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INVESTMENT IN TECHNOLOGY ENHANCED LEARNING AND FINANCIAL SUSTAINABILITY OF UNIVERSITIES IN KENYA

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ABSTRACT

Public and private higher education institutions in Kenya have increasingly faced challenges of financial unsustainability in recent years. Achieving financial sustainability requires institutions to secure regular and reliable internally generated funds to support their operations. In the context of dwindling government funding, escalating operational costs, rising debts, and deteriorating infrastructure, universities are under mounting pressure to identify and implement alternative income-generating strategies while preserving academic quality and institutional viability.This study evaluated the influence of ***financial resource mobilization strategies*** *on the financial sustainability of universities in Kenya. Specifically, the research examined the impact of* ***investment in technology-enhanced learning*** *on* ***financial sustainability.*** *The study was supported and anchored on Resource Dependency Theory. Using Yamane formula ,a sample of 64 universities comprising of 34 public and 30 private Universities was drawn from a population of 76 chartered universities in Kenya as of December 31, 2022. Stratified sampling ensured proportional representation. Primary data was collected from 290 senior university officers through structured, self-administered questionnaires. Instrument reliability was confirmed with a Cronbach's alpha coefficient exceeding 0.9, surpassing the 0.7 threshold. Secondary data were obtained from university reports and audited financial statements covering the period 2018–2022.Data analysis involved descriptive and inferential statistics, with hypothesis testing conducted using binary logistic regression at a 95% confidence level (a = 0.05). Chi-square analysis was used to determine the association between technology enhanced learning and financial sustainability in the Kenyan Universities The study found a significant association between technology enhanced learning and financial sustainability in the Kenyan Universities at the 5% level (P < 0.05).As shown by the Nagelkerke R Square percentages, Investment in Technology enhanced learning account for 71.2% of the variation, confirming its importance as a key driver of financial sustainability.From the findings of multivariate regression analysis, it was clear that Investment in Technology enhanced learning is significantly associated with financial sustainability (P = 0.002). If significant investment in technology enhanced learning is in place universities in Kenya are 6.343 times more likely to achieve financial sustainability (OR = 6.343) compared to those that do not invest in technology enhanced learning.*

KEYWORDS: *Investment in Technology Enhanced Learning, Financial Resource mobilization strategies ,Financial Sustainability*

1.0 INTRODUCTION

Financial sustainability refers to the state of an institution's finances, highlighting a favorable ratio of income to expenses and effective resource management in operational operations while taking standard environmental considerations into account (Koleda & Oganisjana, 2015).

Universities are under pressure to find alternative sources of funding to ensure their financial sustainability in the modern world, as government funding is becoming less and less available. Competition for funds from other objectives including, healthcare, infrastructure, and poverty reduction programs is directly tied to government

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funding (Chumba, 2023).The onset of the COVID-19 pandemic dramatically accelerated the global shift toward digital education, exposing both the potential and limitations of Technology Enhanced Learning (TEL) systems. Institutions with pre-existing investments in ICT infrastructure, e-learning platforms, and digital pedagogy were able to transition more smoothly to remote instruction, thereby minimizing academic disruptions (Jachna, 2021; Kirkwood & Price, 2014). Conversely, universities lacking such preparedness—particularly in developing countries—faced operational paralysis, widened educational inequities, and reputational challenges.

In Kenya, the pandemic revealed stark disparities in digital readiness across the higher education sector. While a few universities had initiated blended learning models prior to the crisis, the majority struggled with inadequate infrastructure, insufficient bandwidth, and lack of digital devices among faculty and students (Mutisya & Makokha, 2016). These gaps highlighted the urgency of institutional investment in TEL not only as a pedagogical imperative but also as a strategic response to future disruptions and evolving learner needs.

Technology Enhanced Learning has now emerged as a cornerstone for academic delivery, quality assurance, and global competitiveness in higher education. Investment in TEL infrastructure—including hardware, software, digital content, and faculty training—is essential for universities seeking to enhance instructional flexibility, increase access to underserved populations, and sustain financial and operational resilience (Komba & Ng'umbi, 2020)

2.0 PAST STUDIES

Smart sustainable education is an idea and approach to education that blends creative ideas for improving learning with considerations for integrating technology into the classroom. Smart education can also be described as instruction supported by a variety of technologically enabled smart gadgets, like tablets and smartphones (Mori, 2020).Even in the face of the COVID-19 pandemic, there has been a persistent drive for higher education that is accessible, inexpensive, and of good quality. Universities moved from in-person to online teaching and learning methods to guarantee that instruction continued with the least amount of disruptions possible, placing further strain on already resource-constrained universities (Lee & Lundemo, 2021).

Kosgei et al. (2023) examined the availability of infrastructure to support digital learning in public universities in Uasin Gishu County, Kenya and revealed that infrastructure has a positive and significant influence on digital learning in public universities during the post-COVID-19 era, indicating that investments in ICT infrastructure have facilitated online learning.

A study by Agallo (2023) on the investment in contemporary Learning Management Systems (LMS) to facilitate technology-enhanced learning in Kenyan institutions concurs with the predominant response. The research focused on the determinants of adoption of e-learning management systems among students in Technical and Vocational Education and Training (TVET) institutions in Nairobi County. The study found that while there is a positive attitude towards the adoption of LMS, challenges such as user competence and barriers significantly affect its adoption. Despite these challenges, the presence of LMS platforms in these institutions indicates an investment in technology-enhanced learning.

A study by Boniface Wakholi (2023) conducted at Kibabii University, found that 81.5% of students indicated that technology-enabled learning is an effective mode of learning, The study highlights that the implementation of technology-enabled learning has transformed teaching and learning by introducing student-centered environments and enabling independent learning through electronic resources

H0: Investment in Technology Enhanced Learning has no statistically significant influence on financial sustainability of universities in Kenya.

3.0 MATERIALS AND METHODS

The present study employed a descriptive research methodology.The study made use of a deliberate sampling of the Finance officers, Registrar administration,Human resource managers, ICT Managers and Resource mobilization executives from the chosen universities. According to the goals of the research, the five university cadres are crucial in providing administrative and financial data. Primary as well as secondary data was used in the research. The yearly financial statements and financial analysis of the sampled universities covering the 5-year period from 2018 to 2022 was the source of secondary data collection. According to Kothari (2004), secondary data are those that have previously undergone statistical analysis and were gathered by another party.

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The statistical formula devised by Yamane (1967) was used to determine the sample size as follows;

$$n = N/1 + N(e)^2$$

Where n is the sample size from the population of the study, N is the population of 76 Universities under study and e is the sampling error at 95% confidence level which is 5% significance for this study. Therefore, the sample size will be

$$n = 76/1 + 76(0.05)^2 = 64\ Universities$$

Stratified random sampling also known as proportionate sampling, a method suitable once sub-populations contained in the total population differ, was used for identifying the sample size per stratum. The method ensures that there is no bias in determining the sample size. Stratified sampling involves a process of segregation followed by a random or purposive sampling from each stratum. Simple random sampling method is one in which each and every member of the population has an equal chance of being selected as respondents (Mugenda & Mugenda, 2013).Consequently, 30 private universities and 34 public universities made up the sample from the strata.

Participants were requested to fill out questionnaires in order to collect the primary data. Pre-written questions and answers to which respondents record their responses are called questionnaires, and they are an excellent tool for obtaining information from a big group in a short period of time (Sekaran, 2018). According to Kothari (2019), the questionnaire is the best method for quickly collecting a significant quantity of data. Anonymity provides a level of security while guaranteeing that all information is consistent (Chandran, 2021). The questionnaire was selected as a proper tool for this investigation for the above reasons.

Responses were made as simple as possible by using a well-designed questionnaire. They incorporated both open-ended and closed-ended questions on the survey. Two parts are included in the questionnaire. In the first phase, respondents' biographical information was gathered and data on the study's variables was gathered in the second half. Descriptive and inferential analysis was done. Results and findings were presented on tables, charts and graphs.

4.0 RESULTS AND DISCUSSIONS

Demographic Information

Questionnaires were issues to 290 respondents and 215 of them were received back accounting for a return rate of 74 %and non-return rate of 26% which was partially credited to half-finished, not returned and unfilled questionnaires. Wimmer and Dominick (2012) supports a rate of return of 21-70% as sufficient, gives assurance for accuracy, reduces biasness and as acceptable for the questionnaires that are self-administered hence 74% is acceptable in this study.

Descriptive Analysis of investment in technology enhanced learning Variable

The study sought to determine the impact of Investment in Technology enhanced learning on Financial sustainability by requesting the respondents to indicate the extent to which they agree with the statements.

Table 1: Summary of Frequency Analysis of investment in Technology enhanced Learning construct

Statements	Disagree	Neutral	Agree	Mode
The institution has invested in a modern learning management system (LMS)	11.7% (25)	15.8% (34)	72.6% (156)	5
The University has increased investment in ICT infrastructure that supports online learning	13.0% (28)	10.7% (23)	76.3% (164)	4
The University has continuously invested more in bandwidth expansion and reliable power sources	13.0% (28)	16.7% (36)	70.3% (151)	4
The University has continuously invested in learner empowerment tools	18.6% (40)	14.9% (32)	66.5% (143)	5
The University has sought accreditation for online learning	69.8% (150)	16.7% (36)	19.8% (29)	2
The University has an approved internal online teaching policies/framework	67.0% (144)	15.3% (33)	17.7% (38)	2

Source: Research Data (2025)

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Regarding the institution's investment in a contemporary learning management system to facilitate technology-enhanced education, 11.7% of respondents expressed disagreement with the assertion. However, a substantial 72.6% concurred that such an investment has occurred. The data indicated that 15.8% of the respondents may be uncertain or uninformed regarding the existence or quality of the LMS in operation. The mode of 5 signifies that the predominant response from participants was "Strongly Agree." This indicates that the majority of respondents firmly feel that the university has invested in a contemporary Learning Management System to facilitate academic delivery and digital learning activities.

HYPOTHESIS TESTING

Chi-square tests

Chi-square test of significance was done to test the study hypothesis and the relationship between IV (Investment in Technology enhanced learning) and DV (Financial sustainability) since the data is categorical in nature. The null hypothesis was tested by conducting Chi-square test to establish the association between Investment in Technology enhanced learning and Financial sustainability of Universities.

Table 2: Chi-Square Tests; Investment in Technology enhanced learning and financial sustainability

	Value	Asymptotic Significance (2-sided)	P-Value
Pearson Chi-Square	137.754[a]	.000	0.000
Likelihood Ratio	137.196	.000	0.000
N of Valid Cases	215		

Source: Research Data (2025)

Chi-square analysis was used to determine the association between technology enhanced learning and financial sustainability in the Kenyan Universities The study found a significant association between technology enhanced learning and financial sustainability in the Kenyan Universities at the 5% level ($P < 0.05$).

Table 3: Investment in technology enhanced learning and Finacial sustainability Cross-tabulation

			Financial sustainability3 Recoded		
Variable			Financially Unsustainable	Financially Sustainable	Total
Investment Technology Recoded	Inadequate investment in technology enhanced learning strategies	Count	50	8	58
		% within InvestmentTechnology Recoded	86.2%	13.8%	100.0%
	There is investment in technology enhanced learning	Count	9	148	157
		% within InvestmentTechnology Recoded	5.7%	94.3%	100.0%
	Total	Count	59	156	215
		% within InvestmentTechnology Recoded	27.4%	72.6%	100.0%

Source: Research Data (2025)

From results of table 3 above,If there is investment in technology-enhanced learning, financial sustainability is more likely to be achieved. The results from the cross-tabulation analysis show that, among those with no investment in technology-enhanced learning, 86.2% felt there was no financial sustainability, while only 13.8% felt there was financial sustainability. In contrast, among those with investment in technology-enhanced learning, only 5.7% reported no financial sustainability, while a significant 94.3% reported there is financial sustainability. In total, 27.4% of respondents felt there was no financial sustainability, and 72.6% felt there was financial sustainability. This

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suggests that investment in technolog enhanced learning plays a crucial role in achieving financial sustainability, as those with such investment showed a much higher rate of financial sustainability compared to those without it.

Binary Logistic Regression Analysis

In addition to the use of Chi-square analysis to test the study hypothesis, it was important to run regression analysis tests. This is because from Chi-square analysis, the researcher gets insights ultimately on the relationship of the variables of interest while in regression analysis, insights on both the relationship of variables of interest and the actual contribution of each independent variable on dependent variable is given. Regression analysis being a statistical method, enables the researcher to confidently establish factors that mostly matter, those that can be ignored and their influence on each other. In order to establish if there was a relationship between investment in Technology enhanced learning and financial suatainability , regression analysis was done.

Table 4: Variables in the Equation- Investment in technology enhanced learning

Variable	B	S.E.	Wald	Sig.	Odd Ratio
Investment in technology enhanced learning					
There is inadequate technology enhanced learning practices used (RC)					1.000
There is adequate technology enhanced learning practices used	1.847	0.586	9.926	0.002	6.343

Source: Research Data (2025)

The study found a strong correlation (p-value < 0.05) between investment in technology enhanced learning and financial sustainability. It also demonstrated that if there is investment in technology enhanced learning, Kenyan universities are 6.343 times more likely to attain financial sustainability compared to Universities in Kenya that do not practice.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

Conclusion

There is a strong statistical relationship between investment in technology enhanced learning and financial sustainability of universities in Kenya at 5% significance level $(P < 0.05)$. This led to the rejection of null hypothesis. Therefore, from the results, if University managers or the owners invested in technology enhanced learning financial sustanability would be achieved.

Recommendations for University Managers

The findings regarding the significant positive influence investment in technology enhanced learning on financial sustainability suggest that university management should prioritize and strengthen efforts in this area. This could involve significantly investing in ICT infrastrucure and strategically allocating resources to enhance online or virtual learning. The significant association identified in the chi-square and binary regression analyses underscores the importance of effectively establishing LMS platforms and investing and supporting learner empowerment tools .Managers need to carefully consider the interplay of this investment in TEL strategy with other factors and potentially optimize Financial sustainability.

Recommendations for Further Studies

Comparative studies could be conducted to examine the effectiveness of different financial resource mobilization strategies across public and private universities in Kenya, potentially identifying best practices specific to each type of institution. Secondly, the study focused on universities accredited by the CUE by December 2022. Future research could explore the financial sustainability of newer universities or other types of higher education institutions in Kenya, such as TVET institutions and middle level colleges .

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