Digital Financial Services (DFS): A Case of Kenya

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Abstract

The Kenyan banking industry has changed considerably with the introduction of digital financial services like mobile, agency, and online banking. Many Kenyan adults have mobile money accounts, with 40% actively using them, and digital payments are highly prevalent at 97%. Kenya is a prominent illustration of the effect of mobile money on the banking sector.

This study investigated how Digital Financial Services (DFS) affect financial inclusion in Kenyan banks, considering the growing adoption of these services by individuals and organizations. Various theoretical frameworks, including financial innovation, bank-centered theories, innovation diffusion, technology acceptance, and agency theories, guided the research. It utilized a quantitative research approach based on theories, quantitative methods, and hypothesis testing.

The study obtained primary data from 124 middle-level managers in four Kenyan commercial banks: NCBA, ABSA, UBA, and SIDIAN. Additionally, secondary data sources included regulatory authorities like the Central Bank of Kenya (CBK), the Communications Authority of Kenya (CAK), and the Kenya National Bureau of Statistics (KNBS).

The correlation analysis showed a robust and positive relationship between Digitalization, the creation of innovative models, and the implementation of Digital Financial Services (DFS). The study's key finding was that DFS has a favorable impact on financial inclusion in Kenyan banks. The study provided recommendations, proposing that banks invest in technology, encourage innovation, and revise their policies to grow their market presence and increase profits.

Government involvement is crucial, as it can establish regulations for financial institutions and facilitate the integration of certain public services with electronic platforms to enhance access to Digital Financial Services.

Keywords: Digital Financial Services (DFS), Financial Institutions, Online Banking, Mobile financial services (MFS), digitization.

1. Introduction

There has been a significant transformation in the banking industry. This has necessitated the adoption of digital financial services like mobile, agency, and online banking. According to Vial's (2019) perspective, e-banking enhances an entity by modifying its fundamental structure. According to Larson's (2019) definition of digital banking, which is widely accepted in the banking industry, e-statements, online trading platforms, e-signatures, digital shopfronts, and mobile payments all fall under its scope.

A partnership ecosystem, as noted by the UN Capital Development Fund and European Investment Bank in 2014, plays a crucial role in the success of these services. Mobile money accounts are prevalent, with 40% of adults using them, and digital payments are at 97%. Kenya is a prime example of how mobile money has reshaped the banking industry, allowing banks to manage customer deposits and offer credit facilities through digital platforms (Monye, 2023). The transition to digital banking in the financial sector is propelled by evolving customer service expectations and technological advancements, as highlighted in Carsten's work from 2018.

The banking industry has undergone transformative changes, adapting to new challenges and embracing digital financial services like mobile, agency, and online banking. The success of these services, as noted by the UN Capital Development Fund and the European Investment Bank in 2014, relies on a partnership ecosystem. Many adults now have mobile money accounts, with 40% using them, and digital payments are at 97%. Kenya is a leading example of mobile money's substantial impact on the banking industry (Monye, 2023). Mobile services have empowered Kenyan banks to manage customer deposits and offer digital-based credit facilities.

2. Existing Literature

2.1 Digital financial services:(DFS)

A case of Kenya. The Effect of Digital Financial Services (DFS) on financial addition in the Kenyan banking industry

Digital finance encompasses internet-based financial products and services such as online banking, credit card payments, ATMs, and electronic transaction systems, as well as mobile applications (Gąsiorkiewicz and Monkiewicz, 2023). It allows people to participate in the financial market without direct access to traditional banks.

Digital Financial Services (DFS) cover various financial activities, including payments, savings, borrowing, investing, insuring, and electronic fund transfers (Monye, 2023). DFS, including mobile financial services (MFS), has become increasingly vital, especially after the pandemic, as it bridges the gap between people and financial services.

2.2 Existing Research

The research follows a structured methodology (Collis and Hussey, 2014) with two leading research philosophies: positivism and interpretivism. Positivism is deductive, quantitative, and objective. In contrast, interpretivism employs an inductive, qualitative approach and is subjective and context-specific.

Interpretive research involves smaller samples, natural settings, and theory development. The data is qualitative, resulting in lower reliability and validity. This research aligns with the positivist philosophy, utilizing theories, quantitative methods, and hypothesis testing.

2.3 Theoretical Framework

This research reviewed several theories that were used to describe financial inclusion. The theories also assessed the impact digital financial services had on banks. These theories include financial innovation, bank-focused, innovation diffusion, technology acceptance, and agency theories.

- **The Theory of Financial Innovation**

According to (Khraisha and Arthur, 2018), in 1975, William Silber presented a general theory known as financial innovation.

This theory is based on the hypothesis that new financial instruments are established to lessen the financial constraints forced on banks. However, this theory is only applicable to specific groups of financial innovations.

- **Bank Focused Theory**

Joseph and Ambrose (2018) discuss the bank-faced theory, which involves traditional banks using cost-effective non-traditional delivery channels to serve existing customers. This approach offers benefits like enhanced branding and control but raises concerns about customer identity security, transaction security, reliability, accessibility, and personalization.

- **Innovation Diffusion Theory**

This theory explains and describes the success of new inventions and the mechanism of utilization, and Everett Rogers developed it in 1962 (Joseph and Ambrose, 2018). This is where a product gains momentum and spreads through a specific population. The outcome of this diffusion is that people adapt to the product and the new idea. The rate of adoption shows how fast the products reach people.

- **Technology Acceptance Model**

According to (Joseph and Ambrose, 2018), this model was proposed by Fred Davis in 1986, and it helps to explain and predict behavior by users of information technology. The technological acceptance model is an addition to reasoned action theory. This explains why people accept or reject technology. The acceptance or rejection of this is due to the people's attitudes, behavioral intentions, and perceived ease and usefulness of the system.

- **Agency Theory**

According to (Joseph and Ambrose, 2018), the agency theory was first put forward by Stephen Ross and Barry Mitnick in the 1970s.

In an agency relationship, the principal enlists an agent, another person, to carry out services on their behalf. The principal is the person who relies on the agent to carry out definite financial transactions and decisions that can have varying outcomes.

2.4 Research Gap

There is an increased need amongst countries to have Digital Financial services and products, given the aftermath of the COVID-19 pandemic. The pandemic, on the one hand, provided several challenges and several opportunities. During the beginning of the pandemic (COVID-19), 40% of adults in developing countries, which did not include China, made a digital merchant payment, and more than one-third of them did so for the first time. These payments were made using a card, the internet, or even a phone (Demirgüç-Kunt*et al.*, 2022). Although studies have been carried out before, we must do a more comprehensive study to fully understand the impact digital financial services (DFS) have had on Kenyan banks.

2.5 Problem Statement

DFS is a fast-growing global market, and accessing financial services is essential to the growth of economies. This study investigated the outcome of relying on digital financial services in Kenyan banks. It focuses on mobile money using qualitative and quantitative research methods and statistical analysis of demographic changes in the country.

2.6 Scope

The study examined the impact of digital financial services on financial inclusion in Kenyan banks, reflecting the growing adoption of these services by individuals and organizations. The research focused on the Nairobi region and four leading banks offering digital financial services. Eighty mid-level managers from these banks completed questionnaires to assess the impact of Digital Financial Services.

2.7 Significance

This research offers fresh insights into the impact of DFS within the Kenya banking system. It highlights the advantages of using these services in daily life, benefiting both Kenyan banks and other organizations. Furthermore, this analysis provides valuable groundwork for future research on the growth potential of digital financial services for banks and institutions.

2.8 Conceptual Framework

This shows the relationships between your variables, relationships among ideas, and how they relate to research. The objectives are defined and mapped out in how they assemble and draw conclusions for the research.

Research Questions.

- Has Digitalization enabled financial inclusion?
- Has Digitalization enabled Kenyan banks to develop innovative models?
- What is the number of customers who have used DFS over the past five years in Kenyan banks?

Research Aim and Purpose

This research aimed at assessing the effect of DFS on financial inclusion within the Kenya banking industry. The purpose of this research was to boost the banking industry by advancing knowledge through digital financial services.

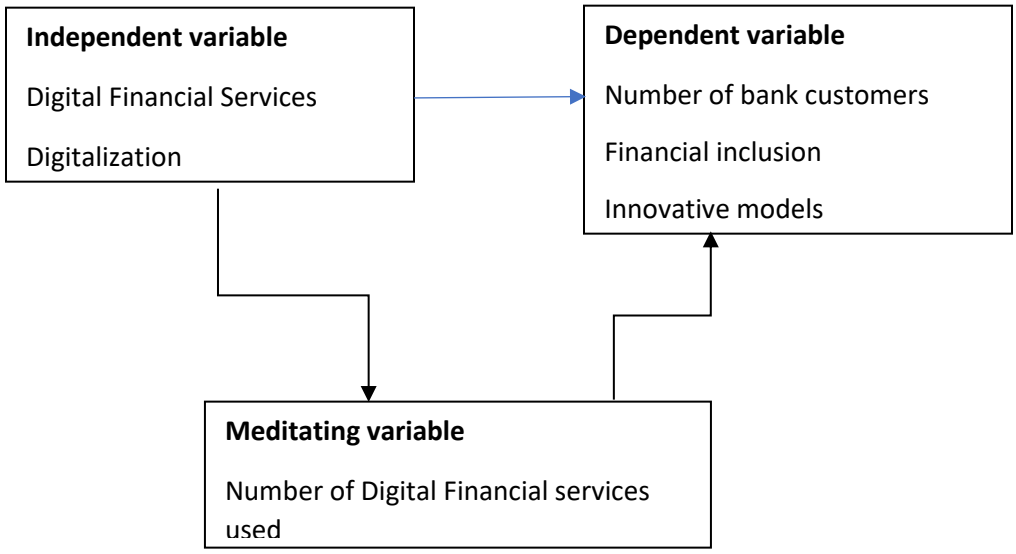
Research Objectives

- To determine the number of customers who have used digital financial services in Kenyan banks over the past five years.
- To determine that digitization of financial services has enabled financial inclusion.
- To assess how digitization has enabled banks to develop innovative models with payment solutions.

Independent and dependent variables:

- DFS is the independent variable, and the number of bank customers is the dependent variable
- Digitalization is the independent, and financial inclusion is the dependent variable
- Digitalization is the independent, and innovative models are the dependent variable

Conceptual framework



Limitations

Two significant limitations in this research could be addressed in the future. The first has to do with the results from the methodology. One of these issues is sampling and selection, where a sampling error might occur when the sample chosen does not reflect the population concerned. Another area for improvement may be more research on the impact of DFS in the Kenyan banking industry. The second limitation is based on the issues with the researcher. Some banks and middle-level managers needed help accessing the questionnaire. Time constraints may also limit the researchers when studying the research problem and measuring the change in the DFS services over time. There may be bias regarding data results that only support the researcher's hypothesis.

3. Methodology

3.1 Research Philosophy

The research follows a structured methodology (Collis and Hussey, 2014) with two leading research philosophies: positivism and interpretivism. Positivism is deductive, quantitative, and seen as objective and scientific. In contrast, interpretivism is inductive, using qualitative methods and being subjective, humanist, and phenomenological. Interpretive research typically involves smaller samples, natural settings, and theory development, resulting in qualitative data with lower reliability and context-specific results. This research aligns with the positivist philosophy, employing theories, quantitative methods, and hypothesis testing.

3.2. Sampling

3.2.1 Population

This study's population comprises four banks in Kenya that have permission to operate within the country. The four banks are NCBA, ABSA, SIDIAN, and UBA. The four banks all have branches in the Nairobi region, the selected area for the study. Each bank branch has one senior manager, the branch manager, and two middle-level managers, the operation and credit managers. NCBA bank has 42 branches in Nairobi and 84 middle-level managers, ABSA bank has 33 branches in Nairobi and 66 middle-level managers, SIDIAN bank has 13 branches in Nairobi and 26 middle-level managers in Nairobi, and finally, UBA bank has three branches in Nairobi and six mid-level managers. The overall number of mid-level managers for the selected banks and the population for this study is 182.

3.2.2 Sampling Frame

It is a complete list of the population for all cases from which the sample is taken for any probability sample (Trochim, 2006). The sampling frame consisted of people who meet the following requirements. They are middle-level managers who work in four commercial banks that offer digital financial services in Kenya and live in Nairobi, a county within Kenya.

3.2.3 Sample Size

This research used a recommended sample size of 124 managers in the four selected banks in Kenya. The sample was explicitly chosen to represent the 4 Banks, and all banks in this group

offer three digital financial services, including agency banking, mobile banking, and internet banking. The study used the Raosoft calculator for sample size determination.

Sample size analysis

Margin of error	5%
Confidence level	95%
Population size	**182**
Response distribution	**50%**
Recommended size	124

Source: Raosoft calculator

3.2.4 Sampling Method

A probability sampling method was used, and the primary type will be simple random sampling. This means a sample was selected from the population without bias.

3.2.5 Respondents

According to (Allen, 2017), respondents are the people who complete the interviews or the surveys for the researcher. In this research, the respondents were middle-level managers of Kenyan banks in the Nairobi region selected for the study. The respondents in this group were chosen according to their availability, ethics, and the setting in which they responded.

3.3 Sources of Data

3.3.1 Primary sources

In this research, the primary sources were respondents from 4 commercial banks in Kenya: NCBA, ABSA, UBA, and SIDIAN. There was a total sample of 124 middle-level managers who were used in this study.

3.3.2 Secondary sources

The sources of data in this research came from the momentary authority of Kenya, known as the Central Bank of Kenya (CBK), the Kenya National Bureau of Statistics (KNBS), and the Communications Authority of Kenya (CAK).

3.4 Methods of Data Collection

It is the method of gathering and analyzing data from sources to find answers to the problem being researched. Since the research was quantitative, information was collected using questionnaires from managers in the selected banks as well as secondary data sources in this research.

3.5 Ethics in Research

Several ethical issues were considered in this research. These issues are.

Informed consent: In ethical research, informed consent is when individuals willingly, knowingly, and intelligently agree to participate (Fouka and Mantzorou, 2011). Participants in this study were provided with a signed consent form clearly explaining their involvement, risks, and the voluntary nature of their participation, allowing them to withdraw at any time.

Voluntary participation: It means that participants in the research chose to participate freely without being coerced or pressured (Bhandari., 2021). Participants in this research were free to leave or withdraw whenever they wanted and did not need to explain why they left.

Anonymity and confidentiality: Research becomes anonymous when participants' responses cannot be linked to them (Fouka and Mantzorou, 2011). Confidentiality means that the study participants are free to either give or hold back information, and they choose to. This research ensured that the participants' responses were kept anonymous and confidential.

Do not harm: The researcher is protected from any harm arising from the research (Fouka and Mantzorou, 2011). This research ensured that the participant's privacy was not invaded, they did not experience any loss due to this research, and their lives were not endangered.

Communication of results :(Mandelbaum, 2020) states that for communication to be ethical, it must be based on values such as truthfulness and responsibility, and the results must be honest and credible.

This research ensured the results were ethical and the participant's preferred communication channel was used.

3.6 Proposed data analysis

3.6.1 Quantitative

Data was gathered using questionnaires, and they were conducted online and paper-based questionnaires. Research questions were created, and a hypothesis was developed based on the research objectives. The statistical tool used was descriptive statistics and the mean, standard deviation, frequencies, and inferential statistics, and the results were presented in the form of tables, figures, and graphs.

a) To determine the number of customers who have used digital financial services in Kenyan banks over the past five years
    - No hypothesis and descriptive analysis were used, and a trend line for mobile, internet, and agency banking was drawn to show the number of customers in the past five years.

b) To determine that digitization of financial services has enabled financial inclusion.
    - Inferential statistics was used to test the hypothesis to determine if digitization has enabled financial inclusion, and data was presented using tables and graphs.

c) To assess how digitization has enabled banks to develop innovative models with payment solutions.
    - Inferential statistics was used to test the hypothesis to assess how digitization has enabled banks to develop innovative models with payment solutions. Data was presented using tables and graphs.

The analysis was based on the statistical results, interpretations, and conclusions.

3.7 Research Hypothesis

Research objective: To determine that digitization of financial services has aided financial inclusion

The hypothesis:

Null (H_0) DFS has not enabled financial inclusion.

Alternate **(H_a).** DFS has enabled financial inclusion.

Research objective: To assess how digitization has enabled banks to develop innovative models with payment solutions

The hypothesis:

Null (H_0) Digitalization has not enabled banks to develop innovative models.

Alternate (H_a). Digitization has enabled banks to develop innovative models.

3.8 Validity and Reliability

Reliability

It denotes the consistency of a measure (Paul C. Price *et al.*, 2017). This research ensured that the results can be reproduced under the same conditions. There are different types of measurement to ensure that the results are reliable, and across items (internal consistency) to ensure reliability was used.

Internal consistency is the consistency of the participant's reactions across the items on a people's measure (Paul C. Price *et al.*, 2017). It means that the participant's scores on items studied should correlate.

Validity

Validity is the accuracy of a measure (Paul C. Price *et al.*, 2017). This research ensured that the results represented what they were expected to measure. To ensure validity in the results, content

validity was used. Content validity the instrument must show that the purportedly covered items are covered relatively and comprehensively (Cohen, Manion, and Morrison, 2003).

Careful sampling, questionnaires, and the appropriate statistical data treatment did this. The research also represented the broader issue under the research.

4. Data Analysis and Findings

4.1 Introduction

The results and reports according to the research objectives are highlighted in this chapter.

4.2. Reliability and validity of the questionnaire

The research also looks at the consistency and the validity of a measure. The questionnaire analysis included measuring content validity using internal consistency and factor analysis, that is, the reliability using Cronbach's alpha (CA) coefficient measures.

Reliability

Case Processing Summary

		N	%
Cases	Valid	96	100.0
	Excluded	0	.0
	Total	96	100.0

a. List-wise obliteration based on all variables in the procedure.

In this case, the number of items was 96, which was 100%, and nothing was excluded from the data analysis.

Table 1: Reliability

The following table shows reliability statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
0.648	8

Source: Cronbach's alpha (CA) coefficient measures.

The Cronbach's Alpha, in this case, was 0.648, indicating internal consistency as it lies between the recommended rate of 0.6-0.7.

Validity

Content validity evaluates the test cover to see if it covers all relevant areas of the content area. Using the factor analysis, the determinant and the KMO are determined and analyzed.

Correlation Matrix
a. Determinant = .273

The determinant value is .273, more significant than the necessary value of 0.00001. That means that for the data used, multicollinearity is not a problem.

The following table shows the validity analysis

Table 1: Validity

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.680
Bartlett's Test of Sphericity	Approx. Chi-Square	118.656
	df	28
	Sig.	0.000

Source: KMO and Bartlett's Test

Kaiser (Stephanie, 2016) recommends acceptable values greater than 0.5. The data in the table above the KMO is 0.680, meaning that factor analysis is appropriate and the data presented is acceptable. The factor analysis is also highly substantial because Bartlett's test is $p<0.001$, therefore appropriate.

4.3. Response rate

The study targeted 124 respondents who were middle-level bank managers in the four selected banks in Kenya. At the closure of data collection, 96 respondents filled out questionnaires and returned them, which translated to a 77.4% response rate. This response rate was statistically sufficient, especially considering that (Mugenda and Mugenda, 2003) asserted the following responses: 50% for analyzing and reporting, 60% is good, and 70% response rate is excellent.

4.4. Demographic information of the respondents

The research inquired about the respondents' demographic to determine their suitability in this study by looking at the age group, the highest level of education, and the Digital financial services they use.

4.4.1. Gender of the respondents

To summarize, the distribution of the respondent's gender is determined by the frequency and is indicated in Figure 1 as per the study.

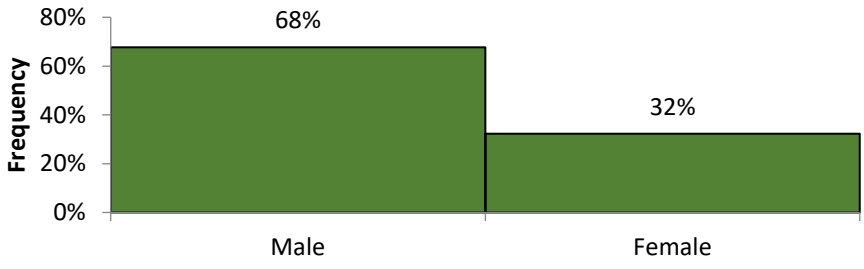


Figure 1: Gender percentages of participants

Source: Author's calculation based on data collected.

The graphs show more male respondents (68%) than females (32%).

4.4.2. Age Group

The respondents' age group is indicated in Figure 2 below.

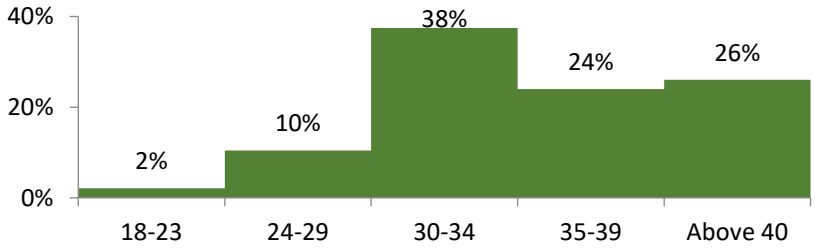


Figure 2: Participants' age characteristics percentages

Source: Author's calculation based on data collected.

4.4.3. Level of Education

The research wanted to determine the respondents' education level, as indicated in Figure 3 below.

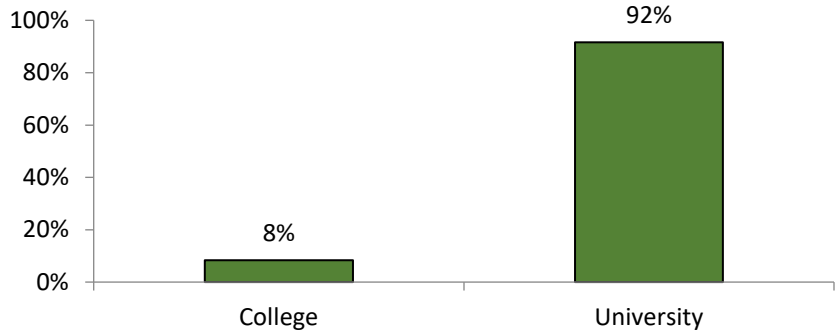


Figure 3: Participants' level of education characteristics percentages

Source: Author's calculation based on data collected.

Most respondents had attained a university degree (92%), while the rest (8%) attended college. It assures the intellectual capability of the respondents to give appropriate views concerning the questions asked.

4.4.4. Digital Financial Services Used

The researcher also wanted to find out the digital financial services that the respondent uses, and this is indicated in Figure 4 below.

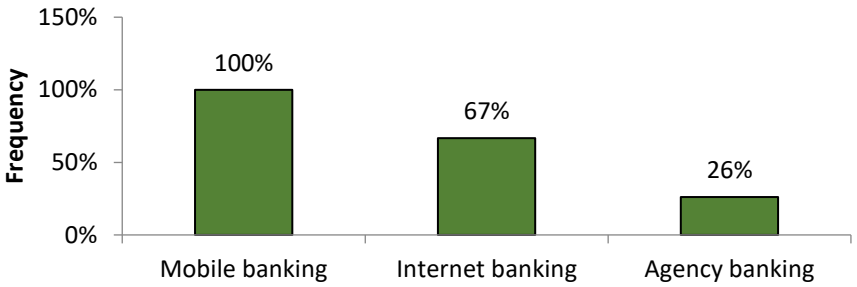


Figure 4: Percentages of Digital Financial Services Used by Participants

Source: Author's calculation based on data collected.

The results show that all respondents use mobile banking (100%), while (67%) of the respondents use Internet banking respondents and only (26%) use agency banking. The respondents have, therefore, used Digital Financial Services long enough to provide reliable data relating to the impact of DFS on financial inclusion in Kenyan banks.

4.5. Number of customers who have used digital financial services

The study's first objective was to ascertain the number of customers using digital financial services. The DFS has included mobile, internet, and agency banking over the last five years.

4.5.1. Mobile Banking

The following table shows data from the last five years showing the mobile subscriber base, mobile penetration, number of transactions, and the value of transactions in the Kenyan banking sector.

Table 3: Digital Financial Inclusion for the period between 2007-2021.

Digital Financial Inclusion 2007 –2021	**2017**	**2018**	**2019**	**2020**	**2021**
Mobile Subscribers (million)	42.8	49.5	54.5	61.4	65.1

Mobile Penetration (%)	94.3	106.2	114.8	129.1	133.6
Number of Transactions (KSh. Million)	139.93	155.77	154.99	181.37	189.8
Value of Transactions (Monthly) (KSh. Billion)	332.62	367.77	382.93	605.69	622.14

Source CBK-Mobile banking

4.6. Digitization of financial services has enabled financial inclusion

The second objective was to determine that digitization of financial services has enabled financial inclusion. The respondents were asked to fill out a questionnaire and give their points of view on a Likert scale of 1-5, where one powerfully agrees, and five strongly disagree.

The factors looked at include Digital Financial Services:

- provided customers with access to interest-bearing services
- provided customers with additional investment portfolios
- provided customers with credit facilities
- enabled more investment products to be accessible

The data was processed for variability, as shown below.

4.6.1. Digital Financial Services have provided customers with access to interest-bearing savings.

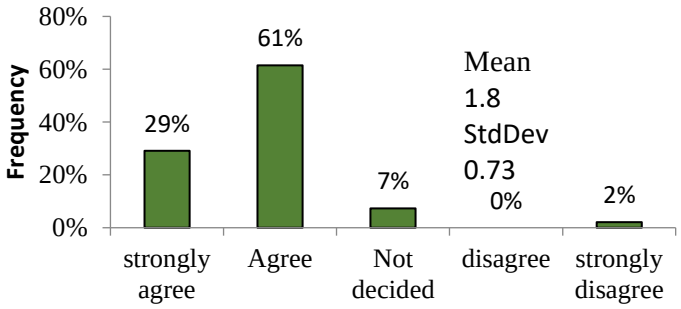


Figure 1: Percentages on Interest-bearing savings due to DFS

Source: Author's calculation based on data collected.

The results show that 61% of the participants strongly agreed while only 2% strongly disagreed with a (Mean 1.8 and SD 0.73) that DFS has provided customers with interest-bearing savings.

4.7. Digitization has facilitated Kenyan banks to develop innovative models

The third objective investigated how digitization has enabled Kenyan banks to develop innovative models. The respondents were asked to fill out the questionnaire and give their points of view on a Likert scale of 1-5. One person strongly agreed, while five strongly disagreed.

The factors looked at include:

- Digitalization has enabled Kenyan banks to have innovative products in the last five years.
- Accessible payment systems have been due to digitization with innovative models.
- Secure payment solutions are due to innovative models developed due to digitization.
- In the last five years, innovative modes have been developed due to digitization, making transactions affordable to customers.

4.7.1. Digitalization has enabled Kenyan banks to have innovative products in the last five years

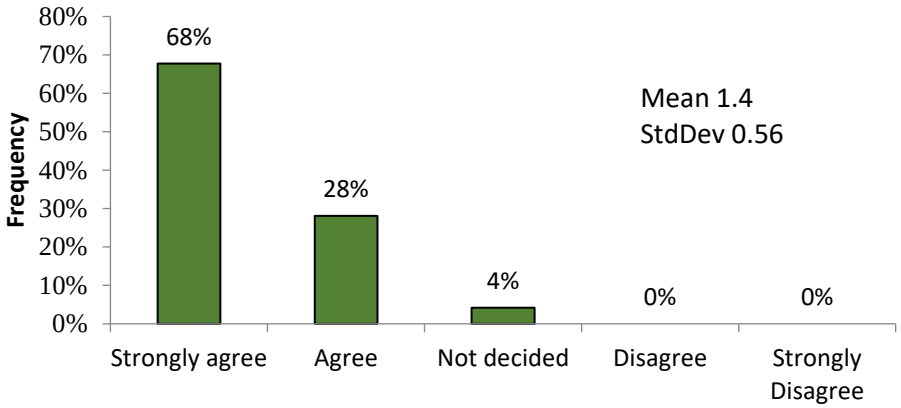


Figure 6: Innovative products in Kenyan banks due to Digitization percentages

Source: Author's calculation based on research findings.

The results show that (68%) of the respondents strongly agree that Kenyan banks have had innovative products due to digitization, and (4%) of the respondents have not decided on that, with a (Mean of 1.4 and SD 0.56).

4.7.2. Accessible payment systems have been due to digitization with innovative models.

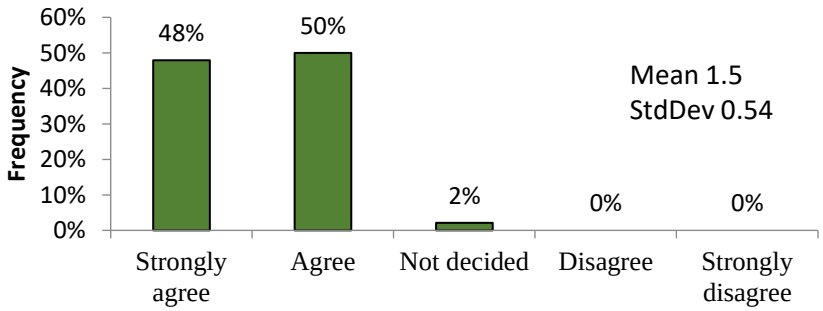


Figure 7: Accessible payment systems due to Digitization percentages

Source: Author's calculation based on data collected.

The results show that most respondents strongly agree (48%) and agree (50%) that digitization has enabled innovative models and that there are accessible payment solutions. Only (2%) of the respondents were not decided, with a (Mean of 1.5 and SD of 0.54).

4.7.3. Secure payment solutions are due to innovative models developed due to digitization Percentages

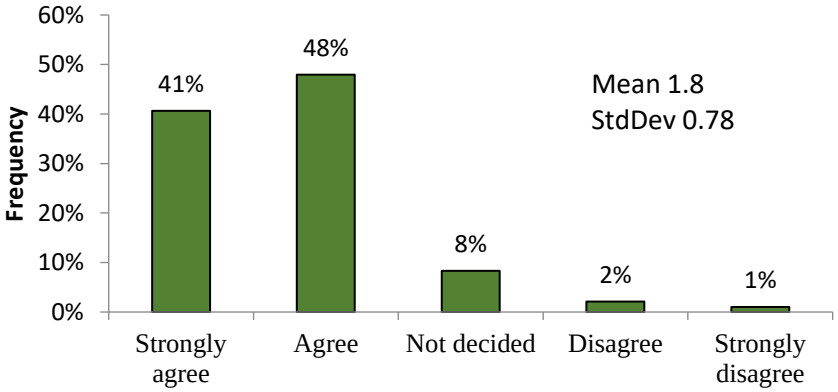


Figure 8: Secure payment solutions due to Digitization percentages

Source: Author's own calculation based on data collected.

The results show that (48%) of respondents agree that due to digitization, innovative models have brought about secure payment solutions. (41%) also strongly agree (8%) are not decided (2%) disagree, and (1%) strongly agree with a (Mean 1.8 and SD 0.78).

4.7.4. In the last five years, innovative modes have been developed due to digitization, making transactions affordable to customers.

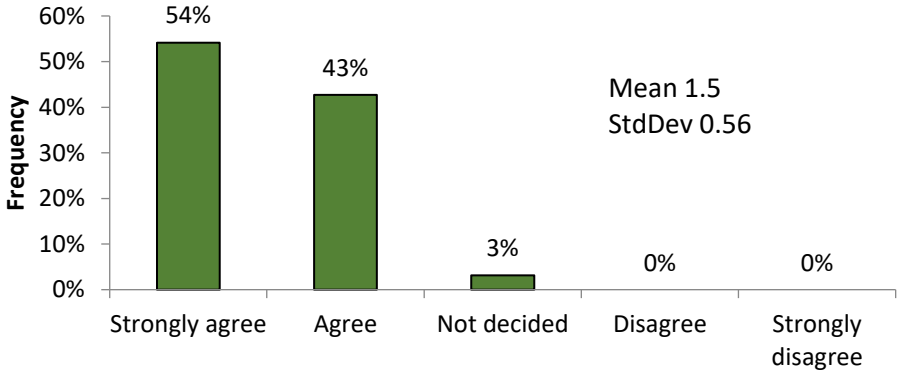


Figure 2: Affordable transactions through innovative models due to Digitization percentages

Source: Author's own calculation based on data collected.

The results show that (54%) of respondents strongly agree, (43%) also agree, and (3%) have not decided that over the last five years, innovative models have been developed due to digitization making transactions more affordable with a (Mean 1.5 and SD 0.56).

Summary of the third objective, as shown in Table 4

Table 4: Summary of the 3rd Objective.

	Valid	Missing	Mean	Standard Deviation
Digitalization has enabled Kenyan banks to have innovative products in the last five years.	96	0	1.4	0.56
Accessible payment systems have been due to digitization with innovative models.	96	0	1.5	0.54
Secure payment solutions are due to innovative models developed due to digitization.	96	0	1.8	0.78
In the last five years, innovative modes have been developed due to digitization, making transactions affordable to customers.	96	0	1.5	0.56

Source: Author's own calculation based on data collected.

The survey results indicate limited variation in respondent views on how digitization drives innovation in Kenyan banks. The findings reveal that digitization has led to innovations such as secure payment solutions (Mean 1.8, SD 0.78), affordable customer transactions (Mean 1.5, SD 0.56), accessible payment systems (Mean 1.5, SD 0.54), and new products (Mean 1.4, SD 0.56) over the past five years. These results suggest that most Kenyan banks have embraced digital financial services to foster innovation, as supported by Ndung'u (2017), who highlights the reliance on DFS, particularly mobile money platforms, to expand their deposit base, serve market niches, and introduce competitive products, ultimately contributing to their growth and success.

4.8. Inferential statistics

The inferential statistics will be the correlation analysis results, ensuring that conclusions and predictions are made based on the data.

4.8.1. Pearson Correlation

Correlation analysis between digitization enabling financial inclusion and digitization enabling innovative models

Table 5 Correlation matrix

Correlations

		QC	QD
Digitization has enabled financial inclusion	Pearson Correlation	1	.509**
	Sig. (2-tailed)		<.001
	N	96	96
Digitization has enabled innovative models	Pearson Correlation	.509**	1
	Sig. (2-tailed)	<.001	
	N	96	96

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

Source: Author's own calculation based on research findings.

The results in Table 7 show a statistically significant relationship between determining whether digitization has enabled financial inclusion and factors assessing how digitization has allowed banks to develop innovative models. This is indicated by the significance value of p (0.01<0.005).

Interpretation of the findings

A positive relationship exists between factors enabling financial inclusion through digitization and factors fostering innovative banking models. When Digital Financial Services enhance customer accessibility to products, offer interest-bearing savings, provide investment opportunities, and extend credit facilities, banks develop more innovative products. They also create more accessible, secure, and affordable payment systems for their customers.

Table 6: Correlation analysis between Digital Financial Services, digitization enabling financial inclusion, and digitization enabling innovative models.

	Digitization has enabled financial inclusion	Digitization has enabled innovative models	Digital Financial Services
Digitization has enabled financial inclusion	1		
Digitization has enabled innovative models	.509**	1	
Digital Financial Services	-.122	.011	1

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

Source: Author's own calculations based on data from sources mentioned.

The results in Table 6 demonstrate that the correlation is substantial at the 0.01 level.

Interpretation of the findings

Pearson correlation results showed a statistically substantial and moderately positive relationship between digitization enabling innovative models and the adoption of Digital Financial Services ($r = .509$, $p < .122$), supporting H1. Increasing services like mobile banking, online banking, and Internet banking contribute to developing innovative banking products and models.

Recent research (Khera et al., 2021) highlights Digital Financial Services as a critical driver of financial inclusion, with a strong positive link between growth and digital financial inclusion. Easy access to mobile phones, the internet, and mobile data services motivates customers to use Digital Financial Services, driving banks to innovate further.

5. Discussion & Conclusion

5.1. Evaluation of findings

This study examined the impact of DFS on financial inclusion in the Kenyan banking industry, focusing on agency banking, mobile banking, and internet banking. The study involved four

commercial banks offering all three DFS, with 96 respondents. A significant number of respondents (100%) used mobile banking, 67% used Internet banking, and 26% used agency banking.

Over five years, mobile subscriptions increased from 30 million to 68.3 million, with corresponding growth in the number and value of transactions. Digitization positively affected financial inclusion and led to an increase in innovative banking products and services. The correlation analysis showed a substantial and positive relationship between digitization, the development of innovative models, and the adoption of DFS. These findings underscore the transformative impact of DFS on the Kenyan banking sector.

5.2. Conclusion

Kenya's banking industry has harnessed technology for resilience and efficiency. The COVID-19 pandemic, beginning in 2020, accelerated DFS adoption. Customers continue to rely on DFS. Increasing subscribers, market penetration, transactions, transaction values, and mobile money agents indicate growing financial inclusion. In conclusion, mobile banking, internet banking, and agency banking have significantly improved financial inclusion in Kenyan banks. These services expand the customer base, reduce banking hall congestion, boost market share, extend reach, and outperform competitors like SACCOS and microfinance banks.

5.3. Recommendation

The study found that Digital Financial Services (DFS) positively impacted financial inclusion in Kenyan banks. To compete effectively, banks should reduce the cost of their DFS offerings, aligning with other financial institutions. Banks should invest in technology, foster innovation, and update policies to grow market share and improve profitability. Government action is vital; it can create regulations for banks and other financial institutions and link certain public services to electronic channels for greater access to Digital Financial Services.

References

Allen, M. (2017) *The SAGE Encyclopedia of Communication Research Methods*. 2455 Teller Road, Thousand Oaks, California 91320: SAGE Publications, Inc. Available at: https://doi.org/10.4135/9781483381411.

Bhandari., P. (2021) 'Ethical Considerations in Research | Types & Examples.' Available at: https://www.scribbr.com/methodology/research-ethics/.

Central Bank of Kenya (CBK), Kenya National Bureau of Statistics (KNBS), and Financial Sector Deepening Trust (FSD) Kenya (2021) '2021 FinAccess Household Survey', p. 88.

Ceyla Pazarbasioglu and Alfonso Garcia Mor (2020) *Expanding digital financial services can help developing economies cope with crisis now and boost growth later*. Available at: https://blogs.worldbank.org/voices/expanding-digital-financial-services-can-help-developing-economies-cope-crisis-now-and-boost-growth-later (Accessed: 3 May 2023).

Collis, J. and Hussey, R. (2014) *Business research: a practical guide for undergraduate & postgraduate students*. Fourth edition. Houndmills, Basingstoke, Hampshire ; New York, NY: Palgrave Macmillan.

Demirgüç-Kunt, A. *et al*. (2022) *The Global Findex Database 2021: financial inclusion, digital payments, and resilience in the age of COVID-19*. Washington: World Bank.

Fouka, G. and Mantzorou, M. (2011) 'What are the major ethical issues in conducting research? Is there a conflict between the research ethics and the nature of nursing?', Volume 5(Issue 1). John Sevec (2021) *Validating a Survey: What It Means, How to do It - mTab*. Available at: https://www.mtab.com/blog/mtab.com/blog/validating-a-survey-what-it-means-how-to-do-it (Accessed: 11 May 2023).

Monye, O. (2023) *Digital financial inclusion and regulation*. London ; New York, NY: Routledge, Taylor & Francis Group (Routledge studies in development economics). Mugenda, O.M and Mugenda, A. (2003) *Research Methods, Quantitative and Qualitative Approaches*. African Centre for Technology, Nairobi.

Ndung'u, N. (2017) 'M-Pesa, a success story of digital financial inclusion.' Available at: https://www.bsg.ox.ac.uk/research/publications/m-pesa-success-story-digital-financial-inclusion (Accessed: 7 April 2023).

Njuguna S. Ndung'u (2021) 'A Digital Financial Services Revolution in Kenya: The M-Pesa Case Study,' *African Economic Research Consortium*.

Paul C. Price *et al.* (2017) *Research Methods in Psychology*. 3rd American Edition. Washington State University.

Purva Khera, Stephanie Ng, Sumiko Ogawa, and Ratna Sahay (2021) 'Is Digital Financial Inclusion Unlocking Growth?', *Ulric Eriksson von Allmen* [Preprint].

Stephanie (2016) *Kaiser-Meyer-Olkin (KMO) Test for Sampling Adequacy*, *Statistics How To*. Available at: https://www.statisticshowto.com/kaiser-meyer-olkin/ (Accessed: 11 May 2023). UN Capital Development Fund and & European Investment Bank (2014) 'Digital Financial Services in Africa: Beyond the Kenyan Success Story,' *EIB - UNCDF*.

Victoria, Elliott (2018) 'Thinking about the Coding Process in Qualitative Data Analysis,' *University of Oxford, United Kingdom*, Volume 23(Number 11).

World Bank Group (2022) *Financial inclusion, World Bank*. Available at: https://www.worldbank.org/en/topic/financialinclusion/overview (Accessed: 24 January 2023).