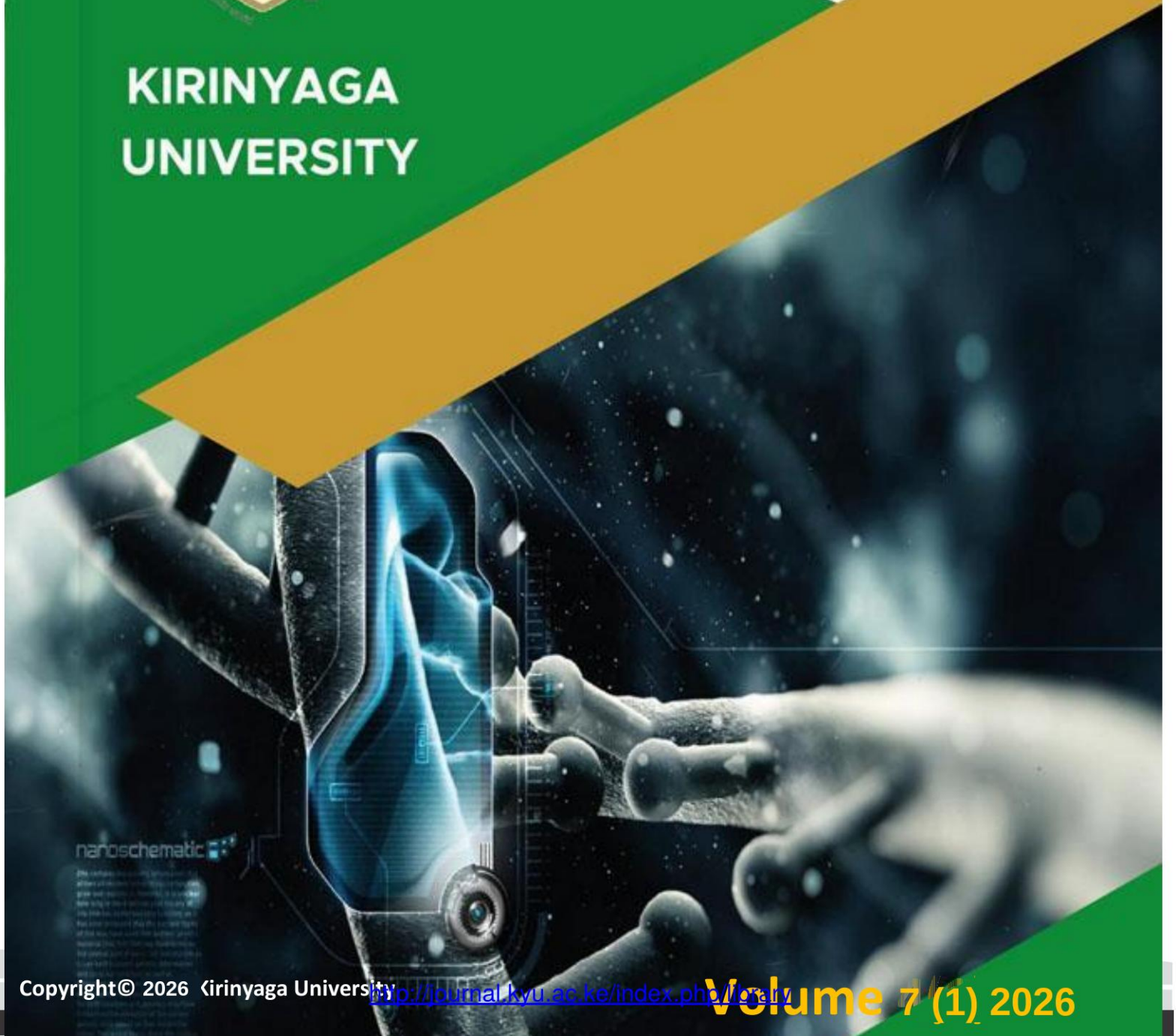
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The Digital Paradox: Assessing the Impact of Health Information Systems (HIS) on Cognitive Load, Patient Interaction, and Work-Life Integration Among Kirinyaga's Medical Practitioners

Njoroge, D., Wairia, G.W.
School of Business and Education, Kirinyaga University, KENYA
Correspondence: gibsonwaynee@gmail.com

ABSTRACT

The effect of Health Information System (HIS) adoption strategies on the performance of medical practitioners in Level 4 and Level 5 public hospitals of Kirinyaga County, Kenya, was investigated. Based on the Job Demands-Resources (JD-R) model, four dimensions of HIS were used: system usability, administrative screen-time demands, IT infrastructure stability, and digital work-life boundaries. The cross-sectional approach was used, and a stratified random sampling of 272 practitioners was made from a target population of 990. The data collected from 166 valid responses were analyzed descriptively and with multiple regression analysis (SPSS v26). The four dimensions explained 77.6% of the variance in practitioner performance in the results. The most consistent individual predictor was IT infrastructure stability, followed by system usability, administrative screen-time demands, and digital work-life boundaries. The significance of all the null hypotheses was taken as < 0.001. It was found that the adoption of HIS is a "digital paradox" in Kirinyaga County: technologies that were meant to enhance performance can hinder performance when not implemented correctly. The need for emphasis on priority investment in IT infrastructure, systematic usability audits, documentation redesign, and formal digital disconnection policies.

Keywords: Health Information Systems, HIS, Cognitive Load, Patient Interaction, Work-Life Integration, Medical Practitioners, Kirinyaga County, System Usability, IT Infrastructure, Job Demands-Resources Model.

INTRODUCTION

Health Information Systems (HIS) include Electronic Health Records (EHR), Laboratory Information Systems (LIS), Telemedicine Systems, and the Integrated Hospital Management Systems and are a key pillar of healthcare delivery reform in today's world. The adoption of HIS in public health facilities is a strategic initiative in Kenya as it is confronted with a combination of resource constraints, staff shortages, and an increasing number of patients. Kirinyaga County is a textbook example of this situation: Despite at least four sector strikes between 2018 and 2022, the county allocated KES 1.962 billion (43.31% of its total budget) to health in 2021/2022, which is still a very low doctor-to-population ratio, at 1:36,339, compared to the WHO recommended ratio of 1:230.

This study centers on an intriguing paradox: the digital paradox. HIS are adopted specifically because they have the potential to make healthcare delivery faster, safer, and more efficient. In reality, however, these systems can have the opposite impact: a nurse that spends 40% of her shift filling out data in a poorly designed interface has less time on hands to spend with patients. With the loss of data, a clinical officer whose EHR system crashes in the middle of their consultation is losing clinical momentum and trust from their patients. A doctor who receives an after-hours alert notification on a shared mobile platform will never

get the day back, regardless of what happens the next morning. In both, the device intended to assist turns into a source of aggravation.

The study analyzed four identifiable aspects of this paradox: (i) system usability, which focuses on whether the design of the HIS interface makes the system easy to use for practitioners and thus less burdensome cognitively; (ii) administrative screen-time demands, which centers on whether documentation requirements are more likely to interfere with or enhance direct patient care; (iii) stability of IT infrastructure, which looks at the stability of the technology that underpins the HIS and whether this is adequate for practitioners to rely on; and (iv) digital work-life boundaries, whether the introduction of digital systems leads to a reduction or an increase in direct patient care. The study was guided by the Job Demands-Resources (JD-R) Model, which was used to develop the theoretical framework for comprehending when a digital tool becomes a performance resource or a performance-depleting demand.

The study aimed at establishing: (i) the relationship between system usability and practitioner performance; (ii) the relationship between administrative screen-time demands and the practitioner's performance; (iii) the relationship between IT infrastructure stability and practitioner performance; and (iv) the relationship between digital work-life boundaries and practitioner performance in Level 4 and Level 5 hospitals in Kirinyaga County.

METHODOLOGY

A descriptive cross-sectional research design was used. The target population was 990 medical practitioners from all the public health facilities in Kirinyaga County at levels 4 and 5. A sample of 272 respondents was selected using stratified random sampling in the five practitioner cadres based on Yamane's (1967) formula at a 95% confidence level and 5% error. Data was gathered using a structured questionnaire that included the System Usability Scale, along with scales for the other variables. A reliability study of the sub-scales was conducted on a pilot study of 28 participants at a similar facility in Murang'a County with Cronbach's Alpha coefficients all above 0.70 (Table 2), which confirmed reliability. The data were analyzed using descriptive statistics, Pearson correlation, simple regression, and multiple regression in SPSS v26. Descriptive statistics were performed on the data obtained from 166 valid questionnaires returned (response rate: 61.0%).

Table 1: Sampling Distribution by Practitioner Cadre

Stratum	Categories	Population	Sample
Physicians	Medical Officers, Clinical Officers, Dental Officers	180	49
Nurses	Registered and Enrolled Nurses	480	132
Technicians	Lab, Radiography, Pharmacy, Dental	170	47
Specialists	Nutritionists, Physiotherapists, Surgeons, Radiologists	60	17
Others	Public Health, Social Work, Entomology	100	27
Total		990	272

Table 2: Instrument Reliability (Cronbach's Alpha)

Variable	No. of Items	Cronbach's Alpha
System Usability (SUS)	10	0.831
Administrative Screen-Time Demands	8	0.756

Variable	No. of Items	Cronbach's Alpha
IT Infrastructure Stability	9	0.802
Digital Work-Life Boundaries	8	0.721
Performance	12	0.850
Overall Instrument	47	0.818

RESULTS

Descriptive Profile of Respondents

The majority of respondents (105 out of 166, 63.3%) were female, reflecting the gender distribution of the healthcare workforce in Kenya, where the majority of nurses are female. 86 (51.8%) of those who responded were aged 30–40 years, and 121 (72.9%) had the most advanced education level of a bachelor's degree and/or postgraduate education. Nurses were the largest cadre with 65 (39.2%) of the respondents as sampled, a higher proportion than was reported in the population of nurses. This mid-career group was well-educated, and so was their sensitivity to the HIS demands.

Descriptive Statistics on HIS Variables

Results were found to be high on the composite mean for all four HIS dimensions (range 4.56–4.62 on a 5-point scale) with good agreement from practitioners regarding the relevance of the HIS dimensions to their experience. The integration of the HIS system was poor, with a mean score of 4.57 (161/166 participants). The IT infrastructure stability was also high (M = 4.59), but there was more variation in the answers (SD up to 0.712) across the facilities, thus again highlighting the issue of infrastructure inequality. Respondents concurred that the greatest concern with digital work-life boundaries was that they posed a negative impact on productivity (M = 4.55, SD = 0.706), with 159 of 166 (95.8%) respondents agreeing that work-life integration challenges negatively affected productivity. Performance indicators were rated consistently high (M = 4.62), with the highest scores for goal achievement (M = 4.68) and team promotion (M = 4.68), and the most variable scores for delivery of efficient patient services (M = 4.42, SD = 0.805), suggesting a genuine degree of heterogeneity between facilities.

Correlation Analysis

Table 3 shows significant positive relationships between all HIS dimensions and practitioners' performance by using Pearson correlation analysis. The strongest bivariate correlation was found for system usability ($r = 0.845$, $p < 0.01$), IT infrastructure stability ($r = 0.800$), administrative screen-time demands ($r = 0.784$), and digital work-life boundaries ($r = 0.773$). Multiple regression analysis was supported by the meaningful but non-collinear relationships among the predictors, as determined by the correlation coefficient ranging from 0.682 to 0.804.

Table 3: Pearson Correlation Matrix

Variable	Performance	Sys. Usability	Screen-Time	IT Stability	Work-Life
Performance	1				
System Usability	.845**	1			
Screen-Time Demands	.784**	.747**	1		
IT Stability	.800**	.697**	.769**	1	

Variable	Performance	Sys. Usability	Screen-Time	IT Stability	Work-Life
Work-Life Boundaries	.773**	.682**	.692**	.804**	1

Simple Regression Results by HIS Dimension

Numbers of the digital paradox. All four HIS dimensions below carry the same story in each dimension, so good-quality implementation enhances performance, but poor-quality implementation has a negative impact on performance. These relationships are summarized in Table 4. The results of the four null hypotheses (H01–H04) were all rejected at $p < 0.001$.

Table 4: Summary of Simple Regression Results

HIS Dimension	R	Adj. R^2	F-value	p-value
System Usability	0.845	0.712	419.345	< 0.001
Administrative Screen-Time Demands	0.784	0.612	274.032	< 0.001
IT Infrastructure Stability	0.804	0.644	310.044	< 0.001
Digital Work-Life Boundaries	0.773	0.568	247.814	< 0.001

IT Infrastructure Stability (Adj. $R^2 = 0.644$). The simplest paradox: a system that does not work cannot help anybody. Most of the individual predictors were significant, with infrastructure stability being the most significant ($F = 310.044$, $p < 0.001$; $B = 0.834$), indicating that for each unit increase in infrastructure reliability, there is an increase in performance of 0.834 units. The paradox comes when the facilities invest in the HIS but in the absence of the supporting infrastructure necessary for use by practitioners to achieve the desired results. Downtime in resource-limited public facilities is a problem necessitating either restoration (loss of clinical time) or the use of paper despite all the efficiency gains. This aspect of the paradox can be resolved with reliable infrastructure; otherwise, it can be worsened.

System Usability (Adj. $R^2 = 0.712$ bivariate; Beta = 0.377 combined). The cognitive paradox here is that the use of HIS can be adopted to lessen mental strain during patient record management, but with a poorly designed interface, the mental strain can be enhanced. Usability is also the most significant switch in the combined model, having the highest standardized beta and the strongest bivariate correlation ($r = 0.845$). Intuitive and cognitively compatible navigation frees mental bandwidth for patient care when HIS is integrated into clinical workflows. If it is not, then practitioners have to handle two cognitive loads at once: the clinical and the navigational, and both are not given sufficient focus. Good systems address this aspect of the paradox; bad usability perpetuates the paradox.

Administrative Screen-Time Demands (Adj. $R^2 = 0.612$). This dimension is most poignantly captured by the paradox that was evident from the beginning: that HIS documentation was designed to be used in the patient record, but unmanaged, it takes the practitioner away from the patient. Documentation requirements that are structured and supported, with a positive regression coefficient ($B = 0.848$), explain 61.2% of variance among individuals. The conundrum is when they're not—when a nurse finishes patient rounds in a lower time than the EHR could fill out and when a clinical officer sits at a screen longer than at the bedside. This dimension is addressed by structured documentation design and proper clinical support staff.

Electronic Work-Life Balance (Adj. $R^2 = 0.568$). The final dimension of the paradox is outside the walls of the facility. With HIS connectivity, practitioners don't have to stay on duty all the time, a design goal that helps deliver responsive and flexible healthcare. Of the 166 who responded, 159 (95.8%) said this connectivity hampers their productivity. The practitioner who receives a system notification at 10 pm is

already exhausted the next morning when he or she returns to work. The paradox is that the technology that makes care possible at all hours of the day also takes its toll on the human resources that make care possible. This dimension is addressed by formal digital disconnection processes and organizational norms for boundaries; if these are missing, the cycle continues.

Multiple Regression Analysis

The overall model, including all four HIS dimensions, was highly significant [$F(4,161) = 150.233$, $p < 0.001$] and explained 77.6% of the variance in practitioner performance (Adjusted R^2). There was no evidence of autocorrelation (Durbin-Watson statistic = 1.599); H_{05} was rejected.

$$\mathbf{Y = -0.241 + 0.362X1 + 0.231X2 + 0.328X3 + 0.198X4}$$

Table 5: Multiple Regression Coefficients

Predictor	B	Std. Error	Beta	t	Sig.
(Constant)	−0.241	0.187	—	−1.288	.200
System Usability (X1)	0.362	0.054	0.377	6.692	.000**
Screen-Time Demands (X2)	0.231	0.061	0.214	3.786	.000**
IT Infrastructure Stability (X3)	0.328	0.052	0.398	6.297	.000**
Digital Work-Life Boundaries (X4)	0.198	0.063	0.172	3.143	.002**

$p < 0.01$. Model: Adjusted $R^2 = 0.776$; $F(4, 161) = 150.233$; Durbin-Watson = 1.599

IT infrastructure stability was co-dominant in the combined model with system usability (Beta = 0.398 and 0.377, respectively); subordinate factors included administrative screen-time demands (Beta = 0.214) and digital work-life boundaries (Beta = 0.172), which also contributed significantly. The individual coefficient reduction from simple regression to multiple regression models illustrates how the dimensions of HIS are interrelated; infrastructure reliability adds to usability benefits, the cognitive cost of the demands of screen time is influenced by usability, and the boundary is defined by organizational digital policies that are dependent on infrastructure capabilities. No single dimension works on its own; a holistic approach is needed.

CONCLUSION

The aim of this study was to explore one of Kirinyaga County's public healthcare system's basic paradoxes: the use of the same digital technologies that are supposed to enhance practitioner performance is, under some circumstances, causing practitioners' performance to decline. It is found empirically in the findings, which also reveal the exact location of the breach in the paradox and its reasons.

The paradox is based on a disconnect between what you want and how you do it. The aim of HIS is to simplify clinical workflow, enhance data quality, and facilitate evidence-based decision-making. However, in reality each of the four dimensions examined can become a performance facilitator or a performance saboteur. A system that fails to run three times a day is not streamlining; it just forces practitioners to go back to paper, duplicate work, and waste time. If it takes two hours to document a shift, it is not saving time; it is taking the time needed to sustain performance the next day. These are not hypothetical but actual risks evident in the data, which together account for 77.6% of the variance in performance in Level 4 and Level 5 facilities.

The first and most obvious driver of the digital paradox is the instability of IT infrastructure. Infrastructure reliability was the top individual predictor of performance with an adjusted R^2 of 0.644. For any other benefit of HIS to come true, the system itself must function — reliably, consistently, and readily with a quick response from technical support if it breaks. Every minute of downtime costs someone something in a county with more than 36,000 people served by one doctor. Infrastructure investment is thus not a luxury from a technical point of view but rather a condition for the solution of the paradox.

Secondly, usability is the most important way by which HIS changes from demand to resource. A well-designed interface will minimize the cognitive load and leave clinical decision-making at the center of focus. A poorly designed one becomes a second job — a job with technology — and it takes away from the first job of caring for patients. The paradox deepens when usability is poor and lessens when usability is high.

Third, administrative screen-time demands present the most visible side of the digital paradox in most practices. Structured documentation, proper allocation, and clinical staff support make HIS documentation a performance resource with better records accuracy and follow-up care. If those requirements aren't managed and focused, they work against the very patient-to-practitioner interaction that makes the healthcare experience good.

Fourth, work-life boundary erosion is real: 95.8% of respondents said these boundary violations hamper their productivity when they leave the facility. The very technology that allows for flexible, connected healthcare delivery also makes practitioners unable to recover. When there are no formal organizational arrangements for digital disconnection, this connectivity is a constant demand without a buffer.

Therefore, it can be concluded that the digital paradox in Kirinyaga County exists and is measurable and solvable. It is real because the data show that HIS adoption both enables and hinders performance. It is measurable because the four dimensions together account for 77.6% of the variance in performance. It is solvable — not by giving up on digital health systems, but by taking a multi-faceted approach addressing infrastructure, system usability, documentation design, and boundary management as a single policy agenda rather than separate technical decisions.

RECOMMENDATIONS

Policymakers and County Health Administrators

(i) Create IT infrastructure quality criteria for all the Level 4/5 facilities, including minimum uptime and dedicated clinical-grade network bandwidth. All decisions for the expansion of HIS should follow or be based on investment in infrastructure.

(ii) Conduct biennial HIS usability audits based on validated tools like the SUS, with findings feeding into procurement decisions. No HIS platform should be deployed below a minimum agreed usability threshold.

(iii) Establish and implement formal protocols for digital disconnection (after hours, when to and when not to use digital communication, and explicitly protecting time for practitioners to recover).

(iv) Match HIS documentation workload to staffing models — implementing clinical support officers to enter information into the HIS to free practitioner time for clinical functions.

HIS Implementation Teams

(i) Implement co-design strategies as a meaningful way of engaging frontline practitioners in the development of interfaces and workflow mapping before deployment. Clinical workflow compatibility needs to be shown prior to rollout.

(ii) Design and conduct cadre-specific training programs, incorporating a continuous component of refresher training where necessary, specifically targeting cadres most likely to be involved in documentation (such as nurses and clinical officers).

(iii) Embed automated documentation tools such as voice recognition, smart templates, and clinical decision support to minimize manual data entry loads and enhance documentation quality and completeness.

Healthcare Institutions

(i) Develop digital wellness monitoring systems to measure practitioner screen time and documentation allocation and provide evidence to guide workload management.

(ii) Develop structured peer mentoring programs to pair HIS users who experienced successful adoption with those who are struggling, thus minimizing the performance cost of the adoption learning curve.

(iii) Establish systematic feedback loops and clear escalation procedures for practitioners to share information on infrastructure failures, usability barriers, or documentation burden issues with management and IT teams.

Areas for Further Research

Future studies should (i) use longitudinal study designs to capture dynamic HIS-performance relationships as systems and practitioner experience change; (ii) include patient-level outcome variables to provide insight on context-specific performance; (iii) incorporate the moderating effect of leadership style and organizational culture; and (iv) explore the impact of emerging clinical decision support (CDS) using artificial intelligence (AI) and telemedicine on practitioner performance in the Kenyan public health context.

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Assessing the Effect of Credit Risk Identification on Loan Performance in Credit-Only Microfinance Institutions in Central Kenya

Maina, J., Gitau, R., Waita, G.
School of Business and Education, Kirinyaga University, KENYA
Correspondence: *jmaina@kyu.ac.ke*

ABSTRACT

Credit-only microfinance institutions play an important role in expanding access to credit among underserved households, micro-entrepreneurs and small businesses in Kenya. However, persistent loan defaults and declining portfolio quality continue to threaten their financial sustainability, particularly because many borrowers operate in informal markets with limited financial records and unstable income streams. This study examined the effect of credit risk identification on loan performance among credit-only microfinance institutions in Kirinyaga, Nyeri, Murang'a and Kiambu counties in Central Kenya. The study was anchored on Information Asymmetry Theory, which explains how limited borrower information can increase adverse selection and moral hazard in lending. A descriptive and explanatory research design was adopted. Data was collected from credit managers, junior credit officers and field credit officers using structured questionnaires and interviews. Quantitative data was analyzed using descriptive statistics and simple linear regression, while qualitative responses were analyzed thematically. Credit risk identification had a positive and statistically significant relationship with loan performance. Specifically, credit risk identification explained 41.2% of the variation in loan performance, with regression results indicating a significant positive coefficient, $B = 0.735$, $p < .001$. Results suggest that borrower screening, verification of loan application information, background checks, use of Credit Reference Bureau reports and assessment of borrower credit history are important in improving repayment performance and reducing default risk. Effective credit risk identification is a critical determinant of loan performance among credit-only microfinance institutions. There is need for these institutions to strengthen borrower appraisal systems, improve credit information sharing, train credit officers continuously and adopt data-driven tools for early identification of risky borrowers.

Keywords: Credit Risk Identification, Loan Performance, Microfinance Institutions, Non-Performing Loans, Borrower Screening, Central Kenya.

INTRODUCTION

Microfinance institutions play an important role in promoting financial inclusion, especially in developing economies where many low-income households, small-scale traders and micro-entrepreneurs remain underserved by formal banking institutions (Armendáriz and Morduch, 2022). In Kenya, credit-only microfinance institutions (COMFIs) provide credit facilities to individuals and small businesses that often lack adequate collateral, formal financial records or stable income documentation required by conventional banks (Central Bank of Kenya, 2024). Through this role, COMFIs contribute to enterprise growth, household welfare and access to finance among populations that would otherwise depend on informal credit sources. However, their ability to sustain this contribution depends greatly on the quality of their loan portfolios and the effectiveness of their credit risk management practices.

Credit risk remains a major concern for lending institutions because it reflects the possibility that borrowers may fail to meet their repayment obligations as agreed. The challenge is particularly serious among

COMFIs because they mainly lend to clients operating in informal and semi-formal sectors, where income streams are often irregular, business records may be incomplete and financial literacy levels vary across borrowers (Karlan et al., 2022). Since COMFIs do not mobilize customer deposits in the same way as deposit-taking financial institutions, persistent loan defaults can quickly weaken liquidity, reduce lending capacity and threaten institutional sustainability (Ledgerwood et al., 2022). Effective credit risk identification is therefore essential in protecting portfolio quality and strengthening loan performance.

Credit risk identification enables lending institutions to recognize borrower-specific, business-related and environmental risks that may affect repayment ability. These practices help lenders distinguish between low-risk and high-risk borrowers and reduce the likelihood of lending to clients with hidden repayment weaknesses. In lending relationships, information asymmetry may lead to adverse selection, where risky borrowers are approved because lenders cannot fully observe their true risk profile before loan disbursement.

As a result, lenders cannot depend only on conventional financial statements or collateral-based appraisal. Instead, they may combine formal mechanisms such as Credit Reference Bureau reports and repayment histories with informal mechanisms such as field visits, community information, business observation and borrower interviews (Adusei and Tweneboah, 2023). This combination improves the lender's understanding of borrower behavior, repayment capacity and potential default risk before credit is granted.

Loan performance is commonly assessed through indicators such as repayment rates, default levels, portfolio at risk, loan recovery rates and non-performing loans (Microfinance Information Exchange, 2024). Strong loan performance enables COMFIs to maintain liquidity, recycle lending capital and continue serving financially excluded clients. Poor loan performance, on the other hand, increases provisioning costs, reduces profitability, weakens portfolio quality and limits the institution's capacity to extend new credit (Ledgerwood et al., 2022). Since loan performance is influenced by the quality of decisions made at the loan origination stage, credit risk identification becomes a strategic function rather than a routine administrative procedure.

Empirical studies have shown that effective borrower screening and credit information sharing improve repayment outcomes and reduce default risk. Bassem (2022) observed that institutions with stronger borrower screening practices experienced lower default exposure than those relying on minimal verification. Studies in microfinance contexts also indicate that business appraisal, background checks and site visits strengthen portfolio quality by helping lenders identify borrower risks before disbursement (Adusei and Tweneboah, 2023; Okoth and Mwangi, 2023).

Despite this evidence, most studies on credit risk and loan performance in Kenya have focused on commercial banks and deposit-taking microfinance institutions, with limited attention to credit-only microfinance institutions. This creates a gap because COMFIs operate under a distinct lending model, serve borrowers with different risk profiles and face unique sustainability challenges due to their dependence on loan recoveries and external funding. This study examines the effect of credit risk identification on loan performance among credit-only microfinance institutions in Kirinyaga, Nyeri, Murang'a and Kiambu counties in Central Kenya.

RESEARCH METHODOLOGY

Research Design

This study adopted a descriptive and explanatory research design to examine the effect of credit risk identification on loan performance among credit-only microfinance institutions in Central Kenya. The descriptive design enabled the study to describe existing credit risk identification practices, including borrower screening, background verification, use of Credit Reference Bureau reports, credit history review and verification of loan application information. The explanatory design was appropriate because the study tested whether credit risk identification significantly predicted loan performance. A mixed-methods approach was used, where quantitative data supported statistical analysis, while qualitative responses provided contextual explanations.

Study Area

The study was conducted in Kirinyaga, Nyeri, Murang'a and Kiambu counties in Central Kenya. These counties were selected because they have active credit-only microfinance institutions and vibrant economic activities in agriculture, trade and small enterprises that rely on microfinance credit. The target population comprised 37 credit-only microfinance institutions operating in the study area. Since the number of institutions was small and manageable, the study adopted a census approach in which all the 37 COMFIs were included. From each institution, three respondents were purposively selected from the credit management function: a credit manager, a junior credit officer and a field credit officer. This produced a total target population of 111 respondents.

Table 1: Target Population Distribution Across Counties

County	Number of COMFIs	Target Respondents
Kirinyaga	8	24
Murang'a	8	24
Kiambu	12	36
Nyeri	9	27
Total	37	111

Source: AMFI-K (2022)

Data Collection Instruments

Data was collected using questionnaires and interviews. The questionnaire contained both closed-ended and open-ended items and was used as the main instrument because it allowed standardized data to be collected from credit management staff across the selected COMFIs. The instrument covered demographic information, credit risk identification practices and loan performance indicators. Interviews with credit managers were used to obtain additional institutional insights on how borrower risk was identified before loan approval and how these practices related to loan performance.

Validity and Reliability

Validity of the research instruments was established through content and construct validity. Content validity was ensured by aligning the questionnaire items with the study objective, relevant literature and the key constructs of credit risk identification and loan performance. Construct validity was assessed through a pilot study conducted among credit-only microfinance institutions outside the study area. Reliability was tested using Cronbach's alpha coefficient, with a threshold of 0.70 and above considered acceptable for internal consistency.

Data Collection Procedures and Analysis

Formal authorization was obtained from the university and approval was granted by the National Commission for Science, Technology and Innovation before data collection. Questionnaires were distributed personally using the drop-and-pick method, allowing respondents adequate time to complete them. Quantitative data was coded and analyzed using SPSS (version 27). Descriptive statistics, correlation analysis and simple linear regression were used to determine the effect of credit risk identification on loan performance. The regression model was specified as $LP = \beta_0 + \beta_1 CRI + \varepsilon$, where LP represents loan performance, β_0 is the constant term, β_1 is the regression coefficient, CRI represents credit risk identification and ε is the error term. Qualitative data from interviews and open-ended responses was analyzed thematically.

Ethical Considerations

Ethical considerations were observed to protect respondents and ensure research integrity. Approval was obtained from the relevant institutional authorities and the National Commission for Science, Technology and Innovation. Respondents were informed about the purpose of the study, their voluntary participation and their right to withdraw at any stage without penalty. Informed consent was obtained before participation, while confidentiality and anonymity were maintained by excluding identifying information from the report.

RESULTS AND DISCUSSION

Response Rate and Respondent Characteristics

A total of 111 questionnaires were distributed to respondents drawn from credit-only microfinance institutions in Kirinyaga, Murang'a, Kiambu and Nyeri counties. Of these, 108 questionnaires were duly completed and used for analysis, while 3 were incomplete and excluded. This represented a response rate of 97%. The high response rate was attributed to personal administration of the questionnaires and the drop-and-pick method.

Table 2: Questionnaire Response Rate

Response Category	Frequency	Percentage
Questionnaires distributed	111	100
Questionnaires returned and analyzed	108	97
Incomplete questionnaires	3	3
Total	111	100

Source: Field Data (2025)

Respondent characteristics showed that most respondents were within the active working-age group and were therefore suitably placed to provide information on credit operations in COMFIs. Gender distribution was relatively balanced, with 56 of 108 (52%) respondents being male and 52 of 108 (48%) female. In terms of job category, junior credit officers formed the largest group (45 of 108, 42%), followed by field credit officers (37 of 108, 34%) and credit managers (26 of 108, 24%). This distribution ensured that the study captured operational, field-level and managerial perspectives on credit risk identification and loan performance.

Table 3: Demographic Characteristics of Respondents

Characteristic	Category	Percentage
Gender	Male	52
	Female	48
Age Group	18 to 25 years	10
	26 to 35 years	40
	36 to 45 years	31
	46 to 55 years	13
	Above 56 years	6
Respondent Category	Credit Managers	24
	Junior Credit Officers	42
	Field Credit Officers	34
Years of Experience	Less than 1 year	9
	1 to 5 years	29
	6 to 10 years	36
	11 to 15 years	19
	Above 15 years	7
County Distribution	Kirinyaga	12
	Murang'a	24
	Nyeri	27
	Kiambu	37

Source: Field Data (2025)

Credit Risk Identification Practices

Table 4 presents descriptive findings on credit risk identification practices among credit-only microfinance institutions in Central Kenya. The findings show that borrower credit history as a key factor in loan approval recorded the highest mean score (M = 4.25, SD = 0.88). This was followed by effective use of Credit Reference Bureau reports (M = 4.18, SD = 0.98), verification of information provided in loan application forms (M = 4.16, SD = 0.96), and training of credit officers to identify risk indicators (M = 4.15, SD = 0.97). Use of data analytics to identify risk patterns had the lowest mean score (M = 3.99, SD = 1.07).

Table 4: Descriptive Statistics for Credit Risk Identification Practices

Credit Risk Identification Practice	Mean	SD
Borrower credit history is a key factor in loan approval	4.25	0.88
Effective use of Credit Reference Bureau reports	4.18	0.98
Information in loan application forms is thoroughly verified	4.16	0.96
Credit officers are trained to identify risk indicators	4.15	0.97
Clear and consistent process for identifying credit risks	4.07	0.97
Background checks on borrowers are conducted	4.02	1.00

Credit Risk Identification Practice	Mean	SD
Use of data analytics to identify risk patterns	3.99	1.07

Source: Field Data (2025)

Results indicate that COMFIs placed strong emphasis on borrower screening and verification before loan approval. The high mean scores for borrower credit history, Credit Reference Bureau reports and verification of loan application information suggest that both internal and external sources of borrower information were important in credit decisions. However, the relatively lower mean score for the use of data analytics suggests that technological integration in credit risk identification remained less developed. The findings are consistent with Information Asymmetry Theory, which argues that improved access to borrower information reduces uncertainty and adverse selection in lending decisions (Akerlof, 1970).

Loan Performance Outcomes

Table 5 presents descriptive findings on loan performance among credit-only microfinance institutions in Central Kenya. Improvement in loan repayment rates had the highest mean score (M = 4.20, SD = 0.89), followed by reduction in loan defaults (M = 4.14, SD = 0.94), improvement in portfolio quality (M = 4.11, SD = 0.96), increase in loan recovery rates (M = 4.08, SD = 0.99), and reduction in non-performing loans (M = 4.04, SD = 1.01).

Table 5: Descriptive Statistics for Loan Performance

Loan Performance Indicator	Mean	SD
Improvement in loan repayment rates	4.20	0.89
Reduction in loan defaults	4.14	0.94
Improvement in portfolio quality	4.11	0.96
Increase in loan recovery rates	4.08	0.99
Reduction in non-performing loans	4.04	1.01
Improvement in loan portfolio performance	3.98	1.03
Growth in quality lending outcomes	3.95	1.06

Source: Field Data (2025)

The findings suggest that respondents generally perceived loan performance among COMFIs to be favorable. The relatively high mean scores for repayment rates, default reduction, recovery rates and portfolio quality indicate that the institutions had made progress in managing loan outcomes. However, the lower scores for overall portfolio performance and growth in quality lending outcomes suggest that portfolio quality still required improvement.

Effect of Credit Risk Identification on Loan Performance

The objective of the study was to examine the effect of credit risk identification on loan performance among credit-only microfinance institutions in Central Kenya. To test this hypothesis, simple linear regression analysis was conducted with credit risk identification as the predictor variable and loan performance as the dependent variable. The model summary results indicated a positive relationship between credit risk identification and loan performance. The correlation coefficient was $R = 0.642$, suggesting a moderate positive relationship between the variables. The coefficient of determination was $R^2 = 0.412$, indicating that credit risk identification explained 41.2% of the variation in loan performance.

Table 6: Model Summary for the Effect of Credit Risk Identification on Loan Performance

Model	R	R^2	Adjusted R^2	Std. Error of Estimate
1	0.642	0.412	0.398	0.765

Predictors: (Constant), Credit Risk Identification. Dependent Variable: Loan Performance. Source: Field Data (2025)

Table 7: ANOVA Results

Source	Sum of Squares	Df	Mean Square	F	Sig.
Regression	24.56	1	24.56	41.76	< .001
Residual	35.12	106	0.33		
Total	59.68	107			

Source: Field Data (2025)

The regression coefficient results indicated that credit risk identification had a positive and statistically significant effect on loan performance (B = 0.735, β = 0.642, t = 6.462, p < .001). This implies that an increase in credit risk identification practices was associated with an increase in loan performance among COMFIs. The confidence interval for the coefficient ranged from 0.509 to 0.961 and did not include zero, further confirming the statistical significance of the relationship.

Table 8: Regression Coefficients

Variable	B	Std. Error	Beta	t	Sig.	Lower	Upper
Constant	1.621	0.190	—	8.531	< .001	1.246	1.996
Credit Risk Identification	0.735	0.114	0.642	6.462	< .001	0.509	0.961

Dependent Variable: Loan Performance. Source: Field Data (2025)

The null hypothesis was therefore rejected, and the study concluded that credit risk identification has a statistically significant effect on loan performance among credit-only microfinance institutions in Central Kenya. The findings suggest that effective borrower screening, background verification, review of borrower credit history, use of Credit Reference Bureau reports and verification of loan application information improve loan performance by reducing information asymmetry in lending decisions.

CONCLUSION

Credit risk identification has a positive and statistically significant effect on loan performance among credit-only microfinance institutions in Central Kenya. Institutions that emphasized borrower credit history, Credit Reference Bureau reports, background verification, verification of loan application information and clear risk identification procedures reported stronger loan performance outcomes. The findings further indicate that credit risk identification reduces uncertainty in lending decisions by improving access to borrower information before loan approval. This strengthens borrower selection, reduces exposure to high-risk clients and supports better repayment outcomes. The relatively lower mean score for the use of data analytics suggests that technological integration in borrower risk identification remained limited, pointing to an important improvement area.

RECOMMENDATIONS

There is need for management of credit-only microfinance institutions to strengthen borrower screening and verification before loan approval. This should include consistent review of borrower credit history,

effective use of Credit Reference Bureau reports, background checks and thorough verification of information provided in loan application forms.

There is also need for continuous training of credit officers on credit risk identification, focusing on detecting early warning signs of default, identifying over-indebted borrowers, verifying borrower information and interpreting credit reference data. Credit-only microfinance institutions should also invest in simple and practical data analytics tools to support early detection of borrower risk patterns. Finally, these institutions should standardize their credit risk identification procedures across branches and lending teams to reduce subjective lending decisions and improve fairness, accountability and reliability in borrower appraisal.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

The study was limited to credit-only microfinance institutions in Kirinyaga, Murang'a, Kiambu and Nyeri counties in Central Kenya, which may limit the generalizability of the findings to COMFIs operating in other regions. The study also relied mainly on self-reported data from credit management staff, which may be affected by response bias. Future studies should incorporate objective loan portfolio data, such as actual repayment records, default rates, portfolio at risk and non-performing loan ratios. Finally, the study used a cross-sectional design; future research should consider longitudinal designs to assess how changes in borrower screening, Credit Reference Bureau use, data analytics and verification procedures influence loan performance over time.

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Influence of Cost-Benefit Analysis of Digital Investments on Students' Completion Rates in Public Universities in Kenya

Nderitu, N.
School of Business and Education, Kirinyaga University, KENYA
Correspondence: mosesndiritu@kyu.ac.ke

ABSTRACT

Universities have invested in digital infrastructure like learning management systems, digital libraries, online registration platforms and virtual learning tools to improve students' completion rates. However, a number of public universities continue to experience low student completion rates, delayed graduation and high dropout rates. This situation has raised concerns about whether the benefits derived from digital investments justify the costs incurred and whether such investments contribute to improved completion rates. Thus, this study examined the influence of cost–benefit analysis of digital investments on students' completion rates in public universities in Kenya. The study adopted a descriptive survey research design. The target population consisted of 20 Chairpersons of Academic Departments, 214 ICT staff and 967 undergraduate students in selected public universities in Kenya, totaling approximately 1,201 respondents. Using stratified and simple random sampling techniques, a sample size of 300 respondents was selected. Data was collected using structured questionnaires, interviews and institutional records. Quantitative data was analyzed using descriptive statistics and inferentially using regression analysis with SPSS (25). There was a significant positive relationship between cost–benefit analysis of digital investments and students' completion rates ($r = 0.62$, $p < 0.05$). Regression analysis further revealed that cost–benefit analysis explained approximately 38% of the variation in students' completion rates ($R^2 = 0.38$). Universities that evaluated the financial costs, operational efficiency and academic benefits of digital technologies reported higher levels of timely student completion. It was concluded that effective cost–benefit evaluation of digital investments contributes to student completion rates in public universities. There is need for University management to adopt structured cost–benefit assessment frameworks before implementing digital technologies, allocate adequate funding for digital infrastructure, and continuously monitor the impact of digital systems on student progression.

Keywords: Cost-Benefit Analysis, Students' Completion Rates, Digital Investments.

INTRODUCTION

Students' completion rate is the ratio of the number of students who graduate from institutions of higher learning in a given year to the number of students enrolled. According to Macgowen (2022), completion is the outcome of how many students within a cohort complete and graduate from learning institutions, typically measured in two, three or four years, referring to the percentage of students who successfully finish a programme of study within a defined period. In the context of higher education, this commonly means graduating with a degree within the expected timeframe, for example, four to six years for a bachelor's degree. According to Watson (2023), completion rates are crucial indicators of institutional performance because they reflect both student success and systemic efficiency in supporting learners toward graduation.

In Kuala Lumpur, Siti et al. (2022) assert that universities where more than 75% of students graduate are considered to have attained high completion rates. The authors observed that a high rate of student

completion is crucial in modern society since education is one of the most effective instruments a nation has at its disposal for promoting sustainable social and economic development. To mitigate completion challenges, universities are leveraging cost-benefit analysis (CBA) to inform digital investments aimed at improving student outcomes. According to Robertson (2024), CBA is a structured financial evaluation that compares the expected costs of an initiative against the anticipated benefits, converting both into quantifiable terms when possible.

In the context of educational technology, Thompson (2023) observed that CBA helps decision-makers assess whether tools designed to enhance retention, personalize learning, or streamline advising are likely to produce returns greater than their costs, measured in improved completion rates, reduced time to degree or lower attrition. Digital investments such as adaptive learning platforms, predictive analytics dashboards, and integrated student services systems have shown potential to mitigate some causes of low completion. Watson (2024) observed that adaptive software can tailor instruction to individual needs, while predictive analytics can identify students at risk of dropping out before problems escalate, enabling timely intervention by advisors or support staff.

Yet not all digital investments are equally effective. Harris and Smith (2024) assert that cost-benefit analysis plays a crucial role: by quantifying both the upfront and ongoing costs of a technology licensing, training, integration and contrasting them with measurable benefits like higher retention and reduced support costs, institutions can prioritize investments with the strongest evidence base. In many countries in Sub-Saharan Africa, low educational completion rates remain a critical challenge. In Nigeria, Nwoye (2024) observed that only 38.7% of students from public universities complete in time and asserted that one strategic approach to addressing this issue is through the cost-benefit analysis of digital investments in education.

In public universities in Kenya, Mwangi (2023) notes that digital investments in education offer immense potential to improve learning outcomes, but low course completion rates remain a persistent challenge; conducting a cost-benefit analysis of these investments provides a strategic framework for addressing this issue. Omollo and Kinyanjui (2024) observed that despite Kenya's rapid expansion of higher education and increasing enrolments to over 628,000 students in degree programmes by 2024, with 74.7% enrolled in public chartered universities, completion rates remain a significant concern. A report by the Commission for University Education (2025) showed that while official total graduation numbers rose from 99,829 in 2023 to 123,928 in 2024, this growth reflects sheer volume and does not capture individual student progression patterns or on-time completion. There is therefore need to interrogate how cost-benefit analysis of digital investments influences students' completion rates in public universities in Kenya.

OBJECTIVES OF THE STUDY

The objectives of this study were to:

(i) assess the status of students' completion rates in public universities in Kenya.

(ii) examine the influence of cost-benefit analysis of digital investments on students' completion rates in public universities in Kenya.

THEORETICAL FRAMEWORK

This study was guided by the Cost-Benefit Analysis (CBA) theory, whose proponent was Jules Dupuit in 1844 and later refined by Alfred Marshall in 1942, as a foundational economic framework used to evaluate

decisions by comparing the expected costs of an action against its anticipated benefits. At its core, CBA operates on the principle of rational decision-making. Institutions are assumed to allocate resources efficiently by choosing options where the marginal benefits exceed marginal costs. When applied to digital investments, such as e-learning platforms, online libraries, student information systems, and virtual classrooms, universities assess whether the educational and administrative gains justify the financial and operational expenditures.

This theory is premised on the principle of monetization, where both costs and benefits are expressed in monetary terms to allow comparison. In digital investments, costs may include software acquisition, maintenance, staff training, and infrastructure upgrades, while benefits may include improved access to learning materials, enhanced student engagement, and reduced dropout rates. Second is discounting, which accounts for the time value of money by evaluating future benefits in present terms. Third is efficiency, which ensures that resources are used in a way that maximizes net social benefit. Lastly, sensitivity analysis is used to test the robustness of decisions under different assumptions.

In this study, this theory provides a structured lens for analyzing how digital investments affect academic outcomes. For instance, investing in a robust Learning Management System (LMS) may initially appear costly, but the long-term benefits such as flexible learning, improved communication, and access to digital resources can significantly enhance student persistence. Digital investments can also address systemic barriers that often hinder completion rates. By digitizing services such as registration, advising, and assessment, universities can streamline processes and reduce delays that frustrate students. Through CBA, decision-makers can identify investments with the highest impact-to-cost ratio, ensuring that limited public funds are used effectively.

RESEARCH METHODOLOGY

The study adopted a descriptive survey research design to investigate the relationship between the cost-benefit analysis of digital investments and students' completion rates. The target population consisted of 20 Chairpersons of Academic Departments, 214 ICT staff and 967 undergraduate students in selected public universities in Kenya, totaling approximately 1,201 respondents. Using stratified and simple random sampling techniques, a sample size of 300 respondents was selected. Data was collected using structured questionnaires, interviews, and institutional records. Quantitative data was analyzed using descriptive statistics like frequencies and percentages, and inferential statistics like regression analysis, with the aid of SPSS version 25 and presented using tables.

RESULTS AND DISCUSSIONS

Response Rates

In this study, questionnaires were administered to undergraduate students, Chairpersons of Academic Departments and ICT Staff. This yielded the response rates shown in Table 1.

Table 1: Response Rates

Respondents	Targeted	Participated	Return Rate (%)
Chairs of Department	18	14	77.8
Undergraduate Students	180	165	91.7
ICT Staff	102	90	88.2

Respondents	Targeted	Participated	Return Rate (%)
Total	300	269	89.7

Table 1 shows that Chairpersons of academic departments registered a response rate of 77.8%, undergraduate students 91.7% and ICT Staff 88.2%, giving an average response rate of 89.7%, which is consistent with the assertions of Creswell (2018) that a response rate above 75.0% is adequate. This information enabled the researcher to generalize the study outcomes to the target population.

Students' Completion Rates in Public Universities

The study sought to assess students' completion rates in public universities. This was measured by analyzing the proportion of students who graduate from public universities every year for the last five years (2020–2024). Results are shown in Table 2.

Table 2: Students' Completion Rates in Public Universities in Kenya

Completion Rate (%)	2020 %	2021 %	2022 %	2023 %	2024 %
50-60	4.2	4.1	3.8	3.1	2.3
60-70	66.1	59.6	31.8	25.6	20.4
70-80	27.8	32.9	56.3	62.4	67.5
80-90	1.3	3.4	6.7	7.0	7.7
90-100	0.6	0.9	1.4	1.9	2.1

Table 2 shows that there has been a shift in the distribution of completion rates over the period. This corroborates the findings of Omollo and Kinyanjui (2024) that, despite Kenya's rapid expansion of higher education and increasing enrolments to more than 628,000 students in degree programmes by 2024, completion rates remain a significant concern. These findings point to the fact that, despite progressive increases in the number of students who complete their college education, many public universities are yet to achieve students' completion rates of more than 90%.

Cost-Benefit Analysis of Digital Investments on Students' Completion Rates

The study sought to examine the influence of cost-benefit analysis of digital investments on students' completion rates in public universities. Descriptive data was collected from undergraduate students, processed, and the results are shown in Table 3.

Table 3: Views of Undergraduate Students on the Influence of Cost-Benefit Analysis of Digital Investments on Students' Completion Rates

Test Items	SA %	A %	U %	D %	SD %
Affordability of digital learning tools (LMS, e-books, internet access) enables more students to persist and complete their studies	59.5	15.5	4.5	11.5	9.0
Students are more likely to complete their programs when they perceive digital technologies as improving learning quality	56.5	23.5	2.5	9.5	8.0
When students believe digital investments enhance employability, they are more motivated to complete their degrees	51.5	8.5	7.0	22.5	10.5
Benefits of increased access to digital resources outweigh the financial costs, leading to higher completion rates	68.5	15.5	3.5	8.5	4.0

Test Items	SA %	A %	U %	D %	SD %
Universities that allocate funds efficiently toward impactful digital tools experience higher completion rates	57.6	9.7	4.2	21.2	7.3

Table 3 reveals that 59.5% of the undergraduate students strongly agreed that affordability of digital learning tools, such as LMS, e-books, and internet access, enables more students to persist and complete their studies, whereas 9.0% strongly disagreed. During the interviews, Chairpersons of Academic Departments and ICT Staff also supported the views expressed by the students. On further probing, one Chairperson of an Academic Department, CoD1, noted:

> *When digital platforms are affordable and accessible, we notice fewer dropouts because students can consistently engage with course materials. Cost-effective LMS and open educational resources reduce barriers, especially for students from low-income backgrounds.*

On their part, the ICT Staff noted that subsidized internet bundles and institutional access to e-books had significantly increased student participation and retention. These findings affirm the fact that affordability of digital learning tools plays a critical role in improving student retention and completion rates in public universities. These findings corroborate a study carried out in Kakamega East Sub-county by Wakoli (2024), which revealed that affordable digital tools also lower the cost of education by minimizing the need for expensive printed textbooks and physical resources.

The study revealed that 56.5% of the undergraduate students strongly agreed that students are more likely to complete their programmes when they perceive digital technologies as improving the quality of their learning experience, with 8.0% strongly disagreeing. One Chairperson of Department, CoD2, stated that interactive digital tools had transformed teaching quality, making learning more engaging and improving completion outcomes. These findings lend credence to the assertions of Depay and Jense (2024) that, in the Netherlands, positive perceptions of digital technologies often lead to increased participation in online discussions, improved access to learning resources, and better communication with lecturers and peers.

Further, 51.5% of the undergraduate students strongly agreed that when students believe that digital investments enhance their employability, they are more motivated to complete their degrees, whereas 10.5% strongly disagreed. This belief acts as a form of instrumental motivation, where education is seen not just as a requirement but as a strategic pathway to future career success. This observation is consistent with the findings of a study carried out in Nairobi County by Mwangi and Kinyanjui (2024), which revealed that such perceptions improve persistence, engagement, and goal-oriented behavior.

In addition, 68.5% of the undergraduate students strongly agreed that the benefits of increased access to digital resources outweigh the financial costs for students, leading to higher completion rates, whereas 4.0% strongly disagreed. This is consistent with the assertions of Rossi (2023) that, although implementing and maintaining digital infrastructure requires substantial investment, the long-term gains are evident: students with reliable access to digital resources tend to perform better academically due to improved study efficiency, wider access to scholarly materials, and enhanced engagement. Finally, 57.6% of the undergraduate students strongly agreed that public universities that allocate funds efficiently toward impactful digital tools experience higher student completion rates, supporting Dupont (2024) that efficient funding means targeted investment in tools that directly enhance teaching and learning outcomes.

Inferential Analysis

To further ascertain the relationship between cost-benefit analysis of digital investments and students' completion rates, data was collected from the 14 public universities on their annual digital investment cost and the average students' completion rates for the last five years (2020–2024). Results are shown in Table 4.

Table 4: Annual Digital Investment Cost and Average Students' Completion Rates

Annual Digital Investment Cost (KES)	Students' Completion Rates (%)
102,000	37.0
445,890	53.0
333,566	56.5
157,000	49.0
211,345	50.5
145,000	46.0
111,700	42.5
190,000	48.0
456,800	58.0
533,500	60.0
376,000	63.5
444,000	59.5
167,900	44.0
245,700	51.0

Table 4 shows that public universities which invest more funds in digital infrastructure experience relatively higher students' completion rates and vice versa. This indicates that public universities which allocate more funds toward advanced digital tools, such as high-speed internet, cloud-based learning platforms, interactive software, and robust online libraries, create an environment conducive to learning and engagement. Conversely, universities with limited investment in digital infrastructure tend to experience lower completion rates. The data above were run through linear regression analysis and results are shown in Table 5.

Table 5: Relationship between Annual Digital Investment Cost and Average Students' Completion Rates

Model	B	Std. Error	Beta	t	Sig.
(Constant)	38.735	2.272	—	5.486	.000
Annual Digital Investment Cost	0.00004495	1.655	0.621	2.779	.012

Dependent Variable: Students' Completion Rates in Public Universities.

Table 5 shows a linear regression model of the form: Students' Completion Rates = 38.735 + 0.00004495 × Annual Digital Investment Cost. From the model, there is a positive relationship between digital investment and completion rates. However, the slope is relatively small, reflecting that while digital investment contributes positively, it is not the sole determinant of completion rates. Other factors like teaching quality, student support services, socioeconomic status and campus facilities likely interact with digital investment to influence outcomes. The intercept of 38.74% implies that, in the absence of any digital investment, the baseline completion rate is expected to be around 38.7%. Table 5 further shows a significant positive relationship between the cost-benefit analysis of digital investments and students' completion rates

($r = 0.621$, $p < 0.05$). Regression analysis revealed that cost–benefit analysis explained approximately 38% of the variation in students' completion rates ($R^2 = 0.38$).

SUMMARY OF FINDINGS AND CONCLUSIONS

From the study findings, many public universities continue to struggle with achieving student completion rates above 90%. Research indicates that this challenge is largely due to insufficient investment in digital infrastructure and academic programmes. Limited access to online learning platforms, modern classroom technologies, and e-resources hampers students' ability to engage effectively with coursework. Additionally, underfunded support systems, such as tutoring and mentoring, exacerbate dropout risks. Universities that prioritize upgrading digital tools and expanding programme offerings demonstrate higher retention and completion outcomes.

RECOMMENDATIONS

There is need for public universities to continue prioritizing strategic investment in robust digital infrastructure and online learning programs, ensuring accessible, interactive, and scalable platforms that support student engagement, retention, and ultimately higher completion rates.

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