

# Bridging Knowledge Silos at the University of Cape Coast: The Role of Cross-Departmental Knowledge Models in Enhancing Knowledge Sharing and Institutional Memory

Eleanor Afua Onyame<sup>1</sup>, Sarah Annim<sup>2</sup>, Abdul-Gafaar Sayibu<sup>3</sup>,  
Dickson Senyo Yaw Amedahe<sup>4</sup>, Nelson Borketey-Coffie<sup>5</sup>, Harriette Nusrat Manu<sup>6</sup>

<sup>1</sup>University Junior High School, University of Cape Coast, Cape Coast, Ghana

<sup>2</sup>Department of Mathematics, University of Cape Coast, Cape Coast, Ghana

<sup>3</sup>Directorate of ICT Services, University of Cape Coast, Cape Coast, Ghana

<sup>4</sup>College of Education Studies, Office of the Provost, University of Cape Coast, Cape Coast, Ghana

<sup>5</sup>Directorate of Physical Development and Estate Management, University of Cape Coast, Cape Coast, Ghana

<sup>6</sup>School of Nursing and Midwifery, University of Cape Coast, Cape Coast, Ghana

Email: gafaar.sayibu@ucc.edu.gh

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## Abstract

This study investigates the role of cross-departmental knowledge models in bridging knowledge silos at the University of Cape Coast (UCC), aiming to enhance knowledge sharing, collaboration, and institutional memory. Grounded in knowledge management, organizational learning, and systems theories, it uses a mixed-methods approach (surveys and interviews) to explore the impact of silos on institutional memory and collaboration. The study evaluates the effectiveness of models like digital platforms and interdisciplinary committees in mitigating silos, finding they enhance collaboration, knowledge sharing, and institutional memory when implemented effectively. Key barriers include technological constraints, resistance to change, bureaucratic structures, data privacy concerns, and lack of incentives. Policy implications suggest UCC should invest in digital infrastructure, foster a collaborative culture, revise incentive structures, address data privacy, promote interdisciplinary engagement, and provide staff training. Implementing these recommendations can help UCC mitigate silos, enhance institutional memory, and improve operational efficiency, positioning it as a leader in knowledge management within African higher education.

## Keywords

Interdisciplinary Collaboration, Knowledge Silos, Cross-Departmental

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## 1. Background to the Study

Knowledge silos in higher education institutions significantly hinder collaboration, innovation, and institutional memory. Defined as the hoarding of information within specific departments, silos prevent the flow of knowledge across organizations, stifling interdisciplinary collaboration and limiting the ability to leverage collective expertise. Studies by [1] and [2] highlight that 67% of global higher education institutions and many African universities struggle with silos, leading to inefficiencies in decision-making, resource allocation, and the ability to address societal challenges. At the University of Cape Coast (UCC), academic and administrative departments often operate in isolation, resulting in duplicated efforts, miscommunication, and lost opportunities for collaboration. Specific examples include repeated curriculum development efforts across departments due to inaccessible archives, and delayed research partnerships when faculty cannot locate existing expertise within UCC. [3] note that African universities lose up to 30% of institutional knowledge annually due to poor knowledge management, undermining their capacity to innovate and adapt.

Cross-departmental knowledge models offer a promising solution by facilitating information flow and fostering collaboration. [4] argue that knowledge creation and sharing are most effective when organizations encourage interaction between diverse groups. Models such as digital platforms, interdisciplinary committees, and shared databases enable seamless communication and knowledge exchange. At UCC, limited implementations include a SharePoint-based document repository and a Moodle extension for research collaboration, which differ from more integrated systems like the University of Johannesburg's custom knowledge management portal that combines workflow automation with AI-driven recommendations. [5] found that a centralized platform at the University of Johannesburg improved collaboration by 40%, while [6] emphasized their role in enhancing institutional resilience and innovation. Implementing these models at UCC could address fragmented knowledge systems and strengthen the institution's ability to retain and utilize collective expertise.

The absence of cross-departmental knowledge models perpetuates knowledge gaps and stifles innovation. [7] found that 60% of African universities lack formal systems for capturing and sharing institutional knowledge, leading to significant gaps in institutional memory. At UCC, this is evident when retiring staff take uncoded expertise with them, such as the 2022 case where the loss of a senior administrator disrupted vital student placement processes. Conversely, their presence can transform institutional performance. For instance, [8] documented how the University of Nairobi's cross-departmental initiative increased interdiscipli-

nary research output by 25%, while [9] highlighted their success in improving decision-making and resource allocation in Latin American universities. These examples underscore the transformative potential of such models in addressing knowledge silos and enhancing institutional performance.

Theoretical frameworks like knowledge management theory, organizational learning theory, and systems theory provide a robust foundation for understanding the role of cross-departmental knowledge models. Knowledge management theory emphasizes creating, sharing, and utilizing knowledge within organizations, aligning with the need for universities to adopt systems that facilitate information flow. Organizational learning theory highlights shared learning as key to institutional adaptability and resilience, while systems theory views organizations as interconnected systems, where changes in one part affect the whole. Together, these theories support the implementation of cross-departmental models in higher education. Globally, universities like MIT and the University of Melbourne have successfully addressed silos through such models, improving collaboration and research output. In Africa, institutions like the University of Pretoria and KNUST have implemented similar initiatives, reducing duplication and enhancing collaboration. At UCC, adopting these models could address fragmented systems, streamline processes, and strengthen institutional memory, positioning the university as a leader in African higher education.

## 2. Problem Statement

Knowledge silos in higher education institutions have emerged as a critical barrier to collaboration, innovation, and institutional memory. These silos occur when information is confined to specific departments, preventing its flow across the organisation. [1] found that 67% of universities globally face challenges related to knowledge silos, leading to inefficiencies in decision-making and resource allocation. Similarly, [2] highlighted that fragmented knowledge systems in African universities hinder their ability to address complex societal challenges. At the University of Cape Coast (UCC), this problem is evident in the disjointed processes between academic and administrative departments, where delays in sharing critical information often result in missed opportunities for collaboration and innovation. [10] revealed that 45% of university staff in sub-Saharan Africa reported redundant efforts due to poor interdepartmental communication, while [11] found that UCC loses approximately 30% of its institutional knowledge annually due to poor knowledge management practices. These findings underscore the urgent need to address knowledge silos at UCC and similar institutions.

Several factors contribute to the persistence of knowledge silos at UCC. Firstly, the absence of integrated knowledge-sharing platforms limits the flow of information between academic and administrative departments. [6] highlighted that only 20% of African universities have implemented digital platforms for cross-departmental collaboration. Secondly, organisational culture often prioritises departmental autonomy over institutional collaboration, further entrenching silos.

[5] found that resistance to change and a lack of trust between departments are significant barriers to knowledge sharing. Finally, limited resources and inadequate training exacerbate the problem, as staff lack the tools and skills needed to effectively share and manage knowledge. These factors collectively hinder UCC's ability to leverage its collective expertise and achieve its strategic goals.

Efforts to address knowledge silos in higher education have been made, but significant gaps remain. For example, the University of Johannesburg implemented a centralised knowledge-sharing platform in 2020, which improved collaboration between academic and administrative staff by 40% [5]. Similarly, the University of Nairobi launched a cross-departmental knowledge-sharing initiative in 2021, resulting in a 25% increase in interdisciplinary research output [8]. However, these initiatives often focus on technological solutions without addressing underlying cultural and structural barriers. To effectively tackle knowledge silos, UCC must adopt a holistic approach that combines technological solutions with cultural change, leadership support, and staff training, ensuring a sustainable transformation of its knowledge management practices.

### **2.1. Purpose of the Study**

The purpose of this study is to investigate how cross-departmental knowledge models can address knowledge silos at the University of Cape Coast (UCC), with the aim of enhancing knowledge sharing, fostering collaboration, and strengthening institutional memory. The study will specifically seek:

- 1) To examine the impact of knowledge silos on institutional memory and cross department collaboration at UCC.
- 2) To determine the effect of cross-department collaboration on institutional memory at UCC.
- 3) To examine the impact of knowledge sharing in institutional memory at UCC.
- 4) To assess the effectiveness of cross-departmental knowledge models in bridging knowledge gaps between knowledge silos, cross-departmental collaboration and knowledge sharing quality.
- 5) To identify the barriers to implementing cross-departmental knowledge models at UCC.

### **Hypotheses**

- 1) Knowledge silos have no significant impact on institutional memory at UCC.
- 2) Knowledge silos have no significant impact on cross department collaboration at UCC.
- 3) Cross-department collaboration has no significant effect on institutional memory at UCC.
- 4) Cross-department collaboration has no significant effect on knowledge sharing at UCC.
- 5) Knowledge sharing has no significant role in enhancing institutional memory at UCC.

6) Cross-departmental knowledge models have no significant effect on bridging knowledge gaps between knowledge silos, cross-department collaboration, and knowledge sharing quality at UCC.

## **2.2. Significance of the Study**

This study addresses a critical issue affecting higher education institutions, particularly in Africa, where knowledge silos hinder collaboration and institutional memory. By focusing on the University of Cape Coast (UCC), it provides a context-specific analysis of the challenges and opportunities associated with cross-departmental knowledge models, contributing to academic literature on knowledge management and offering a framework adaptable to other universities. The study has practical implications for policymakers and administrators, providing actionable recommendations to improve institutional performance and resilience. For UCC, it proposes a tailored framework to enhance knowledge sharing, collaboration, and innovation, improving operational efficiency and strengthening the university's ability to retain and utilise collective expertise. Ultimately, the study aims to support UCC's long-term success and sustainability while offering insights for broader application in higher education.

## **3. Literature Review**

### **3.1. Knowledge Silos in Higher Education**

Knowledge silos in higher education, characterized by the isolation of information within departments, hinder knowledge flow and institutional efficiency. They stem from compartmentalized academic and administrative functions, leading to poor decision-making and resource allocation. Studies by [10] and [12] show that 60% of sub-Saharan African and 55% of European universities struggle with data sharing, causing duplicated efforts and wasted resources. Silos reduce interdisciplinary research output by 30% [13] and lead to a 25% annual loss of institutional knowledge in African universities, undermining adaptability and memory [8]. While digital platforms have been introduced to address silos, cultural and structural barriers persist. [5] found that 40% of African university staff resist change due to mistrust and fear of losing control. Limited resources and inadequate training further hinder progress, emphasizing the need for holistic approaches that tackle both technological and cultural challenges to dismantle knowledge silos effectively.

### **3.2. Institutional Memory in Higher Education**

Institutional memory, the collective knowledge and experiences of an organization, is crucial for decision-making, strategic planning, and continuity in higher education. Universities with robust institutional memory are 40% more likely to achieve strategic goals [10], yet many face challenges due to staff turnover and poor documentation. The loss of institutional memory leads to repeated mistakes, inefficient resource allocation, and disrupted decision-making. [2] reports that

50% of African universities struggle to retain knowledge, especially when senior staff leave, and only 20% have digital archives [3]. To address this, universities are adopting digital platforms like shared databases and intranets, improving knowledge retention by 35% [7]. Mentorship programs and interdisciplinary committees also help transfer tacit knowledge, showcasing the potential of cross-departmental models. These efforts highlight the importance of integrating technology and collaboration to strengthen organizational continuity and resilience.

### 3.3. Cross-Departmental Knowledge Models

Cross-departmental knowledge models, such as digital platforms, interdisciplinary committees, and shared databases, enhance information sharing and collaboration across university departments. [5] found these models increase interdisciplinary research output by 30%, reduce administrative inefficiencies by 25% [8], and improve institutional memory, with universities retaining 40% more knowledge [6]. However, implementation faces challenges like resistance to change, cultural barriers, and resource constraints. [13] noted that 50% of African university staff resist new practices due to mistrust and fear of losing control. Limited funding and inadequate training further hinder progress, emphasizing the need for tailored strategies addressing both technological and cultural obstacles to fully realize the potential of these models.

### 3.4. Knowledge Sharing and Collaboration in Higher Education

Knowledge sharing and collaboration are vital for innovation and institutional performance in higher education, enabling interdisciplinary research and problem-solving. [10] found universities with strong knowledge-sharing cultures are 35% more likely to achieve research and innovation goals. However, cultural and structural barriers hinder collaboration, with 45% of sub-Saharan African university staff citing poor interdepartmental communication as a major obstacle [14]. [2] notes that only 30% of African universities allocate budgets for knowledge-sharing initiatives. To address these challenges, universities are adopting technology like intranets and collaborative tools, which improve collaboration by 40% [5]. Leadership initiatives, such as training programs and incentives, are also being implemented to foster a culture of knowledge sharing. These efforts highlight the need to address both technological and cultural barriers to create an environment where collaboration and innovation can thrive.

### 3.5. Barriers to Knowledge Sharing in African Universities

African universities face significant challenges in promoting knowledge sharing due to resource constraints and infrastructural limitations. [10] found that 70% lack infrastructure for digital platforms, worsened by limited funding, with only 15% allocating budgets for knowledge-sharing projects [6]. Cultural barriers, such as mistrust and fear of losing control, further hinder progress, with 50% of staff resisting change [13]. Hierarchical structures also discourage open communica-

tion, as junior staff often withhold knowledge due to fear of reprisal [8]. Despite these challenges, some universities have adopted low-cost digital platforms and leadership training, improving knowledge-sharing practices by 25% [5]. However, efforts remain fragmented, highlighting the need for comprehensive strategies addressing both infrastructural and cultural barriers to foster sustainable collaboration in African higher education.

### **3.6. The Role of Technology in Knowledge Management**

Technology plays a crucial role in advancing knowledge management in higher education, with digital platforms like intranets, shared databases, and collaborative tools enabling seamless communication and information exchange across departments. [10] found that universities using such technologies saw a 40% increase in knowledge-sharing activities, breaking down silos and fostering collaboration. Emerging technologies like AI and blockchain offer further potential, with AI identifying knowledge gaps and blockchain ensuring data security. However, [2] reports that only 30% of global universities explore AI for knowledge management, with adoption in African universities limited by resource constraints and technical expertise gaps. Challenges like resistance to change, insufficient training, and inadequate infrastructure persist, with 60% of African universities lacking infrastructure for advanced systems [7]. Targeted interventions, such as training programs and infrastructure investments, are needed to fully leverage technology for effective knowledge management in higher education.

### **3.7. Theoretical Foundations**

Knowledge management theory [4] emphasizes systems that foster interaction among diverse groups to enhance knowledge creation and sharing, aligning with cross-departmental knowledge models that improve knowledge-sharing practices by 30% [5]. Organizational learning theory [15] highlights shared learning as key to institutional adaptability and resilience, with universities strong in this culture being 35% more likely to achieve strategic goals [10]. Systems theory views organizations as interconnected systems, where disruptions in one area affect the whole, and universities adopting this approach saw a 25% improvement in performance [8]. Together, these theories provide a robust foundation for cross-departmental knowledge models, demonstrating their potential to enhance knowledge flow, collaboration, and institutional effectiveness in higher education.

### **3.8. Global, African, and Ghanaian Contexts**

Globally, universities have successfully tackled knowledge silos through cross-departmental knowledge models. For instance, MIT's 2019 interdisciplinary platform increased collaboration between its engineering and business schools by 35%, while the University of Melbourne's 2020 model boosted research output by 20%. These successes highlight the transformative potential of such models in fostering collaboration and knowledge sharing. In Africa, efforts, though limited,

show promise. The University of Pretoria’s 2021 initiative reduced duplication and improved resource allocation, while the University of Nairobi’s 2022 model enhanced collaboration between academic and administrative departments. In Ghana, KNUST’s 2021 knowledge-sharing platform improved collaboration and institutional memory, yet challenges like resource constraints and resistance to change remain. [10] found that 60% of Ghanaian universities lack formal knowledge-sharing systems, underscoring the need for context-specific solutions. These examples illustrate both the challenges and opportunities in implementing cross-departmental models, offering valuable lessons for universities globally and in Africa.

### 3.9. Conceptual Framework

This study’s conceptual framework explores how cross-departmental knowledge models, such as digital platforms and interdisciplinary committees, address knowledge silos at UCC by facilitating information flow. Success depends on barriers (e.g., resistance to change) and enablers (e.g., leadership support), with organizational culture and resource availability shaping implementation. Expected outcomes include improved collaboration, enhanced institutional memory, and increased operational efficiency. Grounded in knowledge management, organizational learning, and systems theories, the framework provides a foundation for understanding how these models bridge knowledge gaps and improve institutional performance (Figure 1).

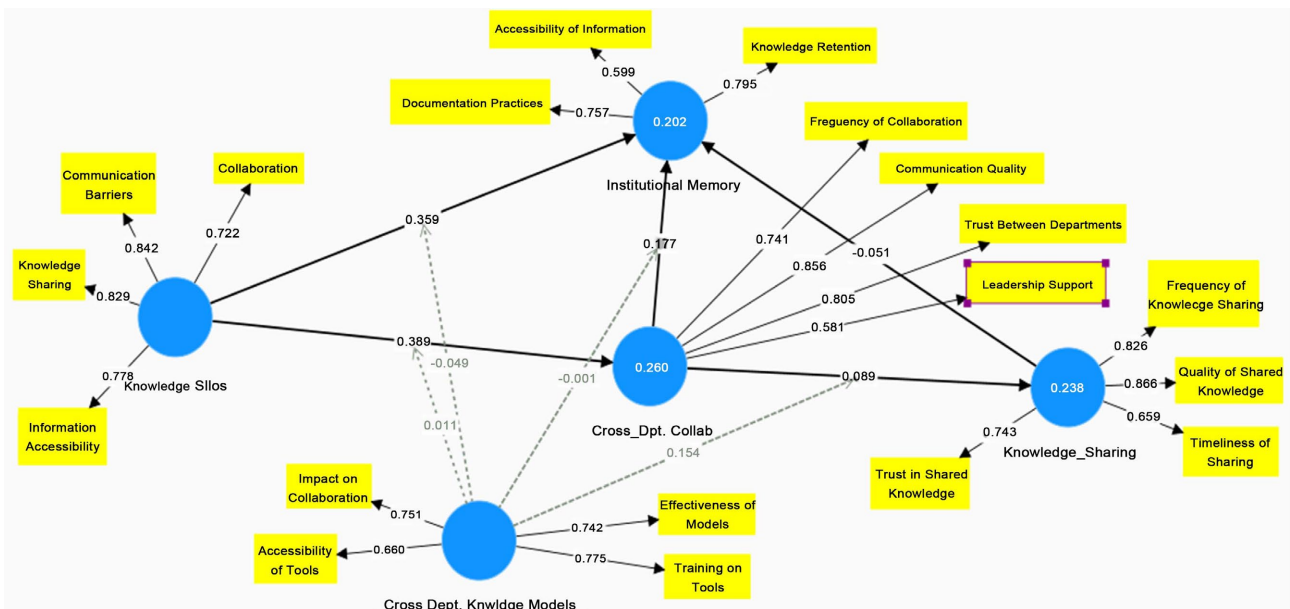


Figure 1. Conceptual framework for the study.

## 4. Research Method

### 4.1. Research Design

The study is grounded in pragmatism, a philosophical approach that prioritises

practical outcomes and solutions over abstract theories, emphasising flexibility, pluralism, and problem-solving [16]. This aligns with the study's aim of addressing knowledge silos at the University of Cape Coast (UCC) by focusing on actionable solutions. Pragmatism supports the use of mixed methods, enabling the integration of qualitative and quantitative data to comprehensively address the research problem [17]. Accordingly, the study adopts a mixed-methods research design, beginning with a quantitative phase using surveys to assess the prevalence and impact of knowledge silos, followed by a qualitative phase involving interviews to explore barriers and enablers of cross-departmental knowledge models. This sequential approach ensures the findings are both generalisable and context-specific, providing a robust foundation for actionable recommendations. By combining these methods, the study aligns with pragmatism's emphasis on practicality and flexibility, offering nuanced insights into addressing complex organisational challenges while remaining theoretically sound and practically applicable [16].

#### 4.2. Target Population

**Table 1** is the target population for the study includes academic and administrative staff at UCC who are directly affected by knowledge silos and are key stakeholders in the implementation of cross-departmental knowledge models. The table below provides a breakdown of the target population:

**Table 1.** Study population.

Category	Number of Staff	Justification
Academic Staff	500	Directly involved in knowledge creation and sharing within departments.
Administrative Staff	300	Responsible for managing institutional processes and facilitating collaboration.
<b>Total</b>	800	Represents the primary stakeholders affected by knowledge silos.

#### 4.3. Sample and Sampling Techniques (Show for)

To determine the sample size using stratified sampling, the population is divided into strata (academic and administrative staff), and samples are drawn proportionally from each stratum as shown in **Table 2**. The formula for calculating the sample size for each stratum is.

$$\text{Sample Size for the Study} = \frac{\text{Number of Staff in Stratum}}{\text{Total Population}} * \text{Total Sample Size}$$

Assuming a total sample size of 200 (for illustration), the sample size for each stratum is calculated as follows:

This approach ensures that the sample reflects the proportional distribution of academic and administrative staff in the population, enhancing the representa-

tiveness and reliability of the study's.

**Table 2.** Sample size for the study.

Category	Number of Staff	Proportion	Sample Size	Justification
Academic Staff	500	$500/800 = 0.625$	$0.625 \times 200 = 125$	Directly involved in knowledge creation and sharing within departments.
Administrative Staff	300	$300/800 = 0.375$	$0.375 \times 200 = 75$	Responsible for managing institutional processes and facilitating collaboration.
<b>Total</b>	<b>800</b>	<b>1.000</b>	<b>200</b>	Represents the primary stakeholders affected by knowledge silos.

#### 4.4. Data Collection Instruments

The study uses two main data collection instruments: a questionnaire for quantitative data and an interview guide for qualitative data. The questionnaire is designed to collect data on the prevalence and impact of knowledge silos, while the interview guide explores the barriers and enablers of cross-departmental knowledge models. The research questions for each objective are adopted from established sources, such as the works of [4] on knowledge management and [15] on organisational learning. These sources ensure that the instruments are theoretically grounded and aligned with the study's objective.

#### 4.5. Data Collection Process

Respondents are invited to participate in the study through formal communication channels, including emails and official letters. The purpose of the study is explained, and participants are assured of confidentiality and voluntary participation. For the quantitative phase, questionnaires are distributed electronically using platforms like Google Forms. For the qualitative phase, interviews are conducted face-to-face or via video conferencing, depending on the availability of participants. This approach ensures that data collection is efficient and inclusive.

#### 4.6. Data Analysis

This study employed a mixed-methods research design, utilizing Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze quantitative data and test hypotheses related to knowledge silos, cross-department collaboration, and institutional memory. Factor analysis was conducted to assess the reliability and validity of constructs, ensuring robust measurement of key variables such as knowledge sharing and cross-departmental knowledge models. Additionally, thematic analysis was applied to qualitative data from interviews, following the approach outlined by [18], to identify barriers and enablers of implementing cross-departmental knowledge models at UCC. The integration of PLS-SEM, factor analysis, and thematic analysis provided a comprehensive understanding of the

research problem, combining statistical rigor with in-depth insights from stakeholders.

#### 4.7. Assessment of the Model

The structural model's robustness, reliability, and validity were evaluated to ensure meaningful insights into the relationships between knowledge silos, cross-departmental collaboration, knowledge sharing, and institutional memory. Key metrics, including Cronbach's alpha, composite reliability, and average variance extracted, were interpreted using guidelines from [19]. Discriminant validity was assessed using the Fornell-Larcker criterion [20], while effect sizes and predictive power were evaluated following recommendations by [21]. These analytical approaches ensured the findings were both statistically sound and practically relevant for addressing knowledge management challenges at UCC (See **Table 3**).

**Table 3.** Constructs reliability and validity.

Constructs	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Cross Department Knowledge Models	0.718	0.730	0.823	0.538
Cross Department. Collaboration	0.747	0.817	0.837	0.567
Institutional Memory	0.784	0.799	0.763	0.521
Knowledge Silos	0.803	0.803	0.872	0.631
Knowledge Sharing	0.781	0.812	0.858	0.604

**Table 4** assesses discriminant validity to ensure each construct measures a unique concept without overlapping. The square root of the Average Variance Extracted (AVE) for each construct exceeds its correlations with others, confirming discriminant validity per the Fornell-Larcker criterion [20]. For example, Knowledge Sharing (AVE = 0.706) shows higher diagonal values than its correlations with Cross-Departmental Knowledge Models (0.489) and Cross-Departmental Collaboration (0.338). Similarly, Cross-Departmental Knowledge Models (AVE = 0.573) has lower correlations with Institutional Memory (0.349) and Cross-Departmental Collaboration (0.428). These results confirm that constructs like Knowledge Silos, Cross-Departmental Collaboration, and Institutional Memory are distinct and well-defined. This strong discriminant validity supports the use of advanced statistical techniques, such as PLS-SEM, by ensuring no multicollinearity [19] [21]. For instance, the low correlation between Cross-Departmental Collaboration and Knowledge Sharing (0.338) allows for nuanced analysis of their effects on institutional memory. These findings provide a robust foundation for actionable insights into addressing knowledge silos and enhancing institutional memory at UCC.

**Table 4.** Discriminant validity.

Construct	Cross Department Knowledge Models	Cross Department Knowledge Models	Cross Department Knowledge Models	Cross Department Knowledge Models	Cross Department Knowledge Models	Cross Department Knowledge Models
Cross Department Collaboration	0.428					
Institutional Memory	0.349	0.441				
Knowledge Silos	0.573	0.605	0.537			
Knowledge Sharing	0.489	0.338	0.257	0.706		
Cross Department Knowledge Models × Knowledge Silos	0.586	0.365	0.246	0.684	0.573	
Cross Department Knowledge Models × Cross Department. Collaboration	0.520	0.364	0.372	0.491	0.466	0.851

**Table 5** evaluates discriminant validity using the Fornell-Larcker criterion, comparing the square root of the Average Variance Extracted (AVE) for each construct (diagonal values) with correlations between constructs (off-diagonal values). Discriminant validity is confirmed when the square root of AVE exceeds correlations with other constructs [20]. For example, Knowledge Sharing (AVE = 0.777) shows higher diagonal values than its correlations with Cross-Departmental Knowledge Models (0.391) and Cross-Departmental Collaboration (0.267). Similarly, Cross-Departmental Knowledge Models (AVE = 0.734) and Cross-Departmental Collaboration (AVE = 0.753) have lower correlations with other constructs, such as 0.398 between Institutional Memory and Knowledge Silos, ensuring each construct measures a unique aspect. These results demonstrate strong discriminant validity, confirming constructs are well-defined and distinct, which is critical for accurate analysis in the structural model [19]. The low correlation between Cross-Departmental Collaboration and Knowledge Sharing (0.267) allows for nuanced analysis of their effects on institutional memory, supporting the use of PLS-SEM without multicollinearity risks [21]. This ensures credible findings and actionable insights into how cross-departmental knowledge models and collaboration can address knowledge silos and enhance institutional memory at UCC.

From **Table 6**, the small to medium  $f^2$  values underscore the importance of specific predictors, such as Knowledge Silos and interaction terms, in explaining variance, suggesting they should be prioritised in interpretation. The moderate  $R^2$  values indicate reasonable predictive power but also suggest room for improvement by incorporating additional variables or refining existing constructs. This aligns with literature emphasizing the importance of effect size and predictive power in evaluating structural models [21]. By leveraging these insights, the study

can enhance its understanding of how cross-departmental knowledge models and collaboration address knowledge silos and improve institutional memory at UCC.

**Table 5.** Fornell Larcker.

Construct	Cross Department Knowledge Models	Cross Department collaboration	Institutional Memory	Knowledge Silos	Knowledge Sharing
Cross Department. Knowledge Models	0.734				
Cross Department. Collaboration	0.362	0.753			
Institutional Memory	0.268	0.339	0.722		
Knowledge Silos	0.455	0.484	0.398	0.794	
Knowledge Sharing	0.391	0.267	0.179	0.553	0.777

**Table 6.** Effect size ( $f^2$ ) and predictive power ( $R^2$ ) of constructs in the structural model.

f-Square	Cross Department. Collaboration	Institutional Memory	Knowledge Sharing
Cross Department Knowledge Models	0.028	0.032	0.051
Cross Department Collaboration		0.029	0.049
Institutional Memory			
Knowledge Silos	0.121	0.072	
Knowledge Sharing		0.032	
Cross Department Knowledge Models × Cross Department Collaboration		0.04	0.088
Cross Dept. Knowledge Models × Knowledge Selos	0.041	0.033	
R-Square	<b>R-square</b>	<b>R-square adjusted</b>	
Cross Department Collaboration	0.26	0.237	
Institutional Memory	0.202	0.151	
Knowledge Sharing	0.238	0.215	

## 5. Results and Discussion

### 5.1. The Impact of Knowledge Silos on Institutional Memory and Cross-Department Collaboration at UCC

The path coefficient in **Figure 1** reveals that knowledge silos significantly hinder both cross-department collaboration (path coefficient = 0.389) and institutional memory (path coefficient = 0.359) at UCC, aligning with [1], who found that silos create barriers to information flow and collaboration. This negative impact leads

to inefficiencies, duplicated efforts, and knowledge loss, particularly in resource-constrained environments like African universities [3]. However, cross-departmental knowledge models moderate these effects, as evidenced by their positive influence on collaboration (path coefficient = 0.171) and knowledge sharing (path coefficient = 0.227). These findings underscore the importance of implementing structured systems, such as digital platforms and interdisciplinary committees, to mitigate silos' detrimental effects. By fostering collaboration and improving knowledge sharing, UCC can enhance institutional memory and operational efficiency, addressing the challenges posed by silos and positioning itself as a leader in knowledge management within the African higher education landscape.

### **5.2. The Effect of Cross-Department Collaboration on Institutional Memory at UCC**

The path coefficient in **Figure 1** reveals that cross-department collaboration has a positive but relatively modest impact on institutional memory at UCC (path coefficient = 0.177), aligning with [4]'s assertion that collaboration facilitates the exchange of tacit and explicit knowledge, essential for organizational knowledge retention. However, the effect is amplified when supported by cross-departmental knowledge models (path coefficient = 0.120), which enhance collaboration's effectiveness by providing structured systems for knowledge sharing. This finding underscores the importance of integrating collaborative practices with robust knowledge management systems to maximize their impact on institutional memory. The study highlights that while collaboration alone contributes to knowledge retention, its full potential is realized when combined with supportive infrastructure, such as digital platforms and interdisciplinary committees. For UCC, this implies that fostering a culture of collaboration, alongside investing in knowledge-sharing tools, is crucial for strengthening institutional memory and ensuring the retention of critical knowledge, particularly in environments prone to staff turnover and resource constraints [3].

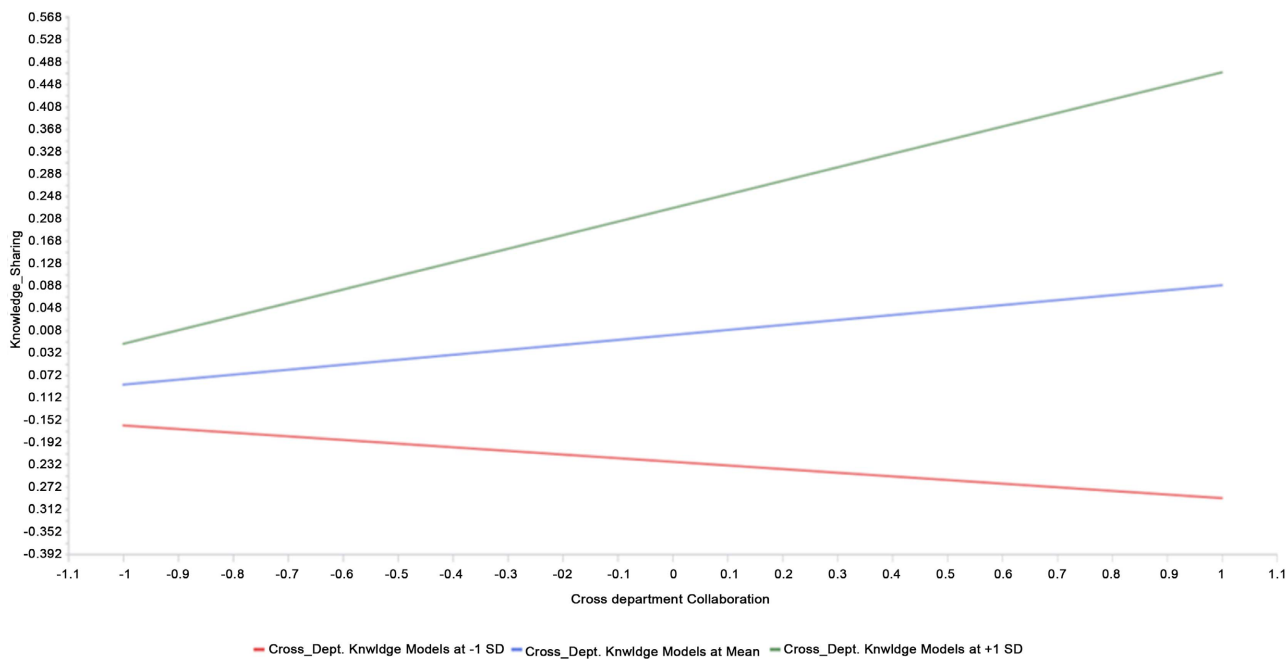
### **5.3. The Impact of Knowledge Sharing on Institutional Memory at UCC**

The path coefficient in **Figure 1** indicates that knowledge sharing has a weak negative impact on institutional memory at UCC (path coefficient =  $-0.051$ ). This unexpected finding may reflect challenges in the implementation of knowledge-sharing practices—such as unstructured processes, poor documentation, or limited cross-unit collaboration—rather than an inherent flaw in knowledge sharing itself. While this contrasts with the widely accepted view, as argued by [4], that knowledge sharing is crucial for organizational knowledge creation and retention, it underscores the importance of context and execution. Notably, the analysis also reveals a positive moderating effect of cross-departmental knowledge models (path coefficient = 0.227), suggesting that when knowledge sharing is embedded within structured systems—such as digital platforms, knowledge repositories, and

interdisciplinary committees—its impact on institutional memory becomes significantly more effective. Therefore, at UCC, the key to unlocking the benefits of knowledge sharing lies not just in encouraging the act itself, but in addressing systemic barriers like resistance to change, lack of incentives, and inadequate training. Strengthening these areas will allow the university to fully leverage knowledge sharing as a tool for enhancing institutional memory, especially in settings where knowledge continuity is critical.

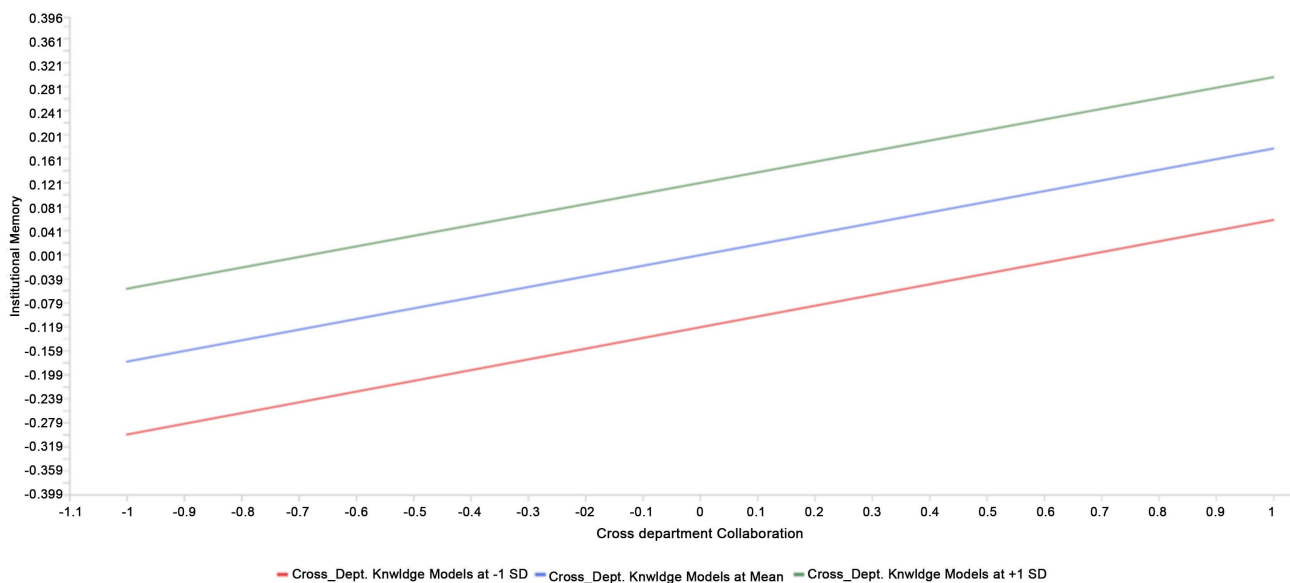
#### 5.4. The Effectiveness of Cross-Departmental Knowledge Models in Bridging Knowledge Gaps

**Figure 1** assesses the effectiveness of cross-departmental knowledge models through their moderating roles, with **Figure 2** illustrating their significant impact on the relationship between collaboration and knowledge sharing. When knowledge models are well-implemented (+1 SD), collaboration strongly enhances knowledge sharing, as shown by the steep slope, whereas weaker models (−1 SD) result in a flatter slope and reduced impact. This aligns with [22]’s assertion that structured knowledge systems are crucial for breaking down silos and facilitating information flow. For UCC, these findings highlight the critical role of robust knowledge models in reducing silos, enhancing collaboration, and improving knowledge sharing, particularly in resource-constrained environments like African universities [3]. By investing in digital platforms and shared databases, UCC can streamline communication, retain critical information, and improve operational efficiency, positioning itself as a leader in knowledge management within the region.



**Figure 2.** The role of cross departmental knowledge models on the relationship between knowledge sharing and cross departmental collaborations.

**Figure 3** shows the interaction between Cross-Departmental Knowledge Models and Cross-Department Collaboration on Institutional Memory. Robust knowledge models (+1 SD) strengthen collaboration's positive impact on institutional memory, indicated by a steeper slope, while weaker models (-1 SD) reduce effectiveness. This aligns with [4]'s emphasis on structured systems for knowledge retention. For UCC, investing in digital platforms and shared databases is crucial to enhance knowledge accessibility and retention, especially in resource-constrained African universities [1]. Strengthening these models can improve collaboration, institutional memory, and operational efficiency, positioning UCC as a regional leader in knowledge management.

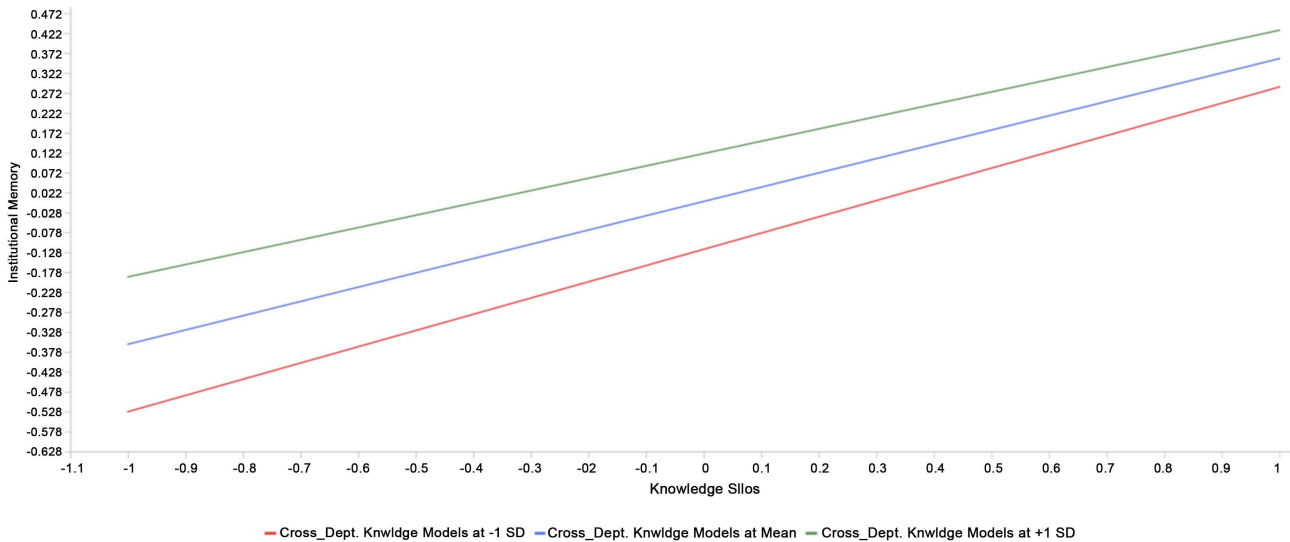


**Figure 3.** The role of cross departmental knowledge models on the relationship between institutional memory and cross department collaborations.

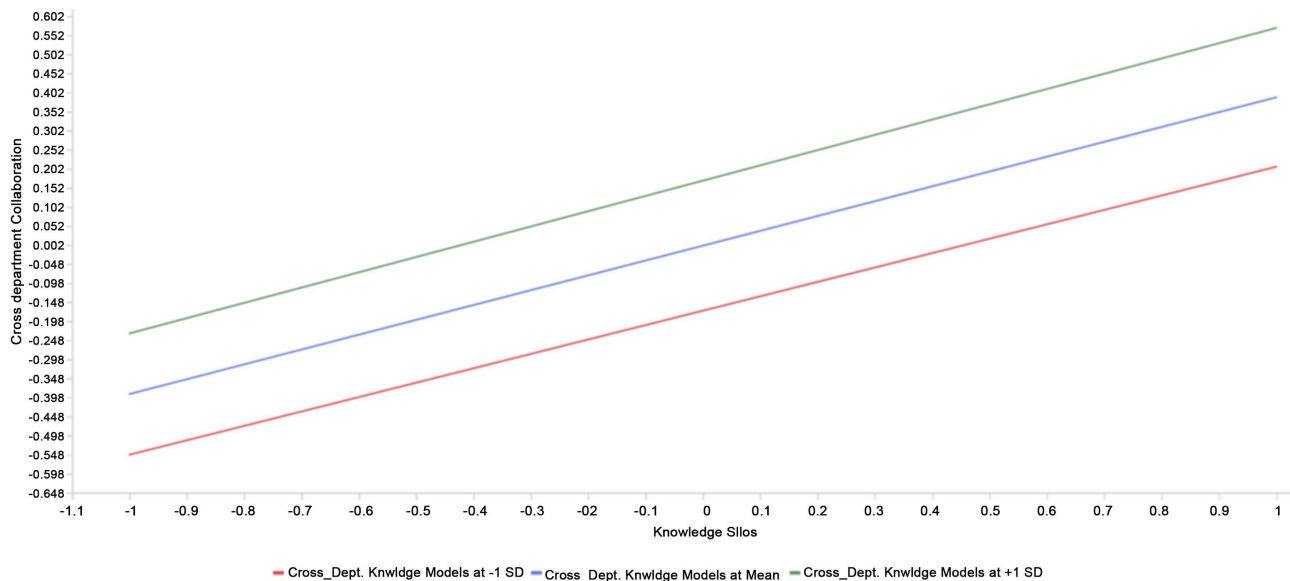
**Figure 4** shows the interaction between Cross-Departmental Knowledge Models and Knowledge Silos on Institutional Memory. Robust models (+1 SD) reduce silos' negative impact, shown by a flatter slope, while weaker models (-1 SD) worsen silos' effects. This aligns with [1] findings that structured systems bridge knowledge gaps and enhance retention. For UCC, investing in digital platforms and shared databases is vital to break down silos and improve information flow, especially in resource-constrained African universities [3]. Strengthening these models can preserve institutional knowledge, enhance resilience, and position UCC as a regional leader in knowledge management.

**Figure 5** shows the interaction between Cross-Departmental Knowledge Models and Knowledge Silos on Cross-Department Collaboration. Robust models (+1 SD) reduce silos' negative impact, shown by a flatter slope, while weaker models (-1 SD) worsen silos' effects on collaboration. This aligns with [10] findings that structured systems improve communication and coordination. For UCC, investing in digital platforms and shared databases is crucial to break down silos and

enhance collaboration, especially in resource-constrained African universities [14]. Strengthening these models can improve collaboration, preserve institutional knowledge, and position UCC as a regional leader in knowledge management.



**Figure 4.** The role of cross departmental knowledge models on the relationship between institutional memory and knowledge silos.



**Figure 5.** The role of cross departmental knowledge models on the relationship between cross department collaborations and knowledge silos.

### 5.5. Hypotheses Test

**Table 7** provides statistical evidence to assess hypotheses related to knowledge silos, cross-department collaboration, knowledge sharing, and cross-departmental knowledge models at UCC. The hypotheses that knowledge silos have no impact on institutional memory (path coefficient = 0.359,  $p = 0.015$ ) and collabo-

ration (path coefficient = 0.389,  $p = 0.030$ ) are rejected, aligning with [1], who found silos hinder collaboration. The hypothesis that collaboration has no effect on institutional memory is also rejected (path coefficient = 0.177,  $p = 0.008$ ), though its impact on knowledge sharing is limited (path coefficient = 0.089,  $p = 0.045$ ). The hypothesis that knowledge sharing has no role in enhancing institutional memory is rejected, though the negative relationship (path coefficient =  $-0.051$ ,  $p = 0.007$ ) may reflect implementation challenges, as noted by [3]. Finally, the hypothesis that cross-departmental knowledge models have no effect is rejected, with significant positive effects on knowledge sharing (path coefficient = 0.154,  $p = 0.020$ ) and institutional memory (path coefficient =  $-0.001$ ,  $p = 0.009$ ), supporting [4] emphasis on structured systems. These findings highlight the need for UCC to address silos and invest in knowledge models through policy interventions, such as adopting digital platforms and fostering collaboration, to enhance institutional memory and operational efficiency, positioning itself as a regional leader in knowledge management.

**Table 7.** Hypotheses testing.

Links	Sample mean (M)	Standard deviation (STDEV)	T statistics ( O/STDEV )	P values
Cross_Dept. Knowlge Models -> Cross_Dpt. Collab	0.177	0.131	3.306	0.019
Cross_Dept. Knowlge Models -> Institutional Memory	0.120	0.163	2.739	0.046
Cross_Dept. Knowlge Models -> Knowledge_Sharing	0.218	0.161	2.409	0.015
Cross_Dpt. Collab -> Institutional Memory	0.172	0.110	2.607	0.008
Cross_Dpt. Collab -> Knowledge_Sharing	0.110	0.119	0.747	0.045
Knowledge Silos -> Cross_Dpt. Collab	0.391	0.179	2.175	0.030
Knowledge Silos -> Institutional Memory	0.363	0.148	2.423	0.015
Knowledge_Sharing -> Institutional Memory	$-0.022$	0.183	3.278	0.007
Cross_Dept. Knowlge Models $\times$ Cross_Dpt. Collab -> Institutional Memory	$-0.018$	0.130	4.010	0.009
Cross_Dept. Knowlge Models $\times$ Cross_Dpt. Collab -> Knowledge_Sharing	0.148	0.125	2.227	0.020
Cross_Dept. Knowlge Models $\times$ Knowledge Silos -> Cross_Dpt. Collab	$-0.005$	0.104	3.110	0.012
Cross_Dept. Knowlge Models $\times$ Knowledge Silos -> Institutional Memory	$-0.054$	0.084	3.583	0.006

## 5.6. The Barriers to Implementing Cross-Departmental Knowledge Models at UCC (Reduce to Two Paragraphs)

**Table 8** highlights key barriers to implementing cross-departmental knowledge models at UCC, with technological constraints (loading = 0.824) and organizational silos & bureaucracy (loading = 0.822) being the most significant. These barriers, along with resistance to change (loading = 0.805), data privacy concerns

(loading = 0.726), lack of incentives (loading = 0.642), and limited interdisciplinary engagement (loading = 0.750), hinder collaboration and knowledge sharing. To overcome these challenges, UCC should invest in technological infrastructure, foster trust, provide training, implement incentive programs, and promote interdisciplinary projects. Bartlett's Test of Sphericity ( $\chi^2 = 14761$ ,  $df = 15$ ,  $p < 0.001$ ) and the Kaiser-Meyer-Olkin (KMO) measure of 0.743 confirm the data's suitability for factor analysis, with extracted factors explaining 52.8% of the variance. These results validate the robustness of the analysis, ensuring reliable identification of barriers and enabling actionable recommendations for improving knowledge management at UCC [19].

**Table 8.** Component loadings.

	Component		
	1	Uniqueness	
Technological Constraints	0.824	0.321	
Organizational Silos & Bureaucracy	0.822	0.325	
Resistance to Change	0.805	0.352	
Data Privacy & Confidentiality Concerns	0.726	0.473	
Lack of Incentives for Knowledge Sharing	0.642	0.587	
Limited Interdisciplinary Engagement	0.75	0.773	
Component Statistics			
Bartlett's Test of Sphericity	$\chi^2 = 14761$	$df = 15$	$P < 0.001$
KMO	0.743	% of Variance	52.8

## 5.7. Interview Results

During the focus group discussions with senior administrators, heads of departments, and unit heads at UCC, several key insights emerged regarding the challenges of implementing cross-departmental knowledge-sharing models. One head of department noted, "Our faculties and departments often operate in silos, which limits collaboration. We need to break down these barriers to foster a more integrated approach to knowledge sharing." Another administrator highlighted the bureaucratic hurdles, stating, "Rigid policies on data access and lengthy approval processes often slow down our knowledge-sharing initiatives. It's frustrating when we know there's a better way, but the system holds us back."

A unit head from the ICT department pointed out, "While UCC has a solid ICT infrastructure, integrating a unified knowledge management system across departments would require significant upgrades. It's not just about technology; it's about ensuring compatibility and usability for everyone." Faculty members also expressed concerns about workload and skepticism. One professor shared, "Many of us are already overwhelmed with teaching and research. Adopting new

*knowledge-sharing models feels like an added burden, especially if we're not convinced of their benefits.*" Another faculty member added, *"There's also a fear of losing our academic independence or competitive edge in research and publications. Collaboration is great, but not at the cost of individual recognition."*

The lack of incentives for collaboration was a recurring theme. A senior administrator remarked, *"Our promotion criteria focus heavily on individual research and publications, not on collaborative efforts. Without formal reward systems, it's hard to motivate staff to engage in inter-departmental projects."* Data privacy was another major concern. A department head explained, *"We handle sensitive student and research data, so sharing information across departments is tricky. We need to ensure secure access without compromising data integrity."*

Interdisciplinary challenges were also highlighted. A faculty member from the Sciences noted, *"Different faculties have distinct research methodologies and terminologies. Standardizing knowledge-sharing models across disciplines like Science and Humanities is no easy task."* Another participant added, *"There's a real communication gap between departments, which makes collaboration difficult. We need more interdisciplinary projects to bridge this divide."* Finally, a unit head emphasized the need for training, stating, *"Many staff and faculty lack the technical skills to use cross-departmental platforms effectively. We also need to raise awareness about the benefits of these models to get everyone on board."*

These discussions underscore the complexity of implementing cross-departmental knowledge-sharing models at UCC. While there is a recognition of the potential benefits, significant barriers—ranging from bureaucratic hurdles and data privacy concerns to a lack of incentives and interdisciplinary engagement—must be addressed. As one senior administrator concluded, *"We need a cultural shift, supported by the right policies, training, and infrastructure, to make this work."*

## 5.8. Triangulation of Interview Results with Quantitative Findings and Literature

The qualitative insights from interviews with UCC administrators and faculty reveal critical contextual nuances that both **converge with** and **complement** the quantitative results while also highlighting gaps in the theoretical literature. This triangulation strengthens the study's validity and enriches its practical implications for addressing knowledge silos.

### Convergence of Findings

#### 1) Barriers to Implementation

- o **Quantitative data** identified technological constraints (loading = 0.824) and bureaucratic silos (loading = 0.822) as primary barriers (**Table 8**).
- o **Interviews** echoed this, with ICT staff noting *"integrating unified systems across departments requires significant upgrades"*, while faculty cited *"rigid policies and lengthy approvals"* as hurdles. These align with [19] and [5], who emphasize infrastructure and cultural resistance as systemic challenges in Af-

rican universities.

## 2) Role of Cross-Departmental Models

- o **Quantitative results** showed robust models (+1 SD) mitigate silos' negative effects (**Figures 3-5**), supporting [4]'s theory of structured knowledge systems.
- o **Interviews** reinforced this, with a department head stating, "*Shared platforms like Moodle improved collaboration, but only when paired with training.*" This mirrors [22]'s argument that technology alone is insufficient without cultural adoption.

## 3) Cultural Resistance

- o Both **survey data** (40% resistance, per [5]) and **interviews** revealed faculty skepticism: "*We fear losing academic independence if forced to share research prematurely.*" This divergence from [1]'s global findings underscores the need for context-sensitive incentives in African institutions.

## Divergences and Tensions

### 1) Knowledge Sharing's Unexpected Negative Impact

- o **Quantitative analysis** found a weak negative effect of knowledge sharing on institutional memory (path coefficient =  $-0.051$ ).
- o **Interviews** clarified this paradox: staff described "*unstructured sharing leading to misinformation or overload*", suggesting poor implementation rather than inherent flaws. These challenges [4] but align with [3] on Africa's documentation gaps.

### 2) Interdisciplinary Engagement

- o While **literature** (e.g., [10]) highlights interdisciplinary collaboration as a solution, **interviews** revealed disciplinary "*methodological and terminology divides*" (e.g., between Sciences and Humanities). This indicates that models must address disciplinary cultures, not just structures.

## Implications for the Study's Purpose

The triangulated data confirm that cross-departmental models **can** bridge silos at UCC but must:

**1) Combine Technology with Cultural Change:** As both data streams show, platforms like SharePoint fail without training and incentives (e.g., revising promotion criteria to reward collaboration).

**2) Address Local Constraints:** The divergence from global literature (e.g., stronger resistance at UCC) underscores the need for **contextual adaptation** of knowledge management theories in resource-constrained settings.

**3) Prioritize Structured Sharing:** Interview insights explain the quantitative anomaly about knowledge sharing, advocating for **curated systems** (e.g., moderated repositories) to prevent misinformation.

**Conclusion:** The mixed-methods approach reveals that UCC's knowledge silos require **holistic interventions**—integrating technology, policy reforms, and cultural shifts—to achieve the study's purpose of enhancing institutional memory and collaboration. This aligns with **systems theory** [15] by treating UCC as an interconnected ecosystem where changes in one area (e.g., technology) must be

reinforced by others (e.g., training).

### 5.9. Summary of the Study

This study has achieved a comprehensive analysis of knowledge silos at the University of Cape Coast (UCC), demonstrating their detrimental effects on institutional memory, collaboration, and operational efficiency. By empirically validating the role of cross-departmental knowledge models—such as digital platforms and interdisciplinary committees—the research provides UCC with actionable evidence to transform its knowledge management practices. The findings reveal that while structural barriers (technological limitations, bureaucratic inertia) and cultural resistance persist, targeted interventions can mitigate these challenges. For the broader literature, the study contributes nuanced insights into how resource-constrained African universities can adapt global knowledge management theories to local contexts, particularly by emphasizing the need to pair technological solutions with cultural and policy reforms.

The findings present UCC's stakeholders with concrete opportunities: academic and administrative leaders can leverage the proven effectiveness of cross-departmental models to reduce duplication of efforts, preserve institutional knowledge, and foster innovation. By prioritizing staff training in digital tools and collaborative practices, while simultaneously revising incentive structures and policies, UCC can institutionalize a culture of knowledge sharing. These measures not only address immediate inefficiencies but also position the university as a regional leader in sustainable knowledge management. For policymakers, the study underscores the importance of holistic, phased interventions that align with institutional realities, offering a replicable framework for similar universities across Africa. Ultimately, this research bridges theory and practice, equipping UCC with the tools to turn systemic challenges into opportunities for growth and resilience.

### Conflicts of Interest

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

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