Effect of Digital Banking on Financial Sustainability of Tier 1 Commercial Banks in Kenya

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Abstract:

Purpose: *This study examined the effect of digital banking on the financial sustainability of Tier 1 commercial banks in Kenya. The study was anchored on the Diffusion of Innovation (DOI) Theory, which explains the adoption and integration of technological innovations within organizations.*

Material/methods: *The study adopted an explanatory cross-sectional research design. The target population comprised 105 heads of departments across nine commercial banks classified within the Central Bank of Kenya's large peer group as of 31 December 2024. A census approach was adopted, and primary data were collected using structured questionnaires. Of the 105 questionnaires distributed, 87 were returned and analyzed, representing a response rate of 82.9%. Data were analyzed using descriptive statistics, Pearson correlation, and simple linear regression analysis.*

Findings: *Digital banking had a positive and statistically significant effect on financial sustainability ($\beta = 0.847$, $p < 0.001$), explaining 71.7% of the variation in perceived financial sustainability. The findings suggest that digital banking supports revenue sustainability, operational efficiency, financial resilience, and service accessibility. However, customers' continued reliance on physical banking halls indicates that the potential benefits of digital banking have not been fully realized.*

Conclusion: *The study concludes that digital banking is a significant predictor of financial sustainability among Tier 1 commercial banks in Kenya. It recommends strengthening digital banking infrastructure, enhancing platform reliability and security, promoting customer adoption of digital services, and reducing dependence on physical banking channels. Future studies should adopt longitudinal research designs and incorporate objective financial indicators to establish the long-term contribution of digital banking to financial sustainability.*

Value: *The study extends existing empirical literature by examining digital banking in relation to broader dimensions of financial sustainability, including revenue stability, liquidity adequacy, operational continuity, financial reserves, and resilience to financial shocks, within the Kenyan banking sector.*

Keywords: *Digital banking, financial sustainability, digital transformation, Diffusion of Innovation Theory, Tier 1 commercial banks, Kenya*

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1. Introduction

Financial sustainability refers to a bank's ability to generate sufficient income to cover its costs, meet its obligations, and continue providing financial services over time. It matters to the wider economy because households rely on banks to safeguard savings,

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while businesses depend on them for credit to finance operations and investment (Osberghaus et al., 2025). Digital banking can influence this capacity by changing the cost of serving customers. Mobile applications, internet banking platforms, and electronic payment systems allow customers to transfer funds, pay bills, and manage accounts without visiting a branch. As more routine transactions move to these channels, banks can reduce the cost per transaction and serve a larger customer base. The financial benefit depends, however, on whether the resulting savings and additional income are sufficient to cover the cost of operating and securing the platforms (Jameaba, 2024).

Across Africa, the expansion of mobile money has widened access to financial services and intensified competition between commercial banks and non-bank providers. In Nigeria, electronic banking and mobile payments have been associated with lower transaction costs and improved access to banking services (Adeleye et al., 2021). In Kenya, the growth of mobile money gives customers alternatives for everyday payments and transfers, increasing pressure on banks to offer affordable and convenient digital services (Ndung'u, 2019). Musau and Muathe (2025) linked digitization strategies to improved performance among Kenyan commercial banks and identified cost, security, and ease of use as important considerations. For a bank, the longer-term financial question is whether customers use its digital channels frequently enough to generate recurring income and sustain the savings achieved through fewer branch transactions.

This question is particularly important for Kenya's Tier 1 commercial banks, which hold a substantial share of the sector's assets and deposits and serve a large customer base (Kenya Bankers Association, 2024). At this scale, even a modest reduction in the cost of processing each payment could yield substantial savings. Equally, the expense of maintaining reliable digital services across a large network could reduce those gains. Previous Kenyan studies have examined the operational outcomes of digital adoption (Kamau, 2020) and the contribution of financial innovation to bank performance (Asisi & Egessa, 2023). These findings leave open whether the gains associated with digital banking strengthen the capacity of Tier 1 banks to cover costs and sustain earnings over time. Accordingly, this study examined the effect of digital banking on the financial sustainability of Tier 1 commercial banks in Kenya.

2. Theoretical Review

Everett M. Rogers introduced the Diffusion of Innovation (DOI) Theory in 1962 to explain how new ideas, technologies, and practices spread through a social system over time. Rogers (2003) identified five stages in the adoption process, beginning with knowledge of an innovation and progressing through persuasion, decision, implementation, and confirmation. The pace of adoption depends partly on five perceived characteristics of the innovation, namely its relative advantage, compatibility with existing practices, complexity, trialability, and observability (Dearing & Cox, 2018; Greenhalgh et al., 2004; Rogers, 2003). In banking, these characteristics help explain why some institutions integrate digital channels into routine service delivery more quickly than others. For example, a bank may be more willing to expand a mobile banking platform when a pilot demonstrates that customers can complete transactions at a lower cost and that the platform works reliably with its existing systems. Studies on mobile and internet banking identify perceived relative advantage and compatibility as important influences on adoption and link their use to improved operational efficiency (Alalwan et al., 2022; Vasileiadis, 2021). Early adoption may also give banks more time to refine their services, respond to customer preferences, and retain customers as competing digital offerings emerge (Hassan et al., 2023; Kaur & Arora,

2021). For Tier 1 commercial banks in Kenya, the theory therefore explains how differences in management support, technological readiness, and the perceived benefits of digital channels may influence both the timing of adoption and the extent of use. Its relevance to financial sustainability lies in what happens after adoption. When customers consistently use digital channels for routine transactions, a bank can serve more customers at a lower cost per transaction, retain business, and generate recurring income to support its operations over time.

3. Empirical Review (Hypotheses Development)

International evidence suggests that digital banking can support financial sustainability by lowering the cost of delivering banking services. In a cross-country study, Liu (2021) found that banks operating in countries with stronger digital infrastructure benefited from lower operating costs and improved service delivery, although greater customer choice also intensified competition. Using panel data from Chinese commercial banks, Jia and Liu (2024) found that digital transformation reduced marginal costs and improved operational efficiency. Similarly, Citterio et al. (2024) found that banks across the European Union that made more effective use of information technology recorded lower operating costs and higher profitability between 2017 and 2022. These findings suggest that digital banking can strengthen a bank's capacity to sustain earnings when efficiency gains translate into lasting cost savings.

Evidence from Central Asia and South Africa shows that the financial benefits of digital banking vary with the pace of adoption and the ability of banks to retain customers. In Kazakhstan and Kyrgyzstan, Begimkulov and Kuti (2024) found that digital banking lowered barriers to entry and made it easier for customers to switch providers. Banks that adopted digital technologies earlier improved their efficiency and profitability, while slower adopters experienced declining market power. In South Africa, Mhlongo et al. (2025) likewise found that mobile and digital banking intensified competition, although banks that successfully integrated these channels retained customers and improved efficiency. These findings suggest that digital banking can reduce service costs while also exposing banks to competitive pressures that influence how much of those savings they retain as earnings.

The reviewed studies provide grounds to expect a relationship between digital banking and financial sustainability, but their outcomes differ in ways that matter for hypothesis development. For example, Jia and Liu (2024) and Begimkulov and Kuti (2024) used the Lerner Index to assess market power, while Citterio et al. (2024) examined profitability and efficiency. These measures capture aspects of bank performance, but they leave open whether digital banking enables Kenya's Tier 1 commercial banks to generate sufficient income to cover costs and sustain operations over time. To address this gap, the study tested the following null hypothesis.

H_{01} states that digital banking has no statistically significant effect on the financial sustainability of Tier 1 commercial banks in Kenya.

4. Research Methodology

The study used a quantitative explanatory survey to examine the relationship between digital banking and financial sustainability.

Study Population and Census

The population comprised 105 heads of department identified through human resource records at the nine commercial banks in the CBK large peer group as of 31 December 2024 (Central Bank of Kenya, 2025). The census invitation covered managers in functions including operations, finance, audit, retail and corporate banking, customer

care and strategy. Of the 105 questionnaires distributed, 87 were returned and analyzed. Each observation represents one departmental head's assessment.

Data Collection and Measurement

Respondents rated statements on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Five items assessed digital deposits, withdrawals, electronic wallets, access across times and locations, and reduced reliance on banking halls. Eight items assessed financial sustainability through revenue continuity, the ability to meet short-term obligations, financial reserves and the ability to withstand or recover from shocks.

Supervisors and subject experts reviewed the instrument for clarity and coverage. A pilot with 10 heads of department from Tier 2 banks informed revisions before the main survey. Cronbach's alpha was .884 for digital banking and .733 for financial sustainability. The coefficients support the internal consistency of each scale within the study.

Table 1: Reliability Analysis

Construct	Items	Cronbach's α
Digital banking	5	0.884
Financial sustainability	8	0.733

Data Analysis and Regression Model

SPSS was used in the original study to summarize the questionnaire responses and estimate the Pearson correlation. The focal hypothesis was assessed using a simple linear regression of financial sustainability on digital banking. For a regression with one predictor and an intercept, the standardized slope equals Pearson's r and the coefficient of determination equals r^2. These relationships allow the standardized regression results to be recovered from the reported correlation and number of observations (Mweta, 2026).

$$FS_i = \beta_0 + \beta_1 DB_i + \varepsilon_i \quad \text{.....1}$$

FS_i and DB_i represent respondent i's financial sustainability and digital banking scores, respectively. The intercept is β_0, the digital banking coefficient is β_1, and ε_i is the residual. The hypothesis was tested at the .05 significance level. The original thesis's multiple regression provides a separate estimate adjusted for other banking technologies.

5. Results

The results presented in Table 2 indicate that the respondents were adequately qualified and experienced, with 55.2% holding undergraduate degrees, 28.7% possessing postgraduate qualifications, and 63.2% having more than 20 years of professional experience. Regarding bank characteristics, 36.8% of the respondents worked in banks that had been operational for over 30 years, followed by 26.4% in banks operating for 21–30 years, 24.1% for 11–20 years, and 12.6% for 1–10 years. These findings suggest that most respondents were drawn from relatively mature and well-established commercial banks with considerable operational experience. In terms of organizational size, 41.4% of the respondents worked in banks with more than 100 employees, 36.8% in banks with 60–100 employees, and 21.8% in banks with 1–50 employees. Overall, the findings demonstrate that the respondents were drawn predominantly from established commercial banks with relatively large workforces, providing a relevant organizational context for examining the effect of digital banking on the financial sustainability of Tier 1 commercial banks in Kenya.

Table 2: Bank Characteristics

		Frequency	Percent
Years Bank Has Been in Operation	1-10 years	11	12.6
	11-20 years	21	24.1
	21-30 years	23	26.4
	over 30 years	32	36.8
	Total	87	100
Number of Employees	1-50 years	19	21.8
	60-100 years	32	36.8
	Above 100 years	36	41.4
	Total	87	100

Descriptive Results

The descriptive results presented in Table 3 indicate that Tier 1 commercial banks in Kenya exhibited a moderate level of financial sustainability (M = 3.39, SD = 0.97). Respondents expressed the greatest confidence in their banks' ability to sustain operations during periods of economic and market uncertainty (M = 3.49, SD = 1.43), followed by maintaining stable revenue levels over time (M = 3.45, SD = 1.40) and consistently meeting financial obligations as they became due (M = 3.30, SD = 1.45). Moderate ratings were recorded for generating sufficient revenue to support ongoing operations (M = 3.25, SD = 1.27), maintaining adequate financial reserves to absorb unexpected losses (M = 3.22, SD = 1.31), and recovering from unexpected financial shocks (M = 3.15, SD = 1.23). However, maintaining adequate liquidity to meet short-term financial obligations (M = 3.11, SD = 1.42) and sufficient liquid resources to support day-to-day financial requirements (M = 2.94, SD = 1.29) received relatively lower ratings, suggesting perceived liquidity management challenges. The relatively high standard deviations across the indicators reflect considerable variations in respondents' perceptions. Overall, the findings suggest that although Tier 1 commercial banks demonstrate relative operational resilience and revenue stability, strengthening liquidity management, financial reserves, and shock recovery mechanisms remains important for enhancing long-term financial sustainability. Nevertheless, these findings reflect managerial perceptions rather than independently verified financial performance.

Table 3: Descriptive Results for Financial Sustainability

	Mean	Std. Dev
The bank maintains stable revenue levels over time.	3.45	1.4
The bank generates sufficient revenue to support its ongoing operations.	3.25	1.27
The bank maintains adequate liquidity to meet its short-term financial obligations.	3.11	1.42
The bank consistently meets its financial obligations as they become due.	3.3	1.45
The bank maintains sufficient liquid resources to support its day-to-day financial requirements.	2.94	1.29
The bank maintains adequate financial reserves to absorb unexpected financial losses.	3.22	1.31
The bank is able to sustain its operations during periods of economic and market uncertainty.	3.49	1.43
The bank has sufficient financial capacity to recover from unexpected financial shocks.	3.15	1.23
Financial Sustainability	**3.39**	**0.97**

The descriptive results presented in Table 4 indicate a moderate level of digital banking implementation among Tier 1 commercial banks in Kenya (M = 3.28, SD = 1.09). Respondents expressed the highest agreement that digital banking services enabled customers to conduct transactions anytime and anywhere (M = 3.67, SD = 1.42), followed by the ability to deposit money digitally without visiting physical branches (M = 3.62, SD = 1.31) and withdraw funds through digital channels (M = 3.47, SD = 1.36). However, the use of e-wallets for payments, transfers, and storage of funds received a relatively moderate rating (M = 3.10, SD = 1.47), suggesting opportunities for further adoption. The reduction in reliance on physical banking halls recorded the lowest mean (M = 2.78, SD = 1.21), indicating that despite the availability of digital banking services, customers continued to rely on traditional banking channels. The relatively high standard deviations reflect considerable variation in respondents' perceptions regarding digital banking implementation. Overall, the findings suggest that although Tier 1 commercial banks have made progress in expanding digital accessibility and transaction convenience, opportunities remain to enhance digital service utilization, promote e-wallet adoption, and reduce dependence on physical banking infrastructure, potentially improving operational efficiency and financial sustainability.

Table 4: Descriptive Results for Digital Banking

	Mean	Std. Dev
Our bank's customers can deposit money digitally through mobile or online banking platforms without visiting a branch.	3.62	1.31
Our bank enables customers to withdraw funds digitally through mobile, online, or cardless channels.	3.47	1.36
Our bank supports the use of e-wallets for payments, transfers, and storage of funds.	3.10	1.47
Digital banking services in our bank allow customers to conduct transactions anytime and anywhere.	3.67	1.42
The availability of digital services has reduced reliance on physical banking halls.	2.78	1.21
Digital Banking	**3.28**	**1.09**

Correlation Analysis

The Pearson correlation results presented in Table 5 reveal a strong, positive, and statistically significant relationship between digital banking and financial sustainability among Tier 1 commercial banks in Kenya ($r = 0.847$, $p = 0.000$). This implies that higher levels of digital banking implementation were associated with higher levels of financial sustainability. Specifically, the findings suggest that adopting digital banking services, including digital deposits, withdrawals, electronic wallets, and round-the-clock access to banking services, may contribute to financial sustainability through enhanced operational efficiency, reduced transaction costs, improved revenue generation, and increased customer accessibility.

Table 5: Pearson Correlation with Financial Sustainability

		FS	DB
Financial Sustainability (FS)	Pearson Correlation	1	
	Sig. (2-tailed)	1	
	N	87	
Digital Banking (DB)	Pearson Correlation	.847**	1
	Sig. (2-tailed)	0.000	
	N	87	87

** Correlation is significant at the 0.01 level (2-tailed).

Regression Analysis (Hypothesis Testing)

The simple linear regression results presented in Table 6 indicate that digital banking had a positive and statistically significant effect on the financial sustainability of Tier 1 commercial banks in Kenya. The model yielded a correlation coefficient of 0.847 and a coefficient of determination (R^2) of 0.717, indicating that digital banking explained 71.7% of the variation in financial sustainability, while the remaining 28.3% was attributable to other factors not captured in the model and unexplained variation. The adjusted R^2 of 0.713 further demonstrated the model's substantial explanatory power. The analysis of variance confirmed that the overall regression model was statistically significant ($F(1, 85) = 215.097$, $p < 0.001$), demonstrating that digital banking significantly predicted financial sustainability. Furthermore, the regression coefficients revealed that digital banking had a positive and statistically significant effect on

financial sustainability ($\beta = 0.847$, $p < 0.001$). The unstandardized coefficient implies that a one-unit increase in digital banking implementation was associated with a 0.826-unit increase in perceived financial sustainability. Consequently, the null hypothesis (H_{01}), which stated that digital banking has no statistically significant effect on the financial sustainability of Tier 1 commercial banks in Kenya, was rejected. These findings suggest that strengthening digital banking services through digital deposits, withdrawals, electronic wallets, and continuous access to banking services may enhance financial sustainability by improving operational efficiency, reducing transaction costs, expanding revenue-generating opportunities, and enhancing customer convenience. However, given the cross-sectional nature of the study, the findings establish a significant predictive relationship rather than definitive causality.

Table 6: Simple Regression of Financial Sustainability on Digital Banking

	Unstandardized Coefficients		**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	0.529	0.178		2.976	0.004
Digital banking	0.826	0.056	0.847	14.666	0.000
Model Summary					
R	.847				
R Square	0.717				
Adjusted R Square	0.713				
Std. Error of the Estimate	0.46861				
ANOVA					
F	215.097				
Sig.	.000				

Dependent variable: Financial sustainability

6. Discussion of the Findings

The study established that digital banking had a positive and statistically significant effect on the financial sustainability of Tier 1 commercial banks in Kenya ($\beta = 0.847$, $p < 0.001$), explaining 71.7% of the variation in financial sustainability. These findings suggest that the adoption of digital banking services, including digital deposits, withdrawals, electronic wallets, and round-the-clock access to banking services, plays an important role in strengthening banks' capacity to generate sustainable revenues, manage operational costs, meet financial obligations, and maintain operational continuity. The findings are consistent with Liu (2021), who established that banks operating in countries with stronger digital infrastructure benefited from reduced operating costs and improved service delivery. Similarly, Jia and Liu (2024) found that digital transformation reduced marginal costs and enhanced operational efficiency among Chinese commercial banks, while Citterio et al. (2024) established that effective utilization of information technology contributed to lower operating costs and improved profitability among European Union banks. The findings also corroborate Begimkulov and Kuti (2024), who established that early adopters of digital banking technologies in Kazakhstan and Kyrgyzstan experienced improved operational efficiency and

profitability, whereas slower adopters experienced declining market power. Likewise, Mhlongo et al. (2025) found that South African banks that successfully integrated mobile and digital banking services improved customer retention and operational efficiency despite increasing competitive pressures. Collectively, these findings suggest that digital banking supports financial sustainability by reducing transaction costs, improving service delivery, expanding revenue-generating opportunities, and strengthening competitiveness. However, the descriptive findings of the present study revealed that digital banking had not substantially reduced customers' reliance on physical banking halls, suggesting that the full financial benefits of digital transformation may not have been realized. Furthermore, the present study extends existing empirical literature by examining financial sustainability beyond conventional performance indicators such as profitability, operational efficiency, and market power. Whereas Jia and Liu (2024) and Begimkulov and Kuti (2024) examined market power using the Lerner Index, and Citterio et al. (2024) focused on profitability and efficiency, the present study incorporated broader dimensions of financial sustainability, including revenue stability, liquidity adequacy, financial reserves, operational continuity, and resilience to financial shocks. Although the cross-sectional nature of the study and reliance on managerial perceptions limit causal inference, the findings provide contextual empirical evidence that digital banking is an important predictor of financial sustainability among Tier 1 commercial banks in Kenya. Consequently, strengthening digital banking infrastructure, promoting customer adoption of digital services, and reducing dependence on physical banking channels may enhance operational efficiency, financial resilience, and long-term financial sustainability.

7. Conclusion

The study concludes that digital banking is a significant predictor of financial sustainability among Tier 1 commercial banks in Kenya. The findings demonstrate that digital banking services, including digital deposits, withdrawals, electronic wallets, and continuous access to banking services, are positively associated with banks' capacity to sustain revenue generation, maintain operational continuity, meet financial obligations, and withstand financial shocks. Digital banking provides opportunities for reducing transaction costs, improving operational efficiency, enhancing customer convenience, and expanding revenue-generating opportunities. However, the relatively low rating regarding reduced reliance on physical banking halls suggests that commercial banks have yet to fully realize the potential benefits of digital banking. Therefore, financial sustainability depends not only on the availability of digital banking services but also on their effective utilization, reliability, accessibility, and integration into existing banking operations.

8. Recommendations

The study recommends that the management of Tier 1 commercial banks in Kenya strengthen investment in digital banking infrastructure, enhance the reliability and security of digital platforms, and expand the range of services accessible through mobile banking, internet banking, and electronic wallets. Banks should also undertake customer awareness and digital literacy initiatives to encourage the utilization of digital banking services and reduce dependence on physical banking halls. Furthermore, management should establish monitoring mechanisms to evaluate digital transaction completion rates, service delivery costs, customer satisfaction, and the contribution of digital banking to revenue generation and operational efficiency. Particular attention should be directed towards identifying and addressing challenges that compel customers to seek assistance through physical branches or call centres after initiating

digital transactions. Additionally, the Central Bank of Kenya should consider strengthening regulatory frameworks that promote digital banking innovation, interoperability, cybersecurity, consumer protection, and standardized reporting of digital banking performance indicators to support the long-term financial sustainability of commercial banks.

9. Study Limitations and Further Research

The study was limited to Tier 1 commercial banks in Kenya, which may restrict the generalizability of the findings to smaller commercial banks and other financial institutions operating under different resource and technological conditions. Furthermore, the study adopted a cross-sectional research design, which limited its ability to establish causal relationships and capture changes in financial sustainability over time. The reliance on self-reported data from heads of departments also introduced the possibility of common method bias and subjective assessments of digital banking and financial sustainability. Additionally, the regression analysis did not explicitly account for potential within-bank clustering of respondents, which may affect the precision of the estimated coefficients. Future studies should adopt longitudinal research designs and incorporate objective financial indicators, such as liquidity ratios, revenue stability, cost-to-income ratios, and operating expenses, to assess the long-term contribution of digital banking to financial sustainability. Further research should also extend the scope to Tier 2 and Tier 3 commercial banks to facilitate comparative analysis across different banking categories. Moreover, future studies could examine the mediating role of operational efficiency and customer satisfaction, as well as the moderating effect of technological capabilities, cybersecurity risk, regulatory frameworks, and competitive intensity on the relationship between digital banking and financial sustainability.

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