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*Digital Banking and Financial Performance of Listed
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Digital Banking and Financial Performance of Listed Commercial Banks in Kenya

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Abstract

Purpose: The purpose of this study was to examine the relationship between digital banking and financial performance of listed commercial banks in Kenya.

Methodology: The study employed both cross sectional and longitudinal research designs. The target population consisted of the 11 listed commercial banks in Kenya. Data was derived from annual financial reports and publications from 2019 to 2022 and recorded in secondary data capture forms. The research employed descriptive statistics performing both correlation and regression analyses. The data was analyzed using excel spreadsheets.

Findings: The study revealed that online banking, agency banking and mobile banking are positively related to financial performance while ATM banking negatively impact the financial performance of listed commercial banks in Kenya.

Conclusion & Implications: Following the research findings, the study concludes that listed commercial banks in Kenya should increase their uptake of online banking, agency banking and mobile banking to improve their financial performance. They should cautiously use ATM banking as this can negatively affect their financial performance. The study recommended that listed commercial banks in Kenya should increase digitalization to improve their financial performance. Digitalization is the best way to remain competitive in the fast-paced economy.

Keywords: Commercial Banks, Digital Banking, Financial Performance

Introduction

Like many other enterprises, banks evaluate their overall financial performance to gauge their success and profitability. According Nizam et al. (2019), evaluating the financial performance of banks is a vital gauge of their long-term viability and success. Assessment of banks' financial performance is critical to various stakeholders who use the findings to assess the health and sustainability of banks. Banks must promote their performance to attract customers and investors and meet the demands of regulatory bodies (Panida & Sunsern, 2012). High financial performance is paramount for banks to remain competitive and expand their operations. Hannagan (2008) indicated that the financial performance of banks is quantified using various strategies. The strategies include the profitability, liquidity, quality of assets and capital adequacy methods. Nyabaga and Wepukhulu (2020) identified certain factors in the Kenyan banking scene that influenced the performance of banking institutions. One of the elements was a nation's economic situation.

Many scholars assert that variations in economic stability of a nations impact on the performance of financial institutions in the different countries. Other elements which affect banks finances is regulatory environment and the CBK policies, such as limiting the interest rates banks charge, significantly impacts

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their performance. Competition is another key factor. The competition present in the Kenyan banking scene is relatively high. Banks, especially smaller ones, must attract customers and generate profits. One of the more recent factors identified as a significant factor influencing the performance of banks is technological advancements in the sector. Technological advancements have resulted to growth of electronic banking, rapidly spreading in the banking scene (Isa- Olatinwo, Uwaleke & Ibrahim, 2022). Commercial banks have embraced electronic banking as a response to ever changing business environment in attempt to satisfy customer satisfaction and respond to their needs in order to increase their revenue (Chedrawi, Harb&Saleh, 2019).

The result of digital banking on banks performance can be explained using transaction cost theory. It is built on cost of transactions. It is used when a decision has to be made on whether to make or buy. This decision is influenced by the transaction costs and the lower cost option is preferred. When transaction costs were high internalizing transactions was preferred while low transaction costs meant buying from the market. The theory developed various dimensions for characterizing costs. They include frequency, asset specificity and uncertainty. An additional theory that elucidates the influence of digital banking on banks' performance is the technology acceptance theory. It states that uptake of technology hinges on the perceived usefulness and the attitude toward technology (Hu et al., 2019). In the context of digital banking, customers are more likely to use electronic banking services if they recognize them as advantageous. This can enhance banks' financial performance by reducing the costs associated with ensuring banking security and by fostering customer satisfaction.

Digital banking is relatively new notion in Kenya's banking industry. This technology is barely 20 years old with prominence beginning in the early 2010s. Commercial banks play key role in a country's payment system by linking the lenders to the borrowers of the economy thus curing economic imbalances (Kithaka, 2014). Kenya has greatly improved its financial inclusion in the last 15 years. While financial inclusion in 2006 was only 26%, today, 83% of the population has access to at least basic financial services. Uptake of digital technologies has greatly increased within the Kenyan banking sector where customer-centric business model is highly advocated for (Innovation Survey, 2021).

Digital Banking

Digital banking may be taken to refer to a wide range of bank services offered through digital channels, devices and internet platform which are linked to robust digital payment system (Ukoh, 2019). Digital banking can also be defined a collection of alternative delivery platform for bank services (IBM Global Services, 2015). The bank services enhanced through digital platforms include money deposits and withdrawals, payments, balance enquiries, credit processing, funds transfers, remittance, Airtime top-up among other services (Ukoh, 2019). Digital banking also facilitates bill payment and other bank services without customers having to physically visit to the bank. Banks are able to outsource some of its services through agency banking. Agency banking helps the banks to reach more customer base, reduce operating expenses as well as increases their profits.

Digital banking has revolutionized the manner in which customers in the banking industry access services and products. In digital banking, customers are provided an opportunity to operate their bank accounts remotely. Digital banking encompasses the use of electronic channels, including internet and mobile devices, to provide customers access to their accounts without the need for physical visits to bank premises. This has improved the levels of convenience offered to customers while minimizing the costs of operation and expansion.

Past studies have used various measures to quantify digital banking. A majority of past research uses methods such as user friendliness, efficiency of digital banking, reliability, frequency of annual transactions, convenience, security, personalization and web-architecture (Ali et al., 2021; Vaslamidis et al., 2020; Ukoh 2019; Ahmed & Suru, 2023; Bashir & Madhavaiah, 2015; Hossain et al., 2020). These factors are useful for the assessment of customer related factors such as their satisfaction (Vaslamidis et al., 2020). However, this study is interested in the extent of usage of digital banking across the banks.

Financial performance of an entity can be accessed from different dimensions with profitability being the mostly considered measure among investment returns, profitability to total assets ratio and return on equity of shareholders and others. ROA quantifies the net income produced for each unit of investment in total assets, while ROE represents the net income as a percentage of the capital invested by the shareholders. Both ROA and ROE can both be adopted in analyzing the efficiency of an entity in generating earnings from investments but they display different information (McClure, 2018). According to Hannagan

(2008) ROA is a better measure of financial performance compared to ROE. The ROA considers all a company's assets rather than equity only like the ROE. The ROA also provides a better measure of the company's operating efficiency (Pradhan et al., 2017). The ROA is therefore the best measure of financial performance of banks.

Listed Commercial Banks in Kenya

There are 11 listed banks at NSE having complied with all the listing requirements, necessary amount for deposit as well as net asset value (CBK, 2022). The commercial banks include; Stanbic Holdings, ABSA Bank, DTB, I&M Bank, NCBA, Standard Chartered Bank, Co-operative Bank, Equity Bank, KCB and HF Group. The banking sector has reported a steady growth from 2011-2016 (CBK report manual 2012). In September 2016, CBK introduced interest capping through Banking (amendment) Act of 2016. This change affected performance of banks in 2017. According to Cytonn investments, listed banks reported 1% decline in earnings per share in 2017 compared to average 5-year growth of 6.7%, the reduction was attributed to decline in net margins. Profit before tax moved by Kshs 14.2 billion from 2016 to 2017 representing 9.6% decline. As at 2018 the listed commercial banks commanded approximately 70% of value of the deposits in the banking sector while the commercial banks not listed accounted for 30% of the deposits (CBK, 2018). The banking sector reported pretax profit of Kshs 244.1 billion for the period ended December 2022. The listed banks' share was Kshs 213.3 billion while the other 30 commercial banks (not listed) shared Kshs 30.8 billion shared by the other banks. This implies that the listed banks' share was 87.38% of the total profit before tax reported by the banking sector.

The study focused on listed commercial banks because they command larger market share which has been steadily increasing over the years as discussed above. This is therefore a better representative of the population. Listed banks are often subjected to higher levels of scrutiny from analysts, investors and regulators (Omware, 2020). This makes it mandatory for them to provide accurate data which can easily be accessed.

Research Problem

There has been gradual transition of banks from traditional banking services to offering the services through digital banking platforms. Digital banking has emerged as an essential method for providing customers with multi-channel services, in contrast to the conventional banking approaches (Cortiñas et al., 2010). However,

digital banking is still an imaginary idea to most people due to cyber security threats. Many scholars argue that with the advent of digital banking, financial institutions have experienced an increase in deposits, withdrawals, and various banking transactions. Nevertheless, despite this extensive digitization, some banks have experienced poor performance, faced regulatory intervention, or ceased their operations (Mutua, 2013).

On the other hand, Commercial banks in Kenya have faced problems in extending their infrastructure to remote places (Nery, 2021). These problems arise from the costs involved and the general feasibility of such projects which affects their financial performance. However, the use of technology has been embraced by many commercial banks with a view of enhancing their performance. In the late 2000s, M-Pesa, a digital banking service operated by a telecommunications company, gained prominence as a result of providing banking services to individuals in various parts of the country without the need for banking infrastructure (Kingiri & Fu, 2019). The success of mobile banking has led to commercial banks spreading their operations into digital banking across the country. Kiragu (2017) indicated that embracing banking digitally has allowed commercial banks to increase their transactions. As per the 2016 study report and information provided by the Central Bank of Kenya, the Kenya Electronic Payment and Settlement System, along with the East African Payment System, documented 2.855 million transactions, amounting to a total value of Kshs. 27,002 billion. This marked an increase compared to the previous period when 2.240 million transactions with a total value of Kshs. 24,311 billion were reported. This represented increase in volume and value by 30% and 12% respectively. There was an average decline in monetary exchange 12 % decrease. The average number of transactions increase by 2,459 increasing from 8,954 to 11,413 dealings daily.

However, the growth in transactions may or may not be indicative of how commercial banks' performance is influenced by digital banking. (Markus & Nan, 2020). On the contrary in 2021, the report of Kenya bankers' association eluded that the profits of banking institutions in Kenya went down by 30.9% and this is the period when most of the banks embraced almost if not 100% digital banking during Corona pandemic. Further, the banking industry return on assets went down by 2% in 2020 from the previous year. Empirical data indicates that the effect of electronic banking on the economic achievement of commercial banks yields diverse results. Majority of the findings from the limited studies that have been examined are broadly applicable to the economic achievement of commercial banks as a whole. (Wang, Nguyen and Dang 2021)

found out that productivity of banks depends highly on technological advancement. (Okoye et al 2018) concluded that digital banking impact on efficient customer delivery of financial services but was silent on how digital banking impact on the bank performance. (Ouma and Ndede, 2020) found that convenience of accessibility to electronic banking through technological innovations in digital banking had a favourable influence on the economic achievement of commercial banks in Kenya. Their scrutiny measured financial performance using profit after tax.

On the other hand, (Kiragu 2017) indicated that digital banking has allowed commercial banks to increase their transactions however the study is silent on how digital banking may impact on financial performance. On the contrary, (Olaiya and Adeleke, 2019) established that no correlation exists between digital banking channels and the achievement of banks. From the reviewed literature therefore, it is clear that the studies reviewed so far do not clearly bring out how digital banking impact on financial performance. Regardless of the inventive ideas in electronic banking, some gaps have not been filled since some banks are still collapsing, (Ouma and Ndede 2020). With all the heightened digitalization in Kenya some banks still perform dismally and are put under statutory management (Mutual, 2013). Some scholars argue that digital banking may allow banks to access larger customer bases hence increase financial performance but on the other hand technology success depends on practical implementation and management at the same time digital banking may have its own problems which may also affect the economic achievements negatively. (Kamau et al, 2019) It is upon these mixed results that the current research seeks to address the research question, to what extent does the usage of digital banking influence financial performance of listed commercial banks in Kenya?

Research Objective

The objective of the study was to analyse the relationship between digital banking and financial performance of listed commercial banks in Kenya.

Literature Review

Theoretical Frameworks

The theoretical assessment includes theories on which various concepts in the study are based on. This study shall be guided by Technology acceptance as well as transaction cost theory as discussed below. The two theories provide important frameworks that guide studies in the field of technology adoption and usage.

This research combines the two theories to acquire a better understanding of how people perceive digital banking.

The Technology acceptance theory

Fred Davis introduced the concept in the 1980s to elucidate the adoption and utilization of novel technology. The core premise is that the receipt and utilization of new innovation is contingent on level of effort required for its use and the perceived advantages it offers. These determinants gauge the degree of system acceptance. "Perceived usefulness" signifies the user's belief in the system's potential to enhance their performance and productivity, while how easy it is to use pertains to user's perception of how straightforward the system is to operate (Scott & Davis, 2015). When considered importance and how easy to utilize increase, the purpose to use the technology also rises. Additionally, user preferences, social influence, support from leadership, and available resources exert an impact on the acceptance and usefulness of new technology. The theory is relevant because it points out on areas to be addressed for seamless acceptance and usage of technology in the banks. The management must ensure that the system to be introduced is beneficial and requires minimal effort of the employees when using. This will enhance its acceptance by the users. Adoption of the appropriate technology by banks will improve their performance.

Transaction Cost Theory

It was established in the 1930s by Ronald Coase and further developed in the mid-1970s by Williamson, this theory is rooted in the expenses associated with conducting transactions. It posits that a firm's performance is shaped by its ability to balance the transaction costs with the production costs incurred internally. Transaction costs sums up all disadvantages that result from exchange of goods and services between two parties. Changes in technology and development of better/ more superior market models have resulted to decline in transaction costs. Coarse developed a principle to explain the size of a firm. He opined that when firms can cheaply make transactions within then they grow but when it is cheaper making transactions externally then they shrink. This explains why vertical integration is less popular since markets have become more efficient and competitive resulting to decline in transaction costs.

Transaction costs are majorly used in evaluating make or buy decisions with respect to the economic efficiency achieved in a particular decision. The transaction cost theory strives to attain economic efficiency

by reducing exchange-related expenses. Oliver's research in 2009 significantly contributed to the recognition and development of this theory. This theory is pertinent because the study is centred on enhancing financial performance, which can be achieved by reducing transaction costs through the adoption of technology.

Digital Banking and Financial Performance of Banks

Wepukhulu and colleagues (2016) did a research to investigate impact of online banking on the economic achievement of banks in Eldoret town, Kenya. They utilized questionnaires to collect raw data and examined audited annual reports for second hand data. They also gathered additional information by reviewing various documents. From a total of 364 employees working in 25 banks, the researchers selected a sample of 224 employees using both proportional and simple random sampling. The research results revealed a direct relationship between online banking and the economic performance of commercial banks. The research suggests that, to maintain high levels of achievement, financial institutions should prioritize the safety, trustworthiness, flexibility, and convenience of technology they implement.

Zelege and Chauhan (2022) carried out research to investigate how electronic banking services affect the fulfilment or surpassing of customer expectations in the administration of Hawassa city, Ethiopia. They surveyed 400 out of the 42,269 electronic banking users from 23 branches. Raw data was composed through Likert-type scale questionnaires, with 343 out of the 400 participants responding. The research employed correlation, regression and ANOVA for data analysis. Variables under consideration in the study included convenience, assurance, responsiveness, reliability, sympathy with, and tangibility. The results indicated that all variables, except for tangibility, had a positive influence on meeting consumer needs. The analysis ranked the order of importance of the quality of service measures as assurance, reactivity, reliability, empathy, and lastly, convenience. The study concluded that measurements of service quality significantly impact the ability to meet and even surpass customer expectations.

Olaiya and Adeleke (2019) Investigated correlation between digital banking and the profitability of deposit money banks in Nigeria. Secondary data was gathered from financial stability reports and statistical bulletins published by Nigeria's central bank, spanning an eight-year period from 2010. The data analysis began with stationary tests to assess unit root characteristics, followed by the application of inferential statistics. Counteraction was estimated using autoregressive lags to determine relationships among the

variables. The study's model comprised four variables: transaction values of automated teller machines, internet banking, point of sale, and mobile banking. When each variable was analyzed individually, the transaction values of automated teller machines and point of sale showed a positive correlation with return on assets, while the transaction values of digital banking and internet banking exhibited a negative relationship with return on assets in separate tests. However, when all four variables were examined together, no significant relationship with return on assets was found. Consequently, the study's concluded that digital banking and achievement of banks are not related. The research suggests that customers should be educated on advantages of internet banking and mobile banking, as they have predominantly used automated teller machines and point of sale for their transactions.

Odhiambo and Ngaba (2019) examined the influence of electronic banking services on the economic performance of commercial banks in Kenya. The study involved analysis of both secondary and primary data and was conducted on the complete population, including all 43 commercial banks in Kenya. The unit of observation consisted of 24 managers responsible for operations and electronic banking units at the headquarters of these banks. Data analysis was performed using SPSS, encompassing both descriptive and inferential statistics. The research revealed a noteworthy positive correlation between electronic banking channels and the economic performance of commercial institutions. The research suggest importance of continuously informing, reminding, and sensitizing customers about the benefits offered by electronic banking. Additionally, it advises banks to embrace innovation, adopt contemporary technology, and invest in training as means to enhance the adoption of digital banking.

Wadesango and Magaya (2020) investigated the effect of digital banking services on the achievement of commercial banks in Zimbabwe, he focused on one commercial bank, CBZ. The study involved a population consisting of this single bank, and questionnaires were distributed to 25 respondents, including both staff and top management. From this population, 15 respondents were randomly selected for participation. The data analysis utilized correlation and regression techniques. He found that online banking and the return on assets (ROA) are directly related. He concluded that increase in online customer deposits increased ROA. Additionally, internet banking expenses and online bank transactions contributed to an increase in the total assets' ratio. As a recommendation, the study suggests the increased use of digital banking to increase the achievement of the bank.

Okoye et al., (2017) investigated the influence of technology on meeting consumer expectations in Ogun and Lagos states, Nigeria. The research focused on indicators of customer satisfaction, including ease of use, time savings, reduced crime and risk, reliability, and convenience. Primary data was collected through questionnaires and oral interviews from three banks, which were grounded on individual judgment and convenience. The used 120 questionnaires to obtain information on the standard of services customers received on online platforms. Data analysis was performed using SPSS, and model estimation was facilitated through ANOVA. The research revealed that electronic banking has a significant effect on customer contentment. As a recommendation, the study suggests that banks can achieve greater benefits by offering more user-friendly products, consistently upgrading their systems, and providing additional training to their staff. Kamau et al., (2019) investigated the effect of digital accomplishment on the competition of commercial banks in Kenya. Primary data was gathered from 39 commercial banks in the country, and the study focused on assessing digital capabilities through indicators such as IT resources, objects, and operations. The research utilized a descriptive research design and applied regression analysis. The results of the research showed a positive connection between digital capabilities and the competitive advantage of commercial banks in Kenya. As a suggestion, the study proposes an expanded adoption of digital technology to bolster competitive advantage.

Methodology

The research utilized both cross-sectional and longitudinal study designs. These chosen designs will assist in understanding the relationship between the two variables. Longitudinal studies involve observing an individual on multiple occasions over an extended period. This design will consider variations, establish the correct sequence of events, and elucidate cause-and-effect relationships, thereby enhancing the correctness and trustworthiness of the information.

The cross-sectional design involved the collection of data and the measurement of study outcomes at a specific moment in time. Variations within groups were assessed simultaneously. When cross-sectional analyses were conducted repeatedly, it became a longitudinal approach. This research design was suitable for facilitating comparisons of various variables at the same time. These designs were particularly suitable as they allowed for the repeated collection of data encompassing different variables simultaneously.

The research's entire group of interest consisted of listed commercial banks in Kenya, disclosed in appendix 2. The population was 11 listed banks (NSE 2022). Given that there were only 11 banks, which is fewer than 30, the study was conducted as a census study. This population had also widely adopted digital banking. Information was collected from secondary sources using data capture forms. These sources encompassed data derived from annual financial reports and publications released by the individual commercial banks from the year 2019 through 2022. The data on the predictor variables encompassed the number of ATM machines, the count of registered and active bank agents, and the percentage of usage for both mobile banking and online banking. The data collected for the dependent variables included the total assets of the banks and their net profits. These elements aided in the determination of the return on assets for each bank. Data analysis was conducted to confirm the association between digital banking and the economic achievement of commercial banks. Bank performance was assessed using assets return, while digital banking was measured using the indicators described in the conceptual model.

Descriptive statistics were employed to summarize the data collected for both the predictor variable and the response variable. The predictor variable, digital banking, was categorized into three groups for each indicator, namely low-level, medium-level, and high-level usage, determined using the mean. Correlation analysis was subsequently applied to examine whether there was an association between high usage, medium usage, and low-level usage of digital banking and financial performance. Additionally, ANOVA determined the significant difference in the relationship between high usage, medium usage, and low-level usage of digital banking and the financial achievement of commercial banks.

Data Analysis and Presentation of Results

Overview of Digital Banking Status in Commercial Banks in Kenya

The section sort to investigate the status of digital status within commercial banks in Kenya for the duration 2019 to 2022. The study focused on mobile money subscriptions, average value of daily transactions, ATM network and agency banking for the commercial banks in Kenya. The study established that use of mobile money has been rising between from year to year for the period under review. From the statistics, it is indicated that mobile money has continuously been on an upwards trajectory as indicated in Figure 4.1 below. The 2022 CBK report indicates that the number of active mobile money subscribers increased by more than 0.6 million from 2021 to 2022 due to excitement about new technologies the fuel the utilization of cell phones in financial services. From the figure

4.1 below, the number of mobile money subscribers who were active increased from 29m in 2019 to 32m in 2020 to 35m and to 39m in 2022. Much growth can be observed in 2020 where which can be associated with the outbreak of COVID-19 pandemic that called for the adoption of cashes transactions.

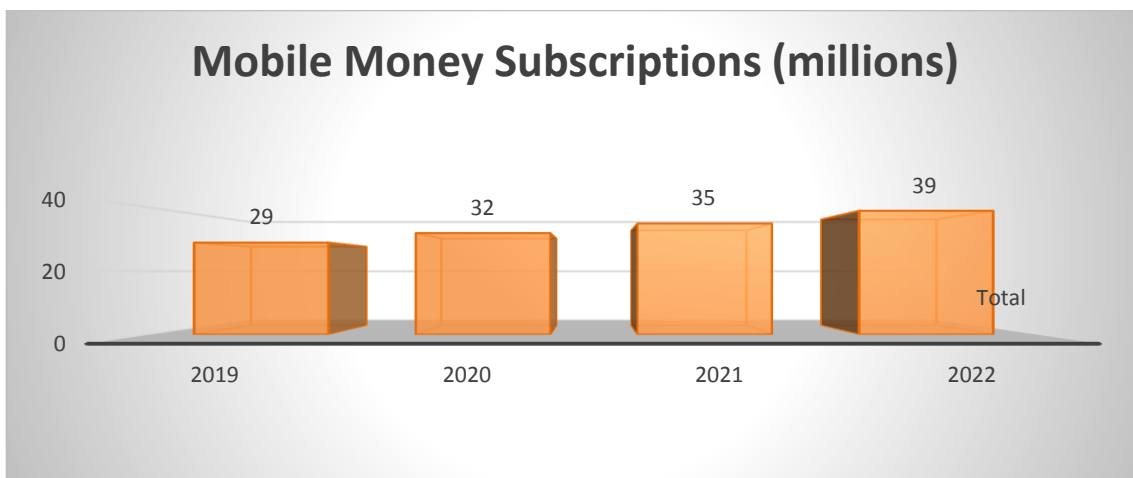


Figure 1: Mobile Money Subscriptions

The study also sought to analyze the average value of the daily transactions via mobile money platforms among the commercial banks in Kenya between 2019 and 2022. Figure 4.2 below indicates that growth in the average value of the daily mobile money transactions. As reported by the CBK 2022 report. From the figure, it can be observed that the much growth is also observed in 2020 as fuelled by outbreak of COVID-19 pandemic.

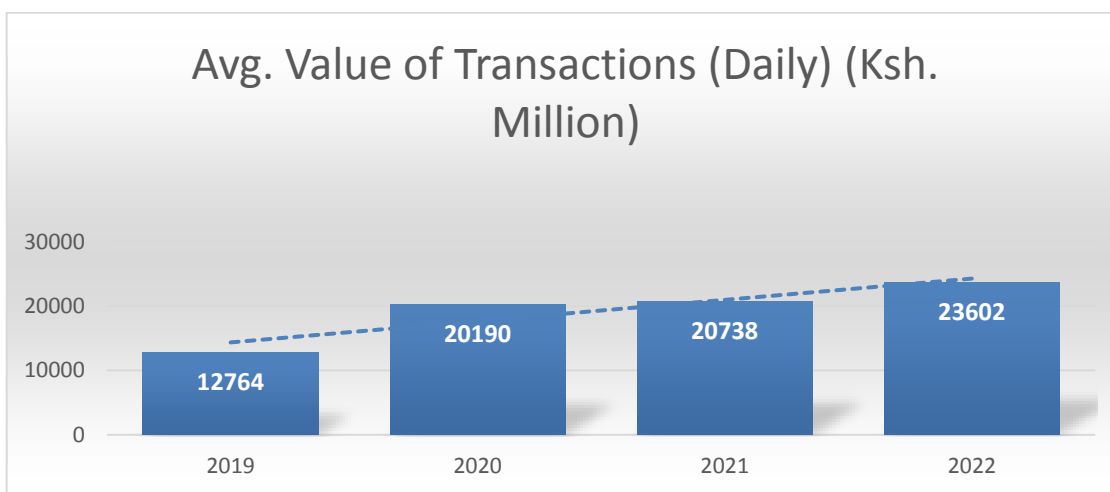


Figure 2 Average Value of Mobile Money Transactions

The study also examined the trends in the number of ATM machines for commercial banks in Kenya from 2019 to 2022. From the Figure 4.3 below, it can be observed that the total number of ATM machines has been declining from 2,459 machines in 2019 to 2,412 machines in 2020 to 2,366 machines to 2021 and 2,301 machines in 2022. The observed decline is much associated with adoption of agency, mobile and digital banking in the banking industry as reported by the CBK 2022 report

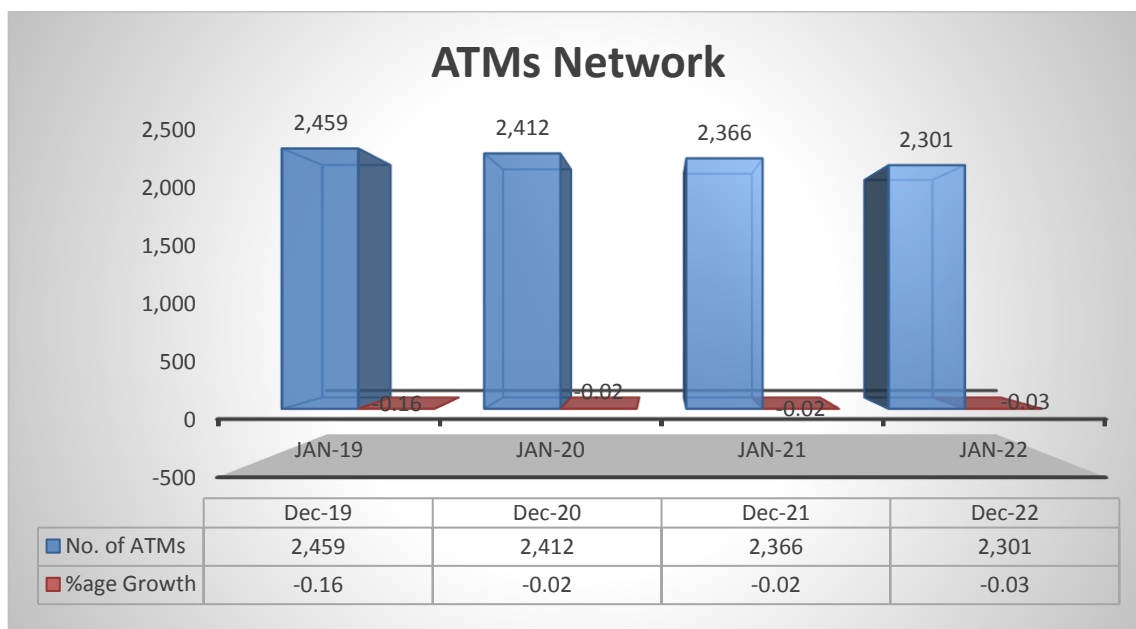


Figure 3: ATM Network

The study established that in an effort to ensure financial services are delivered through agency model of banking increased throughout the period under investigation. From the CBK report, it is observed that 21 commercial banks and 5 microfinance banks had contracts with at least 82,780 agents, this value had increased from 78,371 agents in 2021. The increase was majorly linked with the growth in confidence of customers in bank agents. The figure below represents the growth in active number of mobile money agents.

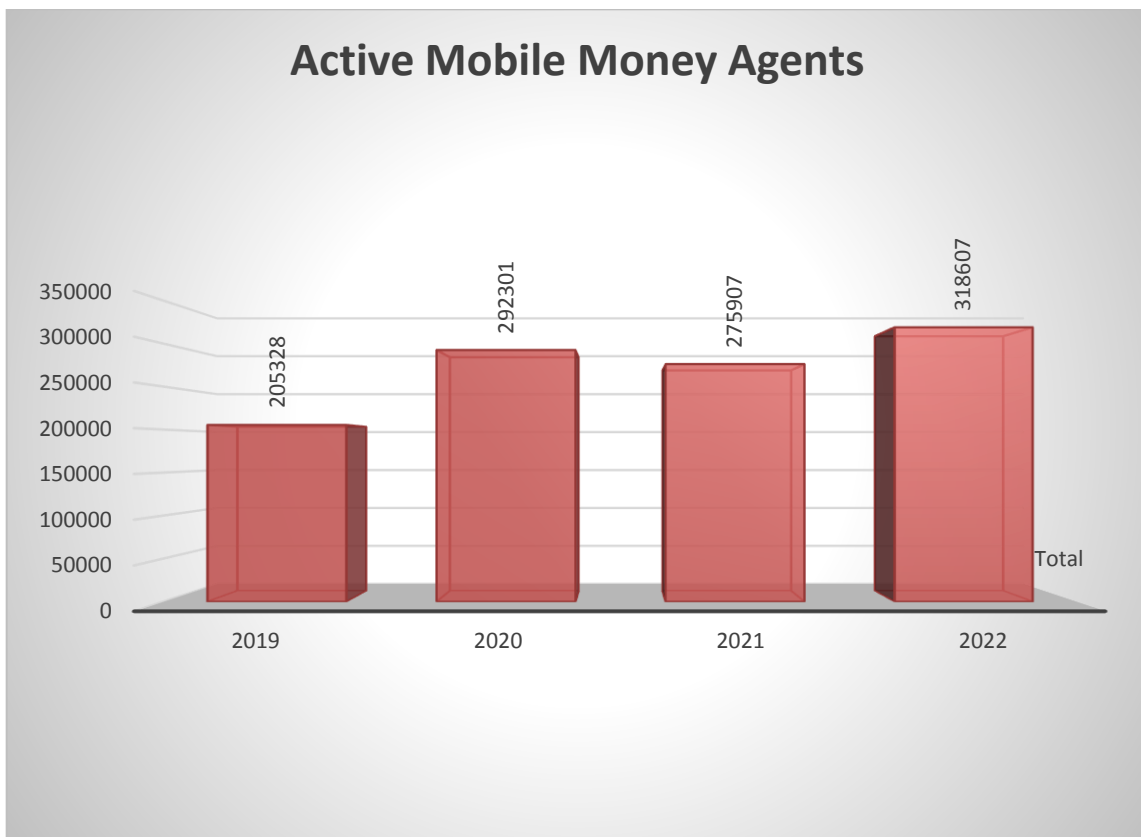


Figure 4: Active Mobile Money Agents

Descriptive Statistics

Table 1 shows the descriptive statistics of the data collected with regards to mobile money banking, ATM banking, Agency banking, online banking and ROA. From the table below, it can be observed that the mean growth in mobile banking transactions for 2019-2022 period stood at 42.38% with a standard deviation of 4.85%. Based on the mean it means the average percentage growth rate in the mobile banking transactions stood at 42.38% this mean growth recorded a standard deviation of 4.85% up and below the mean meaning that 68% of the percentage growth in mobile transactions lied between 37.53% to 47.23%. The percentage growth rate in the mobile banking transactions had a median of 42.5, this indicates that half of commercial banks under study recorded a growth rate below 42.5 while the other half had growth rates above 42.5 in mobile banking. The most frequent growth rate in mobile banking transactions among the listed commercial banks was 42.5% as shown by the mode in table 1. According to the kurtosis and skewness figures in table 1 is indicate that the mobile banking transactions growth rate was negatively skewed and highly peaked. The minimum growth rate in mobile banking was observed to be 24% while the maximum growth rate was observed to be

50% giving a range of 26%. With regards to ATM banking transactions, the mean growth rate for 2019-2022 period stood at -1.261%, with a standard deviation of 11.218. Based on the mean it means the average percentage growth rate in the ATM banking transactions stood at -1.261% this mean growth recorded a standard deviation of 1.691% up and below the mean meaning that 68% of the percentage growth in mobile transactions lied between -2.952% to 0.43%. The percentage growth rate in the ATM banking transactions had a median of 0.000, this indicates that half of commercial banks under study recorded a growth rate below 0.000 while the other half had growth rates above 0.000 in ATM banking transaction. The most frequent growth rate in ATM banking transactions was observed to 0% indicated by the modal value in table 4.1 below. From the Kurtosis and Skewness figures, the data distribution for the growth in ATM banking transactions was normally distributed but highly peaked. The minimum growth rate in ATM banking was observed to be -24.7% while the maximum growth rate was observed to be 28% giving a range of 52.7%. With regards to the agency banking, the mean growth rate stood at 12.311 with a standard deviation of 22.703 and a median of 1.000. Based on the mean it means the average percentage growth rate in agency banking transactions stood at 12.311% this mean growth recorded a standard deviation of 22.703% up and below the mean meaning that 68% of the percentage growth in mobile transactions lied between -10.392 % to 35.014%. The percentage growth rate in the ATM banking transactions had a median of 1.000, this indicates that half of commercial banks under study recorded a growth rate below 1.000 while the other half had growth rates above 1.000 in agency banking transactions. The most frequent growth rate in agency banking was observed to 0.000% as shown by the mode in table 4.1 below while the kurtosis and skewness figures indicate that the distribution was positively skewed and highly peaked. The minimum growth in the agency banking transactions was observed to be 0 while the maximum observation was 82% giving a range of 82%.

Online banking transactions recorded a mean growth rate of 44.448% for the listed banks with a standard deviation of 57.38% and a median of 15.500. Based on the mean it means the average percentage growth rate in online banking transactions stood at 44.45% this average growth recorded a standard deviation of 57.383% up and below the mean meaning that 68% of the percentage growth in mobile transactions lied between -12.93% to 101.83%. This observation also indicates that there was much variations in the online banking transactions. The percentage growth rate in the online banking transactions had a median of 15.500, this indicates that half of commercial banks under study

recorded a growth rate below 15.500 while the other half had growth rates above 15.500 in online banking transactions. The most frequent growth rate among the listed banks was 12.000% as indicated by the mode in table 1. From the kurtosis and skewness figures, this data distribution was positively skewed and highly peaked. The minimum growth in online banking was recorded at 0 while the maximum growth rate in online banking transactions stood at 212% giving a range of 212%.

Table 1: Summary of Descriptive Statistics.

Statistic	Mobile banking	ATM banking	Agency banking	Online banking	ROA
Mean	42.377	-1.261	12.311	44.448	2.632
Standard Error	0.731	1.691	3.423	8.651	0.274
Median	42.500	0.000	1.000	15.500	3.105
Mode	42.500	0.000	0.000	12.000	4.700
Standard Deviation	4.850	11.218	22.703	57.383	1.819
Sample Variance	23.524	125.841	515.422	3292.768	3.308
Kurtosis	6.712	0.632	3.364	1.397	-0.353
Skewness	-2.375	0.007	2.057	1.553	-0.684
Range	26	52.7	82	212	6.87
Minimum	24	-24.7	0	0	-1.77
Maximum	50	28	82	212	5.1
Sum	1864.6	-55.5	541.7	1955.7	115.82
Count	44	44	44	44	44

According to the table, the average ROA for the listed banks between 2019-2022 periods stood at 2.632 with a standards deviation of 1.819 and a median of 3.105. The most frequent ROA observed was 4.700 as indicated by the mode in table 4.1 below. Based on the mean it means the average ROA for the commercial banks under study, was 2.632% this average growth recorded a standard deviation of 1.819% up and below the mean meaning that 68% of the percentage growth in mobile transactions lied between 0.819% to 4.451%. This observation also indicates that there was less variations in the

ROA for the sampled commercial banks. The ROA figures had a median of 3.105, this indicates that half of commercial banks under study recorded a ROA below 3.105 while the other half had growth rates above 3.105 for the 2019 to 2022 financial years. The maximum ROA observed was 5.1 while the minimum was -1.77 translating into a range of 6.87. The kurtosis and skewness figures were all negative indicating that this distribution was negatively skewed and lowly peaked.

Correlation Analysis

The correlation analysis focuses on addressing the link between the response and the predictor variables in this case the financial performance for listed banks as measured by ROA being the dependent variable, while the digital banking being the independent variables. The measure also looks into the correlation amongst the predictor variables to address the aspect of multi-collinearity. Table 2 below indicates the summary of correlation coefficients between predictor variables and response variable as well as among the predictor variables.

Table 2: Correlation Analysis

	Mobile banking	ATM banking	Agency banking	Online banking	ROA
Mobile banking	1				
ATM banking	-0.329	1			
Agency banking	0.180	-0.389	1		
Online banking	0.262	-0.456	0.958	1	
ROA	0.325	-0.132	0.414	0.425	1

From the table above, it was observed that the ROA positively correlated with mobile banking to low extent with a correlation coefficient of 0.325, ROA related negatively with ATM banking with a correlation coefficient of -0.132 while related positively with agency banking and online banking with correlation coefficients of 0.414 and 0.425 respectively. Amongst the independent variables, strong correlation was only observed between online banking and agency banking with a correlation coefficient of 0.958.

Regression Analysis

The section presents the summary statistics, ANOVA and correlation coefficients as shown in table 3. The excel output presented in table 4.3 show the regression statistics comprising majorly of total number of observations, the standard error, adjusted R squared, the R squared as well the multiple R value.

Table 3: Summary Statistics

Regression Statistics	
Multiple R	0.500
R Square	0.250
Adjusted R Square	0.173
Standard Error	1.654
Observations	44

From the above output table, the Multiple R value represents the correlation coefficient for the overall regression model. This value ranges between -1 and +1. The close to -1 this value is, the perfect negative the relationship and vice versa. The correlation coefficient given above is 0.5 which indicates there is a moderate positive correlation between digital banking and financial performance of listed commercial banks in Kenya. The R squared value is the coefficient of regression. It measures the percentage of changes in the response variable explained by the changes in predictor variable(s). The correlation coefficient obtained above is 0.25 meaning 25% of the variances in listed banks` ROA clears up changes in digital banking.

Table 4 ANOVA

	df	SS	MS	F	Significance F
Regression	4	35.613	8.903	3.256	0.021
Residual	39	106.630	2.734		
Total	43	142.243			

The significant F value in the ANOVA table above measures the significance of the regression model thus its reliability in making future predictions. For the above model the significance F- value is 0.021 this is below 5% at 95% confidence level. The regression model so obtained is therefore statistically insignificant. The table 5 presents the regression coefficients which can be used to establish the multiple linear regression model linking digital banking to financial performance of listed commercial banks in Kenya.

Table 5: Regression Coefficients

	Coefficients	Standard Error	t Stat	P-value
Intercept	0.940	0.695	1.352	0.184
Mobile banking	0.038	0.021	1.836	0.04
ATM banking	0.022	0.026	0.850	0.400
Agency banking	0.019	0.040	0.472	0.640
Online banking	0.006	0.017	0.354	0.725

From the above table, the following regression equation can be established;

From the above table 5 the P-values 0.184, 0.04, 0.400, 0.64 and 0.725 for the intercept, mobile banking, ATM banking, agency banking and Online banking respectively. For any predictor variable to statistically significant at 5% significance level, then its P-Value should be less than 5%. From the observed P-values only mobile banking had a statistically significant impact on ROA. $ROA = 0.940 + 0.038 \text{ Mobile Banking} + 0.022 \text{ ATM Banking} + 0.019 \text{ Agency Banking} + 0.006 \text{ Online Banking}$. From the above regression equation, when the digital banking variables are held constant, the value of ROA for the listed commercial banks stands at 0.940. However, a unit rise in mobile banking rise the ROA by 0.038, a unit growth in ATM banking increases the ROA by 0.022, a unit rise in agency banking increases the ROA by 0.019 while a unit increase in online banking increases the ROA by 0.006. The P-values measures the significance of each of the predictor variable in influencing the response variable. From the above table 4.4, only mobile banking has been found to be statistically significant in influencing the value of ROA for the listed commercial banks. Therefore, the adjusted regression model is

$$ROA = 0.038 \text{ Mobile Banking}$$

Discussion of the Results

The study aimed to establish the effect of digital banking on ROA for commercial banks listed at NSE. The measures of digital banking included, mobile banking, ATM banking, agency banking and online banking. Financial performance was measured using ROA. The study has presented an overview of the status of digital status within commercial banks in Kenya for the period 2019 to 2022 from the overview, the study established that; The study established that use of mobile money has been rising between from year to year for the period under review. In this regard, much growth was observed in 2020 where which can be associated with the outbreak of COVID-19 pandemic that called for the adoption of cashes transactions. The study also sought to analyse the average value of the daily transactions via mobile money platforms among the commercial banks in Kenya between 2019 and 2022. It was also observed that the much growth was also observed in 2020 as

fuelled by outbreak of COVID-19 pandemic. It was further established that the total number of ATM machines was declining from 2,459 machines in 2019 to 2,412 machines in 2020 to 2,366 machines to 2021 and 2,301 machines in 2022. The observed decline was much associated with adoption of agency, mobile and digital banking in the banking industry as reported by the CBK 2022 report. The study established that delivery of financial services through the agent banking model continued to increase from 205, 328 agents in 2019 to 318,607 agents in 2022.

From the descriptive statistics, the average growth was higher in only banking with a mean of 44.448, followed by mobile banking with a mean of 42.377 followed by agency banking with a mean of 12.311 and lastly ATM banking transaction with had a mean of -1.261. From the correlation coefficient, the ROA had a stronger correlation with online banking, following agency banking, followed by mobile banking and lastly ATM banking. The correlation coefficient obtained was 0.5 which indicated that there exists a moderate positive correlation between digital banking and financial performance of listed commercial banks in Kenya. The correlation coefficient obtained above is 0.25 meaning 25% of the changes in listed banks' ROA is explained by changes in digital banking. From the ANOVA table, the significance F- value is 0.021 which is less than 5% at 95% confidence level.

The study finally established the following regression model. $ROA = 0.940 + 0.038 \text{ Mobile Banking} + 0.022 \text{ ATM Banking} + 0.019 \text{ Agency Banking} + 0.006 \text{ Online Banking}$. From the above regression equation, when the digital banking variables are held constant, the value of ROA for the listed commercial banks stands at 0.940. However, a unit increase in mobile banking increases the ROA by 0.038, a unit increase in ATM banking increases the ROA by 0.022, and a unit increase in agency banking increases the ROA by 0.019 while a unit increase in online banking increases the ROA by 0.006. The P-values measures the significance of each of the predictor variable in influencing the response variable. From the above table 4.4, only mobile banking has been found to be statistically significant in influencing the value of ROA for the listed commercial banks. Therefore, the adjusted regression model is $ROA = 0.038 \text{ Mobile Banking}$.

Summary, Conclusions and Recommendations

The research has provided an overview of the digitalization status in Kenyan commercial banks from 2019 to 2022 where from the overview, the study established that; The study established that use of mobile money has been rising between from year to year for the period under review. In this regard, much growth was observed in 2020 where which can be associated with the outbreak of COVID-19 pandemic that called for the adoption of cashes transactions. The study also sought to analyze the average value of the daily transactions via mobile money platforms among the commercial banks in Kenya between 2019 and 2022. It was also observed that the

much growth was also observed in 2020 as fuelled by outbreak of COVID-19 pandemic. It was further established that the total number of ATM machines was declining from 2,459 machines in 2019 to 2,412 machines in 2020 to 2,366 machines to 2021 and 2,301 machines in 2022. The noted decrease was largely linked to the implementation of agency, mobile, and digital banking within the banking sector, as indicated in the CBK 2022 report. The research found that the utilization of the agent banking model for delivering financial services witnessed consistent growth, expanding from 205,328 agents in 2019 to 318,607 agents in 2022.

According to the descriptive statistics, the highest average growth rate was observed in online banking, with a mean of 44.448. This was followed by mobile banking, which had an average growth rate of 42.377. Agency banking had a mean growth rate of 12.311, and ATM banking transactions had the lowest average growth, with a mean of -1.261. From the correlation coefficient, the ROA had a stronger correlation with online banking, following agency banking, followed by mobile banking and lastly ATM banking. The obtained correlation coefficient of 0.5 suggests a moderate positive correlation between digital banking and the financial performance of publicly traded commercial banks in Kenya. Specifically, the coefficient of 0.25 indicates that 25% of the variations in the return on assets (ROA) of these listed banks can be attributed to changes in digital banking. Furthermore, the ANOVA table shows a significance F-value of 0.021, which is below the 5% threshold at a 95% confidence level.

The research ultimately derived the following regression model: $ROA = 0.940 + 0.038 \text{ Mobile Banking} + 0.022 \text{ ATM Banking} + 0.019 \text{ Agency Banking} + 0.006 \text{ Online Banking}$. According to this regression equation, with the digital banking variables kept constant, the ROA value for the publicly traded commercial banks is 0.940. Nonetheless, a one-unit increase in mobile banking results in a 0.038 increase in ROA, a one-unit increase in ATM banking leads to a 0.022 increase in ROA, a one-unit increase in agency banking yields a 0.019 increase in ROA, and a one-unit increase in online banking contributes to a 0.006 increase in ROA. The p-values assess the significance of each predictor variable's influence on the response variable. The findings reveal that only mobile banking is statistically significant in influencing the ROA value for the listed commercial banks. Therefore, the adjusted regression model simplifies to $ROA = 0.038 \text{ Mobile Banking}$.

Conclusion

Increased utilization of mobile banking by listed commercial banks is likely to enhance their financial performance. Conversely, the study suggests that ATM banking may have adverse effects on the financial performance of these commercial banks. The research findings indicate that mobile, agency, and online banking all positively influence the financial performance of listed commercial banks. Consequently, boosting the usage of ATM banking is expected to have a detrimental effect on financial performance. The

implementation of mobile banking by commercial banks will result in decreased transaction costs, ultimately attracting a greater number of customers and thereby enhancing their financial performance. Additionally, this adoption will lead to improved operational efficiency and effectiveness, accelerating transaction processing and making the banks more appealing to customers.

A greater volume of transactions through mobile banking correlates with a higher Return on Assets (ROA). This suggests that to boost their financial performance, listed commercial banks can achieve this by increasing the utilization of mobile, agency, and online banking, while also reducing transaction costs. Elevated transaction costs tend to discourage customer usage of mobile, agency, and online banking, which in turn limits ROA. The substantial expenses associated with mobile banking result from its adverse effect on financial performance. By lowering these costs, the banks can mitigate this issue and make these services more appealing to customers, thus improving their financial performance.

Banks that actively incorporate mobile banking technology into their financial operations are likely to report higher Return on Assets (ROA) compared to banks that neglect or underutilize this technology, as evidenced by the substantial impact of mobile banking on ROA. The convenience of conducting transactions from one's home, office, or any location significantly appeals to most customers, saving them time and reducing the expenses associated with visiting bank branches. Additionally, this approach eliminates the inconveniences caused by long queues in bank branches, which, in turn, not only attracts more customers but also contributes to retaining existing ones.

Recommendations

Kenyan publicly traded commercial banks are encouraged to expedite their adoption of digital banking solutions to stay competitive in a fast-evolving technological landscape and amid heightened competition. They should focus on bolstering electronic banking methods and devise more robust strategies to entice customers to utilize mobile, agency, and online banking. Furthermore, increasing their financial commitment to implementing these technologies is advisable. Additionally, reducing transaction fees associated with mobile banking can serve as a means to attract a larger customer base and enhance profitability.

It is essential to develop effective strategies that encourage customers to embrace digital banking. These strategies may encompass offering affordable transaction costs, which are lower than the expenses associated with traditional banking methods. Banks should also ensure that the digital banking procedures and processes are straightforward, thereby increasing convenience and efficiency for all customers. This approach guarantees a user-friendly experience for individuals, regardless of their abilities or disabilities, which might otherwise

limit their use of digital banking for personal financial transactions. Additionally, enhancing the customer experience can be achieved by implementing voice-over services tailored for those with visual impairments. This approach enables banks to reach a broader market and expand their customer base.

As per the study, it is advisable for commercial banks to enhance the security measures of digital banking. This action is essential to address the issues of fraud and cyber-attacks, which could deter users from engaging in digital banking. To achieve this, banks should implement comprehensive safeguards to protect both the customers' funds and their personal information. This can be accomplished by employing effective customer verification methods and by offering courtesy calls in cases where there is suspicion of fraud or hacking. Such actions will foster greater trust and satisfaction among customers, ultimately leading to their retention. Customer retention is a crucial strategy for enhancing the financial performance of banks. Commercial banks should be proactive in regularly updating and enhancing their security tools while conducting thorough assessments of their effectiveness. Moreover, they are advised to adhere to the policies and guidelines set forth by the government, as regulated by the Central Bank of Kenya, particularly with respect to addressing customer complaints. Such measures will contribute to strengthening trust and security among their customer base.

The study suggests that the Central Bank of Kenya, as the primary regulator and overseer of commercial banks in the country, should formulate and implement effective policies governing the utilization of digital banking within these institutions. These policies should be designed to foster a positive transformation in digital banking practices and, subsequently, in profitability. Furthermore, the Central Bank of Kenya is urged to provide support to commercial banks in addressing customer complaints and in mitigating the impact of fraud and cyber-attacks.

Limitations of the Study

This study had several limitations. It exclusively focused on listed commercial banks in Kenya. As a result, the conclusions drawn from this research may not be transferable to non-listed commercial banks in Kenya, other countries, or different regions. Variations in the operations, digital banking adoption, and customer acceptance levels could exist among these different banks. Additionally, disparities in terms of associated charges, processes, and procedures may further contribute to differences.

The study also had limitations related to its chosen methodology. Given that the research couldn't encompass all available methods, there is a possibility that certain aspects may not have been fully addressed in the findings, as other methodologies might have illuminated different facets that were not explored using the approach employed in this study.

The study also faced limitations regarding the theoretical frameworks it relied upon. Being primarily guided by the Technology Acceptance and Transaction Cost Theory of Innovation, it may not comprehensively capture all the phenomena under examination. Other theories might offer insights into aspects of digital banking not covered by the mentioned theories. Furthermore, the technology itself may evolve over time, potentially rendering the study results outdated, which underscores the necessity for future reviews.

Areas for Further Research

The present research investigated the influence of digital banking on the financial performance of publicly traded commercial banks in Kenya, with specific attention to the effects of ATM banking, mobile banking, agency banking, and internet banking. Subsequent studies could explore how digital banking affects various other aspects of bank performance, including long-term operational efficiency and overall success. Furthermore, this research relied on existing secondary data. Utilizing both primary and secondary data could potentially yield more robust conclusions. Incorporating primary data may address the issue of unavailability of published data and potentially enhance the generalizability of the study's findings.

The study measured the increase in transaction volumes across different digital banking systems. Subsequent research should consider exploring additional metrics, such as transaction value, to provide a more comprehensive understanding of how digital banking affects the financial performance of commercial banks. Using both sets of measurements could complement the study's findings.

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