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Knowledge Modeling and Institutional Memory at the University of Cape Coast: Examining Technology as a Mediator and Leadership Styles as a Moderator in Enhancing Administrative Efficiency

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Abstract

The integration of digital tools and effective knowledge management practices is critical for enhancing administrative efficiency and institutional continuity in higher education. This study investigates the relationships between knowledge modeling, institutional memory, leadership styles, technology, and administrative efficiency at the University of Cape Coast (UCC). The study sought to identify the challenges and opportunities in integrating digital tools into administrative processes and to provide actionable recommendations for improvement. A mixed-methods research design was employed, combining quantitative analysis using Partial Least Squares Structural Equation Modeling (PLS-SEM) with qualitative thematic analysis of interviews. The findings revealed key challenges, including resistance to change, fragmented knowledge repositories, and inadequate funding, alongside opportunities such as centralized knowledge systems, cost-effective open-source tools, and capacity-building initiatives. The study highlights the importance of strategic leadership, robust policies, and investments in digital infrastructure to enhance administrative practices. Policy implications include the need for clear digital transformation guidelines and leadership training to foster innovation and collaboration. Recommendations include investing in scalable digital tools, implementing comprehensive capacity-building programs, and promoting stakeholder engagement

to drive successful digital integration. These insights provide a roadmap for UCC and similar institutions seeking to optimize administrative efficiency through digital transformation.

Keywords

Knowledge Management, Institutional Memory, Digital Integration, Technology Adoption, Administrative Efficiency, Leadership Styles, Centralised Knowledge Repositories

1. Background to the Study

Effective knowledge management (KM) and institutional memory are critical to the success of University administration, serving as essential tools for retaining and utilizing critical information to ensure operational efficiency and continuity [1] [2]. The University of Cape Coast (UCC), one of Ghana's leading academic institutions has prioritised these elements in its vision to become a fully digital University. Leveraging digital tools and fostering transformational leadership, UCC aims to enhance institutional memory, streamline administrative workflows, and foster a culture of innovation. Globally, KM systems in higher education institutions (HEIs) have been shown to support operational excellence by enabling seamless access to information, collaborative practices, and efficient workflows [3]-[5]. KM theory highlights the importance of converting tacit knowledge into explicit formats, enabling institutions to retain institutional expertise, drive decision-making, and enhance learning processes.

Despite its potential, many HEIs face challenges like knowledge silos and inadequate documentation processes, which hinder collaboration and cause inefficiencies. Knowledge silos often arise when departments hoard information, limiting accessibility and causing redundancies. Employee turnover exacerbates these issues, leading to the loss of critical institutional knowledge. Addressing these challenges, studies like [3] and [6] emphasise that structured repositories and cross-departmental knowledge-sharing initiatives are crucial for operational continuity. In the Ghanaian context, [7] notes that institutional memory is pivotal for decision-making and continuity but highlights that fragmented repositories and inconsistent policies often impede KM strategies. Digital tools, such as document management systems and data analytics platforms, present opportunities for overcoming these challenges, offering efficient solutions for documenting, storing, and retrieving institutional knowledge [8].

At UCC, digital platforms have already begun to transform workflows, enabling improvements in decision-making and administrative efficiency. For instance, the implementation of a digital student records system has significantly reduced delays, a key issue in manual administrative setups [7]. Similar advancements have been documented globally. At the University of Pretoria, integrated digital systems have streamlined workflows, improved collaboration, and reduced redundancies

[9]. Additionally, cloud-based platforms like Microsoft Teams have enhanced real-time access to institutional information, fostering operational accuracy and inter-departmental coordination. These digital tools are also essential for data-driven decision-making, offering analytics capabilities that track institutional performance and predict trends [10]. Such examples highlight the transformative potential of integrating KM tools and policies within HEIs.

The integration of theoretical frameworks like KM Theory, Diffusion of Innovation (DOI), and Transformational Leadership provides a lens for understanding the interplay between KM, institutional memory, and leadership [11] [12]. KM Theory underscores the processes of acquiring, sharing, and using knowledge to achieve organisational goals, while DOI explains the gradual adoption of innovations like digital tools within institutions [13]. Transformational Leadership focuses on fostering a culture that values knowledge-sharing and innovation through visionary leadership [14]. These theories intersect in university administration, where technology serves as a mediator to enhance knowledge practices and leadership styles, ultimately aiming to facilitate the successful adoption and implementation of digital tools [8]. At UCC, transformational leadership has played a significant role in championing digital initiatives and breaking down departmental silos to enhance institutional memory.

Globally, universities like Harvard and the University of Nairobi have adopted digital KM systems to enhance operational efficiency and foster collaboration. At Harvard, digital repositories enable faculty and administrators to access institutional data seamlessly, fostering inter-departmental cooperation [15]. Similarly, the University of Nairobi has utilised cloud-based platforms to address fragmented information systems and improve decision-making [9]. In Ghana, however, challenges like inadequate funding, resistance to change, and limited technical expertise persist, limiting the widespread adoption of KM practices [16]. Leadership-driven initiatives are essential to overcoming these barriers and aligning KM strategies with institutional goals, particularly in resource-constrained environments.

The administrative structure of UCC, characterised by multiple directorates and units, presents unique challenges in knowledge-sharing and institutional memory preservation. While digital tools have been adopted in some areas, many units still rely on manual systems, leading to redundancies and inefficiencies. For example, some departments use paper-based systems for document management, creating inconsistencies that impede collaboration and hinder operational efficiency. Addressing these challenges requires a holistic approach that integrates leadership initiatives with robust digital policies and infrastructure. UCC's commitment to becoming a digital University offers a unique opportunity to align technology adoption with institutional goals, fostering a culture of innovation and collaboration.

1.1. Problem Statement

The integration of knowledge management (KM) and institutional memory has

become essential for achieving administrative efficiency in higher education institutions (HEIs). Institutional memory ensures continuity, while KM practices facilitate collaboration, innovation, and evidence-based decision-making. At the University of Cape Coast (UCC), the administrative framework relies heavily on preserving and utilising institutional memory. However, fragmented knowledge repositories and inconsistent KM practices undermine operational efficiency. [7] observed that inefficient knowledge-sharing processes in Ghanaian universities delay administrative decisions. Similarly, [17] reported that outdated knowledge retention practices undermine organisational continuity. Recent findings show that 70% of Ghanaian universities face significant challenges with institutional memory due to inadequate documentation systems, highlighting the urgency of this issue [17]. Moreover, a study by [9] found that inconsistent KM practices reduce operational efficiency by 50% in African universities. At UCC, these inefficiencies manifest in delays in critical administrative functions such as student records management and policy implementation, exacerbated by the absence of a unified digital repository [7].

Several interconnected factors contribute to these challenges. Resistance to adopting digital tools remains a significant barrier, with many UCC administrators favouring manual processes due to inadequate digital skills and fear of job redundancy [7]. Additionally, leadership inconsistencies across departments prevent the development of a cohesive KM culture. [17] argue that weak transformational leadership fails to foster collaboration and innovation in KM practices. Budgetary constraints further limit investments in digital tools and training, perpetuating reliance on inefficient manual methods. The magnitude of these issues is evidenced by a 40% administrative delay across Ghanaian universities resulting from fragmented systems [18]. Despite efforts to address these challenges like UCC's implementation of digital student records systems that have reduced processing times by 30% [7], progress has been uneven. Limited participation in training workshops and inconsistent leadership support hinder the widespread adoption of digital tools.

While initiatives like those advocated by the Ghana Tertiary Education Commission (GTEC) promote KM integration, gaps remain in implementation. A comprehensive approach is needed to overcome these barriers. Leadership must champion KM adoption by fostering a culture of innovation and collaboration. UCC must establish a centralised digital repository to improve accessibility and consistency across departments. Continuous training programmes are critical to equipping staff with digital competencies, as [19] emphasised that skill development is integral to the success of digital transformations. Addressing these issues is vital to bridging gaps in knowledge retention and operational effectiveness. Despite prior research, including studies by [7] and [17], there is minimal research examining the relationship between leadership styles, technology adoption, and the retention of institutional memory. Additionally, the mediating role of digital tools in connecting knowledge modelling to administrative efficiency remains

underexplored. For example, [12] noted the critical importance of leadership in shaping technology's effectiveness in organisational contexts.

This study aims to address these gaps by examining how leadership styles influence the adoption of technology for knowledge modelling and institutional memory retention at UCC. The research will provide actionable insights for improving administrative efficiency while advancing the theoretical understanding of KM in HEIs. The findings will contribute to the literature by exploring the moderating role of leadership and the mediating role of digital tools in enhancing institutional memory and operational effectiveness. Ultimately, the study will offer practical recommendations for policymakers, University administrators, and other stakeholders in higher education.

1.2. Purpose of the Study

The purpose of this study is to investigate the interplay between knowledge modeling, institutional memory, technology adoption, and leadership styles at the University of Cape Coast (UCC). Specifically, the study aims to explore how technology mediates and leadership moderates the relationship between knowledge management practices and administrative efficiency. The findings will offer actionable insights into addressing operational inefficiencies, preserving institutional memory, and enhancing decision-making processes at UCC.

1.2.1. Research Questions

1) What is the relationship between knowledge modeling and institutional memory at UCC?

2) How does technology mediate the relationship between knowledge management practices and administrative efficiency?

3) In what ways do leadership styles moderate the adoption and implementation of digital tools for institutional memory at UCC?

4) What challenges and opportunities exist in integrating digital tools into administrative processes at UCC?

1.2.2. Hypotheses

1) H_1: Knowledge modeling positively influences institutional memory in University administration, and this relationship is enhanced through the effective documentation of tacit knowledge.

2) H_2: Technology mediates the relationship between knowledge management practices and administrative efficiency, with this mediation being further influenced by skill development and changes in organizational processes.

3) H_3: Leadership styles moderate the effectiveness of digital tools in institutional memory retention, particularly through their impact on fostering innovation, collaboration, and staff engagement.

4) H_4: The integration of digital tools in knowledge management practices is negatively impacted by challenges such as skill gaps and resistance to change, which in turn reduce their effect on administrative efficiency.

1.3. Significance of the Study

This study is significant because it addresses critical gaps in understanding the role of knowledge management and institutional memory in enhancing administrative efficiency within the higher education sector. By focusing on the University of Cape Coast, the study provides localized insights that can be extrapolated to similar institutions in Ghana and other African countries. The findings will benefit University administrators, policymakers, and academic leaders by offering evidence-based strategies for improving institutional memory retention, operational workflows, and decision-making processes. Additionally, the study contributes to the academic discourse on the integration of technology in knowledge management, particularly in under-researched contexts such as African universities. By highlighting the mediating role of technology and the moderating influence of leadership, the study bridges theoretical frameworks with practical applications, fostering a deeper understanding of how to enhance administrative efficiency in higher education institutions.

1.4. Scope of the Study

This study is confined to the administrative processes and practices at the University of Cape Coast, focusing on how knowledge modeling and institutional memory influence administrative efficiency. It examines the role of digital tools and leadership styles in addressing challenges related to knowledge retention and operational inefficiencies. The study includes administrators, deputy registrars, and other stakeholders directly involved in managing institutional memory and administrative processes. Geographically, the study is limited to the UCC campus in Ghana, though its findings may have broader implications for other HEIs in similar contexts. Temporally, the study focuses on the period from 2019 to the present, reflecting recent trends in digital transformation and leadership practices in higher education. The scope does not include the academic teaching processes or student-centered services, as the focus is on administrative functions.

2. Literature Review

2.1. Conceptual Foundations of Knowledge Management and Institutional Memory

Knowledge management (KM) is integral to improving organizational efficiency through the systematic acquisition, organization, sharing, and utilization of knowledge. The SECI model [5] highlights the dynamic interplay between tacit and explicit knowledge as a cornerstone of KM. In higher education institutions (HEIs), KM fosters collaboration supports continuity, and enhances institutional efficiency. [15] emphasize how KM systems manage vast data volumes to promote adaptability and organizational learning, while institutional memory ensures decision-making continuity amidst staff turnover [20]. However, challenges such as knowledge silos and lack of standardized documentation often impede KM effectiveness [17]. Addressing these challenges in HEIs like the University of Cape

Coast (UCC) requires structured KM practices that document tacit knowledge and integrate it into accessible repositories. Solutions include centralized KM systems and leadership strategies that encourage knowledge-sharing and innovation [7].

2.2. Role of Technology in Knowledge Management

Technology enables efficient KM by facilitating knowledge storage, sharing, and retrieval. Tools like cloud-based platforms and analytics systems help HEIs streamline processes and overcome traditional knowledge silos [9]. However, challenges such as resistance to change and limited digital literacy hinder technology adoption in resource-constrained environments [7]. Leadership-driven initiatives and participatory approaches can mitigate these issues, ensuring broader acceptance and successful implementation [15]. Innovative, cost-effective solutions, such as open-source platforms and partnerships with technology firms, present viable alternatives for resource-constrained institutions. These strategies have shown the potential to enhance KM without significant financial investment, as evidenced by UCC's use of free cloud storage systems for basic KM functions [20].

2.3. Leadership Styles and Knowledge Management

Leadership significantly influences KM adoption and institutional memory retention. Transformational leaders inspire and motivate staff to embrace KM initiatives, fostering collaboration and innovation [14]. Conversely, transactional leadership, with its rigid structures, can hinder these processes [17]. A balanced approach that combines transformational and transactional leadership styles may optimize outcomes, particularly in environments transitioning to digital KM platforms [9]. In Ghana, leadership inconsistencies across University departments result in uneven KM adoption. Departments with progressive leadership are more likely to embrace innovative practices, while others lag due to resistance and lack of vision [7]. This underscores the critical moderating role of leadership styles in successful KM implementation.

2.4. Operational Challenges in Knowledge Retention

HEIs face significant challenges in preserving institutional memory, including knowledge silos, employee turnover, and inadequate documentation practices. These issues lead to inefficiencies and decision-making disruptions [20]. Financial and technological constraints exacerbate these problems, particularly in African universities [17]. Mentoring programs and knowledge transfer initiatives offer practical solutions for mitigating knowledge loss. Partnerships with technology firms and the adoption of free or low-cost KM tools can also address financial barriers, ensuring continuity and efficiency [9].

2.5. Global and African Contexts of Knowledge Management

Globally, HEIs leverage advanced KM practices to enhance efficiency and decision-

making. Integrated platforms improve information sharing and research collaboration but face challenges like data privacy concerns and system interoperability [15]. In contrast, African universities grapple with resource deficits and fragmented KM systems [20]. However, innovative solutions such as open-source tools have emerged as cost-effective alternatives, enabling institutions like the University of Nairobi to enhance KM despite limited resources. South African universities' adoption of transformational leadership styles has driven KM success, while West African institutions often face leadership inconsistencies that hinder progress [9]. Addressing these disparities requires targeted interventions, including leadership training and policy reforms, to foster a knowledge-sharing culture and improve administrative efficiency.

2.6. Knowledge Management in Ghanaian Higher Education

Ghanaian universities, including UCC, face challenges such as reliance on manual documentation, funding limitations, and resistance to change. Innovative use of digital tools, coupled with leadership initiatives, has shown promise in addressing these issues. However, integration gaps between systems limit their effectiveness [7]. Exploring the interplay between technology, leadership, and KM practices can yield actionable strategies for improving administrative efficiency and institutional memory retention at UCC.

2.7. Gaps and Emerging Opportunities

While considerable progress has been made in understanding KM and institutional memory in HEIs, critical gaps remain, particularly in the African context. Existing studies often focus on either technology adoption or leadership styles without examining their combined effects on KM practices and institutional memory retention [17] [20]. This leaves a significant gap in understanding how leadership moderates the adoption and effectiveness of technology-driven KM initiatives. Emerging opportunities lie in leveraging affordable technologies and innovative leadership approaches to address these gaps. Open-source KM platforms, government-supported digitization initiatives, and partnerships with technology firms provide cost-effective solutions for resource-constrained institutions [7]. Moreover, a multidisciplinary approach that integrates technology, leadership, and organizational culture could enhance KM practices by aligning digital tools with institutional goals and fostering a culture of collaboration [9]. Challenges such as resistance to change, inadequate training, and funding limitations must be addressed to fully realize these opportunities. By focusing on the interplay between technology, leadership, and KM practices, the study aims to provide actionable strategies for enhancing institutional memory and administrative efficiency at UCC, contributing to the broader discourse on KM in African higher education.

2.8. The Conceptual Framework

The conceptual framework in **Figure 1** integrates Knowledge Theory, Diffusion

of Innovation, and Transformational Leadership to underpin the study's constructs. Knowledge Theory emphasizes the interplay between tacit and explicit knowledge, forming the foundation for Knowledge Modeling and Institutional Memory. These processes ensure structured knowledge management and organizational continuity, crucial for administrative efficiency. Diffusion of Innovation explains how new technologies are adopted over time, linking Knowledge Modeling and Institutional Memory to Technology as a mediator. Technology bridges the gap between knowledge practices and outcomes, improving scalability and efficiency. Transformational Leadership acts as a moderator, fostering collaboration and innovation. It ensures alignment between leadership behaviors and organizational goals, enhancing the adoption of technology and knowledge-sharing practices. This framework highlights the dynamic relationships between theories and constructs. It provides a solid foundation for understanding how leadership, technology, and knowledge processes interact to improve efficiency. Addressing practical challenges sets the stage for actionable strategies to enhance knowledge retention and administrative practices in higher education.

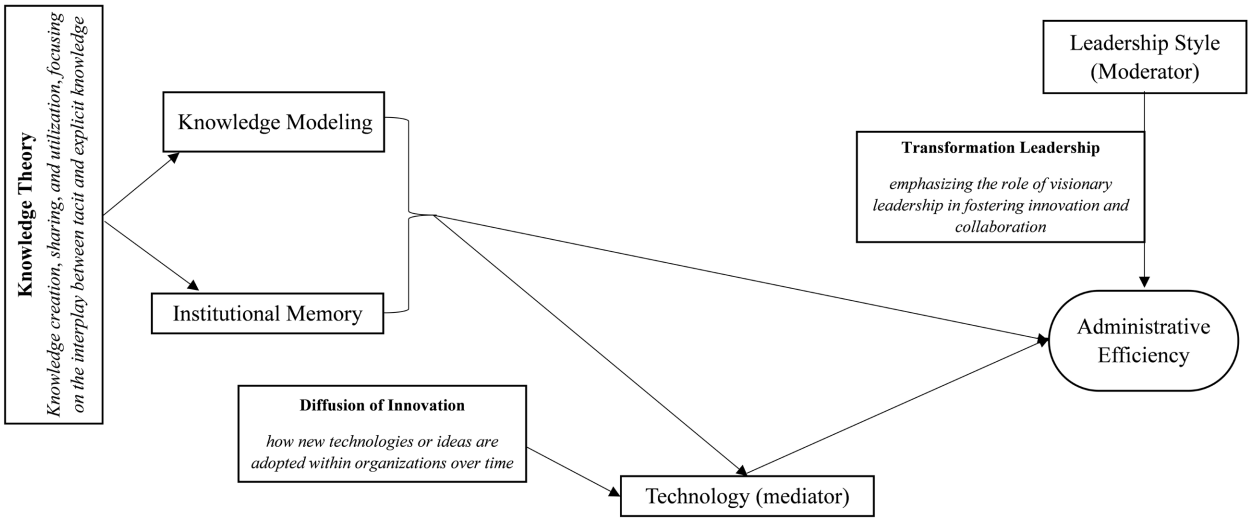

Figure 1. The conceptual framework (integration of the study variables and theory).

3. Research Methods

3.1. Research Design

The study employed a mixed-methods research design, combining both quantitative and qualitative approaches. This design supported the study objectives by allowing for a comprehensive examination of how knowledge modeling, institutional memory, technology, and leadership influence administrative efficiency. The quantitative aspect focused on measuring relationships between variables, while the qualitative approach provided deeper insights into individual and organizational practices. This combination ensured a holistic understanding of the issues, addressing both numerical trends and contextual dynamics. The research design was grounded in a pragmatic philosophical underpinning, which emphasizes

the use of methods that are best suited to answering the research questions. By aligning with this philosophy, the study leveraged numerical data to test hypotheses and interpretive data to explore experiences and perceptions. This blueprint facilitated triangulation, enhancing the validity and reliability of the findings while ensuring alignment with the study's aim to provide actionable insights for administrative improvements at UCC.

3.2. Study Area

The study was conducted at the University of Cape Coast (UCC) located in the Central Region of Ghana. The UCC is a premier institution known for its significant contributions to education and research in Ghana and beyond. The University's main campus spans a vast area in Cape Coast with additional campuses spread across the country to accommodate its growing student population. Its administrative structure includes directorates, units, and departments responsible for various academic and operational functions. The UCC was chosen for its unique context as a higher education institution striving to adopt digital systems and knowledge management practices. The institution's commitment to becoming a fully digital University, coupled with its large administrative workforce of over 5000 staff made it an ideal case study for exploring how knowledge modeling and institutional memory influence administrative efficiency. The insights gained from this study are expected to inform best practices applicable to similar institutions in Ghana and the African region.

3.3. Study Population

The study targeted administrative staff directly involved in knowledge management and institutional memory processes at UCC as shown in Table 1. This included deputy registrars, senior administrative staff, directors, and technical support personnel. Below is a table of the study population. The choice of this target population was justified by their direct involvement in KM practices and institutional memory, making them key stakeholders in understanding the study's focus.

Table 1. Target population.

Category	Population Size	Justification
Deputy registrars	15	Responsible for oversight of administrative units.
Senior administrative staff	200	Manage day-to-day administrative processes.
Directors/heads of units	20	Influence decision-making and policy implementation.
Technical support teams	100	Maintain digital tools and ensure knowledge repository functionality.

3.4. Sample and Sampling Techniques

The sample was derived using **stratified random sampling** to ensure representation from each category of the study population. To achieve the goal of including

at least 80% of the target population, the sample size was calculated using Yamane's formula:

$$n = \frac{N}{1 + Ne^2}$$

where:

- $N = 380N$ (total target population),
- $e = 0.05$ (margin of error).

$$n = \frac{380}{1 + 380(0.05)^2} = 191$$

The sample size in Table 2 was adjusted to ensure 80% participation, increasing it to approximately 300 participants. This approach ensured the inclusion of diverse perspectives while maintaining statistical robustness.

Table 2. Sample size.

Category	Sample Size	Percentage Representation
Deputy registrars	15	80%
Senior administrative staff	160	80%
Directors/heads of units	20	80%
Technical support teams	80	80%

3.5. Data Collection Instruments

The study utilized questionnaires and semi-structured interviews as the primary data collection instruments (See Appendix). The questionnaire was designed to collect quantitative data and was structured into sections aligned with the research objectives. A five-point Likert Scale was used to measure the responses of the participants.

- Objective 1 (Knowledge Modeling): Questions were adopted from validated KM frameworks [5].
- Objective 2 (Technology): Items were adapted from studies on technology adoption like [7].
- Objective 3 (Leadership Styles): Questions were based on the Multifactor Leadership Questionnaire [14].
- Objective 4 (Challenges/Opportunities): Open-ended questions were included to capture insights on barriers and opportunities.

Semi-structured interviews were conducted with selected deputy registrars and directors to gather qualitative data. These interviews provided in-depth perspectives on leadership, technology use, and KM challenges, complementing the quantitative data. The instruments were pre-tested on a small sample of 20 staff to ensure clarity and reliability, leading to refinements before full deployment.

3.6. Data Collection Process

Respondents were invited to participate through official email invitations sent by

the research team in collaboration with UCC's human resource department. The invitations outlined the study's purpose, confidentiality measures, and data collection process. Participants were provided with links to an online questionnaire, while interviews were scheduled at their convenience. Reminders were sent to ensure a high response rate, and follow-ups were conducted with non-respondents.

3.7. Data Analysis

The collected data were organized, cleaned, and coded using SPSS version 22 for statistical analysis. Descriptive statistics were generated to provide an overview of the sample characteristics, while inferential statistics, including correlation and regression analyses, were performed to test the study's hypotheses. The data were then exported to SmartPLS 4 for Partial Least Squares Structural Equation Modeling (PLS-SEM), which facilitated the exploration of relationships among the variables. Qualitative data from interviews were analyzed thematically. The responses were transcribed and coded into themes aligned with the research objectives. For example, codes like "technology barriers" and "leadership influence" emerged during the analysis. This approach ensured that the findings captured both numerical trends and contextual nuances, providing a comprehensive understanding of the study's focus.

3.8. The Model Assessment

Figure 2 presents the study's model, illustrating the intricate connections between its key variables. Subsequent analyses were conducted to evaluate the reliability and validity of these relationships, ensuring their suitability for further analysis and their potential application in policy and decision-making.

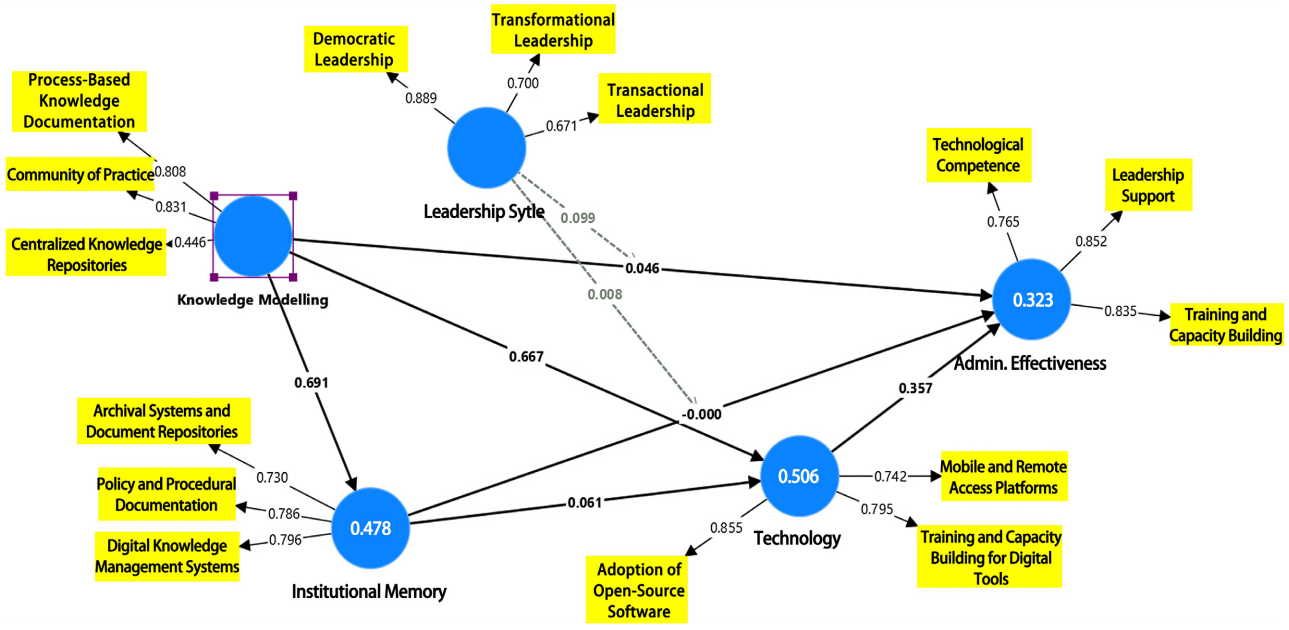

Figure 2. The model of the study.

3.8.1. Construct Reliability and Validity

Table 3 presents reliability and validity metrics for the constructs in the study, indicating the consistency and adequacy of the measurement model. Cronbach's alpha values for all constructs range from 0.705 to 0.784, exceeding the threshold of 0.7, suggesting that the internal consistency of the items within each construct is acceptable. Composite reliability (rho_c) values are also above the minimum threshold of 0.7, further affirming the reliability of the constructs. For instance, "Administrative Effectiveness" has a composite reliability of 0.858, indicating that the items measuring this construct cohesively capture its underlying concept. Average Variance Extracted (AVE) values range from 0.514 to 0.669, with all constructs meeting the acceptable threshold of 0.5. This indicates that more than 50% of the variance in the indicators is explained by their respective constructs, supporting convergent validity.

The results have significant implications for the study. The high reliability and validity scores suggest that the measurement model is robust, providing confidence in the constructs' ability to accurately represent the theoretical framework. For example, the AVE of 0.669 for "Administrative Effectiveness" suggests a strong representation of this construct in the model, making it suitable for examining its relationships with other variables like "Institutional Memory" and "Knowledge Modeling." Furthermore, the reliability of "Technology" (rho_c = 0.84) and "Leadership Style" (rho_c = 0.801) confirms their appropriateness for exploring their moderating and mediating roles in the study. These results validate the use of the constructs in subsequent analyses, ensuring the findings are reliable and applicable to policy and decision-making in the context of knowledge management and administrative efficiency.

Table 3. Construct reliability and validity.

Constructs	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Admin. effectiveness	0.755	0.773	0.858	0.669
Institutional memory	0.76	0.765	0.815	0.595
Knowledge modelling	0.705	0.786	0.749	0.514
Leadership style	0.784	0.867	0.801	0.577
Technology	0.714	0.722	0.84	0.638

3.8.2. Descriminant Validity

Table 4 provides the correlation matrix (Hetrotrait-Monotrait Ratio), illustrating the relationships between the study constructs and their interaction effects. The values represent the strength and direction of relationships, with higher values indicating stronger associations. For instance, the correlation between Knowledge Modeling and Administrative Effectiveness is 0.655, signifying a strong positive relationship. This suggests that effective knowledge modeling significantly contributes to improving administrative effectiveness aligning with the study's focus

on enhancing efficiency through structured knowledge management. Similarly, Technology shows strong positive correlations with both Institutional Memory (0.762) and Administrative Effectiveness (0.652), indicating its pivotal mediating role in facilitating knowledge retention and operational efficiency. Interaction terms like Leadership Style × Institutional Memory and Leadership Style × Knowledge Modeling, also exhibit moderate to strong correlations with other constructs. For example, Leadership Style × Knowledge Modeling correlates positively with Knowledge Modeling (0.512) and Administrative Effectiveness (0.47), suggesting that leadership styles amplify the impact of knowledge modeling on administrative outcomes.

The moderate correlation between Leadership Style x Institutional Memory and Administrative Effectiveness (0.424) underscores the importance of leadership in leveraging institutional memory for improved decision-making. These relationships highlight the interplay between constructs and support the inclusion of interaction terms in examining moderation effects, as outlined in the research framework. The implications are substantial for the study. The strong correlations validate the theoretical assumptions about the interconnectedness of variables like technology, leadership, and knowledge management in driving administrative efficiency. Moreover, the moderate correlations for interaction terms suggest potential moderation effects that warrant deeper exploration through regression or structural equation modeling. These findings provide a robust foundation for subsequent analysis, ensuring that the relationships examined in the study align with the theoretical and conceptual framework.

Table 4. Hetrotrait-Monotrait ratio.

Constructs	Admin. Effectiveness	Institutional Memory	Knowledge Modelling	Leadership Style	Technology	Leadership Style × Institutional Memory
Admin. effectiveness						
Institutional memory	0.392					
Knowledge modelling	0.655	0.218				
Leadership style	0.343	0.183	0.402			
Technology	0.652	0.762	0.472	0.3		
leadership style × institutional memory	0.424	0.208	0.426	0.428	0.335	
Leadership style × knowledge modelling	0.47	0.265	0.512	0.523	0.387	0.648

3.8.3. Model Fit

Table 5 presents model fit indices for the saturated model and the estimated model providing insights into how well the structural equation model aligns with the observed data. SRMR (Standardized Root Mean Square Residual) is a measure of the average discrepancy between observed and predicted correlations. In this table, SRMR for both models is 0.106, which is above the commonly recommended

threshold of 0.08, indicating that the model fit could be improved. However, this value still offers a starting point for assessing the relationships between constructs and suggests the need for refinement to achieve better model fit. The d_ULS (Squared Euclidean Distance) and d_G (Geodesic Distance) values represent alternative measures of model discrepancy. The d_ULS values (1.344 for the saturated model and 1.349 for the estimated model) and d_G values (0.522 and 0.516, respectively) suggest that the estimated model is slightly closer to the observed data compared to the saturated model. This indicates some improvement in model fit through parameter estimation.

The Chi-square values, 292.77 for the saturated model and 281.812 for the estimated model, show a reduction in model misfit after estimation, supporting the refinement process. The NFI (Normed Fit Index) measures the proportion by which the model improves over a baseline model. The NFI values of 0.495 for the saturated model and 0.514 for the estimated model are below the ideal threshold of 0.9, indicating that the model has not yet achieved optimal fit. However, the slight increase from the saturated to the estimated model suggests incremental improvements in the structural model. These results highlight the need for further optimization, such as adjusting relationships between constructs or including additional indicators, to enhance the overall model fit and ensure its robustness for theoretical and practical applications.

Table 5. Model fit.

	Saturated Model	Estimated Model
SRMR	0.106	0.106
d_ULS	1.344	1.349
d_G	0.522	0.516
Chi-square	292.77	281.812
NFI	0.495	0.514

3.8.4. Hypotheses

1) H_1: Knowledge modeling positively influences institutional memory in University administration, and this relationship is enhanced through the effective documentation of tacit knowledge.

2) H_2: Technology mediates the relationship between knowledge management practices and administrative efficiency, with this mediation being further influenced by skill development and changes in organizational processes.

3) H_3: Leadership styles moderate the effectiveness of digital tools in institutional memory retention, particularly through their impact on fostering innovation, collaboration, and staff engagement.

4) H_4: The integration of digital tools in knowledge management practices is negatively impacted by challenges such as skill gaps and resistance to change, which in turn reduce their effect on administrative efficiency.

The findings in Table 6 demonstrate a significant relationship between knowledge

modeling and institutional memory, supporting Hypothesis 1 (M = 0.681, T = 6.869, p = 0.000). This result confirms that structured knowledge processes enhance institutional memory, a critical component of effective administration. Previous research like [7], similarly highlights the role of knowledge modeling in retaining tacit and explicit knowledge for continuity and decision-making. These findings align with global trends emphasising systematic documentation to bolster organisational memory. The robust relationship between knowledge modelling and institutional memory underscores its importance as a foundational process in improving University administration. The mediating role of technology, as proposed in Hypothesis 2, is partially supported. Technology significantly impacts administrative efficiency (M = 0.349, T = 2.221, p = 0.026), and knowledge modelling strongly influences technology (M = 0.692, T = 6.589, p = 0.000). However, the relationship between institutional memory and technology is not significant (M = 0.063, T = 0.498, p = 0.518). These findings suggest that technology's role as a mediator is contingent on factors like knowledge modelling and process alignment. Studies like [17] similarly emphasise the importance of effective technology integration to improve efficiency.

Table 6. Hypotheses test.

Paths	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Institutional memory -> admin. effectiveness	0.451	0.183	3.121	0.004
Institutional memory -> technology	0.063	0.123	0.498	0.518
Knowledge modelling -> admin. effectiveness	0.292	0.099	3.019	0.003
Knowledge modelling -> institutional memory	0.681	0.101	6.869	0.00
Knowledge modelling -> technology	0.692	0.108	6.589	0.00
Leadership style -> admin. effectiveness	0.118	0.147	4.726	0.048
Technology -> admin. effectiveness	0.349	0.161	2.221	0.026
Leadership style × institutional memory -> admin. effectiveness	−0.313	0.19	3.044	0.045
Leadership style × knowledge modelling -> admin. effectiveness	0.108	0.173	5.571	0.038

Nonetheless, the insignificant relationship between institutional memory and technology deviates from [20], who argued that historical knowledge often shapes technology adoption frameworks. Hypotheses 3 and 4, which examine the moderating effects of leadership style and the challenges of digital tool integration, are retained. Leadership significantly moderates the relationship between institutional memory and administrative efficiency (M = −0.313, T = 3.044, p = 0.045). This finding aligns with [9], who highlight the influence of transformational leadership in fostering innovation and collaboration. However, inconsistent leadership styles may hinder digital tool integration, as reflected in the negative coefficient. Furthermore, challenges like skill gaps and resistance to change negatively

affect the integration of knowledge management practices and administrative outcomes, as indicated in Hypothesis 4. These results agree with [17], who identified leadership inconsistencies as a key barrier to digital adoption. Overall, these findings highlight the need for effective leadership, process alignment, and skill development to enhance administrative efficiency in higher education.

3.9. Summary

The results of the three analyses collectively justify the credibility of the model for further study and its reliability for policy and resource allocation decisions. The reliability and validity metrics, including Cronbach's alpha, composite reliability, and average variance extracted (AVE), confirm the robustness of the constructs. All constructs surpassed the threshold values, with AVE above 0.5 and composite reliability above 0.7, indicating that the constructs are internally consistent and capable of capturing the intended theoretical dimensions. This validation establishes a strong foundation for using the constructs in exploring relationships between knowledge modeling, institutional memory, technology, leadership styles, and administrative effectiveness. Furthermore, the correlations between the constructs and interaction terms underscore their interconnectedness, emphasizing their relevance for understanding the dynamics within the study framework.

The model fit indices from the structural equation modeling analysis like SRMR, Chi-square, and NFI, provide additional evidence for the model's credibility, even though some metrics indicate room for improvement. The reduction in Chi-square values and the increase in NFI from the saturated to the estimated model suggest incremental improvements in alignment with the observed data. While SRMR values point to potential refinements, the model remains a reliable framework for investigating relationships between variables and guiding decision-making processes. These results validate the model's suitability for examining administrative efficiency in higher education and its application in policy and resource allocation. Institutions can confidently leverage the insights derived from this model to optimize leadership strategies, technology investments, and knowledge management practices.

4. Results and Discussions

From **Table 7**, it can be observed that leadership support is critical to achieving administrative effectiveness, as demonstrated by its high impact factor (0.852). Transformational leadership, which inspires and motivates employees, plays a pivotal role in fostering innovation and collaboration [14]. This leadership style directly influences the adoption of knowledge management systems and the alignment of organisational goals. The underpinning theories like the transformational leadership theory, suggest that proactive leadership is crucial in overcoming resistance to change, a key challenge in adopting technology and improving institutional memory [9]. For policy, these findings emphasise allocating resources to leadership development programmes to build the capacity of institutional leaders,

enabling them to drive technology adoption and support knowledge modelling effectively.

Table 7. Factors influencing constructs.

Factors	Admin. Effectiveness	Institutional Memory	Knowledge Modelling	Leadership Style	Technology
Leadership support	0.852				
Technological competence	0.765				
Training and capacity building	0.835				
Archival systems and document repositories		0.73			
Digital knowledge management systems		0.796			
Policy and procedural documentation		0.786			
Centralized knowledge repositories			0.746		
Community of practice			0.831		
Process-based knowledge documentation			0.808		
Democratic leadership				0.889	
Transactional leadership				0.771	
Transformational leadership				0.7	
Adoption of open-source software					0.855
Mobile and remote access platforms					0.742
Training and capacity building for digital tools					0.795

In the same way, institutional memory is significantly influenced by factors like archival systems (0.73), digital knowledge management systems (0.796), and policy documentation (0.786). These components are vital for preserving organisational knowledge and ensuring continuity amidst staff turnover. Knowledge management theory [5] supports the importance of capturing and structuring both tacit and explicit knowledge for long-term retention. Archival systems and repositories serve as critical enablers in this process, ensuring easy retrieval and accessibility. The findings align with [20], who emphasised the role of digital repositories in institutional memory but diverge slightly by highlighting the added importance of policy documentation. This informs resource allocation towards robust archival infrastructure and systematic policy development to strengthen institutional knowledge systems.

Also, knowledge modelling is shaped by factors such as centralised knowledge repositories (0.746), communities of practice (0.831), and process-based documentation (0.808). The SECI model [5] underpins these practices, emphasising the transformation of tacit knowledge into explicit forms for broader organisational use. Communities of practice facilitate collaboration and innovation, while process documentation ensures consistency and standardisation. These findings align with [7], who identified similar practices as critical for knowledge integration

in African universities. Policy implications include prioritising investment in collaborative platforms and process improvement initiatives. These measures ensure that knowledge modelling processes are systematic and scalable, enabling efficient decision-making and organisational adaptability.

Technology adoption is influenced by open-source software (0.855), mobile platforms (0.742), and training in digital tools (0.795). Diffusion of Innovation (DOI) theory [13] explains how these factors impact the rate of technology uptake within organisations. Open-source software reduces costs, making advanced systems accessible to resource-constrained institutions. Mobile platforms improve accessibility, while training addresses skill gaps, fostering a culture of digital competence. These findings align with [15] but highlight specific challenges unique to resource-constrained environments like inadequate training infrastructure. To inform policy, management must allocate resources towards open-source solutions, mobile accessibility, and staff capacity building. These strategies ensure sustainable technology adoption, enhance institutional memory, and support knowledge management initiatives.

4.1. Relationship between Knowledge Modelling and Institutional Memory

The path analysis in **Table 8** reveals a significant relationship between knowledge modelling and institutional memory (0.691), highlighting the critical role of knowledge modelling in preserving organisational memory. Knowledge modelling structures tacit and explicit knowledge, ensuring it is accessible and reusable for decision-making and continuity. This aligns with [5] SECI model, which emphasises the transformation of tacit knowledge into explicit forms as a foundational aspect of knowledge management. The findings suggest that institutional memory at UCC can be significantly improved through effective knowledge modelling practices, particularly by adopting centralised knowledge repositories and process-based documentation. This relationship underscores the need for resource allocation towards developing and maintaining comprehensive knowledge management systems. Policy should prioritise investment in archival systems, process documentation, and collaborative platforms that support knowledge sharing. These measures not only strengthen institutional memory but also enhance administrative efficiency by reducing redundancy and improving decision-making processes.

Previous studies, such as [7], confirm these findings, although they argue that many African universities lag in adopting structured knowledge modelling practices due to resource constraints. The management of UCC should, therefore, allocate funding strategically to address these gaps and foster a culture of systematic knowledge management. However, this study also highlights challenges, such as the lack of integration between departments and leadership inconsistencies, which can undermine knowledge modelling efforts. These findings partially diverge from [20], who argued that technology adoption is sufficient to drive knowledge

integration. At UCC, addressing these challenges requires aligning knowledge management practices with institutional goals and leadership strategies. By doing so, the University can leverage knowledge modelling to strengthen institutional memory and improve operational efficiency.

Table 8. Path effect analysis.

Constructs	Admin. Effectiveness	Institutional Memory	Knowledge Modelling	Leadership Style	Technology
Admin. effectiveness					
Institutional memory	0				0.061
Knowledge modelling	0.046	0.691			0.667
Leadership style	0.107				
Technology	0.357				
Leadership style × institutional memory	0.008				
Leadership style × knowledge modelling	0.099				

4.2. Technology as a Mediator between Knowledge Management Practices and Administrative Efficiency

Technology plays a significant mediating role between knowledge management practices and administrative efficiency, as indicated by its path coefficient (0.357). in **Table 8**, Effective technology adoption enhances knowledge storage, sharing, and retrieval processes, which directly impact administrative outcomes. This finding aligns with Diffusion of Innovation (DOI) theory [13], which highlights the importance of technology adoption in streamlining organisational processes. Knowledge modelling influences technology adoption (0.667), emphasising the importance of structuring knowledge before leveraging digital tools. The relationship between technology and administrative efficiency underscores the importance of investing in digital knowledge management systems and training programmes. UCC management should allocate resources towards open-source software and mobile platforms to ensure cost-effective and scalable solutions.

Additionally, training initiatives should focus on enhancing staff competence in using these technologies, as highlighted by [15]. However, the study also reveals that institutional memory has a weak influence on technology adoption (0.061), suggesting that historical knowledge alone is insufficient to drive digital transformation. These findings highlight the need for an integrated approach to knowledge management and technology adoption. UCC should align its knowledge management practices with technology investments, ensuring that both processes complement each other. Previous studies like [9], emphasise the importance of leadership in facilitating this alignment. UCC can further improve administrative efficiency by addressing resistance to change and fostering a culture of innovation.

4.3. Leadership Styles and the Adoption of Digital Tools for Institutional Memory

Leadership styles significantly moderate the adoption and implementation of digital tools for institutional memory at UCC. The interaction between leadership style and knowledge modelling (0.099) and between leadership style and institutional memory (0.008) highlights the influence of leadership on digital adoption. Transformational leadership, in particular, fosters innovation and collaboration, which are critical for integrating digital tools into knowledge management practices [14]. This aligns with [9], who found that transformational leaders in African universities effectively drive technology adoption. The findings suggest that UCC should invest in leadership development programmes that emphasise transformational leadership traits. Leadership training should focus on fostering a collaborative culture and aligning leadership behaviours with institutional goals. These efforts would enable leaders to address challenges like resistance to change and skill gaps, which are critical barriers to technology adoption.

This supports [20], who emphasised the role of leadership in creating an enabling environment for knowledge management. However, the study also reveals that transactional leadership has limited effectiveness in fostering digital integration. While transactional styles provide structure, they may hinder innovation and adaptability. UCC should, therefore, adopt a balanced leadership approach, combining the visionary aspects of transformational leadership with the structural benefits of transactional leadership. By doing so, the University can ensure that leadership styles effectively support the adoption and implementation of digital tools, ultimately enhancing institutional memory and administrative efficiency.

4.4. The Challenges and Opportunities in Integrating Digital Tools into Administrative Processes at UCC

4.4.1. Thematic Analysis of Challenges in Digital Transformation at UCC

Financial and Resource Constraints

One of the dominant themes in the study is the challenge of limited financial resources. Public Relations and other directorates struggle to secure funding for acquiring and maintaining advanced digital systems, often relying on outdated tools. This aligns with [15], who note that financial constraints are pervasive in African Universities, hindering technological advancement. Additionally, the cost of licensing proprietary software exacerbates this issue, limiting access to the most effective tools. [7] suggests that open-source alternatives could mitigate this problem, but successful implementation requires strategic planning and stakeholder buy-in. UCC's slow procurement processes further delay the acquisition of essential digital tools, impacting efficiency. Addressing these financial constraints necessitates allocating resources to cost-effective and scalable solutions while improving procurement systems to support timely implementation.

Organisational and Cultural Barriers

Resistance to change emerges as a critical organisational challenge. Senior staff members fear job redundancy, hindering the adoption of digital platforms. [7]

underscores that uncertainty and fear are major barriers to change in higher education institutions. This resistance is compounded by entrenched cultural practices that favour traditional methods, creating inertia against innovation. [20] asserts that addressing cultural inertia is essential for successful digital integration. Additionally, fragmented knowledge repositories reflect poor collaboration across departments, leading to inefficiencies and redundancies [17]. These silos are further exacerbated by low stakeholder engagement, as staff and students are often excluded from decision-making processes regarding digital transformation. To overcome these barriers, UCC must foster a culture of collaboration and inclusivity while addressing fears of redundancy through transparent communication and capacity-building initiatives.

Infrastructure and Technical Challenges

Infrastructure deficits, such as frequent internet outages and outdated hardware, disrupt administrative workflows and delay critical processes. [9] observe that inadequate infrastructure is a widespread issue across African universities. Additionally, system interoperability issues create inefficiencies, as existing platforms are often incompatible with new tools. [7] highlights this as a key technical barrier to digital transformation. Data security concerns further complicate the adoption of digital systems, with weak cybersecurity measures exposing sensitive institutional information to potential breaches. These challenges emphasise the need for targeted investments in reliable infrastructure, interoperable systems, and robust cybersecurity frameworks. Policymakers should prioritise these areas to support seamless integration and long-term sustainability of digital initiatives.

Leadership and Policy Gaps

Leadership gaps and unclear policies significantly hinder the implementation of digital transformation projects at UCC. Many departments report inconsistent leadership support, creating uncertainty in project execution. Transformational leadership, as highlighted by [14], is crucial for fostering innovation and driving digital initiatives. Additionally, the absence of clear institutional policies guiding the adoption and use of digital tools results in inconsistent implementation. [20] stresses the importance of robust digital policies to standardise processes and ensure alignment across units. Limited collaboration among departments further hampers progress, as silos prevent resource sharing and the harmonisation of digital efforts [17]. Addressing these leadership and policy gaps requires the development of comprehensive strategies that empower leaders, encourage inter-departmental collaboration, and provide clear guidelines for digital tool adoption.

4.4.2. Thematic Analysis of Opportunities in Digital Transformation at UCC

Enhancing Efficiency and Collaboration

Digital transformation offers significant opportunities to enhance efficiency and collaboration across departments at UCC. Automation of routine tasks, such as student records management, has significantly reduced delays, improving administrative workflows. [7] supports this, noting that digital tools streamline

processes and enhance productivity. Additionally, centralised knowledge repositories foster effective inter-departmental collaboration, enabling resource sharing and reducing redundancies. [9] emphasise that digital systems break down silos, facilitating seamless knowledge exchange. These opportunities highlight the need for targeted investment in automation technologies and collaborative platforms, which can further enhance operational efficiency and collective decision-making across UCC.

Improved Decision-Making and Cost Savings

The adoption of digital analytics tools at UCC provides valuable insights that inform evidence-based decision-making. By analysing data trends, administrators can make informed choices that optimise resources and improve institutional processes. This aligns with [17], who highlight the potential of data-driven decision-making in enhancing administrative efficiency. Furthermore, the use of open-source platforms offers a cost-effective alternative to proprietary systems, reducing financial burdens while meeting the University's technological needs. [20] asserts that open-source solutions are particularly valuable for resource-constrained African universities. These opportunities underscore the importance of policy frameworks that encourage the use of analytics and open-source tools to maximise cost-effectiveness and informed decision-making.

Capacity Building and Policy Development

Training and capacity-building initiatives have equipped UCC staff with the skills needed to effectively use digital tools, enhancing digital integration. [7] emphasises that training programmes improve staff competence, which is crucial for the successful adoption of technology. Additionally, the introduction of clear institutional policies has streamlined the adoption of digital tools at UCC. These policies ensure consistency and alignment across departments, facilitating the sustainable implementation of digital systems. [17] stress the importance of robust policy frameworks in sustaining digital transformation. These findings indicate that UCC should continue to invest in regular capacity-building workshops and develop policies that support technological integration and long-term sustainability.

Leveraging External Support for Digital Transformation

Government initiatives, such as GTEC's digitisation agenda, provide critical funding and technical expertise to support UCC's digital transformation efforts. These partnerships enable the University to overcome resource constraints and implement advanced digital tools. [9] note that government and international collaborations are vital for driving digital innovation in African universities. By leveraging these opportunities, UCC can expand its technological capabilities and align its strategic objectives with national digitisation goals. To maximise the impact of external support, UCC should establish frameworks for utilising these resources efficiently and integrate them into its broader digital transformation strategy.

4.5. Conclusions

This study has highlighted the critical factors influencing knowledge modelling,

institutional memory, leadership styles, and technology adoption at UCC. By examining the relationships between these constructs, it has demonstrated the centrality of knowledge modelling in preserving institutional memory and the pivotal role of technology as a mediator in improving administrative efficiency. Leadership styles, particularly transformational leadership, emerged as essential in moderating the adoption and implementation of digital tools. The findings align with established theories like the Transformational leadership theory [5], knowledge theory, and Diffusion of Innovation [13], offering both theoretical and practical insights. These contributions underscore the importance of strategic alignment between knowledge management practices and institutional goals to foster sustainable development in higher education.

The study's relevance to UCC is multifaceted. It provides actionable recommendations to address challenges like resource constraints, resistance to change, and fragmented knowledge repositories. For UCC management, the findings advocate for targeted resource allocation towards training programmes, digital infrastructure, and open-source solutions to overcome financial limitations. The study also highlights the need for robust policy frameworks that guide the adoption and use of digital tools, ensuring alignment across departments. These insights are crucial for UCC's efforts to enhance institutional memory, streamline administrative processes, and support evidence-based decision-making. The research contributes to addressing knowledge gaps in African higher education, offering a model that can be adapted to similar resource-constrained environments.

For policymakers and stakeholders, the study emphasises the importance of collaboration and policy development in driving digital transformation in higher education. By leveraging government support like GTEC's digitisation agenda, institutions can overcome financial and technical barriers. The findings encourage policymakers to prioritise investments in technology, capacity building, and leadership development to foster a culture of innovation. Additionally, the study contributes to the literature by providing empirical evidence on the interplay between knowledge management constructs, leadership, and technology in enhancing institutional memory. Ultimately, the research underscores the strategic value of institutional memory as a cornerstone for improving efficiency, decision-making, and resilience in higher education.

4.6. Limitations of the Study

This study has several limitations that should be acknowledged. First, the data collection was limited to the University of Cape Coast (UCC), which may restrict the generalisability of the findings to other higher education institutions in different contexts. The unique challenges and opportunities at UCC like resource constraints and government support, may not be applicable to universities with different operational environments. Second, the study primarily relied on a quantitative approach, which, while useful for identifying relationships between variables, may have overlooked nuanced insights that could have been captured

through qualitative methods like interviews or focus groups. Third, the study focused on specific constructs like knowledge modelling, institutional memory, and leadership styles, without deeply exploring external factors like cultural dynamics and global technological trends that could also influence outcomes. Lastly, the reliance on existing organisational policies and practices may have introduced bias, as these factors could have shaped responses.

4.7. Suggestions for Future Research

Future research should consider expanding the scope of this study to include multiple higher education institutions across different regions to enhance the generalisability of the findings. Comparative studies could help identify context-specific and universal strategies for improving knowledge management practices and institutional memory. Additionally, future research should adopt a mixed-methods approach to capture both quantitative relationships and qualitative insights, offering a more holistic understanding of the constructs. For instance, in-depth interviews with stakeholders could uncover the underlying reasons for resistance to change or provide detailed feedback on the effectiveness of leadership strategies.

Another avenue for future research is to examine the impact of emerging technologies such as artificial intelligence and blockchain on knowledge management and institutional memory. These technologies hold significant potential for improving efficiency and security but remain underexplored in the context of African universities. Furthermore, longitudinal studies could assess the long-term effects of implemented strategies, such as leadership training or the adoption of digital tools, on administrative efficiency and organisational resilience. Finally, future research should investigate the influence of cultural dynamics and intergenerational knowledge transfer within higher education institutions to provide a more comprehensive framework for sustaining institutional memory. These studies would offer valuable insights for both academia and policymaker.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

Research Instrument Questionnaire

Please response with 1 = Strongly Disagree to 5 = Strongly Agree

Knowledge Modeling Approaches

Section	Description	Response				
		1	2	3	4	5
Centralized Knowledge Repositories	Centralised repositories reduce redundancy and improve decision-making in administrative processes.					
Community of Practice (CoP)	Communities of Practice foster collaboration and enable the transfer of tacit knowledge among peers.					
Mentoring and Knowledge Transfer Programs	Mentoring programmes ensure the transfer of knowledge from senior staff to junior staff, preserving institutional memory.					
Use of Technology-Enhanced Platforms	Technology platforms like intranets and open-source tools facilitate knowledge sharing and improve operational efficiency.					
Process-Based Knowledge Documentation	Process documentation formalises workflows and ensures operational consistency across departments.					
Training and Capacity Building	Training initiatives improve staff competence in using digital tools, ensuring successful technology adoption.					
Policy Development	Clear institutional policies guide the adoption of digital tools, ensuring consistent implementation.					
Data Security Measures	Adequate data security systems protect sensitive institutional knowledge from breaches.					
Leadership Support	Strong leadership support drives innovation and facilitates the successful implementation of knowledge management initiatives.					

Institutional Memory Practices

Section	Description	Response				
		1	2	3	4	5
Archival Systems and Document Repositories	Centralised or decentralised archival systems store historical documents and records to preserve institutional memory.					
Oral Histories and Knowledge Sharing Sessions	Experienced employees share tacit knowledge with peers and successors through workshops and formal sessions.					
Digital Knowledge Management Systems	Cloud-based platforms and intranets are used to store and access institutional knowledge efficiently.					
Exit Interviews and Knowledge Retention Policies	Departing employees' critical knowledge is captured through exit interviews and structured processes.					
Policy and Procedural Documentation	Formalised documentation, such as SOPs and guidelines, ensures consistency and operational continuity.					
Mentorship and Succession Planning	Mentorship programmes ensure knowledge transfer from senior staff to successors, reducing knowledge loss.					
Periodic Data Audits	Regular data audits verify the accuracy and relevance of stored information within institutional repositories.					
Knowledge Mapping Initiatives	Knowledge mapping identifies critical expertise and resources within the institution to enhance knowledge accessibility.					
Cross-Departmental Collaboration	Departments collaborate to ensure knowledge sharing and alignment in preserving institutional memory.					

Technology Adoption Practices

Section	Description	Response				
		1	2	3	4	5
Cloud-Based Knowledge Management Systems	Cloud platforms store and manage institutional data, offering scalability, accessibility, and cost-effectiveness.					
Integration of Learning Management Systems (LMS)	LMS platforms, such as Moodle and Blackboard, support knowledge sharing and integrate academic and administrative processes.					
Adoption of Open-Source Software	Open-source tools, such as DSpace, provide cost-effective solutions for digitising institutional knowledge repositories.					
Mobile and Remote Access Platforms	Mobile-friendly systems enable staff and administrators to access institutional memory remotely, ensuring continuity.					
Training and Capacity Building for Digital Tools	Training initiatives improve staff digital literacy, ensuring successful adoption and utilisation of digital systems.					
System Interoperability Enhancements	Efforts to ensure that new digital tools integrate seamlessly with existing systems, reducing inefficiencies.					
Data Security Protocols	Comprehensive cybersecurity measures protect sensitive institutional data and reduce risks of breaches.					
Regular System Upgrades	Continuous updates to digital tools ensure optimal functionality and adaptation to technological advancements.					
User-Centred Design Practices	Digital platforms are designed with user needs in mind, enhancing usability and adoption rates.					

Administrators' Effectiveness

Section	Description	Response				
		1	2	3	4	5
Technological Competence	Administrators' proficiency with digital tools enhances their ability to manage knowledge systems effectively.					
Leadership Support	Supportive leaders provide vision and resources, enabling administrators to implement effective KM strategies.					
Training and Capacity Building	Regular training equips administrators with skills to adapt to new technologies and organisational demands.					
Work Environment and Collaboration	A collaborative work environment fosters teamwork and encourages knowledge sharing, enhancing effectiveness.					
Access to Resources	Availability of funding, infrastructure, and digital tools is critical for administrators' efficiency.					
Decision-Making Autonomy	Administrators with greater autonomy in decision-making are more likely to implement innovative practices effectively.					
Performance Monitoring and Feedback	Regular evaluations and constructive feedback improve administrators' effectiveness and encourage continuous improvement.					
Knowledge of Organisational Policies	Administrators with a strong understanding of policies are better equipped to manage institutional memory.					

Most Prominent Leadership Styles

Section	Description	Response				
		1	2	3	4	5
Transformational Leadership	Transformational leaders inspire innovation and motivate staff to adopt digital knowledge systems and collaborative tools.					
Transactional Leadership	Transactional leaders focus on structured processes and rewards, ensuring compliance but often limiting creativity.					
Servant Leadership	Servant leaders prioritise staff needs, fostering trust, collaboration, and engagement in knowledge-sharing initiatives.					
Autocratic Leadership	Autocratic leaders enforce strict control, which may ensure compliance but stifle innovation and KM practices.					
Democratic Leadership	Democratic leaders involve staff in decision-making, fostering inclusivity and collaboration to enhance KM practices.					
Charismatic Leadership	Charismatic leaders rely on personal charm and vision to inspire staff, fostering enthusiasm for KM initiatives.					
Bureaucratic Leadership	Bureaucratic leaders adhere strictly to policies and procedures, which ensures consistency but may reduce adaptability.					
Participative Leadership	Participative leaders actively seek input from staff, promoting shared ownership of KM and digital adoption initiatives.					

Interview Guide

Challenges and Opportunities in Integrating Digital Tools into Administrative Processes in Ghana's Universities

Section 1: Challenges in Digital Integration

1) *Financial Constraints*: How does inadequate funding impact your ability to purchase or maintain advanced digital tools?

2) *Resistance to Change*: What are the key reasons staff or leadership resist transitioning to digital systems, and how has this been addressed?

3) *Training Gaps*: Do you believe staff receive sufficient training to adopt digital tools effectively? If not, what areas require improvement?

4) *Infrastructure Deficits*: How do unreliable internet connectivity or outdated hardware affect your daily operations?

5) *Data Security*: What measures are currently in place to protect sensitive institutional data, and where do you see gaps?

6) *Knowledge Repositories*: How does the lack of a centralised system affect data storage and retrieval across departments?

7) *Leadership Support*: How would you assess the level of leadership commitment to digital transformation in your unit or department?

8) *Policy Gaps*: Are there institutional policies guiding the adoption and use of digital tools? How effective are they?

9) *Collaboration*: How does the current level of inter-departmental collaboration support or hinder digital integration efforts?

10) *System Interoperability*: Have you encountered difficulties in integrating new tools with existing systems? If so, how do they impact workflow?

11) *Staff Turnover*: How does frequent staff turnover affect ongoing digital projects and institutional knowledge retention?

12) *Cultural Barriers*: What traditional practices within your institution hinder the adoption of innovative digital tools?

13) *Cost of Licensing*: How do proprietary software licensing costs affect your ability to acquire the necessary tools?

14) *Procurement Delays*: Can you describe how bureaucratic procurement systems have affected your access to essential digital tools?

15) *Customization*: Do you find that generic digital solutions meet your department's needs, or are tailored solutions required?

16) *Stakeholder Engagement*: Are stakeholders adequately involved in decisions about digital tool adoption? How does this affect implementation?

Section 2: Opportunities in Digital Integration

1) *Efficiency*: How has automating processes improved efficiency in your department? Are there areas where automation could be expanded?

2) *Collaboration*: What opportunities do you see in implementing a centralised digital repository for collaboration across departments?

3) *Decision-Making*: How can data analytics tools enhance decision-making in your institution?

4) *Open-Source Solutions*: What potential do you see in adopting open-source software to reduce costs while enhancing functionality?

5) *Training*: How effective are current training programs in equipping staff with the necessary skills to use digital tools? What could be improved?

6) *Policy Development*: What kind of policies do you believe would ensure consistency and long-term success in digital integration?

7) *Government Support*: How has your institution leveraged government initiatives like GTEC's digitisation agenda, and what more can be done to maximise these opportunities?

Section 4: Recommendations

1) What strategies or practices would you recommend to address the challenges of digital integration?

2) What opportunities do you believe the institution should prioritise to enhance digital adoption and administrative efficiency?

Section 5: Closing Remarks

1) Is there anything else you would like to share about the challenges and opportunities of integrating digital tools into administrative processes?