanzania. Most studies emphasize e-learning or online pedagogy rather than institutional KM processes (Mtebe, 2020; Shao et al., 2023). This study seeks to fill that gap by exploring the perceived challenges to ICT adoption and their implications for KM effectiveness in Tanzanian HEIs. Understanding these barriers is vital for informing policy interventions, infrastructure planning, and capacity-building initiatives aligned with national and institutional digital strategies.

### Research Objective

- To establish the influence of perceived barriers to effective ICT use on knowledge management in higher learning institutions in Tanzania.

### Research Hypothesis

- $H_1$  Perceived barriers to ICT use significantly influence knowledge management in higher education institutions in Tanzania.

## REVIEW OF LITERATURE

The present study is anchored in the Technology Acceptance Model (TAM) proposed by Davis (1989), which emphasizes two key determinants of technology adoption: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). PU reflects users' belief that a system enhances their performance, while PEOU refers to the belief that using the system requires minimal effort. These constructs jointly influence users' attitudes and behavioral intentions toward technology utilization. In higher education, TAM has been widely used to explain variations in ICT adoption among students and staff, particularly in contexts where infrastructural and skill-based barriers persist (Yang, 2023; Karimi & Khawaja, 2025). The model also provides a theoretical bridge between technological design and human

acceptance behavior, suggesting that if ICT systems are perceived as useful and easy to use, individuals are more likely to integrate them into daily academic and administrative routines (Arakpogun et al., 2023). In resource-limited environments like Tanzania, however, these perceptions are often shaped by systemic constraints such as unreliable internet, limited access

to digital devices, and inadequate institutional support (Lubuwa et al., 2024; Omanyo & Ndiege, 2025).

Figure 1 illustrates the theoretical and conceptual framework of this study, based on the Technology Acceptance Model (TAM), highlighting the key constructs and their relationships.

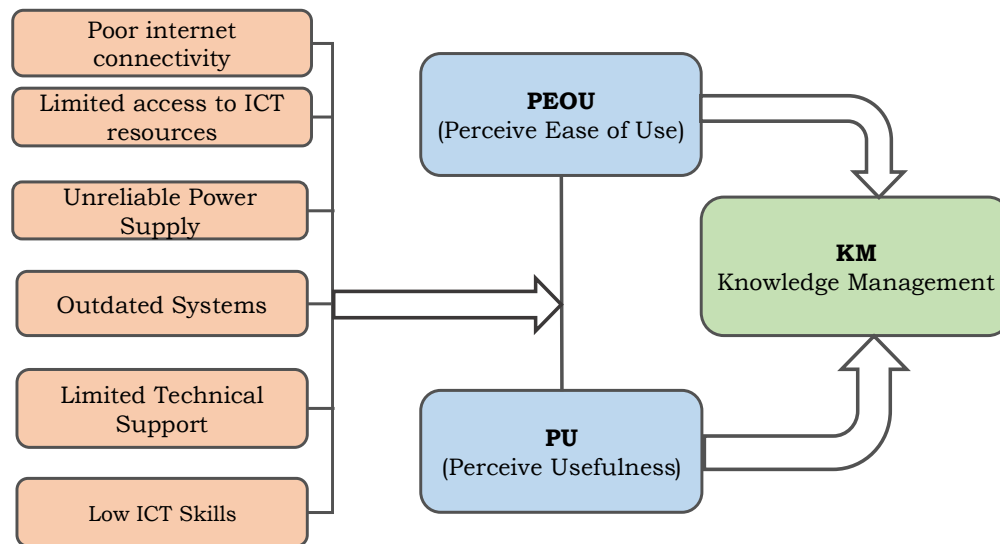


Figure 1. Theoretical and Conceptual Framework: Technology Acceptance Model (TAM)

Source: Author's construct (2025).

Within the framework of Knowledge Management (KM), ICT serves as both an enabler and a mediator of organizational learning and knowledge sharing. Conceptually, KM encompasses processes of knowledge creation, storage, transfer, and application aimed at enhancing institutional effectiveness (Adhikari & Shrestha, 2022). ICT tools ranging from digital repositories and learning management systems to collaborative cloud-based platforms facilitate these processes by enabling access to and dissemination of information across academic communities (Machado et al., 2022; Romero-Ochoa et al., 2025). When properly implemented, ICT-supported KM fosters institutional memory, collaboration, and innovation (Mosha & Ngulube, 2025). However, scholars emphasize that ICT infrastructure alone is insufficient; organizational culture, leadership commitment, and users' digital competence are equally critical for effective KM practices (Millidonis et al., 2024; Alghail et al., 2023). These interrelated factors highlight the importance of

aligning technological, human, and institutional systems to optimize knowledge outcomes.

Empirical evidence across regions demonstrates both progress and persistent barriers in ICT-supported KM. Studies in developed countries report that technological readiness and institutional policies strongly predict ICT adoption (Feng et al., 2025; Antoninis et al., 2023). In contrast, research from developing contexts, particularly in Africa, underscores enduring infrastructural and human capacity limitations (Shao et al., 2023; Arakpogun et al., 2023). For instance, in Kenya and Uganda, Ayiro et al. (2023) found that insufficient digital resources and weak policy frameworks constrained universities' ability to embed KM in strategic planning. Similarly, Guzman et al. (2021) and Escorcia Guzman et al. (2022) observed that inadequate ICT literacy and inconsistent internet access limited knowledge shared among faculty and students in Latin America and Sub-Saharan Africa. In Tanzania, Mtebe (2020) and Kisanga and Kisanga (2020) identified unreliable connectivity, outdated systems, and low digital skills as key inhibitors of ICT

adoption, consistent with TAM's prediction that such barriers reduce PEOU and PU.

Despite growing research attention, there remains a lack of context-specific empirical studies linking ICT barriers directly to KM effectiveness within Tanzanian higher education. Most prior studies have focused on e-learning adoption or general digital transformation rather than the organizational knowledge management perspective (Ponera, 2023; Lubuva et al., 2024). Moreover, few have employed mixed methods approaches that integrate quantitative and qualitative insights from both students and institutional staff (Shao et al., 2023). As a result, the relationship between ICT challenges and KM outcomes remains underexplored in the Tanzanian context. This study, therefore, extends the current body of knowledge by investigating how infrastructural, technical, and human barriers interact to shape the perceived usefulness and ease of use of ICT systems, and consequently, their effectiveness in supporting KM within universities.

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## METHODOLOGY

This study adopted a mixed-methods research design that integrated both quantitative and qualitative approaches to examine perceived barriers to ICT-supported knowledge management (KM) in Tanzanian higher education institutions. The use of a cross-sectional design enabled the collection of data from a broad population at a single point in time, providing a snapshot of prevailing conditions across multiple institutions (Creswell & Creswell, 2017; Babbie, 2020). The quantitative component focused on identifying and quantifying common ICT-related challenges among students, while the qualitative component explored the contextual and institutional explanations underlying these challenges through interviews, focus group discussions, and document reviews. This integration strengthened both the reliability and validity of findings by allowing the triangulation of data from diverse sources (Speaker & Creswell, 2022; Fusch et al., 2022). The study was conducted in three universities one each from Tanzania's southern, northern, and eastern zones purposefully selected to capture geographical and institutional diversity in ICT adoption. The population included students, lecturers, ICT staff, and librarians who possess first-hand experience with ICT usage in KM practices. A total of 400 questionnaires were distributed, and 350 were returned fully completed, representing a 90% response rate. Simple random sampling was applied to select student participants, while purposive sampling was used for staff members due to their specialized knowledge of ICT systems and KM processes.

Data collection was achieved through structured questionnaires, in-depth interviews, focus group discussions, and institutional document reviews. Quantitative data were coded and analyzed using SPSS version 26, employing descriptive statistics (frequencies and percentages) and chi-square tests to determine associations between categorical variables

at a significance level of  $p < .05$ . Qualitative data from interviews and focus group discussions were transcribed, coded, and thematically analyzed to identify patterns reflecting infrastructural, technical, and human challenges to ICT-supported KM. The integration of qualitative and quantitative results enabled comprehensive interpretation of both the magnitude and meaning of the identified barriers. Reliability and validity were assured through a pre-test involving 15 students (Cronbach's  $\alpha > .70$ ), expert review, and method triangulation. Ethical approval was obtained from the St. Augustine University of Tanzania and the Ministry of Education, and permission was sought from participating universities. Informed consent was obtained from all participants, anonymity and confidentiality were guaranteed, and the collected data were used strictly for academic purposes.

## RESULTS AND DISCUSSIONS

This study examined the perceived barriers to the adoption and use of ICT in supporting knowledge management (KM) within Tanzanian higher education institutions (HEIs). Quantitative and qualitative data were integrated to generate a thematic understanding of these barriers and their implications for KM effectiveness. Three central themes emerged: (i) infrastructural barriers, (ii) technical and human capacity barriers, and (iii) institutional and policy-level barriers. Each theme is discussed below in light of the Technology Acceptance Model (TAM) and relevant empirical evidence.

### Infrastructural Barriers to ICT-Supported Knowledge Management

The most significant barriers to ICT use identified in the study were infrastructural in nature, including poor internet connectivity (72%), limited access to ICT resources (65%), and frequent electricity interruptions (56%). These findings highlight how inadequate digital infrastructure directly limits access to online academic platforms, institutional repositories, and collaborative systems essential for KM. Qualitative narratives revealed that Wi-Fi networks were often restricted to central facilities such as libraries and laboratories, leaving lecture halls and dormitories underserved. Respondents noted that projectors, computers, and reliable internet connections were insufficient to meet institutional demands, particularly during peak academic periods. The absence of dependable power supply further disrupted teaching and learning activities, forcing students and lecturers to rely on offline or

mobile-based alternatives. One respondent commented, "We cannot depend on the university Wi-Fi; we use our own bundles for group work or sometimes meet physically because the system fails." Such experiences expose the structural limitations that inhibit the practical application of ICTs in day-to-day academic and administrative tasks within Tanzanian HEIs.

These findings corroborate the conclusions of previous studies, which indicate that infrastructural weaknesses are the most persistent barriers to ICT adoption across Sub-Saharan Africa (Lubuva et al., 2024; Arakpogun et al., 2023; Shao et al., 2023). Studies in Kenya and Nigeria have similarly reported that unreliable electricity and limited broadband capacity constrain the operationalization of institutional knowledge systems (Ayiro et al., 2023). Within the framework of TAM, these infrastructural deficits negatively influence perceived ease of use (PEOU) by making ICT systems seem unreliable and time-consuming, while also reducing perceived usefulness (PU) by minimizing their contribution to academic efficiency (Davis, 1989; Feng et al., 2025). Consequently, users develop a sense of technological fatigue and resort to informal digital tools such as WhatsApp or Telegram for communication and resource sharing, which while convenient fragment institutional knowledge flows and compromise data security. Addressing these structural barriers is therefore foundational to enhancing the overall effectiveness and acceptance of ICT-supported KM in Tanzanian higher education.

### Technical and Human Capacity Barriers

Another major theme identified relates to the inadequacy of technical support systems and the limited digital competencies of both staff and students. Approximately 38% of respondents reported insufficient access to technical assistance, while 34% noted a lack of formal ICT training opportunities. Qualitative data further revealed that many users rely on self-taught methods or informal peer guidance to navigate institutional digital systems. Participants emphasized that projectors, e-learning platforms, and library systems were often outdated or malfunctioning, and that limited technical staff made troubleshooting slow. These technical shortcomings were compounded by low levels of digital literacy, particularly among academic staff who lacked confidence in using emerging educational technologies. The resulting situation is one in which users possess the motivation to use ICTs but lack the requisite skills and institutional

support to do so effectively. As one lecturer stated, “We are encouraged to upload materials online, but sometimes the system hangs or no one is available to help us fix it.”

The interplay between technical and human capacity constraints has been widely acknowledged in prior research (Almaiah et al., 2020; Guzman et al., 2021; Karimi & Khawaja, 2025). Studies in other African contexts demonstrate that the absence of structured digital literacy programs contributes to user frustration, underutilization of institutional systems, and reliance on non-institutional platforms (Omanyo & Ndiege, 2025; Mosha, 2025). From the TAM perspective, inadequate training and weak technical support erode users' perceived ease of use (PEOU) and foster resistance to technological integration (Davis, 1989). When individuals encounter technical difficulties without institutional support, they are less likely to perceive ICTs as useful, reducing their behavioral intention to use such systems. This dynamic not only undermines the institutional return on ICT investment but also weakens collective knowledge sharing and innovation capacity. Strengthening continuous professional development and establishing responsive ICT help desks can therefore improve user confidence, enhance perceived ease of use, and foster a more positive technology acceptance culture within universities.

#### **Institutional and Policy-Level Barriers**

The final theme centers on institutional and policy-related barriers that shape ICT-supported KM. The study found that most universities lacked comprehensive ICT or KM policies, strategic plans, or dedicated budgets to sustain technological infrastructure. Respondents revealed that decision-making regarding ICT acquisition and maintenance was often ad hoc, reactive, and dependent on external funding rather than integrated into institutional development agendas. Qualitative evidence further suggested that administrative leaders viewed ICT as a peripheral support service rather than a strategic enabler of KM. This misalignment has led to inconsistent implementation of ICT initiatives across faculties and departments, resulting in duplication of systems and inefficiencies in knowledge sharing. The absence of clear accountability structures or performance monitoring frameworks has also limited the institutionalization of ICT use within KM practices.

These institutional gaps mirror broader trends across developing regions, where policy fragmentation and weak governance mechanisms impede ICT-driven

knowledge ecosystems (Shao et al., 2023; Omanyo & Ndiege, 2025). According to Fussy (2025), Tanzanian universities often face competing priorities that divert resources away from technological innovation and KM integration. From the perspective of the Technology Acceptance Model, weak institutional leadership and lack of policy direction diminish perceived usefulness (PU) by making ICT adoption appear unsustainable or unsupported, thereby reducing users' willingness to engage with institutional systems. Furthermore, without strong digital governance, universities fail to capture and preserve the collective knowledge generated within their communities, undermining institutional memory and learning capacity (Adhikari & Shrestha, 2022). Strengthening institutional ICT governance through budgetary commitments, leadership training, and structured digital strategies would enhance TAM's determinants of technology acceptance while positioning ICT as a central component of effective KM practices in Tanzanian higher education.

To examine the relationship between barriers to using ICTs and knowledge management (KM) effectiveness, a chi-square test of goodness of fit was conducted. The analysis revealed a statistically significant difference in the distribution of reported barriers,  $\chi^2 (6, N = 350) = 412.57, p < .001$ , indicating that certain obstacles particularly poor internet connectivity and limited access to ICT resources were more prevalent and exerted a stronger influence on KM outcomes. These findings support  $H_1$ , confirming that perceived barriers to the use of information and communication technologies significantly affect knowledge management in Tanzanian higher education institutions. The results underscore the urgent need for institution-level interventions aimed at enhancing ICT infrastructure, expanding access to digital resources, and providing targeted training to facilitate effective use of KM systems among both students and staff (Lubuva et al., 2024; Mtebe, 2020; Mosha, 2025).

Overall, the findings reveal that infrastructural, technical, and institutional challenges are interrelated and mutually reinforcing, collectively undermining the effectiveness of ICT-supported KM in Tanzanian universities. The persistent reliance on informal digital communication channels underscores systemic deficiencies in formal ICT systems and raises concerns about data security, academic integrity, and sustainable knowledge management. In the context of the Technology Acceptance Model, the study demonstrates that improving perceived ease of use and perceived

usefulness requires not only user training but also structural reforms and institutional commitment. For higher education practice, this means integrating ICT investment into long-term strategic planning, establishing dedicated support systems for both students and staff, and aligning digital initiatives with national education and innovation policies. Doing so would not only enhance the quality of teaching and research but also build resilient, knowledge-driven institutions capable of adapting to the evolving global digital landscape.

## CONCLUSION AND RECOMMENDATIONS

This study underscores the pivotal role of Information and Communication Technologies (ICTs) in transforming knowledge management (KM) within Tanzanian higher education institutions (HEIs). Using the Technology Acceptance Model (TAM) as its analytical framework, the research provides valuable insights into how contextual constraints infrastructure, technical, and institutional-influence the acceptance and utilisation of technology in low-resource academic environments. The findings reveal that enhancing ICT-supported KM requires more than the mere provision of digital tools; it necessitates the strategic alignment of infrastructure, user competence, and institutional governance. Strengthening these interconnections improves both perceived usefulness and perceived ease of use, thereby fostering greater technological acceptance and more effective knowledge processes across universities.

By situating ICT within the broader discourse of KM, this study reaffirms its strategic role in advancing innovation, collaboration, and data-driven decision-making- all of which are essential for achieving quality education and institutional competitiveness in a knowledge-based economy. The persistent infrastructural and policy-related challenges identified, however, indicate the need for coordinated national and institutional action to ensure that digital transformation becomes a sustainable and inclusive process.

To translate these insights into practice, higher education institutions in Tanzania should prioritise digital transformation as a strategic imperative rather than a peripheral operational concern. Sustained investment in ICT infrastructure is essential, alongside the integration of comprehensive digital literacy programmes within curricula and the establishment of responsive technical support systems. At the policy level, universities should develop and institutionalise

ICT governance frameworks that explicitly link technology use to research, teaching, and administrative objectives. Partnerships between universities, government agencies, and private technology providers can further facilitate resource mobilisation and the adoption of renewable energy solutions, such as solar power, to address persistent electricity challenges. Furthermore, regular monitoring and evaluation mechanisms should be embedded to assess ICT adoption and KM effectiveness, ensuring that digital initiatives remain adaptive, inclusive, and sustainable.

Beyond institutional strategies, attention must also be directed towards data sovereignty and regional knowledge infrastructure. Globally, leading nations have begun launching their own satellites to secure national data and reduce dependence on external platforms such as Google, thereby ensuring that vital academic and research information remains under domestic control. Africa made an early step in this direction through the DATAD (African Dissertation Database), yet its limited maintenance has constrained its potential. Similarly, African Journals Online (AJOL) remains a critical but underutilised platform that requires enhanced coordination and management across member states. In Tanzania, the COSTECH-based national research database, developed in the 2010s, offers a valuable foundation that could be revitalised and linked to all higher education institutions. Reviving and interconnecting such indigenous systems would promote sustainable digital ecosystems, strengthen research visibility, and safeguard national academic data. This approach would also align with continental efforts to build African-centred repositories that support innovation, collaboration, and long-term knowledge preservation.

Ultimately, embedding ICT-supported KM within the institutional culture of Tanzanian universities will enhance academic performance, strengthen research capacity, and position the country as an active contributor to global knowledge networks. By combining robust infrastructure, competent human resources, and sovereign data management frameworks, Tanzanian higher education can move towards a more resilient, autonomous, and knowledge-driven future.

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