# The Influence of E-banking on the Financial Performance of Kenyan Commercial Banks

## Justus Mwandoe Mwakera [a*], Marcella Riwo-Abudho [a] and Silas Onyango Abudho [b]

*[a] Department of Business and Economics, Pwani University, Kenya.*
*[b] Department of Business Administration, University of Nairobi, Kenya.*

***Authors' contributions***

*This work was carried out in collaboration among all authors. Authors JMM and SOA identified the area of study and reviewed literature and thereafter designed the data collection instruments. Author MRA tested the statistical methods and tools used and compiled the manuscript for publishing. All authors collected data, read and approved the final manuscript.*

*Original Research Article*

## ABSTRACT

**Aims:** The mobile and internet revolution has influenced creation and delivery of financial services leading to more innovative ways of linking customers and partners. Electronic Banking (e-banking) has opened up a new channel of banking resulting in new capabilities for banks as intermediaries. The research questions that the study sought to answer include, the role of mobile banking on the financial performance in Kenyan commercial banks, the effect of Electronic Funds Transfer (EFT) on the financial performance of Kenyan commercial banks.
**Study Design:** The research adopted descriptive design with quantitative data approaches.
**Place and Duration of Study:** The target population was made up of 24 Kenyan Commercial Banks in the North Coast region of Kenya with a total of 240 employees. These banks are top tier

_____

*\*Corresponding author: E-mail: justusmwandoe@gmail.com;*

lead brands listed in the stock exchange in the banking sector in Kenya between December 2022 and July 2023.

**Methodology:** Strata of top management (section heads), middle managers (branch managers and super agents) and operational employees (lower cadre employees & credit officers) provided 72 respondents. Both secondary and primary data sources were used with the self-administered questionnaires containing both open and closed ended questions. Data analysis included descriptive statistics, correlation and multiple regression on a model of $Y = 1.518 + 0.438 X_1 + 0.136 X_2 + \varepsilon$.

**Results:** The correlation of the independent variables and the dependent variable was high and positive at 0.697 and 0.573 for mobile banking and Electronic Funds Transfer on financial performance respectively. The value of the adjusted R squared was found to be 0.654. The value of F-statistic was found to be 44.919 and it p-value 0.000. The regression coefficient of mobile banking was found to be 0.438 with a *t*-statistic value of 6.126.

The regression coefficient of EFT was found to be 0.136 with a *t*-statistic value of 6.182.

**Conclusion:** There is a strong relationship between mobile banking, EFT and financial performance of commercial banks in Kenya. M-banking has significantly reduced operational costs while EFT has increased the number of daily transactions. The study established that the popularity of m-banking has is due to the intensity of technology penetration of mobile phones to bank customers which has resulted in the number of customers registering for m-banking services to increase in the last five years. Commercial banks have also experienced increased ROA and growth in market share with adoption of e-banking.

## ABBREVIATIONS

*EFT*     *: Electronic Fund Transfer*
*ATM*     *: Automated Teller Machines*
*ROA*     *: Return on Assets*
*ROE*      *Return on Equity*
*ROAA*    *: Return on Average Asset*
*ROAE*    *: Return On Average Equity*
*CBK*     *: Central Bank of Kenya*
*IB*        *: Internet Banking*
*ICT*      *: Information and Communication Technology*
*IT*        *: Information Technology*
*TAM*     *: Technology Acceptance Model*
*TRA*     *: Theory of Reasoned Action*
*PoS*     *: Point of Sale*
*PU*      *: Perceived Usefulness*
*PEOU*   *: Perceived Ease of Use*
*SPSS*    *: Statistical Package for Social Science*

## 1. INTRODUCTION

### 1.1 The Concept of E-banking

In recent years, the banking industry has tapped into opportunities offered by technology and leveraged its capabilities into service. Banks have eschewed their conventional roles in favor of innovation, improvement, and the launch of new service categories to meet the changing needs of their clientele. The operations of large commercial banks have seen a great deal of innovation and diversification. Electronic Banking (e-banking) has opened up a new channel of banking through the internet which has provided an avenue for new forms of business processes within value chains creating more innovative ways of linking with customers and collaborating with partners. Financial services have been revolutionized by the uptake of technology in both creation and delivery of service [1, 2]. Electronic Banking (e-banking) services include m-banking, Electronic Fund Transfer (EFT), Automatic Teller Machines (ATMs), use of debit cards to make payments and the use of credit cards to acquire loan services [3,4]. E-banking enables the customization of service offerings while using technology based self-creative services like mobile banking and credit cards. M-banking is a term used for performing balance checks, account transactions, payment credit transactions and other banking transactions through a mobile device [5]. Financial institutions can expand their customer base and increase their market share by offering m-banking, which gives millions of consumers in emerging nations access to cellphones but no access to standard banking services, a potential answer [6]. Online banking gives banks a new and more effective electronic delivery tool to complement their existing mobile phone transaction processing

centers, ATMs, and electronic banking delivery systems. In recent years, mobile banking has evolved from a basic information delivery channel to a more complex banking transaction channel that grants access to many services. Due to mobile transactions, populations at the bottom of the pyramid who previously had access to traditional financial services can now participate, improving financial inclusion. Various countries have various rates of adoption of mobile banking services depending on factors like household type, frequency of use, and rate of adoption [7,8].

### 1.1.1 E-Banking in Kenya

The Economic Survey reports that the level of technology adoption in Kenya is high with 100% mobile penetration which is marked by over 65 million simple identifier module (SIM) registration in a country with a population of 49 million [9]. Kenya is marked as an Information and Communication Technology (ICT) ecosystem and is a technology hub together with countries like South Africa, Ghana and Egypt which have resulted from the mobile revolution impacting fin-tech, ed-tech and agri-tech [10]. Supportive firms and industries that has accelerated the growth of fintech and adoption of these technologies in financial services include mobile network operators, internet service providers, governance frameworks and telcos bringing in expertise [11]. The development of the internet has put pressure on banks' ability to act as payment intermediates, leading to the creation of electronic fund transfers, or EFTs, which are structured electronic systems that allow money to be transferred between bank accounts. Debit and credit card usage, ATM withdrawals, bill payments, and online transactions are all included in the EFT services [12]. One of the most popular EFT programs is direct deposit, which entails transferring salary straight into employees' bank accounts, enabling EFT upon check deposits, and enabling business owners to make EFTs by using an ATM cash advance for discretionary business spending. Low administrative costs, increased productivity, more security, and simpler document storage are among the advantages of using EFT. The indices for e-banking can be witnessed from three perspectives i.e. adoption and usage (e-banking usage frequency, number of users, variety of transaction availed and channels used), system and technology (number and variety of technology platforms used, system accessibility and performance, new methods and

innovativeness) as well as customer satisfaction and impact (willingness, loyalty, affordability and financial inclusion [13,14]. Developments in e-banking have therefore been driven by emerging business needs coupled with in mobile and internet technologies.

## 1.2 Theories of Technology Innovation

The purpose of this study is to ascertain how e-banking affects Kenyan commercial banks' financial performance using the Diffusion of Innovation Theory. Five essential features of innovations were recognized by Roger (1995): relative advantage (profitability), compatibility, complexity, observability, and trialability [15,16]. The relative advantage of e-banking as compared to traditional branch banking has been emphasized by various literature and these include economic advantages, convenience, improved service levels and accessibility [17,18]. On the other hand, the Technology Acceptance Model (TAM) is an extension of the Theory of Reasoned Action (TRA) model which was introduced by Devis in 1996 [19]. TAM replaced TRA with two technologically accepted features, perceived usefulness (PU) and perceived ease of use (PEOU), which have been shown to be significant to the adoption of technologies like mobile banking. Numerous researchers have used this model to analyze important issues pertaining to the acceptance and usage of mobile banking, and many of them have produced positive results that showed a correlation between the incorporated variables, such as PU and PEOU. This theory is primarily based on the idea of technology adoption. Comprehensive studies [20] demonstrate that the TAM model guided the investigation of consumer acceptance of mobile banking services by elucidating relationships that exist between variables like PU and PEOU. The results showed that PU was more significant than the other variables in influencing consumers to adopt mobile banking services, but that PEOU, perceived usefulness, and perceived credibility all had an impact on the adoption of mobile banking.

## 1.3 Financial Performance & Technology Platforms in Commercial Banks

A company's ability to create income through the use of its available resources is measured by its financial performance [21]. It's a term used to describe how a company's revenues fluctuate over time or between two or more companies in the same sector. Key Performance Indicators

(KPIs), sometimes referred to as financial performance indicators, are quantitative metrics that are used to assess, monitor, and forecast a company's financial health. They serve as instruments for evaluating the performance of the company in relation to other industry players, for both corporate insiders (investors and research analysts) and outsiders (management and board members). Studies show that these KPIs include gross profit, net profit, working capital, operating cash flow, current ratio, inventory turnover, debt-to-equity ratio, quick ratio and return on equity [22,23,24]. Apart from risk and profitability, which are the two primary factors that determine an organization's significance, the financial success of an organization can also be determined by its magnitude of earnings and its economic outcome. Financial success in India's banking industry is influenced by a number of factors, including ownership, age, size, and liquidity [25]. It is emphasized that factors that may affect financial performance and may change on the face of crisis include leverage, productivity, solvency and assets turnover [26, 27].

Technology is increasingly being employed on service delivery in financial services. Various empirical studies have been conducted to assess the effect of technology adoption on the performance of commercial banks. Earlier studies [28] examined the performance of multichannel banks in Spain between 1994 and 2002 and found that there is higher profitability for multichannel banks through increased commission, income, increased brokerage fees and gradually reduced staffing levels, thereby concluding that internet channel was a complement to physical banking. A study that assessed the performance of Italian banks found that the use of internet banking services as part of a multichannel commercial strategy affected the banks' Return on Average Equity (RoAE) and Return on Average Assets (RoAA) [29]. It was observed the change in financial performance of internet community banks in the United States and found that internet adoption improved community banks profitability from increased revenues from deposit service charges [30]. Ibid continues to explain that internet adoption was also associated with movement of deposits from checking accounts to money market deposit account, increased use of brokered deposits and higher average wage rates for bank employees. Regarding credit unions in Australia, studies found that internet banking was not an operating risk variable nor a performance enhancing tool [31]. Despite the introduction of technologies for

service delivery lowering both staff and information technology costs after the first year of implementation [32,33], the case of Turkish banks reveal that after a period of two years since the introduction of internet banking services, overall profitability decreased as a result of increased competition and diminishing interest income [34,35]. On the other hand, data indicates that clients of US banks mostly use branch banking services due to convenience, security concerns, and the inability to conduct direct in-person encounters. Various researches show emerging trends in banking within developing economies include, universal banking for performing all transactions in a single step, Point of Sale (POS) allowing payment for merchadise, satellite banking enabling banks to have agents deep interior without opening branches, Electronic Clearing System easening transfer of large transactions from institutions, Real Time Gross Settlement allowing the processing of payments at that time when the instructions are received, Electronic Data Interchange for computer to computer exchange of documents and Data Personalization System enabling banks to customize services based on customer profiles [36]. Financial performance on the other hand has various indices with the financial institutions in Kenya using profitability (sales, gross, net profit margin and earnings per share), liquidity (current and quick ratio), solvency (debt-to-equity and interest coverage ratio), efficiency (inventory turnover, accounts receivable and operating expense ratio) and valuation (price-to-earnings and price-to-book ratios) [37,38]. Despite this data, banks are still investing in technology services as a cost-cutting measure, although it is unclear how well these investments are working. Thus, it was crucial for a study to determine the effect of e-banking on performance of the commercial banks in Kenya.

## 2. METHODOLOGY

## 2.1 Research Design

The research adopted descriptive design which was suitable for demonstrating associations between variables. According to Creswell and Johnson (2012) descriptive research design is a scientific method that involves observing and describing the behavior of a subject without influencing it. Quantitative data approaches was used on case study basis in order to obtain in-depth information that will be adequate to project results to the Kenyan commercial banks.

## 2.2 Target Population and Sample Design

The target population was made up of 24 Kenyan Commercial Banks in the North Coast region of Kenya with a total of 240 employees. These banks are top tier lead brands listed in the stock exchange in the banking sector in Kenya. Through stratified sampling, the study obtained respondents from three categories of employees i.e. top management (section heads), middle managers (branch managers and super agents) and operational employees (lower cadre employees & credit officers). The three respondent groups highly engage in strategic decision making regarding e-banking, tactical decisions and business processes pertaining e-banking services respectively. The sampling method resulted in a total sample size of 72 i.e. 30% of the target population.

## 2.3 Data Sources & Collection Instruments

This study used both secondary and primary data sources. Secondary data aiming at building credibility included journals, expert opinion magazines, books and industry reports. Primary data was obtained through questionnaires. The self-administered questionnaires had both open and closed ended questions to allow collect both in-depth information and assist in standardizing responses through a 5-point likert scale.

## 2.4 Data Analysis

Descriptive statistics i.e. means, mode and standard deviations Kurtosis were used with the help of Statistical Package for Social Sciences (SPSS). At a confidence level of 94%, correlation analysis was employed to relate described variables. Multiple regression was used to test variables on a regression model of:

$$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \varepsilon.$$

**Where:**

$Y$ = the financial performance as dictated by e-banking;
$\beta_0$ = constant (coefficient of intercept) the financial performance independent of any existing factors;
$\beta_1 X_2$ = how much mobile banking as a component of e-banking influences financial performance;

$\beta_2 X_2$ = how much electronic fund transfer as a component of e-banking influences financial performance;
$\varepsilon$ = the random error term accounting for all other variables that affect performance but not captured in the model.

The regression analysis was to estimate the relationships between a dependent variable and two or more independent variables in the study.

## 3. RESULTS AND DISCUSSION

### 3.1 Descriptive Analysis

#### 3.1.1 Mobile banking

The study sought to examine the respondent's level of agreement or disagreement on the various contribution of mobile banking to bank operations. Table 1 presents the relevant results with, mean and standard deviations on a 5-point Likert scale (where 1= strongly disagree and strongly agree=5). Results show that M-banking has minimized queues in banking halls (4.36). This is a significant improvement compared to traditional banking, where waiting times can often be much longer. The standard deviation of 0.829 minutes indicates that most customers experience waiting times within 0.829 minutes of the average. This means that the majority of customers are not waiting very long, regardless of whether they use M-banking or traditional banking. Approximately 68% of customers wait between 3.53 and 5.19 minutes. This is a relatively narrow range, which suggests that M-banking is providing a consistent and reliable experience for most customers. The 95% of customers wait between 2.70 and 6.02 minutes. This even wider range suggests that even customers who experience slightly longer waiting times are still generally satisfied with M-banking. M-banking is convenient to customers and banks (4.35). The last five years has registered a rise in number of registered customers (4.37) while the operational cost in banks has resulted from introduction of mobile banking (4.33). Respondents also agreed that m-banking offers wider services to customers (4.351). Based on average statistics, it may be inferred that bank clients are using mobile banking more frequently. These results are represented in Table 1.

#### 3.1.2 Electronic fund transfer

The study sought to examine the participant's level of agreeing or disagreeing on the various

**Table 1. Mobile banking**

| Contribution of Mobile Banking to Bank Operations | Mean | Std deviation |
|---|---|---|
| M-banking has minimized queues in banking halls | 4.36 | 0.829 |
| M-banking is convenient to customers and banks | 4.35 | 0.863 |
| The last five years has registered a rise in number of registered customers | 4.37 | 0.864 |
| Operational cost in banks has resulted from introduction of mobile banking | 4.33 | 0.957 |
| m-banking offers wider services to customers | 4.351 | 0.991 |

**Table 2. Electronic funds transfer**

| Contribution of EFT to Bank Processes | Mean | Std. Deviation |
|---|---|---|
| Linkage of bank with other global banks through EFT | 4.23 | 0.253 |
| EFT as a secure- financial transaction method | 4.21 | 0.198 |
| Increase in number of daily transactions due to EFT | 4.25 | 0.508 |
| Rise in number of customers from EFT | 4.24 | 0.284 |

contribution of EFT to bank processes. Table 2 presents the related results indicating that on a scale of 1 to 5 (where 1= strongly disagree and strongly agree=5) the means and standard deviations were; linkage of bank with other global banks through EFT (4.23). This indicates a strong level of connectivity and integration between the bank and the global EFT network. The standard deviation of 0.253 suggests that most banks have linkage scores within 0.253 units of the average. This means that the data is relatively consistent, and there are not a significant number of outliers with vastly different linkage scores. Approximately 68% of banks have linkage scores between 3.98 and 4.48 which further confirms the consistency of the data and suggests that the majority of banks have a similar level of linkage. The 95% of banks have linkage scores between 3.72 and 4.74. This even wider range indicates that even banks with slightly lower or higher linkage scores are still generally well-connected to the EFT network. EFT as a secure- financial transaction method (4.21), increase in number of daily transactions due to EFT (4.25) and finally, rise in number of customers from EFT (4.24). These statistics are summarized in Table 2.

### 3.1.3 Financial performance

The study sought to examine the participant's level of agreeing or disagreeing on the influence of e-banking on financial performance. Table 3 presents the relevant results which show that on a scale of 1 to 5 (where 1= strongly disagree and strongly agree=5) the means and standard deviations were that there has been a rise in opening of new accounts (4.42), growth in volume of bank sales since adoption of self-service technologies (4.40), expansion of market share by the bank (4.44), growth in in return on assets (4.41) and finally digital platforms enhance returns on assets (4.45). Considering a return on assets with a normal distribution for the ROA growth data for example, the mean of 4.41 indicates the average growth rate in ROA across the observed banks. Indicating that, on average, banks experienced a 4.41% increase in their ROA during the analyzed period which suggests a positive average growth in ROA for the observed banks. The standard deviation of 0.772 quantifies the variability in ROA growth among the banks suggesting that most banks ROA growth rates fall within 0.772 units (above or below) of the average of 4.41%. Assuming in a normal distribution, we can estimate the range within which most ROA growth rates lie; 68% of banks: ROA growth likely falls between 3.638% (mean - std. dev.) and 5.182% (mean + std. dev.), 95% of banks: ROA growth likely falls between 2.866% (mean - 2 * std. dev.) and 5.954% (mean + 2 * std. dev.) indicates moderate variability in ROA growth, with most banks within a reasonable range of the average. Banks with ROA growth rates outside these ranges, either significantly lower than 2.866% or much higher than 5.954%, are considered outliers. These banks might have unique factors influencing their ROA growth strategies or circumstances, implying that the majority of banks exhibit ROA growth rates within predictable bounds. These results show that in the last three years since the introduction of e-banking in commercial banks, there has been an increase in the financial performance as summarized in Table 3.

### Table 3. Financial performance

| Influence of e-banking on Financial Performance in the last three years (2022, 2021,2020) | Mean | Std. Deviation |
|---|---|---|
| Rise in opening of new accounts | 4.42 | 0.914 |
| Growth in volume of bank sales since adoption of self-service technologies | 4.40 | 0.850 |
| Expansion of market share by the bank | 4.44 | 0.811 |
| Growth in in return on assets | 4.41 | 0.772 |
| Digital platforms enhance returns on assets | 4.45 | 0.799 |

### Table 4. Correlation analysis

| | | Financial performance | Mobile banking | Electronics fund transfer |
|---|---|---|---|---|
| **Financial performance** | Pearson Correlation | 1 | | |
| | Sig. (2-tailed) | | | |
| | N | 94 | | |
| **Mobile Banking** | Pearson Correlation | 0.697** | 1 | |
| | Sig. (2-tailed) | .000 | | |
| **Electronic Fund Transfer** | Pearson Correlation | 0.573** | 0.394** | 1 |
| | Sig. (2-tailed) | .000 | .000 | |
| | N | 94 | 94 | 94 |

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

## 3.2 Correlation Analysis

Strong and positive correlations, measuring 0.697 and 0.573, respectively, were found between the independent factors and the dependent variable regarding the effects of mobile banking and electronic funds transfers on financial performance. Since the level of multi-co-linearity between the independent variables was not particularly high, the influence of each variable in the regression model could be evaluated with low multi-colinearity. These results are presented in Table 4.

### 3.2.1 Model summary

Overall, Table 5's corrected R squared score of 0.654 indicated that the model did a good job of fitting the data. This demonstrates the close relationship between financial performance, mobile banking, and EFT. This demonstrates

that, when all factors are considered, the performance of Kenya's commercial banks differs by 65.4%. This description is presented in Table 5.

### 3.2.2 Analysis of variance

The results in Table 6 indicated that the overall model was a good fit since the value of F-statistic was found to be 44.919 and it p-value was found to be 0.000 which is less than the critical value of 0.05. This is summarized in Table 6.

## 3.3 Regression Coefficients

The fitted regression model of Y = 1.518+ 0.438 X1 + 0.136 X2 + ε was used to derive the regression coefficients. Where; Y = Operations Performance, X1 = mobile banking, X2 = Electronic Funds Transfer, ε = Error Term. The regression statistics are presented in Table 7.

### Table 5. Model summary

| Model | R | R Square | Adjusted R Square |
|---|---|---|---|
| 1 | 0.818 | 0.669 | 0.654 |

*a. Predictors: (Constant), mobile banking, Electronic Funds Transfer,*
*b. Dependent Variable: Financial Performance*

**Table 6. Analysis of variance**

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| **1** | Regression | 62.193 | 4 | 15.548 | 44.919 | 0.000 |
| | Residual | 30.807 | 89 | .346 | | |
| | Total | 93.000 | 93 | | | |

*a. Dependent Variable: Financial Performance*
*b. Predictors: (Constant), mobile banking, Electronic Funds Transfer*

**Table 7. Regression statistics**

| Model | Coefficients | Std. Error | t-statistic | probability value |
|---|---|---|---|---|
| **(Constant)** | 1.518 | 0.201 | 7.552 | 0.000 |
| **Mobile banking** | 0.438 | 0.072 | 6.126 | 0.000 |
| **Electronic Funds Transfer** | 0.136 | 0.022 | 6.182 | 0.000 |

*Standard Error 0.201 0.072 0.022*
*t-Statistics 7.552 6.126 6.182*
*p-value 0.000 0.000 0.000*

### 3.3.1 Mobile banking

The regression coefficient for mobile banking was discovered to be 0.438, meaning that a one-unit increase in m-banking impacts the bank's performance by an additional 0.438 units, all other factors in the model being held constant. Additionally positive is the coefficient's value, which indicates that m-banking and bank financial performance are positively correlated. With a t-statistic value of 6.126, the coefficient was statistically significant and positive. Additionally, it was discovered that the variable was the most influencing factor on Kenyan banks' performance. These results are shown in Table 7.

### 3.3.2 Electronic fund transfer

The regression coefficient of EFT was determined to be 0.136 based on Table 7. This figure demonstrates that, when all other model variables are held constant, a one-unit increase in EFT results in a 0.136-unit improvement in bank performance. The positive value of the coefficient indicates a favorable correlation between the performance of banks and the adoption of EFTs. With a t-statistic value of 6.182, the coefficient was statistically significant and positive. This is summarized on Table7.

## 4. CONCLUSION

Conclusions for this study were that, e-banking in Kenya has got a significant influence on the financial performance of commercial banks in Kenya. Strategies for investing on e-banking by commercial banks in Kenya is therefore a worthy undertaking that enhances their financial performance. M-banking and EFT are the most common technologies employed under e-banking and have a significant influence on commercial bank financial performance. The study established that the popularity of m-banking has is due to the intensity of technology penetration of mobile phones to bank customers which has resulted in the number of customers registering for m-banking services to increase in the last five years. These findings supports literatures (Muthoka NI, Oluoch, Njoroge MN, Mugambis, Kamau JG, Senaji) that emphasize how that the major business drivers that have significantly contributed towards mobile banking evolution include customer experience and cost saving in banking operations. Customers may access services including reading bank statements, checking account balances, transferring funds, receiving alerts about account limits, and paying multiple utility bills remotely thanks to mobile banking technology. EFT as a form of e-banking enables transfer of funds from one bank account to another thereby paving way for paperless transactions making paper bills, checks and stamps unnecessary while significantly increasing the number of daily transactions. Many studies confirm that benefits of EFT have been recognized as lowered administrative and transactional fees, cost cutting, enhanced security and easier trail and storage of documents. Commercial banks have experienced increased ROA and growth in market share with adoption of e-banking. It is

therefore vital for commercial banks in Kenya to invest in e-banking supported operations as they improve on the financial performance of the banks.

## ETHICAL APPROVAL

Ethical considerations were made by the researchers in the selection of respondents and the design of the data collection instruments.

## ACKNOWLEDGEMENTS

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Getugi JC, Osoro C, Kihara A. Mobile banking and technical efficiency of commercial banks in Kenya. Journal of Accounting. 2023;6(1):1-20.
2. Kivuitu BM, Aduda J, Ochieng DE, Njeru W. Effect of bank innovation on the financial performance of commercial banks in Kenya. African Development Finance Journal. 2022;4(2):26-43.
3. Sahoo B, Kotiya M. E-Banking: Innovation challenges and opportunities. International Journal of Research in Engineering, Science and Management. 2022;5(5):103-8.
4. Pyoko OM, Akims MA, Nyachae SM, Mbugua L. Mobile phone technology, agency banking services, online banking services and financial inclusion of small and medium enterprises in Kenya. Asian Journal of Economics, Business and Accounting. 2023;23(22):422-434.
5. Rajisha T. Digital payment system: A technology enabled banking self-services in India. ZENITH International Journal of Multidisciplinary Research. 2019;9(6):537-48.
6. Mang'ana R. Strategic adoption of technological innovations on competitive advantage of commercial banks in Kenya.

Journal of Business and Strategic Management. 2022;7(2):16-36.
7. Gichuki CN, Mulu-Mutuku M. Determinants of awareness and adoption of mobile money technologies: Evidence from women micro entrepreneurs in Kenya. InWomen's Studies International Forum 2018;67:18-22. Pergamon.
8. Kingiri AN, Fu X. Understanding the diffusion and adoption of digital finance innovation in emerging economies: M-Pesa money mobile transfer service in Kenya. Innovation and Development; 2019.
9. Kenya National Bureau of Statistics. The Economic Survey 2019.The KNBS; 2020
10. Combrink HM, Knedlik T, Nour SS, Schuerkens U, de Wet K, Wohlmuth K, editors. Business opportunities, start-ups, and digital transformation in Africa. LIT Verlag Münster; 2023.
11. Tian MW, Wang L, Yan SR, Tian XX, Liu ZQ, Rodrigues JJ. Research on financial technology innovation and application based on 5G network. IEEE Access. 2019;7:138614-23.
12. Amal AK. The impact of financial technology on the operational efficiency of licensed commercial banks in Kenya (Doctoral dissertation, University of Nairobi). Bansal, R. Recent trend in mobile banking in Indian markets. International Journal of Electronic Banking. 2019;1(4), 317-328.
13. Jerene W, Sharma D. The adoption of banking technology and electronic financial services: Evidence from selected bank customers in Ethiopia. International Journal of Electronic Finance. 2019;9(4):310-28.
14. Wasike JM, Kwasira J. Influence of strategic repositioning capabilities on sustainable competitive advantage in financial institutions in kakamega county.
15. Kaur Kapoor K, K. Dwivedi Y, D. Williams M. Innovation adoption attributes: A review and synthesis of research findings. European Journal of Innovation Management. 2014;17(3):327-48.
16. Kristian Häggman S. Functional actors and perceptions of innovation attributes: Influence on innovation adoption. European Journal of Innovation Management. 2009;12(3):386-407.

17. Mori N, Mlambiti R. Determinants of customers' adoption Further of mobile evidence banking from in a Tanzania: diffusion of innovation theory. Behavioral Determinants of Enterprise Development and Innovation. 2020;16(2):203.

18. Shaikh IM, Amin H, Noordin K, Shaikh JM. Islamic bank customers'adoption of digital banking services: extending diffusion theory of innovation. Journal of Islamic Monetary Economics and Finance. 2023;9(1):57-70.

19. Lule I, Omwansa TK, Waema TM. Application of technology acceptance model (TAM) in m-banking adoption in Kenya. International journal of computing & ICT research. 2012;6(1).

20. Okari OD, Box KU. Consumer perceived risk of Internet banking in Kenya: A survey of three selected banks in Nairobi County. International Journal of Science and Research. 2017;6(11):645-56.

21. Lin EM, Sun EW, Yu MT. Systemic risk, financial markets, and performance of financial institutions. Annals of Operations Research. 2018;262:579-603.

22. Sitienei H, Korir M, Koske N. Effect of bank efficiency strategies on firm financial performance among banks in Kenya. Journal of Business, Economics and Management Research Studies. 2023;1(2):1-0.

23. Gabeshi K. The analysis of bank performance indicators. Revista Economia Contemporană. 2020;5(1):29-37.

24. Nazneen A, Goyal S, Bhalla P, Jeet V. A study of changing key performance indicators in banking sector. Research in World Economy. 2019;10(3):56-64.

25. Tabash MI, Al-Homaidi EA, Ahmad A, Farhan NH. Factors affecting financial performance of Indian firms: An empirical investigation of firms listed on Bombay Stock Exchange. International Journal of Economic Policy in Emerging Economies. 2020;13(2):152-72.

26. Madaleno M, Barbuta-Misu N. The financial performance of European companies: Explanatory factors in the context of economic crisis. Ekonomika. 2019;98(2):6-18.

27. Amoa-Gyarteng K. Corporate financial distress: the impact of profitability, liquidity, asset productivity, activity and solvency. Journal of Accounting, Business and Management (JABM). 2021;28(2):104-15.

28. Hernando I, Nieto MJ. Is the Internet delivery channel changing banks' performance? The case of Spanish banks. Journal of Banking & Finance. 2007; 31(4):1083-99.

29. Omarini A. Multichannel distribution in banking: Customers perspectives and theoretical frameworks to increase user acceptance of a multiplatform banking business. Banks & bank systems. 2013(8, Iss. 1):78-96.

30. DeYoung R, Lang WW, Nolle DL. How the Internet affects output and performance at community banks. Journal of Banking & Finance. 2007;31(4):1033-60.

31. Nzevela AK. The Effect of internet banking risk management strategies on financial performance of commercial banks in Kenya (Doctoral dissertation, University of Nairobi).

32. Kyeremeh K, Prempeh KB, Afful Forson M. Effect of Information Communication and Technology (ICT) on the performance of financial institutions (a case study of barclays bank, Sunyani Branch).

33. Ivanov SH, Webster C. Adoption of robots, artificial intelligence and service automation by travel, tourism and hospitality companies–A cost-benefit analysis. Artificial Intelligence and Service Automation by Travel, Tourism and Hospitality Companies–A Cost-Benefit Analysis; 2017.

34. Kasman S, Kasman A. Bank competition, concentration and financial stability in the Turkish banking industry. Economic Systems. 2015;39(3):502-17.

35. Siddik MN, Sun G, Kabiraj S, Shanmugan J, Yanjuan C. Impacts of e-banking on performance of banks in a developing economy: Empirical evidence from Bangladesh. Journal of Business Economics and Management. 2016; 17(6):1066-80.

36. Mosa RA. The Influence of E-customer relationship management on customer experience in e-banking service. Soc. Sci. 2022;12(2):193-215.

37. Maseko FE, Kalama A. The effect of electronic banking on commercial banks' financial performance in Tanzania. The Journal of Informatics. 2022;2(1):33-53.

38. Wewege L, Lee J, Thomsett MC. Disruptions and digital banking trends. Journal of Applied Finance and Banking. 2020;10(6):15-56.

---

---

*Peer-review history:*
*The peer review history for this paper can be accessed here:*
*https://www.sdiarticle5.com/review-history/111950*

---