

**EFFECT OF FINANCIAL TECHNOLOGY ON FINANCIAL  
INCLUSION IN KENYA**


**EUNICE WANGUI MUCHIRI**

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## DECLARATION


I, the undersigned, declare that this is my original work and has not been presented to any institution or university other than the University of Nairobi for examination.

Signed:  Date: 03/09/2023

**EUNICE WANGUI MUCHIRI**

**D63/12601/2018**

This research project has been submitted for examination with my approval as the University Supervisor.

Signed:  Date: September 4, 2023

**DR. HERICK ONDIGO**

**DEPARTMENT OF FINANCE AND ACCOUNTING**

**UNIVERSITY OF NAIROBI**

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May The Almighty God bless you all

## **DEDICATION**

This research project is dedicated to my entire family, parents, friends and colleagues for the support they have given me in my pursuit for further education.

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## LIST OF ABBREVIATIONS

<b>ANOVA</b>	Analysis of Variance
<b>ATM</b>	Automated Teller Machine
<b>CBK</b>	Central Bank of Kenya
<b>FII</b>	Financial Inclusion Index
<b>GDP</b>	Gross Domestic Product
<b>KNBS</b>	Kenya National Bureau of Standards
<b>SME</b>	Small and Medium Enterprises
<b>SPSS</b>	Statistical Package for Social Sciences
<b>TAM</b>	Technology Acceptance Model
<b>VIF</b>	Variance Inflation Factors

## ABSTRACT

Fintech has the potential to both promote financial inclusion or lead to financial exclusion depending on various factors. Arguments in favor of fintech promoting financial inclusion holds that Fintech provides access to financial services, such as mobile banking and digital payments, to people who were previously excluded or underserved by traditional financial institutions. Fintech can increase competition in the financial sector, which can lead to better prices, better services, and increased access to financial services for everyone. The objective of this research was to determine the effect of financial technology on Kenya's financial inclusion. The study was anchored on technology diffusion theory and supported by inclusion financial theory as well as the digital divide theory. The independent variable was financial technology measured using the number of transactions through Mpesa, mobile banking, internet banking and agency banking while the control variables were interest rate, and economic growth rate. The dependent variable that the research attempted to explain was the financial inclusion in Kenya measured using financial inclusion index. The data was collected on a quarterly basis over a period of 10 years (from January 2013 to December 2022). A causal research approach was employed in the research, with a multivariate regression model used to examine the connection between the study variables. The study's findings yielded an R-square value of 0.787, indicating that the chosen independent variables could explain 78.7 percent of the variance in Kenya's financial inclusion, while the other 21.3 percent was due to other factors not investigated in this study. The F statistic was significant at a 5% level with a  $p=0.000$ . This suggests that the model was adequate for explaining financial inclusion in Kenya. Further, the findings demonstrated that Mpesa, mobile banking and economic growth had a significant positive effect on financial inclusion as indicated by positive coefficients and p values less than 0.05 while internet banking, agency banking and interest rate were found not to have a significant effect. The research recommends the need for policy makers to create a conducive environment for development of more financial technologies while at the same time ensuring the safety of the existing ones as this contributes to a rise in financial inclusion. The study also recommends the need for policymakers to encourage private and public sector collaborations to invest in critical sectors, such as agriculture, technology, and infrastructure, that have the potential to drive economic growth. The study recommends the need for future researchers to conduct a study on the effect of fintech on the different sectors of the economy such as small and medium enterprises.

## CHAPTER ONE: INTRODUCTION

### 1.1 Background of the Study

Financial technology (fintech) has the potential to increase financial inclusion by providing access to financial services to people who were previously excluded or underserved by traditional financial institutions (Banna, Mia, Nourani & Yarovaya, 2022). Studies have focused on the relationship between fintech and financial inclusion and there are three schools of thought. Proponents argue that through the use of technology, such as mobile banking, online lending, and digital payments, fintech can reduce costs and increase convenience for users, especially for those in remote or underserved areas (Demir, Pesqué-Cela, Altunbas & Murinde, 2022). Some argue that fintech has a neutral impact on financial inclusion as it may increase access to financial services for some individuals, but at the same time, it may also perpetuate existing financial exclusion for others, such as those without access to the necessary technology or digital literacy (Liu & Walheer, 2022). Critics argue that fintech may have a negative impact on financial inclusion by exacerbating existing inequalities and increasing the risks of financial exploitation and discrimination (Chinoda & Mashamba, 2021).

This study was anchored on technology diffusion theory and supported by inclusion financial theory as well as the digital divide theory. Technology diffusion theory by Rogers (1962) is the anchor theory as it provides a framework for understanding how new technologies, such as Fintech, can spread and become adopted by individuals and organizations. The theory can be used to explain the conditions under which Fintech can be adopted by previously excluded populations, and how it can contribute to promoting financial inclusion. Inclusion financial theory by Polillo (2011) suggests that fintech has the potential to increase access to financial services and improve financial

inclusion, but it also highlights the need for regulatory and policy measures to ensure that fintech solutions are safe, accessible, and affordable for everyone. The digital divide theory by Van Dijk (1999) suggests that access to digital technology can exacerbate existing inequalities, creating a digital divide between those who have access to technology and those who do not.

Kenya is considered a leader in financial inclusion compared to other countries in the region. In recent years, the adoption of mobile technology and digital financial services has been widespread in the country, leading to an increase in the number of people who have access to financial services (Mule, Wafula & Agusioma, 2021). According to the World Bank's Global Findex database, Kenya has made significant progress in financial inclusion, with the proportion of adults with a formal financial account increasing from 28% in 2011 to 86.5% in 2021. However, while progress has been made, there are still challenges to be addressed in terms of achieving full financial inclusion in the country. For example, a significant proportion of the population remains unbanked, particularly women and rural populations. Additionally, the use of formal financial services is still low, with many people relying on informal sources of credit and savings (Muthengi, 2022).

### **1.1.1 Financial Technology**

According to Sheleg and Kohali (2011), any technical advancement affecting the financial industry and its operations is referred to as fintech. Fintech can also refer to businesses that combine financial services with modern technology to provide user-friendly, automated, transparent, and efficient internet-based and application-oriented services (Triki & Faye, 2013). Fintech, according to Freytag and Fricke (2017), is innovative technology that enables financial services. Financial institutions are

expected to offer social network platforms in the future, allowing clients to utilize their mobile phones to access investment options made possible by fintech (World Bank, 2017).

Fintech has been used as a mechanism to an end though not the end itself. Globalization, volatility in client needs, competitiveness, and technical improvements are examples of external environment dynamics that have produced ongoing environmental upheavals and necessitate more innovations from executives (Thompson & Strickland, 2013). As a growth technique, fintech aims to break into modern markets, share market increase, as well as provide a company a competitive advantage via employing strategies that are diverse from the competition. The rising competitiveness in international marketplaces has compelled firms to acknowledge the fintech essence as the business environment changes and traditional services as well as products lose value (Nbakk & Jensen, 2013).

In regard to operationalization, fintech has been operationalized before in various ways (Demirguc-Kunt et al., 2018). Fintech has been operationalized before in terms of mobile banking, internet banking, ATMs, agency banking, Mpesa among others. Internet banking provides financial services via a bank's website. Peer-to-peer financing is a kind of lending that allows people to lend to one another and also loan money which are not used as mediators by a bureaucratic bank (Koki, 2018). This study attempted to quantify the level of financial technology usage, as defined by the total value of transactions carried out via M-pesa, mobile banking, internet banking and agency banking. This measure has been used before by Abdulkadir (2019).

### **1.1.2 Financial Inclusion**

Financial inclusion is distinct as universal accessibility, availability and equal opportunity towards access of financial services and products (Banna, Mia, Nourani &

Yarovaya, 2022). Financial inclusion is ensuring that low-income earners and small business can have accessible financial products and services that's is affordable and suitable to help reduce poverty in the economy (Dollar & Kraay, 2015). Financial inclusion entails adding as many people as possible into the ecosystem so as to give them access to finance to grow and improve their lives and even their businesses (Liu & Walheer, 2022). Financial inclusion refers to a person's ability to get and use financial services in a cost-effective manner (Demir et al., 2022).

Financial inclusion aids in the smoothing of consumption, reduces inequality in income, facilitates the diversification of risk, and positively impacts human development (Chinoda & Akande, 2019). The inclusivity in financing concept is ever-changing and has substantially evolved from its inception. The conventional view of the term was that it was a means of tackling poverty and lowering inequality in income, presently, the concept has evolved to be a key requirement for financial stability and economic development (Iqbal & Sami, 2017). Inclusivity of financial systems permits producers and households to streamline production and consumption of goods and services thereby generating an income. Therefore, it is the driving factor for generating income through an increment in the productive capacity specifically to those lacking initial capital thereby facilitating inclusive growth (Gourène & Mendy, 2017).

In terms of operationalization of financial inclusion, Sarma (2015) operationalized financial inclusion as the percentage of adult population/households with bank accounts. This kind of measure of inclusion, however, has several shortcomings because key requirements of an inclusive system are brushed off, such as its availability, affordability, quality and use that when combined generate an inclusive system of finance. Demirguc-Kunt et al., (2018) developed a global Financial Inclusion Index

(FII) with the following indicators; number of adults holding accounts with formal institutions, adults with savings and borrowings made using these accounts, adults that utilize conventional saving and borrowing methods and number of adults using credit/debit cards, mortgage and health insurance facilities. The current study measured financial inclusion using the FII due to its wider applicability in previous literature.

### **1.1.3 Financial Technology and Financial Inclusion**

Fintechs are innovating at every step of the financial services value chain, often through new value propositions, including flexible products and better ways to address the financial challenges faced by low-income customers. They are making financial services more affordable and accessible. They are improving the customer experience of financial services and accelerating use and engagement. They are also building the groundwork, including easier digital identity verification, collaborative customer due diligence, data sharing, and payment schemes that can catalyse a host of financial services (Banna et al., 2022).

With increment in fintech households are able to have easier access to borrowings and savings products as a result of smoothing of consumption (Mehotra & Yetman, 2015). One of the expected benefits of fintech is that the access to credit and saving facilities by many individuals in the society will bring in economies of scale leading to long-term financial development (Rasheed, Law, Chin & Habibullah, 2016). Accessibility to and utilization of such services is a crucial factor in promoting sustainable economic and social growth, promoting the reduction of poverty and unemployment, and stabilizing the financial sector (Zins & Weill, 2016).

Fintech is giving the choice to enable access to useful financial products such as credit to communities, individuals or businesses. There are some communities who are

disenfranchised from mainstream financial services for one reason or the other, either because of the level of income they are making or because of their geographical location. For instance, through fintech loans, people are able to access finances from various fintech lenders via their mobile phones. This enables them to finance their daily financial needs and more so respond to emergencies such as illness. According to Dupas and Robinson (2009), individuals with the ability to access any form of finances whether formal or informal exhibited greater possibilities of enhancing their income, productivity and consumption and tremendously minimized exposure to sickness and other unforeseen uncertainties.

#### **1.1.4 Financial Technology and Financial Inclusion in Kenya**

Technological disruptions have greatly affected the Kenyan financial services industry in recent years. Mobile money is by far the most significant, as underlined by data from the Central Bank of Kenya (CBK), which indicates that the value of mobile transactions has grown at a rate of 66.3% since inception in 2007, from Kshs 14.8 billion of transaction volume, to Kshs 4.0 trillion of transaction volume in 2017. Online banking has also gained traction and majority of banks are now aligning their business models to towards online channels as opposed to the traditional brick and mortar. The most recent innovation to shake up the industry is digital lending, which has been, to some part, a response to the slow growth in private sector credit.

The digital lending space has grown at an accelerating pace in recent years. Since the launch of the M-Shwari platform in 2012, a vast number of platforms offering these services have emerged. Most recently, Safaricom launched Fuliza, an overdraft facility that enables M-Pesa customers to send or complete mobile payment transactions even if their M-Pesa balance is below the required amount. In the first week of its launch,



more than one million customers signed up and borrowed Kshs 1.0 bn, and after one month of operation had borrowed Kshs 6.2 bn (CBK, 2020).

In terms of financial inclusion in Kenya, formal financial inclusion has gone up from 75.3% in 2016 to 82.9% in 2019 (Fin Access, 2019). This shows that Kenya is making a remarkable progress in increasing financial inclusion. However, according to Fin Access household report (2019), the country is still experiencing the problem of financial exclusion among some of its citizens which currently stands as 11.0%. Financial technology has widely been seen as the emergence of new financial products such as digital loans which has been brought about by the growth and development of fintech companies.

## **1.2 Research Problem**

Fintech has the potential to both promote financial inclusion or lead to financial exclusion depending on various factors (Banna et al., 2022). Arguments in favor of fintech promoting financial inclusion holds that Fintech provides access to financial services, such as mobile banking and digital payments, to people who were previously excluded or underserved by traditional financial institutions. Fintech can increase competition in the financial sector, which can lead to better prices, better services, and increased access to financial services for everyone (Liu, Yao, Latif, Aslam & Iqbal, 2022). Opponents of fintech argue that it relies on technology and access to the internet, which is not available to everyone. This can result in the digital divide, where some people are excluded from financial services due to a lack of access to technology or digital literacy. Further, some fintech companies engage in predatory practices, such as high-cost loans or hidden fees, which can increase financial exclusion for vulnerable populations (Goswami, Sharma & Chouhan, 2022).

Kenya is considered a leader in fintech. In recent years, the country has seen a surge in fintech start-ups and innovation, particularly in the mobile payments and digital lending space. The widespread adoption of mobile technology and the availability of low-cost smartphones have played a significant role in driving the growth of fintech in the region. For example, M-Pesa, has transformed the financial landscape and increased access to financial services for millions of people (Mule et al., 2021). However, while the country has made significant progress in financial technology, there are still challenges to be addressed. For example, there is a need for greater investment in fintech infrastructure, as well as stronger regulations and consumer protection measures to ensure that fintech solutions are safe and accessible for everyone. There has been concerns that the financial technology might lower the level of financial inclusion due to the high interest rates being charged by the digital lenders (Kouladoum, Wirajing & Nchofoung, 2022).

Although there have been international studies in this field, they have mostly focused on certain elements of fintech and how they correlate to other variables such as poverty alleviation, income inequality and economic development. Demir, Pesqué-Cela, Altunbas and Murinde (2022) investigates the interrelationship between Fintech, financial inclusion and income inequality for a panel of 140 countries. The study reveals that financial inclusion is a key channel through which Fintech reduces income inequality. Liu and Walheer (2022) adopt a composite index approach for determining the interrelationship between fintech, financial inclusion and economic development. The empirical exercise reveals important patterns useful in understanding financial inclusion differences and designing future policy implementations. Banna, Mia, Nourani and Yarovaya (2022) focused on the effect of fintech-based financial inclusion and risk-taking of microfinance institutions from Sub-Saharan Africa. The study revealed that higher involvement in fintech solutions is associated with lower risk-

taking of MFIs. All these investigations were conducted in a distinct setting thus, their results cannot be applied to the current situation.

Locally, Muthengi (2022) sought to find out how financial technology and financial inclusion affect SMEs in Kenya's Kabati market. The study revealed that financial technology has significant effect on financial inclusion. The study presents a methodological gap as it relied on primary data and therefore need for a study utilizing secondary data to compliment the findings. Misati, Osoro and Odongo (2021) evaluated the impact of financial innovation on financial inclusion and economic growth in Kenya. The findings reveal that the impact of innovations on economic growth is indirect through financial depth channels. This study presents a conceptual gap as it did not address the direct effect between fintech and financial inclusion. Mule, Wafula and Agusioma (2021) focused on the effect of financial technology loans on financial inclusion among the unbanked low-income earners in Makueni County. This study presents a conceptual gap as it focused on fintech loans leaving a gap on other fintech aspects.

This study was motivated by the increased adoption of fintech. Fintech is expected to enhance financial inclusion. Although there are previous studies in this area, there exist research gaps. First, most of the studies conducted locally have operationalized financial technology in different ways, with the majority choosing for a restricted definition. This presents conceptual gaps that the current study intends to fill. There are also methodological gaps that arise from previous studies conducted locally; most of them were conducted for a short period of time which might not be adequate to capture the effect of financial technology on financial performance. The current study considered a 10-year period with data collected quarterly. Further, most of the local

studies have relied on primary data while the current study made use of secondary data that was considered more objective. The current research was based on these gaps and attempted to answering the research question; how does fintech influence financial inclusion in Kenya?

### **1.3 Research Objective**

The objective of this study was to determine the effect of financial technology on financial inclusion in Kenya.

### **1.4 Value of the Study**

This study's results will contribute to the existing theoretical and empirical literature on fintech and financial inclusion. The findings will also help in theory development as they will offer insights on the shortcomings and relevance of the current theories to the variables of the study. Subsequent studies may also be carried out based on the recommendation and suggestions for further research.

The findings of the research might be relevant to the government and the regulator CBK in developing regulations for the population under investigation. The study's findings will help investors who are considering investing in the population under investigation by providing information on the risk-return tradeoffs that exist in such organizations and their impact on profitability.

The conclusions will aid investors as well as practitioners understand the relationship between the two variables, that is important for ensuring strong management team with diverse viewpoints and competences streamlining operations as well as managing fintech, as well as for building confidence among corporate stakeholders, which will ultimately optimize financial inclusion.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

In this section, the theories which are relevant to the study are discussed in the theoretical review, also empirical studies in the area of study or similar area is discussed. The chapter also exhibits the conceptual framework indicating the anticipated association of variables and to conclude the chapter is the summary of the literature review.

### **2.2 Theoretical Framework**

This segment examines the theories that underpin the study of fintech and financial inclusion. The study was anchored on technology diffusion theory and supported by inclusion financial theory as well as the digital divide theory.

#### **2.2.1 Technology Diffusion Theory**

This theory was developed by Rogers (1962) and it is the anchor theory for the current study. The theory postulates that new technology spreads and diffuses through a population over time, and that the rate and patterns of diffusion are influenced by five key factors: the innovation itself, the communication channels used to spread information about the innovation, the time it takes for the innovation to diffuse, the social system in which the innovation is diffusing, and the decision-making processes of the individuals who adopt the innovation. According to the theory, new technology diffuses through a population in a series of stages, including the early adopters, early majority, late majority, and laggards. Each stage is characterized by different levels of risk tolerance, innovativeness, and influence on others, and the pattern of diffusion can be influenced by various factors, such as the nature of the innovation, the marketing

and communication strategies used to promote the innovation, and the presence or absence of early adopters (Neaime & Gaysset, 2018).

Critics argue that the technology diffusion theory oversimplifies the complex and multi-faceted process of technology adoption. The theory assumes that people adopt new technology in a linear and predictable way, but in reality, the adoption process is often influenced by many different factors, including individual preferences, cultural norms, and political and economic conditions (Rasheed et al, 2016). Critics also argue that the technology diffusion theory does not adequately consider the role of power and domination in the diffusion process. The theory assumes that people adopt new technology because they believe it is beneficial, but in reality, adoption may also be influenced by the power dynamics between adopters and non-adopters, as well as between different adopter groups (Onyinye et al., 2018).

The technology diffusion theory provides a framework for understanding how new technology spreads through a population and the factors that influence the rate and pattern of diffusion. It has been widely used to study the diffusion of various technologies, including information and communication technologies, medical technologies, and agricultural technologies, among others. In the context of fintech and financial inclusion, this theory suggests that the diffusion of fintech technology can increase access to financial services and improve financial inclusion, particularly for people who were previously excluded from traditional financial services.

### **2.2.2 Inclusion Financial Theory**

Polillo (2011) was the pioneer of this theory. It is a multi-disciplinary approach that aims to provide access to financial services to excluded or underserved populations. The postulates of financial inclusion are centered around the idea that access to financial

services can have a positive impact on poverty reduction, economic growth, and financial stability. It aims to provide affordable and appropriate financial products and services to people who are excluded from the formal financial sector, including low-income households, small businesses, and rural populations. The goal is to empower these groups by providing them with the tools they need to manage their finances, invest in their future, and participate in the formal economy (Liu et al., 2022).

Critics argue that providing financial services to low-income and marginalized communities can be expensive and may not be economically viable for financial institutions. Some critics also argue that the financial products and services offered to low-income communities may not be appropriate for their needs, leading to a high rate of default or over-indebtedness. There are also concerns that some financial inclusion initiatives may not be sustainable in the long run, particularly if they do not generate enough revenue to cover costs (Freytag & Fricke, 2017).

In the context of fintech and financial inclusion, this theory suggests that fintech has the potential to increase access to financial services and improve financial inclusion, but it also highlights the need for regulatory and policy measures to ensure that fintech solutions are safe, accessible, and affordable for everyone. Proponents of financial inclusion argue that the benefits of providing access to financial services to underserved populations far outweigh the challenges and that with proper design and implementation, financial inclusion can be a powerful tool for reducing poverty and promoting economic growth.

### **2.2.3 Digital Divide Theory**

The technology acceptance model was developed by Van Dijk (1999). The theory postulates that access to and use of digital technologies create a gap between those who

have access to these technologies and those who do not. This gap can exacerbate existing social and economic inequalities, as those who are excluded from digital technologies are also excluded from the benefits that these technologies provide, such as access to information, education, employment opportunities, and financial services. The digital divide theory also highlights the importance of the social, economic, and cultural factors that affect access to digital technologies. These factors include income, education, race, ethnicity, geography, and gender, as well as the policies and regulations that govern the distribution and use of digital technologies (Demir et al., 2022).

Critics argue that the digital divide theory oversimplifies the issue of unequal access to digital technologies, reducing it to a binary divide between those who have access and those who do not. In reality, the issue is more complex and multifaceted, with varying degrees of access and use among different groups and communities. Critics also argue that the digital divide theory does not address the underlying structural issues that contribute to unequal access to digital technologies, such as poverty, inequality, and discrimination. Without addressing these structural issues, efforts to bridge the digital divide may be limited in their effectiveness (Iqbal & Sami, 2017).

This theory suggests that access to digital technology can exacerbate existing inequalities, creating a digital divide between those who have access to technology and those who do not. However, Fintech can be used to bridge this divide by providing access to financial services to previously excluded populations through mobile phones and other digital devices. The digital divide theory has played an important role in shaping policies and initiatives aimed at bridging the gap between those who have access to digital technologies and those who do not, particularly in developing countries and marginalized communities.



## **2.3 Determinants of Financial Inclusion**

The elements that drive growth can be internal as well as external, and they determine the level of output. Internal factors vary from firm to firm and influence development in different ways. Such elements arise as a result of management's actions, which are taken in cooperation with the board. Financial technology, interest rates, exchange rate volatility, economic growth, public debt, unemployment, and other external factors all contribute to financial inclusion (Athanasoglou et al., 2005).

### **2.3.1 Financial Technology**

Abdulkarim and Ali (2019) argue that fintech is essential for directing money to efficient purposes and allocation of risk to people who can utilize them, and this boosts economic growth. Fintech is anticipated to improve financial inclusion, resulting in improved efficiency of the intermediaries (Rasheed, Law, Chin & Habibullah, 2016). Neaime and Gaysset (2018) asserted that in general, fintech has a substantial influence in increasing financial inclusion of financial firms.

With the number of fintech transactions rise, households, borrowing and savings products are made easy for everyone (Mehotra & Yetman, 2015). Long-term performance of financial institutions is one of the projected benefits of fintech (Rasheed, Law, Chin & Habibullah, 2016). As per system Zins and Weill (2016) making sure people have simple accessibility to and are able to utilize these services is vital in fostering social growth and sustainable economic, decreasing destitution, and helping to stabilize the financial sector. In this study, financial technology will be measured as the total number of transactions through Mpesa, agency banking, internet banking, and mobile banking.

### **2.3.2 Interest Rates**

Interest rate significantly influences the pricing of goods and services both regionally and abroad. Money supply in the thrift can significantly impact the levels of interest. For instance, when money is abundant in the economy, the interest rates are more likely to decrease and this will impact how a business functions in the market. This will thereafter boost the market which will become more appealing to outsiders in the country (Barksenius & Rundell, 2012).

Interest rates define the improvement of the economy. As per Barnor (2014), an unforeseen shift in the interest rates affects the investment decisions, where, investors may change their savings arrangements, like shifting to specified profit instruments from the capital market. Khan and Sattar (2014), state that capital markets development can be affected either negatively or positively by the interest rates depending on the movement. Savings are disheartened by a reduction in interest rates on deposits and increased consumption.

### **2.3.3 Economic Growth**

Economic growth is viewed as an important overall measure of an economy's wellbeing. It is thus used to track the overall economic growth trend of an economy over time and can thus be used to track the effectiveness of economic policies instigated with an aim of enhancing growth overtime. Achieved positive economic growth may help in the realization of various macro-economic objectives that include poverty reduction, increased employment, public services improvement and increased financial inclusion (Phimmarong & Kinnalone, 2017).

Economists have often recognized that capital is a key component of enhancing economic growth, via its deployment to productive investments. Capital is thus required

for both public and private sector investments that enhance local economic growth. Public investments include infrastructure projects that support and stimulate growth, along with employment creating public projects that reduce poverty by increasing incomes and thereby raising standards of living. The private sector requires capital for such needs like supplementing production resources and expanding business activity (Onyinye, Orji, Jonathan & Emmanuel, 2018)

## **2.4 Empirical Review**

Local as well as global researches have determined the link between fintech and financial inclusion, the objectives, methodology and findings of these studies are discussed.

### **2.4.1 Global Studies**

Demir, Pesqué-Cela, Altunbas and Murinde (2022) investigates the interrelationship between Fintech, financial inclusion and income inequality for a panel of 140 countries using the Global Findex waves of survey data for 2011, 2014 and 2017. They posit that Fintech affects inequality directly and indirectly through financial inclusion. They invoke quantile regression analysis to investigate whether such effects differ across countries with different levels of income inequality. They uncover new evidence that financial inclusion is a key channel through which Fintech reduces income inequality. They also find that while financial inclusion significantly reduces inequality at all quantiles of the inequality distribution, these effects are primarily associated with higher-income countries. The direct effect of fintech on financial inclusion was not established and therefore a conceptual gap.

Liu and Walheer (2022) adopt a composite index approach for determining the interrelationship between fintech, financial inclusion and economic development. The

study defines financial inclusion from three main dimensions making use of both demand and supply side data and recognize that financial technology and digital finance are playing an increasing role in boosting financial inclusion. Next, they analyze financial inclusion changes over time by distinguishing between catching-up and environment change effects. The latter allows them to verify whether policy makers have succeeded in creating an environment that has fostered financial inclusion and quantify the scope for policy interventions. The exercise reveals important patterns useful in understanding financial inclusion differences and designing future policy implementations. This study reveals a methodological gap as it was a review of literature and therefore lacks empiricism.

Banna, Mia, Nourani and Yarovaya (2022) focused on the effect of fintech-based financial inclusion and risk-taking of microfinance institutions from Sub-Saharan Africa. They developed a fintech-based financial inclusion (FinFI) index. They focused on Sub-Saharan African MFIs with a remarkable and recent development in fintech solutions. The study revealed that higher involvement in fintech solutions is associated with lower risk-taking of MFIs. Small scale MFIs largely benefited from fintech solutions. This study presents a contextual gap as the focus was on MFIs and therefore cannot be used to generalize other institutions or countries.

Chinoda and Mashamba (2021) develops a novel double financial inclusion model and applies the structural equation modelling to simultaneously analyze the interaction between financial technology, financial inclusion, and income inequality in a panel of 25 African countries over the periods 2011, 2014, and 2017. The results show that financial inclusion mediates the financial technology-income inequality relationship thus playing a fundamental role in reducing income inequality in Africa. The direct

effect of fintech on financial inclusion was not investigated and therefore a conceptual gap.

Al-Mudimigh and Anshari (2020) studied fintech and financial inclusion in South East Asian region. Via the Binary Logistic model and data from 300,000 families from the countries' economic surveys, the study found that fintech has the potential to increase financial access and usage, but the impact varies across different countries and regions, and depends on factors such as regulation, infrastructure, and consumer demand. The study reveals a contextual gap as it was conducted in South East Asia whose social and economic setting is different from Kenya where the current study will be conducted.

#### **2.4.2 Local Studies**

Muthengi (2022) sought to find out how financial technology and financial inclusion affect SMEs in Kenya's Kabati market. Descriptive cross-sectional approach was adopted for use in this study whereby stratified random sampling method was applied with sample size of 223 enterprises on all merchants and wholesalers SMEs in the Kabati market which had a total population of 502 SMEs. Questionnaires were used in the study to collect primary data. The data was analyzed by descriptive statistics as well as inferential statistics. The study concluded that financial technology has significant effect on financial inclusion. The study presents a methodological gap as it relied on primary data and therefore need for a study utilizing secondary data to compliment the findings.

Misati, Osoro and Odongo (2021) evaluated the impact of financial technology on financial inclusion and economic growth in Kenya. They employed autoregressive distributive lag models. Real gross domestic product (GDP) and Credit to private sector indicators were used to measure economic growth and financial depth respectively. The

results reveal that mobile transactions in value, the number of mobile agents and internet have significant positive impact on financial deepening. However, with advancement in mobile and agency banking models, bank branches have negligible contribution to financial inclusion. The findings further reveal that the impact of innovations on economic growth is indirect through financial depth channels. They therefore concluded that investment in cost effective innovation will be key determinant of bank's profitability. This study presents a conceptual gap as it did not address the direct effect between fintech and financial inclusion

Mule et al. (2021) sought to establish the effect of financial technology loans on financial inclusion among the unbanked low-income earners in Makueni County. Descriptive research design was used, with the target population being the unbanked low-income earners over the age of 18 in Makueni County. A sample size of 384 respondents was chosen using the convenience sampling technique. Personal interviews were conducted using an interview guide to collect primary data. The study found that fintech loans have a positive and significant effect on financial inclusion among the unbanked low-income earners in Makueni County. According to the findings of the study, since the unbanked people in Makueni County associate the use of financial technology loans to meeting personal financial needs and especially coping up with day-to-day expenses and emergencies. This study presents a conceptual gap as it focused on fintech loans leaving a gap on other fintech aspects.

Sindani, Muturi, and Ngumi (2019) examined the correlation between the growth of financial distribution channels and the rate of financial inclusion in Kenya during a six-year period, from 2012 to 2017. In particular, the following are some of the objectives of this study: Examine the ways in which the growing popularity of online banking and

automated teller machine use in Kenya have contributed to that country's increasingly high rate of financial inclusion. Information gleaned from secondary sources has been compiled for use in further research. This study's results suggest that internet banking in Kenya benefits the financial sector as a whole by increasing productivity and efficiency. In addition, the introduction of ATM banking has helped increase financial inclusion in Kenya. The study presents a methodological gap as it was conducted for a short period of time that might not be adequate for robust regression analysis.

A study by Nzyuko, Jogongo and Kenyanya (2018) assessed the effect of innovations and financial inclusion on performance of commercial banks in Kenya. The study covered the period 2010 to 2016. The researchers employed multiple regression method and correlation analysis to analyze data. The research focused on adoption of ATM, mobile banking, internet banking and agency banking innovations. The researchers observed that banks have adopted new technologies and alternative delivery channels to reach the unbanked population in Kenya. Using these technologies, they have also reduced operating cost, increased efficiency and improved competitiveness of the institutions. The increased customer base and improved competitiveness of the banks leads to improved performance. The study presents a conceptual gap as the direct effect of fintech on financial inclusion was not investigated.

## **2.5 Summary of the Literature Review and Research Gaps**

The theoretical reviews showed the predicted relation between fintech and financial inclusion. Major influencers of financial inclusion have been discussed. From the reviewed studies, there is a knowledge gap that needs to be filled. From the studies reviewed, there are varied conclusions regarding the relation between fintech and

financial inclusion. The differences from the studies can be explained by conceptual, contextual and methodological gaps.

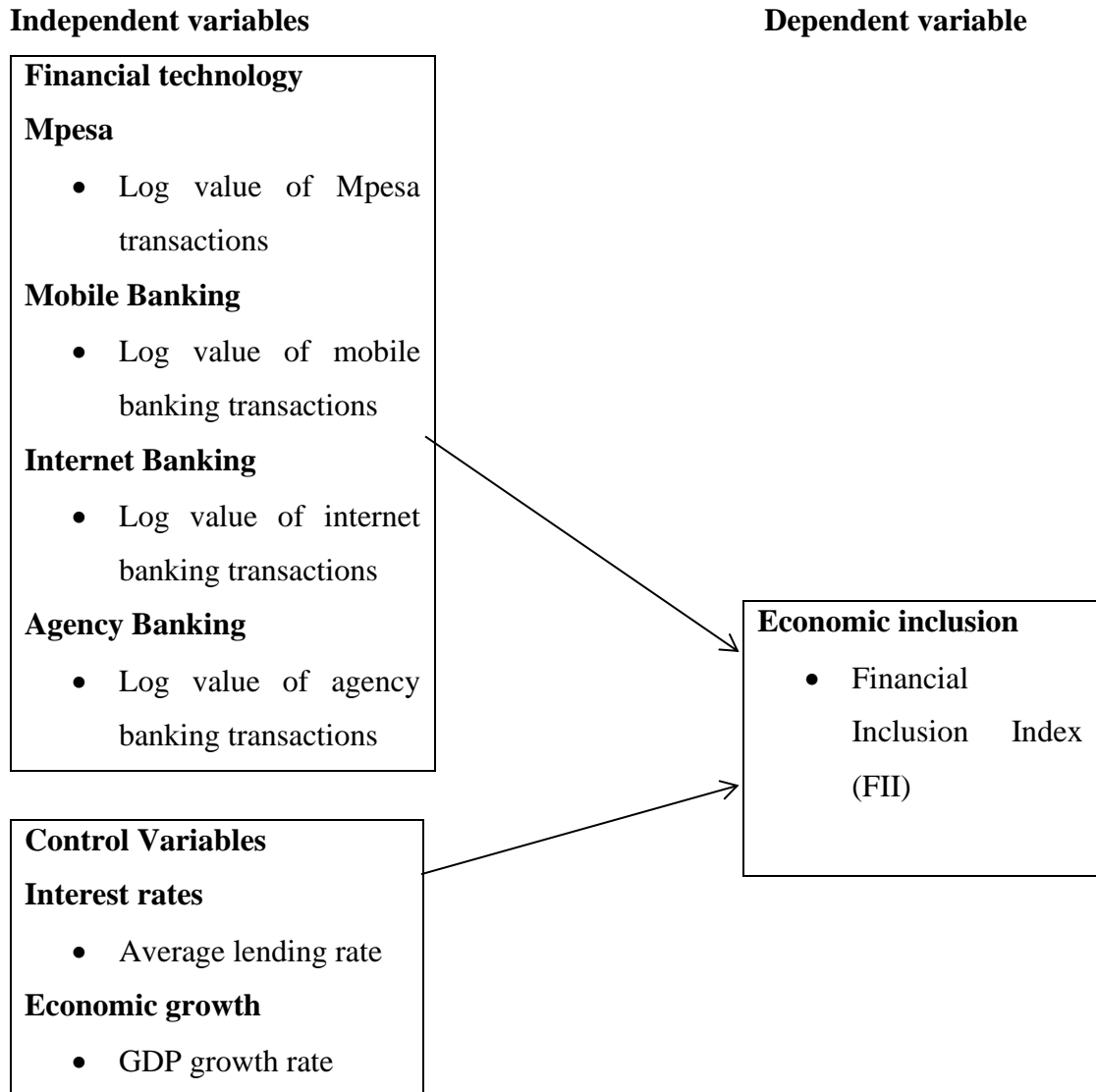
Conceptually, most of the studies conducted locally have operationalized financial technology in different ways, with the majority choosing for a restricted definition. This presents conceptual gaps that the current study intended to fill. There are also methodological gaps that arise from previous studies conducted locally; most of them were conducted for a short period of time which might not be adequate to capture the effect of financial technology on financial inclusion. The current study considered a 10-year period with data collected quarterly.

## **2.6 Conceptual Framework**

Displayed in figure 2.1 is the predicted relation between the variables. The predictor variable was fintech given by the natural logarithm of the value of transactions via Mpesa, internet banking, mobile banking and agency banking. The control variables were interest rate given by average lending rate and economic growth given by GDP growth rate. The response variable was financial inclusion given by FII.



**Figure 2.1: The Conceptual Framework**



**Source: Researcher (2023)**

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

In this chapter, the research design which was used is explained, in addition the approaches and procedures of collecting data are expounded on and finally the chapter explain how the data collected was analysed.

### **3.2 Research Design**

This study adopted a causal research design. This is a type of research design that is used to establish a causal relationship between two or more variables. The goal of a causal research design is to determine whether a change in one variable (the independent variable) leads to a change in another variable (the dependent variable). In a causal research design, the researcher manipulates the independent variable and measures the effect on the dependent variable (Khan, 2008). In this study, the researcher used a causal research design to understand the effect of a new financial technology (fintech) on financial inclusion. In this case, the independent variable was the use of fintech, and the dependent variable was financial inclusion.

### **3.3 Data Collection**

This study relied on secondary data. The secondary data was retrieved from KNBS publications and from the CBK website. The quantitative data collected included number of transactions through Mpesa on a quarterly basis, number of transactions through agency banking outlets in the country, number of transactions through mobile banking, number of transactions through internet banking and the average bank lending rate which was collected from CBK website. Data on GDP growth rate was collected from KNBS on a quarterly basis. The secondary data was collected for a period of 10 years from January 2013 to December 2022 on a quarterly basis. The study period was

selected as this is the period that has experienced heightened adoption of fintech.

### 3.4 Data Analysis

In data analysis, version 24 of SPSS software was used. Tables will present the findings quantitative manner. Descriptive statistics were employed in the calculation of central tendency measures as well as dispersion such as mean as well as standard deviation for every variable. Inferential statistics relied on correlation as well as regression. Correlation determined the magnitude of the affiliation between the variables in the research and a regression determined cause and effect among variables. A multivariate regression linearly determined the relation between the dependent and independent variables.

#### 3.4.1 Diagnostic Tests

The linear regression was based on a number of assumptions including stationarity, no auto-correlation, no or little multi-collinearity, and multivariate normality. The diagnostic tests performed are outlined in Table 3.1

**Table 3.1: Diagnostic Tests**

Test	Meaning	Statistical method	Interpretation	Diagnosis
Autocorrelation	Occurs when the residuals lack independence from each other.	Durbin-Watson statistic	When the test outcomes fall within critical values ( $1.5 < d < 2.5$ ) there is no autocorrelation	Correlogram (Auto Correlation Function-ACF plot) Review model specifications
Multicollinearity	How closely related are the independent variables of the study	Variance Inflation Factors (VIF)	VIF less than 10 implies that there is no multicollinearity	Data that will cause Multicollinearity will be adjusted using log transformation

Stationarity	a unit-root test to establish if the data was stationary	Jarque Bera unit root test	A p value less than 0.05 implies that the data is stationary	Robust standard errors were utilized wherever data failed the test.
Normality Test	When linear regression analysis for all variables is multivariate normal	Goodness of fit test Shapiro-Wilk test	Kolmogorov-Smirnov test prob.> 0.05. If the test is not substantial, the distribution is possibly normal.	Data that is not normally distributed will be adjusted using log transformation and non-linear log transformation.

### 3.4.2 Analytical Model

The following equation was applicable:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon$$

Where: Y = Financial inclusion given by financial inclusion index

$\beta_0$  = y intercept of the regression equation.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$  = are the regression coefficients

$X_1$  = Mpesa given by log number of Mpesa transactions per quarter

$X_2$  = Mobile banking given by log number of mobile banking transactions

$X_3$  = Internet banking given by log number of internet banking transactions

$X_4$  = Agency banking given by log number of agency banking transactions

$X_5$  = Interest rate as measured by the quarterly average lending rate

$X_6$  = Economic growth as measured by the quarterly GDP growth rate

$\varepsilon$  = error term

### **3.4.3 Tests of Significance**

Parametric tests determined the general model and individual variable's significance.

The F-test determined the overall model's significance and this was achieved using ANOVA while a t-test determined coefficient significance.

## CHAPTER FOUR: DATA ANALYSIS, RESULTS AND FINDINGS

### 4.1 Introduction

This chapter presents the analysis, results and discussions of this research. The main aim of the study was to determine how financial technology influences financial inclusion in Kenya. The following sections consist of descriptive statistic, diagnostic test, analysis of correlations, regression and discussion of results.

### 4.2 Descriptive Analysis

Descriptive statistics of all variables on which analysis was done are listed in the table below. Quarterly information was gathered and analyzed using SPSS version 25 software during a ten-year period (2013 to 2022).

**Table 4.1: Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
Financial inclusion	40	.2	.3	.295	.0360
Mpesa	40	5.2	6.5	6.166	.3406
Mobile banking	40	16.1	17.9	17.097	.4150
Internet banking	40	6.9	7.4	7.212	.1380
Agency banking	40	10.2	12.3	11.562	.6444
Interest rates	40	5.8	18.0	9.585	2.8842
Economic growth	40	.02	.1	.096	.0221
Valid N (listwise)	40				

**Source: Research Findings (2023)**

The results from Table 4.1 reveal that the mean value of financial inclusion is approximately 0.295 indicating that, on average, the financial inclusion score is relatively low. The small standard deviation of 0.0360 suggests that the data points are closely clustered around the mean, indicating a relatively consistent level of financial inclusion across the sample. With a mean value of approximately 6.166, the average Mpesa usage is relatively high. The standard deviation of 0.3406 indicates that there is

moderate variability in the Mpesa usage among the sample, with some individuals using it significantly more or less than the mean.

The mean value of approximately 17.097 suggests a relatively high level of mobile banking usage among the sample. With a mean value of approximately 7.212, the average usage of internet banking is moderate. The small standard deviation of 0.1380 indicates that the data points are tightly clustered around the mean, suggesting a consistent level of internet banking usage across the sample. The mean value of approximately 11.562 indicates a moderate level of agency banking usage. The relatively large standard deviation of 0.6444 suggests that there is considerable variability in agency banking usage among the sample.

With a mean value of 9.585, the average interest rate is moderate. The relatively high standard deviation of 2.8842 indicates a wide range of interest rates, with some cases having significantly higher or lower rates than the mean. The mean value of approximately 0.096 indicates a positive economic growth rate on average. The small standard deviation of 0.0221 suggests that the data points are closely clustered around the mean, indicating a relatively consistent level of economic growth across the sample.

### **4.3 Diagnostic Tests**

The linear regression was based on a number of assumptions including stationarity, no auto-correlation, no or little multi-collinearity, and multivariate normality. The diagnostic tests performed are outlined in this section.

#### **4.3.1 Normality Test**

To assess whether the data was normally distributed, the researcher used the Shapiro-Wilk test. If the p-value falls above 0.05, we conclude that there is normal distribution of data and vice versa. Table 4.2 summarizes the results of the test. Since the data

displayed a p value of above 0.05 therefore having a uniform distribution, the researcher adopted the alternative hypothesis. This data was fit to be subjected to tests and analysis like for variance, regression and Pearson's Correlation analyses.

**Table 4.2: Normality Test Results**

	<b>Shapiro-Wilk</b>	<b>P-value</b>
Financial inclusion	3.592	0.208
Mpesa	6.306	0.304
Mobile banking	4.430	0.406
Internet banking	2.765	0.417
Agency banking	3.155	0.329
Interest rates	4.241	0.402
Economic growth	4.147	0.303

**Source: Research Findings (2023)**

#### 4.3.2 Multicollinearity Test

In a multiple regression model, multicollinearity is displayed whenever predictor variables exhibit a substantial relationship. An event where independent variables have great correlations is unfortunate. Parameters are said to have multicollinearity if they have a perfect linear connection. Outcomes for the test on multicollinearity were displayed in Table 4.3.

**Table 4.3: Collinearity Statistics**

	<b>Collinearity Statistics</b>	
	<b>Tolerance</b>	<b>VIF</b>
Mpesa	0.432	2.315
Mobile banking	0.511	1.957
Internet banking	0.387	2.584
Agency banking	0.476	2.141
Interest rates	0.685	1.460
Economic growth	0.701	1.427

**Source: Research Findings (2023)**

VIF value is used where values that fall below 10 are not multi-linear. One condition for multiple regressions to occur is that no strong connection should be evidenced



among variables. Given by the outcomes, every VIF variable is below 10 as indicated in table 4.3 which shows that independent variables in the study experience no significant statistical multi-linearity.

#### **4.3.3 Autocorrelation**

A serial correlation test established the relationship of error terms for different times. For the research to obtain the desired model parameters, the Durbin Watson serial correlation test was used to carry out the analysis of autocorrelation in the data, which is a major shortcoming in the data analysis that must be examined. The findings are shown in Table 4.4.

**Table 4.4: Autocorrelation Results**

<b>Durbin Watson Statistic</b>
1.938

**Source: Research Findings (2023)**

From the null hypothesis, no first-order serial/auto correlation exists. The 1.938 Durbin Watson statistical varies from 1.5 to 2.5 indicating no serial correlation.

#### **4.3.4 Stationarity Test**

The research variables were subjected to a unit-root test to establish if the data was stationary. The unit root test was ADF test. With a standard statistical significance level of 5%, the test was compared to their corresponding p-values. In this test, the null hypothesis states that every variable has a unit root, and the alternative hypothesis is that the variables are stationary. Findings depicted in Table 4.5.

**Table 4.5: Stationarity Test**

Variables	Statistic	P-value
Financial inclusion	7.2126	0.0000
Mpesa	9.2031	0.0000
Mobile banking	8.8718	0.0000
Internet banking	7.8447	0.0000
Agency banking	7.8132	0.0000
Interest rates	7.1398	0.0000
Economic growth	6.9362	0.0000

**Source: Research Findings (2023)**

As demonstrated in Table 4.5, this test concludes that the data is stationary at a 5% level of statistical significance since the p-values all fall below 0.05.

**4.4 Correlation Analysis**

Pearson correlation was employed to establish the relationship linking financial inclusion in Kenya to the characteristics of the study (Mpesa, mobile banking, internet banking, agency banking, interest rate, economic growth). The results are as shown in Table 4.6. The correlation results reveal that there is a moderate positive correlation between financial inclusion and Mpesa usage, with a correlation coefficient of approximately 0.596 (significant at the 0.01 level). This suggests that as Mpesa usage increases, financial inclusion tends to increase as well.

Financial inclusion shows a positive correlation with mobile banking usage, with a correlation coefficient of approximately 0.324 (significant at the 0.05 level). This indicates that as mobile banking usage increases, there is a tendency for financial inclusion to increase too. There is a strong positive correlation between financial inclusion and internet banking usage, with a correlation coefficient of approximately 0.541 (significant at the 0.01 level). This implies that higher internet banking usage is associated with higher levels of financial inclusion. Financial inclusion shows a strong positive correlation with agency banking, with a correlation coefficient of

approximately 0.466 (significant at the 0.01 level). This indicates that as agency banking usage increases, financial inclusion tends to increase as well.

**Table 4.6: Correlation Analysis**

		Financial inclusion	Mpesa	Mobile banking	Internet banking	Agency banking	Interest rates	Economic growth
Financial inclusion	Pearson Correlation	1						
	Sig. (2-tailed)							
Mpesa	Pearson Correlation	.596**	1					
	Sig. (2-tailed)	.000						
Mobile banking	Pearson Correlation	.324*	.632**	1				
	Sig. (2-tailed)	.042	.000					
Internet banking	Pearson Correlation	.541**	.668**	.613**	1			
	Sig. (2-tailed)	.000	.000	.000				
Agency banking	Pearson Correlation	.466**	.663**	.649**	.982**	1		
	Sig. (2-tailed)	.002	.000	.000	.000			
Interest rates	Pearson Correlation	.022	.226	.203	.269	.325*	1	
	Sig. (2-tailed)	.893	.161	.208	.094	.040		
Economic growth	Pearson Correlation	.602**	.197	.096	.067	.005	.151	1
	Sig. (2-tailed)	.000	.223	.556	.680	.977	.353	

\*\* . Correlation is significant at the 0.01 level (2-tailed).  
 \* . Correlation is significant at the 0.05 level (2-tailed).  
 c. Listwise N=40

**Source: Research Findings (2023)**

The correlation between financial inclusion and interest rates is very weak, with a correlation coefficient of approximately 0.022, and it is not statistically significant ( $p > 0.05$ ). Therefore, there seems to be no meaningful relationship between financial inclusion and interest rates. Financial inclusion demonstrates a strong positive correlation with economic growth, with a correlation coefficient of approximately

0.602 (significant at the 0.01 level). This suggests that as economic growth increases, there is a tendency for financial inclusion to increase as well.

#### 4.5 Regression Analysis

Mpesa, mobile banking, internet banking, agency banking, interest rate, and economic growth were utilized as agents to predict financial inclusion in Kenya. The test was done at 5% level of significance. Table 4.7 to 4.9 displays the results.

**Table 4.7: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.887 <sup>a</sup>	.787	.748	.0181

a. Predictors: (Constant), Economic growth, Agency banking, Interest rates, Mobile banking, Internet banking, Mpesa

#### Source: Research Findings (2023)

The R squared indicator indicates how the explanatory variables may describe variations in the response variable. As indicated in Table 4.7, the R square was 0.787, indicating that change in Mpesa, mobile banking, internet banking, agency banking, interest rate, and economic growth account for 78.7 percent of Kenya's financial inclusion with other factors ignored in the research account for 21.3 percent of the variance in financial inclusion in Kenya. The correlation coefficient (R) of 0.887 showed a significant connection amongst predictor factors and financial inclusion.

**Table 4.8: Analysis of Variance**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.040	6	.007	20.274	.000 <sup>b</sup>
	Residual	.011	33	.000		
	Total	.051	39			

a. Dependent Variable: Financial inclusion  
b. Predictors: (Constant), Economic growth, Agency banking, Interest rates, Mobile banking, Internet banking, Mpesa

#### Source: Research Findings (2023)

The value of P obtained by ANOVA is 0.000, which is less than  $p=0.05$ . This demonstrates that the model's importance described how Mpesa, mobile banking, internet banking, agency banking, interest rate, and economic growth affect Kenya's financial inclusion.

The relevance of various variables was determined using the model coefficients. The statistics of t and values of p were used to accomplish this. This study is significant since it allowed the researcher to determine which independent variables were chosen (Mpesa, mobile banking, internet banking, agency banking, interest rate, and economic growth) significantly influences the financial inclusion of the Kenyan economy. The importance of the association between the two variables was shown by the sig. column's p-value. With a confidence level of 95%, a p-value of less than 0.05 was judged to be statistically significant, which is the most conservative estimate. Table 4.9 summarizes the findings.

**Table 4.9: Model Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	2.186	1.046		2.091	.044
Mpesa	.292	.090	2.758	3.244	.003
Mobile banking	.173	.040	1.988	4.315	.000
Internet banking	.113	.158	.433	.715	.480
Agency banking	.009	.043	.160	.210	.835
Interest rates	-.001	.001	-.120	-1.006	.322
Economic growth	.340	.050	3.085	5.407	.000

a. Dependent Variable: Financial inclusion

**Source: Research Findings (2023)**

Table 4.9 suggests that Mpesa, Mobile banking, and Economic growth are significant predictors of financial inclusion as shown by p values less than 0.05, with Mpesa and

Mobile banking having relatively stronger positive impacts, while the effects of Internet banking, Agency banking, and Interest rates are not statistically significant in explaining financial inclusion in this model as shown by p values greater than 0.05.

The following regression was estimated:

$$Y = 2.186 + 0.292X_1 + 0.173X_2 + 0.340X_3$$

Where,

Y = Financial inclusion

X<sub>1</sub> = Mobile banking

X<sub>2</sub> = Internet banking

X<sub>3</sub> = Economic growth

The constant term (2.186) represents the estimated value of financial inclusion when all three independent variables are zero. According to the model, an increase of one unit in Mobile banking (X<sub>1</sub>) is associated with an increase of 0.292 units in financial inclusion, holding Internet banking and Economic growth constant. Similarly, an increase of one unit in Internet banking (X<sub>2</sub>) is associated with a 0.173-unit increase in financial inclusion, holding Mobile banking and Economic growth constant. Additionally, an increase of one unit in Economic growth (X<sub>3</sub>) is associated with a 0.340-unit increase in financial inclusion, holding Mobile banking and Internet banking constant. The model helps to understand how these independent variables collectively contribute to predicting the level of financial inclusion.

#### **4.6 Discussion of the Findings**

This research had an aim of establishing the way in which the predictor variables impacted the financial inclusion in the Kenyan context. Independent variables included Mpesa, mobile banking, internet banking, agency banking, interest rate, and economic

growth. This research tried to show financial inclusion being a dependent variable. The financial inclusion index measured financial inclusion. Correlation as well as regression analysis were utilized to show the connection linking the independent to dependent variables.

The Pearson model reveals that financial inclusion is positively correlated with Mpesa, mobile banking, internet banking, agency banking, and economic growth. However, there seems to be no significant correlation between financial inclusion and interest rates. These findings indicate that the usage of digital financial services (e.g., Mpesa, mobile banking, and internet banking) and agency banking play important roles in promoting financial inclusion, while interest rates might not have a direct impact on the level of financial inclusion.

The regression model with the specified predictors shows a strong positive correlation with the dependent variable, explaining about 78.7% of its variance. However, the adjusted R Square suggests that some predictors may not be significantly contributing to the model's predictive power, and the standard error of the estimate is relatively low, indicating a good fit of the model to the data. The regression results further reveal that Mpesa, Mobile banking, and Economic growth are significant predictors of financial inclusion as shown by p values less than 0.05, with mpesa and mobile banking having relatively stronger positive impacts, while the effects of internet banking, agency banking, and interest rates are not statistically significant in explaining financial inclusion in this model as shown by p values greater than 0.05.

This research is in agreement with Al-Mudimigh and Anshari (2020) who studied fintech and financial inclusion in South East Asian region. Via the Binary Logistic model and data from 300,000 families from the countries' economic surveys, the study

found that fintech has the potential to increase financial access and usage, but the impact varies across different countries and regions, and depends on factors such as regulation, infrastructure, and consumer demand.

The research is also in agreement with Muthengi (2022) who sought to find out how financial technology and financial inclusion affect SMEs in Kenya's Kabati market. Descriptive cross-sectional approach was adopted for use in this study whereby stratified random sampling method was applied with sample size of 223 enterprises on all merchants and wholesalers SMEs in the Kabati market which had a total population of 502 SMEs. Questionnaires were used in the study to collect primary data. The data was analyzed by descriptive statistics as well as inferential statistics. The study concluded that financial technology has significant effect on financial inclusion.

The findings are also in support of a study done by Mule et al. (2021) who sought to establish the effect of financial technology loans on financial inclusion among the unbanked low-income earners in Makueni County. Descriptive research design was used, with the target population being the unbanked low-income earners over the age of 18 in Makueni County. A sample size of 384 respondents was chosen using the convenience sampling technique. Personal interviews were conducted using an interview guide to collect primary data. The study found that fintech loans have a positive and significant effect on financial inclusion among the unbanked low-income earners in Makueni County. According to the findings of the study, since the unbanked people in Makueni County associate the use of financial technology loans to meeting personal financial needs and especially coping up with day-to-day expenses and emergencies.



## **CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS**

### **5.1 Introduction**

The major motive of this study was to investigate the way financial technology influences the financial inclusion in Kenya. The findings from the above sections are outlined in this chapter together with the conclusions and limitations of this study. This section also outlines the recommendations that can be adopted by policymakers. It also outlines the areas for further research.

### **5.2 Summary**

The study assessed how financial technology influenced the financial inclusion in Kenya. Mpesa, mobile banking, internet banking, agency banking, interest rate, and economic growth were adopted to be the predictor variables of the research. The study used descriptive design to do analysis and data collection. Secondary data was obtained from CBK as well as KNBS and prepared using SPSS version 25 program. The study used data of 10 years compiled quarterly.

The findings reveal that financial inclusion is positively correlated with Mpesa, mobile banking, internet banking, agency banking, and economic growth. However, there seems to be no significant correlation between financial inclusion and interest rates. These findings indicate that the usage of digital financial services (e.g., Mpesa, mobile banking, and internet banking) and agency banking play important roles in promoting financial inclusion, while interest rates might not have a direct impact on the level of financial inclusion.

The R-square coefficient was 0.787, meaning that the selected predictors can explain 78.7% of financial inclusion in Kenya, with 21.3% of growth changes relating to factors not considered in this research. This study showed that independent factors together had a significant effect on financial inclusion. ANOVA stresses that the F statistic with  $p=0.000$  is significant at 5 percent demonstrating that the model had the capability to capture independent variables effect on the financial inclusion in Kenya.

The regression results further revealed that an increase of one unit in mobile banking is associated with an increase of 0.292 units in financial inclusion, holding internet banking and economic growth constant. Similarly, an increase of one unit in internet banking is associated with a 0.173-unit increase in financial inclusion, holding mobile banking and economic growth constant. Additionally, an increase of one unit in economic growth is associated with a 0.340-unit increase in financial inclusion, holding mobile banking and internet banking constant.

### **5.3 Conclusion**

The study's findings demonstrate a significant and positive relationship between Mpesa usage and financial inclusion in Kenya. The regression analysis reveals that, on average, a one-unit increase in Mpesa usage is associated with a 0.292-unit increase in financial inclusion, holding other variables constant. This suggests that Mpesa, as a widely adopted mobile money service in Kenya, plays a crucial role in enhancing financial inclusion among the population. It's convenient and accessible nature allows individuals to perform various financial transactions, including payments, transfers, and savings, even without access to traditional banking services.

The study reveals a significant and positive association between mobile banking usage and financial inclusion in Kenya. The regression analysis indicates that, on average, a

one-unit increase in mobile banking usage is linked to a 0.173-unit increase in financial inclusion, while controlling for other variables. This suggests that mobile banking services play a vital role in expanding financial access and inclusion in the country. Mobile banking provides individuals with a convenient and affordable way to access banking services, such as account management, fund transfers, and bill payments, using mobile devices. The ease of use and accessibility of mobile banking have made it a popular option, particularly among the unbanked and underserved populations.

The study's results demonstrate a robust and positive relationship between economic growth and financial inclusion in Kenya. The regression analysis shows that, on average, a one-unit increase in economic growth is associated with a significant 0.340-unit increase in financial inclusion, holding other variables constant. This implies that as the Kenyan economy grows, there is a concurrent increase in financial inclusion, indicating a mutual and reinforcing relationship between the two. Economic growth creates more opportunities for income generation and wealth accumulation, leading to greater participation in formal financial systems.

#### **5.4 Recommendations for Policy and Practice**

Based on the study's findings highlighting the significant and positive impact of Mpesa on financial inclusion in Kenya, it is crucial for policymakers and financial institutions to continue supporting and expanding the usage of Mpesa. To achieve this, initiatives should focus on increasing awareness and education about Mpesa's benefits and functionalities, especially among rural and underserved communities. Efforts to improve digital literacy and address potential barriers to adoption, such as access to mobile phones and internet connectivity, will be essential. Additionally, fostering partnerships between telecommunication companies, banks, and other financial service

providers can help create a more integrated and interoperable financial ecosystem. Policymakers should also work towards creating an enabling regulatory environment that promotes innovation, consumer protection, and fair competition in the mobile money market.

Given the study's evidence on the significant and positive relationship between mobile banking and financial inclusion in Kenya, it is imperative to continue promoting and advancing mobile banking services. Policymakers should collaborate with financial institutions to design and implement targeted financial literacy programs, emphasizing the benefits of mobile banking and providing guidance on its safe and efficient usage. Special attention should be given to vulnerable and marginalized groups, ensuring that they are not left behind in the digital financial revolution. Financial service providers should prioritize the development of user-friendly and accessible mobile banking applications that cater to diverse user needs, including those with low digital literacy. Additionally, the government should invest in digital infrastructure and telecommunications to improve mobile network coverage and internet accessibility, particularly in rural and remote areas.

Given the study's strong evidence of a positive correlation between economic growth and financial inclusion in Kenya, policymakers must prioritize inclusive economic policies and sustainable development strategies. Efforts should focus on reducing income inequality and addressing disparities in wealth distribution to ensure that the benefits of economic growth are shared more equitably across society. Initiatives promoting entrepreneurship, job creation, and skill development can empower individuals to participate actively in economic activities and generate income. Moreover, investments in education, healthcare, and social welfare programs can

enhance human capital and contribute to a more productive and financially inclusive society. Policymakers should encourage private and public sector collaborations to invest in critical sectors, such as agriculture, technology, and infrastructure, that have the potential to drive economic growth and create opportunities for financial inclusion.

### **5.5 Limitations of the Study**

The study's conclusions are based on the available data up until the knowledge cutoff date. Financial technologies and their impact on financial inclusion continue to evolve rapidly. New technologies, policies, and economic conditions may have emerged since then, which could influence the relationship examined in the study. Therefore, the findings were interpreted in the context of the specific timeframe and knowledge cutoff.

The study's conclusions rely heavily on the availability and quality of data. The study relies on aggregated data or data from specific sources, which may have limitations or inaccuracies. Incomplete or inconsistent data can affect the accuracy and generalizability of the findings. To address this, the study did not capture the full range of financial technologies or variations in their implementation across different regions or population segments due to data limitations.

The study focuses specifically on the context of Kenya. Therefore, caution should be exercised when generalizing the findings to other countries or regions. Economic, social, and regulatory factors may differ across contexts, which can influence the impact of financial technologies on financial inclusion. Replication studies in different countries or comparative analyses can help provide a broader perspective on the relationship between financial technologies and financial inclusion.

## **5.6 Suggestions for Further Research**

Complementing quantitative analyses with qualitative research methods, such as interviews or case studies, can provide in-depth insights into the experiences, perceptions, and challenges associated with financial technologies. This can help identify factors that influence adoption, usage patterns, and the impact on financial inclusion from the perspectives of users, financial institutions, and policymakers.

Comparing the impact of financial technologies on financial inclusion across different countries or regions can offer valuable insights. By examining variations in the adoption and implementation of financial technologies, as well as differences in regulatory frameworks and economic conditions, researchers can identify factors that contribute to varying outcomes and inform best practices.

While the study focused on the aggregate impact of financial technologies, conducting micro-level analyses can provide a more granular understanding of their effects. Examining how financial technologies affect different economic sectors, small and medium-sized enterprises, and individual households can shed light on their specific mechanisms of influence and potential challenges faced by different stakeholders.

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## APPENDICES

### Appendix I: Research Data

Year	Quarter	Financial inclusion	Mpesa	Mobile banking	Internet banking	Agency banking	Interest rates	Economic growth
2013	1	0.22	5.18	16.09	6.93	10.16	8.42	0.06
	2	0.23	5.31	16.17	6.94	10.34	8.08	0.05
	3	0.22	5.46	16.48	6.96	10.44	7.75	0.05
	4	0.23	5.59	16.59	6.97	10.55	7.25	0.06
2014	1	0.26	5.77	16.65	6.99	10.46	6.92	0.11
	2	0.29	5.84	16.70	7.02	10.59	6.75	0.11
	3	0.28	5.87	16.74	7.04	10.71	6.00	0.12
	4	0.29	5.92	16.77	7.06	10.80	6.00	0.12
2015	1	0.31	5.95	16.76	7.06	10.90	5.83	0.11

<b>Year</b>	<b>Quarter</b>	<b>Financial inclusion</b>	<b>Mpesa</b>	<b>Mobile banking</b>	<b>Internet banking</b>	<b>Agency banking</b>	<b>Interest rates</b>	<b>Economic growth</b>
	2	0.32	5.96	16.79	7.09	10.99	6.08	0.11
	3	0.29	5.97	16.79	7.11	11.08	6.50	0.11
	4	0.30	5.98	16.83	7.15	11.22	15.17	0.12
2016	1	0.21	6.02	16.90	7.15	11.40	18.00	0.11
	2	0.31	6.08	16.97	7.16	11.51	18.00	0.11
	3	0.32	6.14	17.00	7.18	11.59	15.33	0.11
	4	0.33	6.21	17.03	7.20	11.63	11.67	0.11
2017	1	0.32	6.22	17.07	7.21	11.65	9.50	0.11
	2	0.33	6.23	17.07	7.23	11.68	8.83	0.11
	3	0.34	6.26	17.08	7.26	11.73	8.50	0.11
	4	0.34	6.29	17.05	7.27	11.73	8.50	0.11
2018	1	0.32	6.32	17.05	7.28	11.75	8.50	0.11

<b>Year</b>	<b>Quarter</b>	<b>Financial inclusion</b>	<b>Mpesa</b>	<b>Mobile banking</b>	<b>Internet banking</b>	<b>Agency banking</b>	<b>Interest rates</b>	<b>Economic growth</b>
	2	0.33	6.33	17.09	7.28	11.78	8.50	0.11
	3	0.34	6.36	17.11	7.29	11.82	8.50	0.11
	4	0.34	6.37	17.15	7.33	11.87	8.50	0.10
2019	1	0.33	6.38	17.21	7.33	11.91	8.50	0.10
	2	0.31	6.39	17.26	7.33	11.97	9.00	0.10
	3	0.32	6.40	17.31	7.34	12.05	11.50	0.10
	4	0.30	6.41	17.35	7.34	12.04	11.50	0.10
2020	1	0.31	6.42	17.33	7.33	11.95	11.50	0.10
	2	0.30	6.42	17.35	7.33	12.00	10.83	0.10
	3	0.31	6.43	17.38	7.32	12.03	10.50	0.10
	4	0.33	6.43	17.42	7.33	12.08	10.50	0.09
2021	1	0.28	6.44	17.47	7.32	12.17	10.00	0.10

<b>Year</b>	<b>Quarter</b>	<b>Financial inclusion</b>	<b>Mpesa</b>	<b>Mobile banking</b>	<b>Internet banking</b>	<b>Agency banking</b>	<b>Interest rates</b>	<b>Economic growth</b>
	2	0.28	6.45	17.54	7.32	12.21	10.00	0.10
	3	0.28	6.45	17.59	7.32	12.22	10.00	0.10
	4	0.27	6.46	17.65	7.32	12.25	10.00	0.09
2022	1	0.28	6.47	17.66	7.32	12.27	9.50	0.06
	2	0.28	6.47	17.73	7.33	12.33	9.00	0.05
	3	0.27	6.49	17.82	7.35	12.32	9.00	0.05
	4	0.28	6.52	17.87	7.38	12.32	9.00	0.06



