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Moderating Effect of Information Technology on the Relationship Between Knowledge Management Capability and Competitiveness of Chartered Public Universities in Kenya

[1*]Joseph Nguru Gachanja
Murang'a University of Technology
https://orcid.org/0000-0001-5536-8062

Abstract

Purpose: This study assessed the moderating effect of information technology on the relationship between knowledge management capability and competitiveness of chartered public universities in Kenya.

Materials and Methods: The study adopted a positivist philosophy and a descriptive survey design. The target population comprised 31 chartered public universities in Kenya. Data were collected from 155 middle-level managers using structured questionnaires and secondary institutional data. Analysis was conducted using descriptive statistics and multiple regression in SPSS at a 5% significance level.

Findings: The results showed that knowledge management capabilities significantly influence university competitiveness ($R^2 = 0.778$). Knowledge organization had the strongest effect. When information technology was introduced as a moderator, the explanatory power increased to $R^2 = 0.808$, confirming a significant moderating effect. The study concludes that information technology strengthens the impact of knowledge management capabilities on the competitiveness of chartered public universities in Kenya.

Unique Contribution to Theory, Practice and Policy: Universities should align knowledge management practices with strong IT infrastructure, including digital repositories and knowledge-sharing platforms, to enhance competitiveness.

Keywords: *Knowledge Management Capability; Information Technology; University Competitiveness; Public Universities; Higher Education*

JEL Codes: *I23, O32, D83, L86*

INTRODUCTION

Background of the Study

In the knowledge-driven global economy, the ability to generate, manage, and strategically apply knowledge has become a critical capability for organizations, particularly higher education institutions (HEIs). Universities are increasingly expected to extend beyond their traditional roles of teaching and research to include innovation, community engagement, and responsiveness to socio-economic challenges (Odularu & Bokwe, 2025). In this context, knowledge is not merely an asset but a dynamic resource that enables institutions to adapt, compete, and contribute to development. Consequently, effective knowledge management (KM) systems are essential for universities to organize, store, and utilize knowledge efficiently (Abdullah et al., 2022).

Knowledge management capability (KMC) refers to the institutional capacity to create, acquire, store, share, and apply knowledge and has increasingly been recognized as a driver of organizational performance, particularly in knowledge-intensive environments such as universities (Mugimu, 2021). Institutions with well-developed KM capabilities are better positioned to enhance research productivity, support policy reforms, and meet evolving stakeholder expectations. However, while KM practices are widely adopted in the corporate sector, their integration within higher education institutions, particularly in African public universities, remains uneven and underexplored (Etomaru, 2022; Odularu & Bokwe, 2025). Universities operate as knowledge-centric organizations that must preserve institutional memory, foster collaboration, and ensure continuity in teaching and research. Despite this, barriers such as limited ICT infrastructure, inadequate staff capacity, and the absence of institutional KM frameworks hinder effective knowledge utilization across many African universities (Kwao et al., 2022).

Globally, universities operate in increasingly competitive environments shaped by international ranking systems such as the QS World University Rankings, Times Higher Education (THE), and the Academic Ranking of World Universities (ARWU). These rankings assess institutional performance based on indicators such as research output, citation impact, international collaborations, and academic reputation (Liao & Suprapto, 2024). Leading universities have therefore adopted strategic approaches to strengthen research capacity, international partnerships, and innovation in order to enhance competitiveness (Hazelkorn & Mihut, 2021). For example, institutions such as the National University of Singapore and Tsinghua University have improved their global rankings through deliberate investment in research and knowledge systems aligned with national innovation strategies (Biasi et al., 2021). Such developments demonstrate the importance of effective knowledge management capabilities in enabling universities to remain competitive in the global higher education landscape.

At the regional level, universities in Africa face significant challenges in achieving global competitiveness. Many institutions operate in resource-constrained environments characterized by limited funding, faculty shortages, and relatively low research output (Mugimu, 2021). As a result,

African universities remain underrepresented in global academic rankings and knowledge production. For instance, studies show that African research output accounts for less than one percent of global publications, highlighting the continent's limited participation in global knowledge systems (TARA, 2023). Despite these challenges, knowledge management has increasingly been recognized as a strategic tool for improving institutional performance, innovation, and collaboration across African universities (Etomaru, 2022). Strengthening knowledge creation, sharing, and retention through digital infrastructure and collaborative platforms is therefore essential for enhancing the competitiveness of universities in the region (Maende, 2021).

In Kenya, public universities play a critical role in advancing research, innovation, and human capital development. As of 2024, the country has 35 chartered public universities that serve as key drivers of national development (CUE, 2024). However, these institutions operate in a challenging environment characterized by increasing student enrolment, constrained funding, and growing expectations for globally competitive academic programs. Despite advancements in technology and digital infrastructure, many public universities still experience difficulties in managing institutional knowledge effectively. These challenges include fragmented information systems, underutilized research outputs, and limited integration of knowledge management practices into decision-making processes (Maende, 2021).

Recent policy reforms, including performance-based financing and the Bottom-Up Economic Transformation Agenda (BETA), have further increased pressure on universities to demonstrate improved performance in research, innovation, and graduate employability. In this context, strengthening knowledge management capabilities has become essential for improving institutional learning, enhancing academic quality, and supporting sustainable competitiveness (Etomaru, 2022). Consequently, universities must develop internal systems that facilitate the creation, storage, sharing, and application of knowledge across teaching, research, and administrative functions. Developing robust KM capabilities is therefore critical for enabling Kenyan public universities to enhance innovation, improve global visibility, and contribute effectively to national development.

Statement of the Problem

Chartered public universities in Kenya play a central role in advancing national priorities such as research, innovation, and human capital development. However, their overall competitiveness remains relatively low compared to regional and global institutions. This is reflected in weak performance in international rankings, limited research visibility, and concerns regarding graduate employability. Although Kenyan public universities enrolled over 469,688 students in 2024, accounting for 74.7% of total university enrolment (KIPPRA, 2024), many institutions continue to experience performance challenges that limit their ability to compete effectively in the global higher education landscape.

Knowledge Management Capability (KMC), which includes knowledge creation, organization, sharing, and storage, has increasingly been recognized as a key driver of institutional performance and competitiveness in knowledge-intensive organizations such as universities (Gakuru, 2025; Wendo et al., 2025). Effective knowledge management enables institutions to enhance collaboration, innovation, and evidence-based decision-making. However, many Kenyan universities have yet to fully develop integrated systems that allow knowledge to be effectively captured, shared, and applied across academic and administrative units. As a result, knowledge generated through research, teaching, and institutional experience often remains fragmented and underutilized. In addition, technological tools that support knowledge management, including digital repositories, e-learning platforms, and centralized databases, remain underutilized, limiting knowledge accessibility and institutional learning (Gachanja et al., 2024).

The competitiveness challenges facing Kenyan universities are further intensified by external pressures such as declining government funding and increasing expectations from stakeholders. Government expenditure on higher education has declined by approximately 20% despite rising enrolment levels (KIPPRA, 2024), while 70% of employers report dissatisfaction with graduates' job preparedness (KNBS, 2024). Furthermore, in the 2024 Webometrics ranking, only five Kenyan universities appeared among Africa's top 100 universities, highlighting the persistent competitiveness gap in the sector.

Although previous studies have examined aspects of knowledge management and ICT in Kenyan universities (Rotich & Mose, 2025; Wambui, 2025; Ogechi, 2025), these studies largely focus on isolated elements rather than examining knowledge management capability as an integrated construct. Moreover, limited empirical research has explored how information technology moderates the relationship between knowledge management capability and competitiveness of universities. Therefore, this study sought to examine the moderating effect of information technology on the relationship between knowledge management capability and competitiveness of chartered public universities in Kenya.

Study Hypothesis

H_{01}: Information technology has no moderating effect on the relationship between knowledge management capability and competitiveness of chartered public universities in Kenya

Scope of the Study

This study examined the moderating effect of information technology on the relationship between knowledge management capability and competitiveness of chartered public universities. Information technology in this study refers to the technological infrastructure and digital systems that support knowledge processes within universities. These include digital repositories, knowledge databases, e-learning platforms, and other ICT tools that facilitate knowledge creation, storage, organization, and sharing across academic and administrative units.

Geographically, the study focused on chartered public universities in Kenya accredited by the Commission for University Education (CUE). Specifically, the study targeted 31 chartered public universities accredited as of December 2020, which are distributed across twenty-five counties in Kenya. The study was conducted within the Kenyan higher education sector during the year 2023.

LITERATURE REVIEW

Theoretical Literature Review

Technology Acceptance Theory

The Technology Acceptance Model (TAM), developed by Davis (1989), explains how individuals adopt and use new technologies within organizations. The model proposes that technology acceptance is mainly influenced by two beliefs: perceived usefulness, which is the degree to which a person believes that using a system improves job performance, and perceived ease of use, which refers to the effort required to use the system. These beliefs shape users' attitudes toward technology and influence their intention and actual use of technological systems (Davis, 1989).

Over time, TAM has been extended and empirically validated. For example, Venkatesh and Davis (2000) expanded the model by incorporating external factors such as social influence and cognitive processes. Studies also show that perceived ease of use significantly influences perceived usefulness, which ultimately affects technology acceptance (Chao, 2019). Additionally, models such as the Unified Theory of Acceptance and Use of Technology (UTAUT) have integrated TAM principles to improve the prediction of technology adoption in dynamic organizational environments (Dwivedi et al., 2019).

In this study, TAM explains the role of information technology as a moderating variable. When technological systems are perceived as useful and easy to use, employees are more likely to adopt knowledge management systems, which enhances knowledge creation, organization, sharing, and storage within universities (Hamamurad et al., 2022). Consequently, technology adoption strengthens the relationship between knowledge management capability and university competitiveness by supporting the effective use of digital platforms, repositories, and communication tools**.**

Empirical Literature Review

Recent studies indicate that information technology (IT) plays a significant role in enhancing the competitiveness of universities by improving academic delivery, operational efficiency, and institutional innovation. Globally, Maulani and Hamdani (2019) found that IT adoption in Indonesian private universities improved competitiveness by streamlining operations and enhancing academic service delivery. Similarly, Galynska et al. (2021) reported that innovative teaching technologies such as virtual laboratories and online collaborative platforms enhance students' academic preparedness and employability, thereby strengthening institutional competitiveness. Further research by Vasiliev (2021) and Lin (2020) emphasized that integrating

emerging technologies such as artificial intelligence, digital assessment systems, and adaptive learning platforms can significantly improve academic quality and institutional positioning in competitive higher education environments. In addition, Kholiavko et al. (2021) highlighted the strategic role of ICT in enabling universities to adapt to the digital economy through e-governance systems, digital learning platforms, and technology-enabled curricula. In the Kenyan context, Keitany et al. (2019) found that universities investing in ICT infrastructure, digital libraries, and online learning systems experienced improved operational efficiency and student satisfaction, while Chege et al. (2020) noted that the impact of IT on institutional performance is strengthened when supported by strategic leadership and alignment. Collectively, these studies demonstrate that the effective deployment of information technology enhances universities' capacity for innovation, service delivery, and competitiveness in the evolving higher education landscape.

Conceptual Framework

The conceptual framework illustrates the relationship between knowledge management capabilities and competitiveness of chartered public universities, with information technology acting as a moderating variable. Knowledge management capability is the independent variable and consists of knowledge creation, knowledge organization, knowledge sharing, and knowledge storage capabilities. These capabilities influence the competitiveness of universities, which is measured through student enrollment, number of patents, and number of citations. Information technology, represented by IT infrastructure, IT management, and IT skills, moderates the relationship between knowledge management capability and competitiveness by strengthening or influencing how effectively knowledge processes contribute to institutional competitiveness.

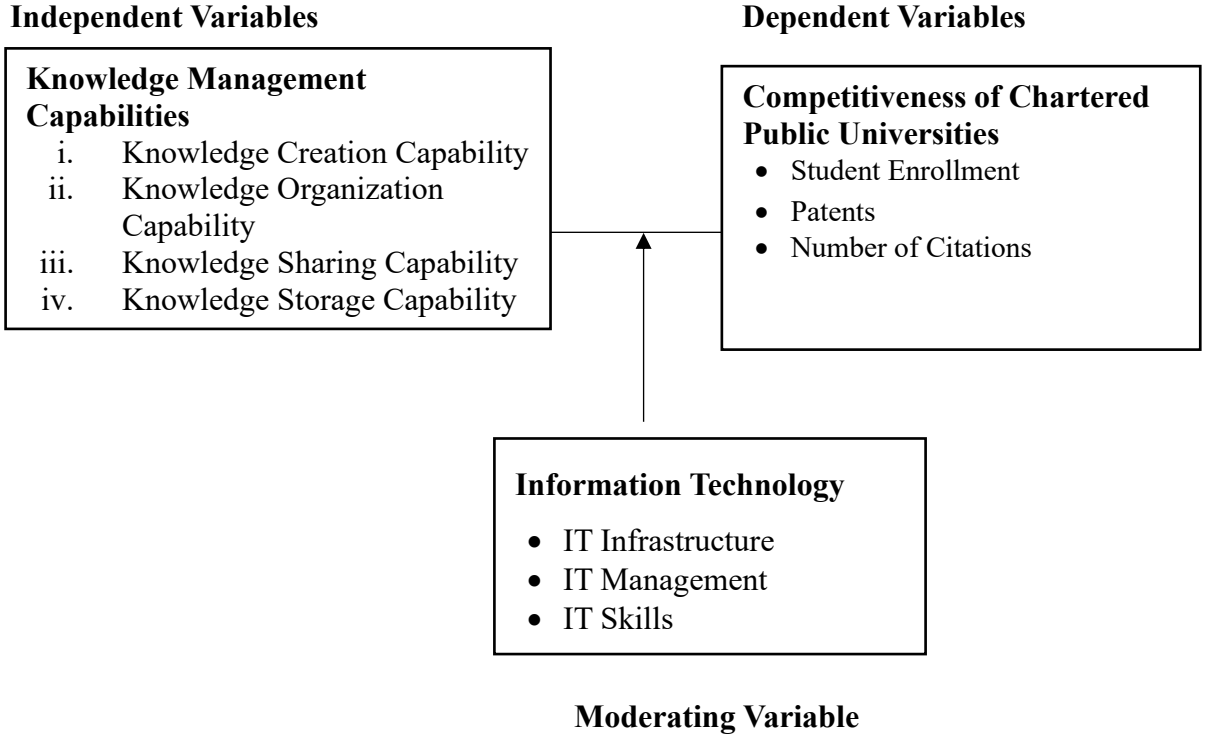

Figure 1: Conceptual Framework

RESEARCH METHODOLOGY

This study adopted a positivist research philosophy, which is appropriate for studies that test hypotheses using objective and measurable data (Hair et al., 2019). Positivism assumes that reality can be observed and measured through empirical methods, particularly quantitative techniques, while maintaining researcher independence to minimize bias (Emon, 2024). Consistent with this philosophy, the study employed a descriptive survey design to examine the relationship between knowledge management capabilities and competitiveness of public universities in Kenya. Descriptive survey designs enable the collection of quantifiable data from large populations and support hypothesis testing and correlation analysis (Bell et al., 2022). This approach has been widely used in studies examining organizational capabilities and performance in higher education institutions (Chondo, 2021; Maende, 2021).

The target population comprised 31 chartered public universities in Kenya, which served as the units of analysis. Data was collected from middle-level managers, including registrars, deans, heads of departments, finance officers, ICT officers, and librarians, who play a key role in implementing knowledge-related processes within universities (Iqbal et al., 2019). A census approach was used at the institutional level, while purposive sampling selected five key managers from each university, resulting in a sample size of 155 respondents. Primary data was collected using structured questionnaires with Likert-scale items, while secondary data on competitiveness

indicators such as student enrolment, patents, and research citations were obtained from official university reports and institutional databases.

Data analysis was conducted using SPSS, where descriptive statistics (means, standard deviations, and frequencies) summarized key variables, and multiple regression analysis tested the study hypotheses. Diagnostic tests such as the Breusch-Pagan test and Variance Inflation Factor (VIF) were conducted to check for heteroskedasticity and multicollinearity (Chicco et al., 2021). The regression models examined the influence of knowledge management capabilities; knowledge creation, organization, sharing, and storage on university competitiveness, while also testing the moderating effect of information technology through interaction terms in the regression model. A 5% significance level was used to determine the statistical significance of the study hypotheses**.**

The models

Equation (1) below shows the multiple linear regression model of the independent variables $X_{1's}$ against the dependent variable Y.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e \quad \ldots\ldots (1)$$

Equation (2) shows the moderating regression model with moderating term X_5 introduced to the reduced model as follows:

$$Y = \alpha_0 + \alpha_1 X_1 X_5 + \alpha_2 X_2 X_5 + \alpha_3 X_3 X_5 + \alpha_4 X_4 X_5 + e \quad \ldots\ldots (2)$$

where:

Y: Competitiveness of chartered public universities (Dependent Variable)

X_1: Knowledge creation capability (predictor variable)

X_2: Knowledge organization capability (predictor variable)

X_3: Knowledge sharing capability (predictor variable)

X_4: Knowledge storage capability (predictor variable)

X_5: Information Technology (moderating variable)

β_0 and α_0 are the Y intercepts in equation (1) and (2) respectively

β_i and $\alpha_{i=}$ 1, 2, 3, 4 are the coefficients of the particular independent variables in equation (1) and (2) respectively

$\{X_i X_5;\ i=1,2,3,4,\}$ refer to the interactive terms capturing the moderating effect e = the error term that is presumed to be normally distributed with mean zero and variance one

RESEARCH FINDINGS AND DISCUSSION

Response Rate

A total of 155 structured questionnaires were distributed to middle-level managers across the 31 targeted universities in Kenya. Out of these, 123 questionnaires were completed and returned, yielding a response rate of 79%, as shown in Table 1.

Table 1: Response Rate

Category	Frequency	Percentage (%)
Filled and returned	123	79.35
Not returned	32	20.65
Total	**155**	**100**

A response rate of 79.35% was achieved, which is considered excellent and adequate for reliable statistical analysis and generalization (Babbie, 2020). The high response rate resulted from effective data collection strategies, including NACOSTI authorization, prior respondent notification, self-administered questionnaires, and follow-up phone calls.

Demographic Information of Respondents

Table 2 presents the demographic characteristics of the respondents, including gender, professional role, and years of service. Out of the 123 middle-level managers, 82 (67%) were male and 41 (33%) were female, indicating that males formed the majority of respondents. This finding reflects the gender imbalance that still exists in many leadership positions within higher education institutions, a trend that has been observed in previous studies on university governance (Morley, 2014).

In terms of professional roles, respondents were fairly distributed across key university management positions, with Deans of Faculty and ICT Officers each accounting for 21% (26 respondents), Registrars and Librarians each representing 20% (25 respondents), and Finance Officers comprising 18% (21 respondents). This balanced representation ensured that insights were obtained from diverse administrative and academic units, which strengthens the reliability of the study findings. Similar studies emphasize that involving managers from multiple functional areas improves the comprehensiveness of institutional research (Iqbal et al., 2019).

Regarding years of service, the majority of respondents had substantial experience in their institutions. Specifically, 46 respondents (37.4%) had served between 5-10 years, 39 (32%) between 1-5 years, 23 (19%) over 10 years, and 15 (12%) less than one year. The dominance of experienced respondents suggests that the data reflects informed perspectives on institutional processes. This finding is consistent with studies indicating that employees with longer tenure possess deeper organizational knowledge and contribute more effectively to knowledge management practices (Qandah et al., 2021).

Table 2 Respondents Demographic Information

Gender of Respondents	Frequency	Percentage
Male	82	67%
Female	41	33%
Role of the Respondent		
Deans of Faculty	26	21%
ICT Officers	26	21%
Librarians	25	20%
Registrars	25	20%
Finance Officers	21	18%
Years Served by the Respondent		
Under 1 year	15	12%
1-5 years	39	32%
5-10 years	46	37.40%
over 10 years	23	19%

Age of the Respondents

Most respondents were 41–50 years old (46%), indicating a mature workforce with substantial institutional knowledge. 30% were aged 31-40, while 20% were over 51, reflecting significant professional experience. Only 4% were aged 21-30, representing a small but potentially innovative group. This mix supports both knowledge continuity and innovation in universities. The findings were summarized in Figure 2.

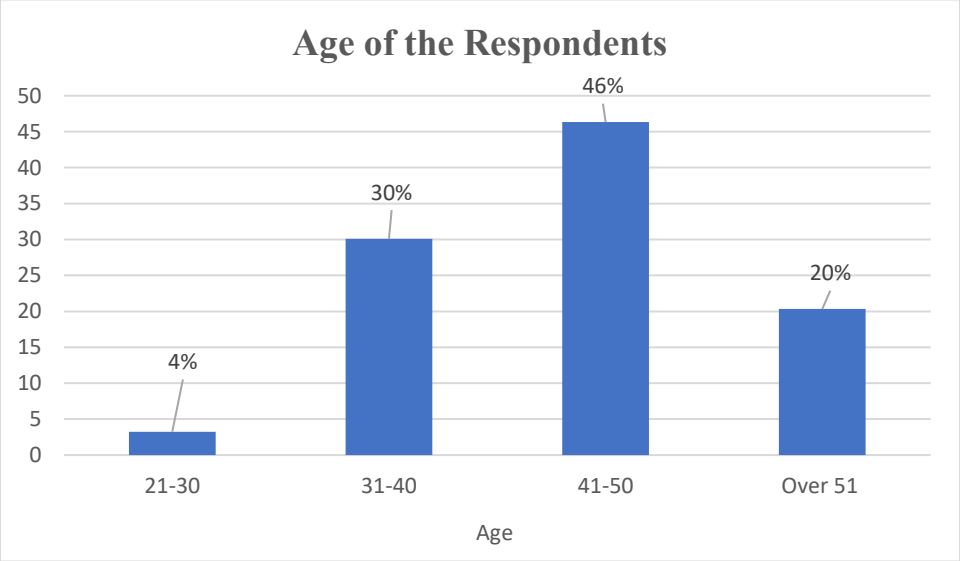

Figure 2: Age of the Respondents

Regression Analysis

The regression model produced an R^2 of 0.778, indicating that 77.8% of the variation in competitiveness of chartered public universities is explained by the four knowledge management capabilities. The ANOVA results confirmed that the model was statistically significant ($F(4,118) = 170.982$, $p < .001$), demonstrating that the predictors collectively influence university competitiveness. Among the capabilities, knowledge organization had the strongest effect ($\beta = 0.462$, $p = .000$), followed by knowledge storage ($\beta = 0.354$, $p = .019$), knowledge sharing ($\beta = 0.328$, $p = .001$), and knowledge creation ($\beta = 0.230$, $p = .000$). Consequently, the null hypothesis that knowledge management capabilities have no effect on competitiveness was rejected.

These findings indicate that universities that effectively manage knowledge through structured creation, organization, sharing, and storage processes are more likely to enhance their competitive position. The results are consistent with Rehman et al. (2022) and Gebreyohans et al. (2022), who found that integrated knowledge management practices improve institutional innovation, collaboration, and overall competitiveness in higher education institutions.

Table 3: Multivariate Regression Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.882a	0.778	0.769	0.49152

a Predictors: (Constant), Knowledge creation capability, Knowledge storage capability, Knowledge organization capability, Knowledge sharing capability

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	79.313	4	19.828	170.982	.000b
	Residual	43.617	118	0.369		
	Total	122.927	122			

a Dependent Variable: Competitiveness

b Predictors: (Constant), Knowledge creation capability, Knowledge organization capability, Knowledge sharing capability, Knowledge storage capability

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.331	0.196		0.387	0.008
	Knowledge creation capability	0.241	0.048	0.23	2.126	.000
	Knowledge organization capability	0.466	0.054	0.462	4.371	.000
	Knowledge sharing capability	0.337	0.071	0.328	5.844	0.001
	Knowledge storage capability	0.359	0.074	0.354	1.356	0.019

a Dependent Variable: Competitiveness

Optimal Model

The moderating effect of information technology (IT) capability on the relationship between knowledge management (KM) capabilities and competitiveness of chartered public universities in Kenya was tested using the hypothesis H_{01}: IT has no moderating effect on the relationship between knowledge management capability and competitiveness of chartered public universities in Kenya. The moderation model was specified as $Y = \beta_0 + \beta_1X_1Z + \beta_2X_2Z + \beta_3X_3Z + \beta_4X_4Z + \varepsilon$, where the interaction terms captured the moderating role of IT across the four KM capabilities.

The results in Table 4.4 showed that the R^2 increased from 0.778 in the base model to 0.808 in the moderated model, indicating that incorporating IT improved the model's explanatory power by 3.01%. Additionally, all interaction terms between IT capability and the KM dimensions were statistically significant ($p < 0.05$), confirming that IT capability strengthens the influence of knowledge creation, knowledge organization, knowledge sharing, and knowledge storage on university competitiveness. Consequently, the null hypothesis (H_{01}) was rejected, demonstrating that IT plays a significant moderating role. based on the coefficient estimates, was modeled as:

Y= 0.451 + 0.338 (Knowledge creation capability) (IT capability) + 0.443 (Knowledge organization capability) (IT capability) + 0.349 **(**Knowledge sharing capability**)** (IT capability) + 0.398 (Knowledge storage capability) (IT capability) + Ɛ

These findings suggest that IT enhances the effectiveness of knowledge management processes by enabling better knowledge access, sharing, and utilization within universities. The results support earlier studies by Olan et al. (2022) and Omanyo and Ndiege (2025), which found that digital technologies amplify knowledge management practices and improve institutional performance in knowledge-intensive organizations.

Table 4: Results of the Overall Moderated Model

Model	R	R Square	Adjusted R Square
1	.899a	0.808	0.801

a Predictors: (Constant), knowledge creation capability, knowledge organization capability, knowledge sharing capability, knowledge storage capability
b Dependent Variable: Competitiveness

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	75.433	1	75.433	148.518	.000b
	Residual	47.494	121	0.393		
	Total	122.927	122			

a Dependent Variable: Competitiveness
b Predictors: (Constant), knowledge creation capability, knowledge organization capability, knowledge sharing capability, knowledge storage capability.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.451	0.224		0.187	0.014
	Knowledge creation capability *IT	0.338	0.085	0.335	2.196	0.001
	Knowledge organization capability *IT	0.443	0.123	0.39	4.362	0.000
	Knowledge sharing capability *IT	0.349	0.249	0.356	5.875	0.000
	Knowledge storage capability *IT	0.398	0.156	0.365	1.647	0.006

a Dependent Variable: Competitiveness

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

The study found that knowledge management capabilities significantly influence the competitiveness of chartered public universities in Kenya. Specifically, knowledge organization, knowledge sharing, knowledge storage, and knowledge creation capabilities all had positive and statistically significant effects on university competitiveness, with knowledge organization showing the strongest influence. The study further established that information technology plays a significant moderating role in this relationship. When IT capability was introduced into the regression model, the explanatory power increased from $R^2 = 0.778$ to $R^2 = 0.808$, indicating that IT strengthens the impact of knowledge management capabilities on competitiveness. All

interaction terms between IT and the KM capabilities were statistically significant, confirming that universities that align their knowledge management processes with strong IT systems are more likely to enhance their competitive performance.

Conclusion

This study concludes that information technology significantly moderates the relationship between knowledge management capability and competitiveness of chartered public universities in Kenya. The findings show that the presence of strong IT capability strengthens the impact of knowledge management processes such as knowledge creation, organization, sharing, and storage on institutional competitiveness.

Recommendations of the Study

The study recommends that public universities in Kenya enhance their knowledge management capabilities by integrating them with strong information technology systems, such as digital repositories and knowledge-sharing platforms, to improve accessibility and utilization of institutional knowledge. It emphasizes that IT should be viewed as a strategic enabler of knowledge management rather than just an operational tool, with investments in infrastructure aligned to knowledge strategies to boost competitiveness. The research contributes to existing knowledge by empirically demonstrating the moderating role of IT in strengthening the relationship between knowledge management and competitiveness in public universities. It extends theory by showing that IT capability enhances the effectiveness of knowledge processes in knowledge-intensive organizations. For future research, the study suggests exploring other moderating or mediating factors like organizational culture, leadership style, or governance. Comparative studies with private universities or across African countries could broaden insights, while longitudinal studies would help track the long-term impact of IT and knowledge management practices on competitiveness.

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