

**EFFECT OF FINTECH SERVICES ON FINANCIAL  
INCLUSION IN KENYA**

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## DECLARATION

This research project is my original work and has not been presented for a degree in any other university.

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## **DEDICATION**

I dedicate this research project to my wife, parents, daughter, and brother for keeping me focused and fueling my dedication and interest in education.

## **ACKNOWLEDGMENT**

I am very grateful for the guidance and great health that saw me through this course. I would like to express special gratitude to God and a number of people for their intentional contributions to this thesis and for ensuring this Master of Business Administration course is fruitful endeavor. Special thanks to my supervisor, Dr. Oluoch his valuable advice, guidance and encouragement, and valuable tips throughout the study. I am grateful to my parents Mr. Boniface Muyuka Aicha and Mrs. Phelisters Andayi Muyuka, my brother Alvin Juma, my daughter Brielle Shilaku and my wife Josyline Kendi Gitonga for the support in the course.

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## ABSTRACT

Many research studies have been done to investigate the subject of financial inclusion. However, there has been no recent study on the impact of FinTechs on Financial Inclusion in Kenya. This study investigates how FinTechs have affected Financial Inclusion in Kenya based on FinTech and financial inclusion data from audited individual Company financial statements and the Central Bank of Kenya. The scope of the study was in the realm of the republic of Kenya. The general objective of the study was to investigate the effects of the various FinTech services on financial inclusion in Kenya. The specific objectives of the study are; to determine the impact of credit-oriented, savings-oriented and transactional- oriented FinTechs on financial inclusion in Kenya. The quick acceptance of FinTechs in Kenya, coupled with the mobile banking platforms already in place, has proven the possibility of opening up opportunities for Kenyans, giving them more credit and savings as well as transactional access options with these kinds of technologies. The Innovation Diffusion Theory, Financial Intermediation Theory and the Silber's Constraint Theory of Innovation were used to explain various concepts of FinTechs and the variables investigated. The study used descriptive design methodology and utilized panel secondary data gathered from annual reports and financial statements of regulated banks and through independent agencies like the Central Bank of Kenya on various financial inclusion parameters. Inferential and descriptive statistics methods were used to interpret and analyze the data and information collected. Descriptive statistics applied trend analysis with mean, maximum, and minimum values being explained over the years for the variables being investigated in the study. Among the inferential statistical techniques applied in the study, included Pearson's correlation and regression analysis. These techniques were used to demonstrate a causal relationship between FinTechs services and financial inclusion. Data was investigated using a statistical software—IBM SPSS to explore and determine the correlation and regression relationship between the dependent variable (financial inclusion) and each independent variable. Tables and figures were effectively used to present the data. The correlation and regression results showed a positive relationship between the dependent variables (financial inclusion) and the FinTech services. Research findings indicated a regular increase in the number of FinTech accounts since 2007. However, FinTech credit services and savings services picked up in 2011 and there has also been a steady rise till the end of 2021. The findings show that there is a positive link between the FinTech transactional services, FinTech savings services, and the dependent variable (financial inclusion). However, they show a negative correlation between FinTech credit services and financial inclusion. The limitations of the study include the possibility of bias given that it is dependent on information given by FinTech services to the Central Bank of Kenya as well as its own reports. Another limitation of the financial inclusion data is that it is provided on an annual basis thus introducing assumptions that the financial inclusion index has been the same for that year from the months of January to December. In terms of recommendations for further study, there is a need for more research based on other financial innovations like internet banking platforms and agencies, etc., to conclude on whether the findings follow the same trends as the ones in this study. Scoping to the larger East African Region or smaller counties can be done using the same variables to assess whether the different economies influence the findings to make them consistent.

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## **LIST OF ABBREVIATIONS**

<b>AFI</b>	Alliance for Financial Inclusion
<b>ATM</b>	Automated Teller Machine
<b>AI</b>	Artificial Intelligence
<b>ANOVA</b>	Analysis of Variance
<b>CBA</b>	Commercial Bank of Africa
<b>CBK</b>	The Central Bank of Kenya
<b>CGAP</b>	Stands for Certified Government Auditing Professional
<b>FSD</b>	Financial Sector Deepening
<b>GPMI</b>	Global Partnership for Financial Inclusion
<b>HF</b>	Housing Finance
<b>IBM</b>	International Business Machines
<b>IMF</b>	International Monetary Fund
<b>KCB</b>	Kenya Commercial Bank
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>PLC</b>	Public Limited Company
<b>SACCO</b>	Savings and Credit Co-operative Society
<b>TelCo</b>	Telecommunications company
<b>SPSS</b>	Statistical Package for Social Sciences software
<b>US</b>	United States

## DEFINITIONS OF TERMS

<b>Financial Inclusion</b>	A state in which all adults within the working age range, including those excluded by the financial systems, have effective access to credit, savings (defined broadly to include current accounts), payments, and insurance financial services provided by Formal financial institutions: (GPFI, 2016).
<b>FinTech</b>	A word portmanteau of ‘financial’ and ‘technology’, ‘FinTech’ is a combination of technology and innovative business models which disrupt, change, or provide financial services/products. It refers to the novel processes and products available for financial services due to digital technological advancements (Abdullatif et al., 2020).
<b>Formal Financial Institutions</b>	Financial institutions subject to supervision and banking regulations (Moloney et al., 2015).
<b>Fuliza</b>	Fuliza means the M-PESA Account overdraw service which allows M-PESA Subscribers to overdraw their M- PESA Accounts in order to complete transactions. This service is provided by KCB Bank Kenya Limited (KCB), Safaricom PLC and the NCBA Bank.
<b>M-Pesa</b>	Safaricom’s mobile payments technology platform for bills, goods and services (Natile, 2020).
<b>NCBA</b>	Merger of NIC(National Industrial Commercial) Bank and CBA (Commercial Bank of Africa)
<b>SACCO</b>	Savings and Credit Cooperative Organization: owned by members and usually registered at country level and with credit bureau, governed by the Ministry of Cooperatives, which in turn usually mandates and authorizes the SACCO to accept deposits and give loans to its members (Patmore & Balnave, 2018).
<b>Safaricom</b>	The leading telecommunication company in Kenya listed on the Nairobi Stock Exchange and offers mobile services, mobile money transfer services, sale of consumer electronics, ecommerce, cloud computing, data, music streaming, and fibre optic services.
<b>Smartphone</b>	A mobile phone that cellular telephone with an integrated computer and the ability to run software applications on its operating system, enabling web browsing, and other functions of a computer. It has a touchscreen interface with internet access and is capable of running downloaded applications (Mohamudally, 2017).

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background**

##### **1.1.1 FinTechs**

‘FinTech’ is the technology in finance that is changing the banking behavior of stakeholders in doing financial transactions (Abdul, 2019). Financial Technology (‘FinTech’) has the potential to disrupt and completely change the way users do their everyday activities: payments, credit, insurance, financial compliance services (RegTech). FinTech refers to the collaboration of innovative business process models with technology to disrupt, change, or enhance financial products and services (Rafay, 2018).

FinTech services in developed countries are focused on online customers, while those in developing economies focused on the broader cell phone users’ population (Demirguc-Kunt et al., 2018). Kenya has stood out as a FinTech hub amongst African countries primarily due to the achievements in the telecommunication sector, particularly the notable success of the money transfer technology, M-Pesa. Motivated by M-Pesa, many other companies with disruptive digital financial services and products have emerged in Kenya.

The suitably conducive environment created by M-Pesa and the inadequate coverage of the incumbent financial institutions laid the perfect foundation for FinTech to blossom. Other important contributing factors are Kenya’s flexible business and regulatory environment, solid digital infrastructure, and a dedicated entrepreneurial society, all of which contribute to the development of FinTechs (Aitken, 2015). Despite barriers like regulatory

challenges, insufficient access to data and information; shortages of management specialists and software programming technocrats and inadequate capital for investment; and the nature of the Kenyan market, the number of FinTechs has significantly increased over the years.

### **1.1.2 Financial Inclusion**

Financial inclusion is the state in which all adults (even those excluded by the financial system) have access to savings, credit, payments, and insurance services from formal financial institutions (GPFI, 2016). FinTechs facilitate people who are financially excluded from utilizing previously unavailable financial services and products (Gabor & Brooks, 2016). This research investigates whether FinTechs have led to an increase in payment techniques and credit availability. To achieve complete inclusion in a country, everyone needs to understand the value of formal financial services and work towards and accessing these services. The impact of financial inclusion has grown to include access to the required financial services (Das, 2018). These essential financial services are readily available credit, insurance products, deposits, payments, transactions and savings products.

There are many challenges to financial inclusion. One of the obstacles against poverty eradication is the inadequate access to formal financial services (Soederberg, 2014). This inadequacy of access to financial services hinders peoples' ability to save, invest, and deal with emergencies (Leach, 2015). Financial inclusion brings on board all entities and platforms, trying to simplify and make available access to basic financial services. Convenient and targeted pricing for every population segment is key for these financial inclusion vehicles (AFI, 2013).

Access can be scoped in terms of services being very accessible when needed, and products being tailored for specific user segments. It should also have reasonable prices for the target population to appreciate the services and facilities offered. Access is challenging to quantify. Most of the time, usage is interpreted as access but this needs to be analyzed to segregate the impact of users who have installed applications or have the ability to access the services but do not utilize these opportunities (Bhakkad, 2018).

From the literature on financial inclusion, there have been discussions on the key advantages and value proposition of having readily available access to financial platforms. These platforms include insurance, savings and cash management, credit, and cash transfer services.

Basically, financial inclusion refers to the ability to access basic financial services, for example, being able to save money in a basic bank account (Neelamegam, 2016). Most of the future needs like education for children, investments for families, and emergencies like hospital bills, especially where public health systems are underdeveloped and poverty is rife, are dependent on the ability to save (Goedecke et al., 2018). Having a savings bank account offers greater advantage compared to storing cash under a mattress, as it is more secure and backed by a regulated entity. Moreover, banking services help in management of impulse spending, as it requires a process to access the cash. The controlled access to accounts is very instrumental in empowering people, especially women in developing economies (Demirguc-Kunt et al., 2018). Governance and security are enhanced since permissions are essential to enable access to money.

Access to formal credit is another central aspect of financial inclusion. Access to

credit is essential to enable investments that could improve the financially excluded people's livelihoods. Informal financiers are available to help businesses and individuals who cannot access credit from formal financial institutions. However, these alternatives may have worse terms, and this may limit the borrowing capacity available (Demirguc-Kunt et al., 2017). In addition, loan sharks have dominated the credit space in developing countries. Studies in 2014 showed that people in developing economies in South Asia were ten times less likely to take loans from informal private lenders than those in high-income OECD economies where more formal systems exist (The World Bank, 2018).

Another crucial aspect of financial inclusion is the ability to make digital payments and transfers. The increased security, efficiency, speed and decreased cost of digital payments and transfers is more beneficial to the receivers and senders compared to the physical transfer of cash. (Riley et al., 2017). This eliminates traveling many miles to make a bill payment or transfer cash with the help of a bank cashier or a money transfer operator. This cut down in traveling time and money saved can be redirected to more important tasks of daily survival. The process of digital money transfer is also less prone to security risks hence has added benefits and peace of mind. In addition, transparency is enhanced as digital transactions are easier to trace (Hacioglu, 2019). This also ensures that the receivers of payments and money transfers only receive the intended amounts, without any leaks to middlemen.

### **1.1.3 FinTechs and Financial Inclusion**

The problem of inadequate access or no access to formal basic financial services is endured by over two billion people and more than two hundred million businesses in the world (World Bank, 2017). Cash transactions through mobile money platforms allow more people the convenience and flexibility to use these financial services, hence scoring points for the financial inclusion process (Soederberg, 2014). Mobile phone access has had a usage boost in the recent past making it the tool of choice in checking bank account balances, transferring money to and from the bank accounts, paying utility bills, buying airtime and even receiving and paying cash for personal and business transactions.

Worldwide, FinTech services have become user-friendly as adoption barriers have been overcome with very low ease of use. Moreover, they have presented attractive wallet non-bank methods of making very convenient payments. Globally, WeChat Pay and Alipay operate on their own (Blakstad & Allen, 2018). These applications integrate with traditional banks and can also independently operate on their own, with sufficient access rights to banking platforms.

Saving through mobile platforms is a creative way of motivating the saving culture without necessarily having minimum balance restrictions on the accounts (Donovan, 2012). FinTechs offer loans using smartphone apps to the poor segments of the population, in a way that is more convenient compared to the access they can get to loans from banks and savings groups (Arslanian & Fischer, 2019). FinTechs and Mobile banking have revolutionized the financial sector to to enable provision of affordable services that provide safety, security and convenience to millions of people who



historically, had no access to any financial services before due to their unemployed nature.

In Kenya, FinTechs provide a channel for quick and instantaneous reception of financial products by reducing the transaction time at a point of sale, e.g., Safaricom's Fuliza (M-PESA Account overdraw service which allows M-PESA Subscribers to overdraw their M-PESA Accounts in order to complete transactions), thereby enabling flexibility by letting clients explore various product offerings on one phone.

Currently, those enrolled on the mobile platforms are privy to ways of accessing higher credit as they utilize and pay more through such platforms like Tala, Branch, KCB M-PESA MCo-op Cash, M-Shwari, Eazzy loan, Timiza, and HF Whizz, etc. It also eases the movement of cash from one person to another by M-PESA that already links millions of customers. In November 2012, a mid-tier bank, NCBA Bank Kenya PLC, collaborated with Safaricom PLC, a leading Telco in the East African region to launch a FinTech product M-Shwari that is co-financed and interfaces with two-tier one commercial banks, KCB and NCBA banks. M-Shwari enables people to borrow while using the M-PESA platform.

These bank accounts link to the customer M-PESA platform account and mirrors a normal bank account. Through this integration, a higher population has been brought into the formal banking sector. Currently, there are over ten million M-Shwari accounts, and CBA disburses 50,000 loans every day. One-third of all active M-PESA customers are also active M-Shwari customers. KCB M-PESA account launched in March 2015, a joint initiative of KCB (Kenya Commercial Bank Group) and Safaricom. It also provides

an avenue for customers to do deposits and savings, and also access loans (Bijaoui, 2017).

Recently, Kenya has greatly improved in spreading the access and use of financial services. If the current FinTech services, digital microfinance, mobile money transfer outfits, savings and credit cooperatives are added to the established formal institutions, then formal financial inclusion would go past the 70 percent recorded in 2015. This is primarily driven by M-PESA, without which the figure is about 26% (Villasenor, West, & Lewis, 2015). Various determinants have led to higher inclusion levels; the growth in market share of the major players, launch and expansion of new digital FinTech players major types of financial service providers, the prioritization of financial inclusion in the vision 2030 strategic plan (FinAccess, 2016).

#### **1.1.4 Kenya' Socioeconomic Context**

Kenya has a population of around 53 million individuals (*Data Catalog, 2022*), and this is growing year in year out. Kenya has a predominantly young population, with a median age of 20.1, evidenced by over 60% of its inhabitants being under 25 years old (Kamer, 2022). Economically, Kenya has a nominal GDP per capita of \$2,006.8, making it among the top 10 economies in Africa (*GDP per capita (Current US\$) - Kenya | Data, 2022*). The service sector contributes 63.4 percent of its Gross Domestic Product (*Kenya Economic Update (KEU), 2022*). This efficient service sector is dependent on the infrastructure, good transport network, and internet connections.

Kenya's internet connection is ranked at the highest speed of 15MBP/s in the Middle East and Africa, boosted by the most recent fiber-optic installations (Akamai, 2016; Mulligan, 2015). Kenya is also ranked as the best in internet and mobile penetration in Africa (Kim et al., 2020). Kenya's economic environment also welcomes investments from domestic

businesspeople, international businesses, and investors, making it very friendly (US Department of State, 2015). Recent government led commitments to change business policies have empowered Kenya's rise up the World Bank's *Ease of Doing Business* ladder, improving 21 positions to the best 92 out of 190 nations from 2016 to 2017 (World Bank, 2017).

As at the end of the last quarter of 2022, the total active mobile money subscriptions in the Kenya was 36.4 million, having gone up from 35.2 million registered at the end of the last quarter of 2018. Consequently, mobile penetration improved to 73.8 percent towards the end of the year March 2022 ("Sector Statistics Report Q3 2021-2022," 2022). The number of smartphones and feature phones connected to mobile networks as at 31st March 2022 were 26.5 million and 33.6 million respectively. Their respective penetration rates computed as a percentage of the total population were recorded at 54.6% and 69.2% ("Sector Statistics Report Q3 2021-2022," 2022).

Smartphone adoption is fueled by the penetration and proliferation of cheap Android phones, some barely going at \$30 (Kemibaro, 2016). During the March 2022 quarter, Safaricom PLC's (Safaricom is a Kenyan mobile network operator that is the largest telecommunications provider in Kenya, and one of the most profitable companies in the East and Central Africa region) mobile subscriptions represented a market share of 62.4 percent down from 63.3% in the previous quarter. Safaricom also had the highest market share in data, 35.8% followed by Wananchi group at 28.1%. (Communications Authority Kenya, 2019).

Over eighty-five percent of the population in Kenya utilizes FinTech services such as M-Pesa for e-commerce and school fees and household bills (Finkle, 2016). This figure surpasses that of the proportion of Kenyans using a formal bank account by far, which stands at 83.7% as per the 2021 FSD Finaccess Survey. As a result, Kenya has the highest internet usage in Africa by a substantial margin. Data indicates that internet penetration

stands at 77.8% of the population, leading a pack of other African countries with over 50 % penetration (Mauritius, 62.7%, Tunisia, 50.5%; Seychelles, 57.6%; Morocco, 57.3%; South Africa, 51.6%) (Simon, 2022).

## **1.2 Problem Statement**

Recent developments in technology have spurred a rise in the FinTech sector, which leverages new digital technologies like the blockchain and data analytics to enhance automation of the delivery chain in financial services to the end user (Lynn et al., 2018). The backbone of provision of these products and services is in the FinTech companies' ability to focus on enhancing the customer experience while developing more optimised business strategies that can maximize returns in the current tough economic climate. With the advent of current technologies like AI that has enabled the FinTech outfits to roll out innovative products, they are offering potential solutions to financial inclusion that are very practical.

However, the research on FinTech and their role in financial inclusion is not yet widely explored. Furthermore, the radical business models of FinTech companies are an essential factor in the FinTech sector. This makes it very pivotal to develop policies and bring these business models in line with the prevailing economic climate. Last, despite being prioritized on the political agenda, there is a huge population excluded from the fold of formal financial systems, and there is still room for more to be done to bring them in. Kenya is not only establishing itself as a global financial hub but also benefiting its population by growing slowly towards inclusion, thus presenting a favorable empirical environment to explore the subject.

Several researchers have published their work on the relationship between mobile banking and financial inclusion. Etim researched the impact of mobile banking and its

adoption on financial inclusion in the population in Nigeria. According to his research, the adoption of mobile banking and mobile banking contributed to the success of financial inclusion in Nigeria (Etim,2014). Even more research was done by Mago and Chitokwindo (2014) on the impact of mobile banking on financial inclusion in Masvingo Province, Zimbabwe. The researcher came to a conclusion that poor people were ready to embrace banking on mobile platforms because it is readily available, appropriate, inexpensive, user-friendly, and safe because they would do it.

Ngugi (2015) did a study in Kenya and researched the impact of mobile banking on financial inclusion and established that services offering banking on mobile technology contributed to financial deepening. However, a study has not been done on the impact of FinTech services provided by products like Timiza, M-Shwari, KCB-MPESA etc., on financial inclusion in Kenya. This is the void that the research covered by giving solutions to the following research questions: What is the effect of credit-oriented FinTech services on financial inclusion in Kenya? What is the effect of investment and savings FinTech services on financial inclusion in Kenya? What is the effect of transactional supporting FinTech services on financial inclusion in Kenya?

### **1.3 Research Objectives**

#### **1.3.1 General Objective**

The general objective of the research is to study the effect of FinTech services on financial inclusion in Kenya.

#### **1.3.2 Specific Objectives**

- 1 To investigate the effect of credit FinTech services on financial inclusion in Kenya.
- 2 To investigate the effect of savings FinTech services on financial inclusion in Kenya.

3 To investigate the effect of transactional FinTech services on financial inclusion in Kenya.

#### **1.4 Research Questions**

While putting in a significant contribution to existing economic, academic, and global literature on the FinTech and financial inclusion subject, the objective of this research study is to investigate the FinTech services impacting financial inclusion in Kenya, and explore how these FinTech services are affecting or contributing to financial inclusion. To achieve this research objective, the research questions addressed were as outlined below:

1. What is the effect of credit FinTech services on financial inclusion in Kenya?
2. What is the effect of savings FinTech services on financial inclusion in Kenya?
3. What is the effect of transactional FinTech services on financial inclusion in Kenya?

#### **1.5 Significance of the Study**

Various stakeholders will benefit from the lessons and recommendations of this research. The government for example, through its agencies and parastatals like the CBK, the Communication Authority of Kenya, the Kenya Bureau of Statistics and other unnamed policymakers will utilize the useful information to approach and develop more effective policies to drive the much needed improvement in the telecommunications and financial services sector. The government and its regulators are likely to benefit as the study sheds light on gaps in policy development which can be sealed to boost financial inclusion in the overall Kenyan population.

This study equips scholars with a wealth of knowledge in this realm as they research and also suggests additional research areas and improvement scopes to be investigated in later studies. Researchers and Academicians in the financial and economics segments will benefit from this paper once uploaded and published in the official repositories and libraries in the public domain

and open-access journals. The gaps identified by this study form a basis for further exploration to add value to the subject area. The study contributes to the literature on FinTechs and financial inclusion.

The theoretical perception of the relationship between FinTech services and financial inclusion has been positive based on the presumption that more access to the internet and smart devices improves access to finance. However, in some markets, the World Bank has reported negative effects of some of these FinTech services due to the profit maximization behaviors of service providers (Ozili, 2018). This is yet to be ascertained in Kenya.

### **1.6 Scope of the study**

For scope definition purposes, the study concentrated the research geographically to Kenya. The study draws also utilizes a stream of literature on social innovations related to FinTechs. The study was based on the annual data on FinTechs for the last ten years. Annual disaggregation ensures there is sufficient data over the years. The study bases on data for the ten years because this is the period FinTechs developed in Kenya. Regarding the measures of financial inclusion, the main attention was focused on the global methods of quantifying the difficulty in reaching the financially excluded population as outlined by the Central Bank of Kenya in their Finclusion surveys done over the years 2007-2021.

Furthermore, as a secondary data collection mode is preferred, the study does not focus on FinTechs which do not publicly declare the financial information. The FinTech services being used in the study are mainly the bank-related regulated applications that have a steady provision of secondary data through their reporting to the Central Bank of Kenya.

### **1.7 Limitations of the Study**

The researcher used a secondary data approach to achieve specific objectives. This data can be validated because it has been presented by the various banks regulated by the Central Bank of Kenya. Part of this study depended on information given by FinTech services to the regulator (CBK) as well as its own reports on supervision of the banks. Hence, the information could be

biased. The researcher did not alter the secondary data for any temporary differences or discrepancies. Financial inclusion data was based on the Central Bank data and reports.

The indices and levels of financial inclusion were presented on an annual basis inducing a blanket assumption that the parameters have been similar month on month in the whole of the year. The inclusion of a monthly breakdown would make it more accurate; however, this monthly segregation is unavailable.

The study was conducted in a multi-cultural micro and macroeconomic environment with several other influential factors. The methodology applied correlations and regression analysis which are multivariate and bivariate, implying a comparison of variables from different data sources was done. The bivariate or multivariate analysis might not have reflected the effects of the economic environment hence affecting the accuracy of the results. Moreover, the variables were limited to the credit services, savings and transactions services. Other services, for example FinTech insurance and brokerage services can be brought in scope to draw more meaningful conclusions based on a wider perspective.

Data scope limitations affected the research, as the researcher could only use data gathered from the secondary sources at a certain period. Although the researcher has confidence in the conclusions made, they still recognized that the data would be more comprehensive and tailored had they done the original documentation. There were different stages of adoption of FinTech services among banks in Kenya. The limitation of the study was a lack of uniformity of data across the banks, with some missing the secondary data as a result of not having launched the products. The study concentrated on the banks which had these products. Due to the expanded scope of the study to cover the whole country, there is a possibility of generalization of the economic environment, making the conclusions have a wider rather than narrower focus. Different counties and sections of the population would yield more concentrated conclusions that would be more accurate.



## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter explores past research studies done around the subject of FinTechs and financial inclusion. This included the theories as well as the empirical literature that has been finalized and published in the study area. Also brought to light are the conceptual and theoretical frameworks that present FinTech services and financial inclusion from a global and local perspective.

#### **2.2 Theoretical Background**

This section presents the financial subject theories on which the study is underpinned on in view of the variables under study. These theories are: Innovation Diffusion Theory, Financial Intermediation Theory and the Silber's Constraint Theory of Innovation.

##### **2.2.1 Financial Intermediation Theory**

Through his exemplary research paper in 1937, Keynes proposed the Financial Intermediation theory. Financial Intermediation is a situation whereby units, organizations and individuals have extra deposits with financial institutions, which then loan some to entities in need of cash (Keynes, 1937). It is simply a system enabling transfer of resources from net savers to net spenders. Diamond and Dybvig (1983) examine the utilization of liquidity in the four operational, restricted, contingent, and strategic functions.

Operational is the cash requirement in running daily business transactions while ensuring timely clearance of bills. Restricted liquidity is limited to precisely defined business transactions, while contingent liquidity is available to meet general financial obligations under a stress scenario. Strategic liquidity is meant for future business needs outside the course of regular business needs. Financial institutions enable the changing of assets into liquid commitments. Normally, savers are not high risk-takers in their

approach and are uncertain about estimates of inflation and future consumption. Without an intermediary, all investors have to consider long-term investments that might yield significant additions while sacrificing liquidity.

The function of financial intermediaries is largely recognized as that of creating unique financial products (Besley & Brigham, 2014). These are put in place every time the intermediary notices that it can sell them for prices that can cover all opportunity and direct expenses related to the service or product. Market imperfections give rise to the existence and prosperity of financial intermediaries. This implies that financial intermediaries cease to exist in ideal market environments, without transactional or information expenses. Many markets show different levels of information between the different component players. Moral hazard hinders sharing of information among participants in the market and this is a key requirement for funding of key projects by investors.

Financial intermediation is the control process and procedure used by institutions to transform funds given by savers into funds used by borrowers (Besley & Brigham, 2014). Investors generally loan to financial institutions like banks at a good rate. The financial institutions then loan to customers and companies that borrow. Investors prefer not lending directly because financial intermediaries have robust credit risk monitoring systems. Moreover, financial intermediaries offer secondary financial instruments to enable clients and investors to purchase primary instruments (Boulware, 2014). If any services are available at a financial intermediary, then it makes no sense to have it. In fact, instead of purchasing the secondary assets from the intermediary, the investor is better off buying primary securities directly without having to pay the intermediation fees.

Irregularities and abrasions in financial markets are the drivers of scarcity traps or income disparity. These market irregularities include unbalanced distribution of information and transaction costs which play a vital role in determining essential

judgments regarding capital staking and return alternatives. This theory is pivotal to this study as it captures financial inclusion, being illustrated by the concept of financial intermediation. This theory also broadens the discussions on how much financial intermediation should be in place to enable higher financial inclusion and thus, how such inclusion helps tap financial innovations into the untapped unbanked population (Jerinabi & Santhi, 2012).

An efficient financial intermediary mobilizes funds from savers to those seeking these funds for more productive use at an affordable cost to help propel the growth and development of the population. This implies that FinTech is the most potent weapon of disintermediation of banks. In the theory of financial intermediation, transaction costs have been a fundamental issue in discussing the existence of financial intermediaries, including the FinTech services in this research (Lynn et al., 2018).

A limitation of this intermediation theory is that it does not recognize the risk management aspect of lenders in the financing relationships (Lynn et al., 2018). It also builds on the notion that intermediaries have a static role in alleviating imperfections in the market, reduce transaction costs, and informational asymmetries that exist.

### **2.2.2 Innovation Diffusion Theory**

Rogers officially presented this theory in 1962. It holds the view that in order to defend their strategic position, maintain competitive advantage and minimize cost, then organizations must selectively adopt an innovation that gives them an edge (Rogers, 1962). This theory recognizes that innovation is absorbed into the market based on the relative advantage with the likelihood of acceptance leaning towards new products (Back, 2013). It also brings out the purchaser's personality through their buying behavior that makes them switch to new products with a higher perceived value compared to older products.

A highly innovative product with highly coveted benefits might not be perceived that way by everyone in the market as some people tend to wait and see if it works. Other consumers are likely to be at the forefront of testing the new product (Back, 2013). These adoption behaviors

lead to the bell-shaped distribution curve used to group the population into the five categories (innovators, early adopters, early majority, late majority, and laggards) involved in traversing innovations (Buckley, 2012). The frameworks and models associated with traditional technology acceptance also mirror those accepting and implementing transformational financial innovations.

Therefore, this research study aims to bring the argument to the conventional techniques and innovations works. Big data has also had a significant impact in extending financial services to unserved and underserved markets. Therefore, this theory will be instrumental in explaining how FinTechs fit into the financial inclusion story in Kenya. A weakness of the theory is that it portrays the idea that most innovations are valuable and should be adopted straight away, even without careful testing and proof of concept, which is not exactly the way to go (Resources, 2018).

### **2.2.3 The Silber's Constraint Theory of Innovation**

William Silber developed and presented this theory in 1975. Financial innovations are attempts to maximize profits by using technology to squeeze as much productivity as possible from the bottlenecks in a Company. The theory presents the argument that the organizational efficiency of a financial institution minimizes its profit maximization potential. According to Silber's observations, some limitations (such as administrative management) hinder profit maximization. Government regulations or controls create difficulties for companies to increase their profits.

Thus, financial institutions reduce government regulations to a minimum or even circumvent government regulations to maximize their profits. Even though these limitations enable a steadfast approach by management, they slow down financial institutions, such that the struggle in these organizations is to try to minimize the expense (Silber, 1975). Based on research findings, if organizations are not very successful in a certain segment, and hence do not achieve high profitability, they become very innovative. This decreased profitability pushes them to innovate more and increase their profitability. This coincides with what was proposed in Silber's

work (1983) that the more an organization invests in technology and innovation, the harder it shields off competition's advances into its success. In the long run, it results in more profitability and sustainable performance.

Since FinTechs are financial innovations, this theory is easy to relate to them. The theoretical concepts outlined in Silber's Constraint Theory can also enlighten our understanding of the variables and their association with financial inclusion. However, just like other innovation theories, they are based on theoretical models that overlook incomplete markets, principle-agent problems, legal regulations, volatility, tax rates, asymmetric information problems, and many other challenges in the market (Hasan & Serhat, 2018). As a result, it tends to hold an impractical view that financial innovations are the tools and driving forces in perfect financial markets while underlining the importance of risk concerns in how financial institutions work.

### 2.3 Conceptual Framework

The relationships between the dependent and independent variables in the research study is illustrated by a diagram referred to as the conceptual framework. (Cullity, 2010).

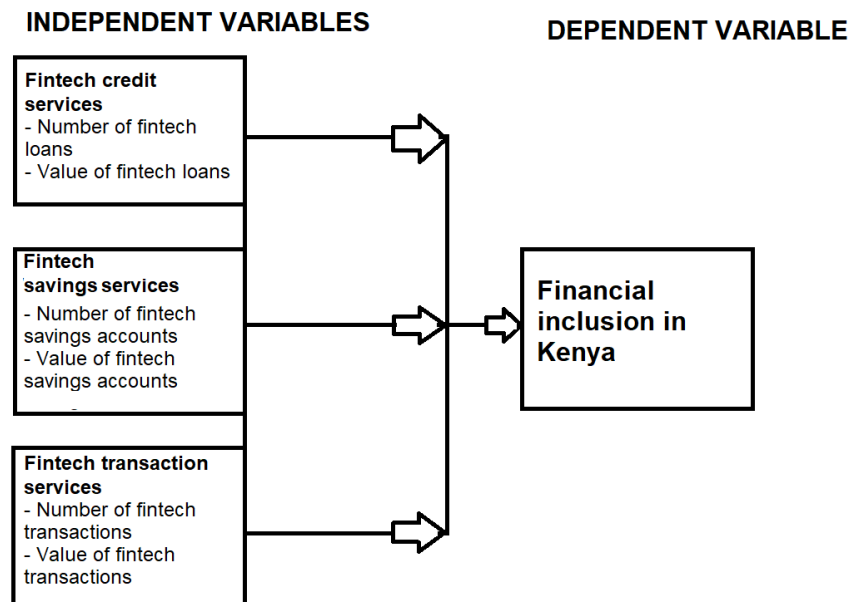


Figure 2.3: Conceptual Framework

### **2.3.1 Independent Variables: FinTech Credit, Savings and Transaction Services**

The concepts that constitute a conceptual framework support one another, articulate their respective phenomena, and establish a framework-specific philosophy that defines relationships.

The conceptual framework of this study relates to independent variables; FinTechs credit services, FinTechs savings services, FinTechs transactional services, and the dependent variable; financial inclusion in Kenya. FinTech credit services refer to the lending products in the FinTech space. These apply artificial intelligence and machine learning algorithms and have been linked to credit rating databases to instantly appraise loan applications based on customer data as they disburse loans to the applications right away.

FinTech savings services are available for all customers with access to the applications. Some offer savings accounts for the clients to enable them achieve short term goals through tailored savings plans offered as simple savings opportunities. For all FinTech products, the transaction services are tied to the package as withdrawal, and cash deposits are essential for both credit and savings services to exist. The transaction services enable movement of funds from one individual or platform to another for various purposes.

### **2.3.2 Dependent Variable: Financial Inclusion**

The most common recognized mode of measurement of financial inclusion is by metrics based on access to formal financial services e.g basic bank accounts. For numerous family institutions, the extent of banking diffusion is more profound through the number of deposit accounts than any other measurement methods (Carol & Mehta, 2015). Knowing the population's exposure to formal bank services in the rural and city setting indicates the level of financial inclusion.

Better wellbeing is not dictated by the extent of financial inclusion. It is more demanding and expensive for organized groups to pay for informal finance services than for the same groups to work with formal financial institutions (Donovan, 2012). There are two major divisions of financial access; one is the supply side, where service providers are, mainly

loan providers, like financial organizations and other institutions. The other category is the demand side, which includes organizations, institutions and families or individual consumers. One of the most common approaches to assessing financial inclusion is based on the number of bank accounts per population (for example, the number of accounts per 1000 adult individuals of the population).

The other fairly common approach is based on the number of automatic teller machines per population (e.g. ATMs per million people) or the number of bank branches (number per million people). The measures mentioned still portray weaknesses, as they give incomplete detail in an economic setup to enable one to get all the information in sufficient quantities for complete justification. Families that utilize financial services provided by banks or other formal financial institutions are formally encompassed (Etim, 2014).

With reference to studies done globally, financial inclusion in rural areas opens up more when people in those remote areas provide financial services to their neighbouring communities as well. Mahmood and Sahai (2011) attest to this being a significant variable where there is motivation to establish financial services presence, as this enhances the services for the local communities provided that the providers of these services deem it viable to offer the services in these areas. According to Gakure, Anene, Arimi, Mutulu & Kiara (2013), mobile banking is a more readily available service compared to other financial products meant for the masses.

The driver of FinTechs is mainly smart phone penetration and internet access, in addition to other supporting factors. These included the impact of literacy, the population, credit, income and deposits knowledge (Chithra & Selvam, 2013) among the people in India. The environmental structure in India is also an influential factor in dictating the population character and attitude towards finance management. According to Camara, Peña and Tuesta (2014), who conducted a study in Peru, they determined that financial inclusion in the population is impacted by the level of education and the earnings. On the other hand,

Africa's financial inclusion is critically influenced by the population density in addition to mobile banking that has been found to increase financial access according to Allen et al., (2014).

## **2.4 Empirical Literature**

FinTech is a high paced technology driven innovation sub-sectors of the financial services industry and has caused a radical disruption to traditional banking. Still, the culture between the incumbent banks and FinTech must convert from competitive to collaborative (Mohan, 2020). The literature being discussed here is in the context of the various studies that have been conducted in FinTechs and financial inclusion. As such, we will classify it as either global or local (Kenyan population).

### **2.4.1 The Global Perspective**

Vincent and Levi (2018) investigated the role of FinTech companies in financial inclusion in the Indian population. The main objective of the research was to investigate how, from a business model perspective, FinTech companies could improve financial inclusion. They also explored how barriers and main challenges facing FinTech companies translate to financial inclusion. India stands out as a global tech hub, hence qualifies as a great practical environment for the study. The research study, based in Bangalore, utilized a qualitative approach characterized by semi-structured interviews with FinTech executives. The study proved that with the digital wave, half of the financially excluded population can cross over the barrier to join the financially included population. The research also highlighted the plight of players in the bottom half of the market who incur very high operating costs.

For the states in India, Uppal and his research associates studied the influence of the penetration of mobile technology on the economic growth witnessed in those states. The researchers studied nineteen states for eight years from 2006, and created a structural model from their data. The model showed that Indian states with more mobile penetration rates will more likely develop faster than the rest. At a leveling penetration rate of 25%, there is a limiting point above which network impacts enhance the role of mobile phone technologies on growth (Kathuria, Uppal &



Mamta, 2009). Network behavior determines telecom networks and the development impact is better when the optimum size and coverage of the network is reached.

Following the advent of mobile money transfer, Etim (2014) investigated the impact of mobile banking services and their acceptance in the population of the financially included Nigerians. Etim researched the impact of mobile banking and its adoption on financial inclusion in the population in Nigeria. The research was meant to highlight how mobile gadgets have bolstered financial inclusion and whether the population viewed these gadgets as user-friendly enablers for cash transfers, and if this utilization was positively accepted in the community. The study found out that mobile phones' widest use was in communication, mainly making calls and sending messages, while rarely being used for other tasks like mobile money transfers or mobile banking.

Saliu's research was carried out among the residents of Kumasi in Ghana, to investigate how their social welfare and economic status was impacted by mobile cash transfer products that had been innovated. The study population on which this research was based on over a hundred mobile money vendors in Kumasi Metropolis. Interviews were done to collect data from the vendors while SPSS was used to carry out the data analysis and interpretation (Saliu, 2015). The study indicated that the income levels, living standards, and employment characteristics that define these vendors' socio-economic status were heavily impacted by the mobile cash services. In addition, the study illustrated that mobile financial services positively correlates with financial inclusion in the Ghanaian people population.

In the Tanzania republic, Ishengoma did a study on access to banking services via mobile devices and the impact of their distribution and adoption on financial inclusion. The population in Kibaha District was made up of mobile banking services customers and the cash transfer agents in the district, with more than twenty million accounts. The findings showed a positive relationship between mobile money banking and financial inclusion (Ishengoma, 2011).

Another team led by Gomber researched and distinguished between the normal formal financial institutions and the modern FinTech outfits, majorly funded start-ups that launch into the

financial services industry (Gomber et al., 2017). The FinTech companies thrive on the inefficiencies that the previous generation of financial institutions have not been able to fix. The FinTech outfits have the flexibility, infrastructure and versatility to tailor and democratise financial services compared to the rigid conventional banks and insurance companies. As a result, consumers are empowered to source their products and services from any providers of their choice.

FinTechs now come out strongly as fierce competitors of the conventional banks and insurance companies by filling in the gaps for needs not catered to these institutions. FinTech companies provide services in digital insurance, digital credit, digital currencies, digital payment services, digital investment services and digital financial advice. Digital financing involves digital financial capital raising methods like crowdfunding, while digital investments enable consumers to invest using their technology devices, such as smartphones, to participate and sign up to global investment platforms (Gomber et al., 2017). Digital assets can be currencies or stores of value that exist digitally and could be issued by central banks or available publicly as powered by blockchain technology.

Digital currencies are decentralized and form a central part of the blockchain payments systems. Digital payments are non physical forms of payments and these are currently dominated by mobile payment systems, online banking, card, check and blockchain payment systems. Others include Peer-to-peer money transfer methods and platforms like payoneer, skrill, PayPal and digital wallets where convertible electronic money is managed and transferred. In as much as FinTechs help consumers develop a closer personal relationship with their providers, for example in the insurance sector and financial consultancy, little attention has been focused on studies in these digital products (Gomber et al., 2017).

Furthermore, FinTech companies have spurred innovation and growth in near field communication (NFC) technology in payments, blockchain technology across many products, peer-to-peer (P2P) technology in digital payments and big data analytics across the board, including the spread psychology inspired by social media networks (Gomber et al., 2017). Cloud

computing has enabled hosting of many of these technologies, while the internet of things has grown a base for data provision and monitoring done by robotics, machine learning and artificial intelligence which are all technologies that drive financial innovations.

#### **2.4.2 The Local Perspective**

Based on a descriptive research technique, Ngugi did his research on the topic of mobile banking, while addressing its impact on financial inclusion in Kenya. The study was based on the period of eight years from the year 2006 and utilized multiple regression methodology while analyzing the relationship between financial inclusion and mobile banking services. The researcher noted that mobile money transfer services and financial inclusion correlate positively for the population tested (Ngugi, 2012). The researcher also noted that the mobile banking services had deepened and increased in scope during that period.

Mutsune conducted a research study that examined financial inclusion in the Kenya population based on the variables of mobile banking. The researcher based their studies on the M-PESA model to establish its role in financial inclusivity and economic empowerment. The researcher builds some work around the assessment structure of measuring how the country's financial inclusion and economic setup have been influenced by mobile money services. In the study findings, the researcher highlighted a significant positive relationship between financial inclusion and mobile banking (Mutsune, 2014). The researcher recommended that policymakers should be flexible in adapting to policy changes as innovations and technology develop.

#### **2.5 Critique of Existing Literature**

Many studies have been conducted to relate FinTechs and financial inclusion. However, Vincent and Levi's research done in 2018 on the case study of the role of FinTech Companies in India's population financial inclusion was only dedicated to that one specific country and did not explore many details on the factors in the deliverables. This is also true for Kathuria and the fellow researchers who concentrated on how economic growth in India has been spurred by the impact of penetration of mobile technologies.

Etim's study took a different approach, mainly tackling the acceptance and uptake of mobile gadgets for financial services and products. The researcher explored if the study participants regarded mobile phones as suitable and favorable devices for cash transfers, and if this kind of utilization was warmly welcome in society (Etim, 2014). The study was mainly focused on the receptiveness in the use of mobile devices for other tasks, like money transfers or mobile banking.

Saliu's research study investigates the impact that mobile cash transfer services had on the economic status and social welfare of the service vendors in Kumasi. The research targeted the mobile money vendors in Kumasi while leaving out the rest of the people in the Metropolis (Saliu, 2015). Due to these limitations, it did not provide a complete picture of the whole test region and extrapolation could not be applied to expand its scope.

The same scope limitation is applicable to Ngugi (2012), who based his research on data for eight years beginning 2006 in his study of the impact of mobile banking on financial inclusion. Given that the period is far back, the study research results might not be relevant to the current economic situation, as the research was done more than five years ago. Mutsune (2014) did concentrate a lot on M-PESA, the transactional facility that most FinTechs use. His research was mainly focused on the number and value of transactions and not the other factors driving the transactions either in terms of the credit services or savings services.

Gomber's research team indicated that FinTech companies are more equipped and versatile to with the flexibility to give consumers tailored offerings as opposed to conventional financial institutions while taking advantage of their inefficiencies. These outfits have now come out strong as fierce competitors to traditional banks and insurance institutions by addressing the overlooked needs of the marginalized market. The new customized services and products leverage new technologies and create interesting opportunities in the market. The research explored the successful streak of FinTechs without investigating other impacts surrounding them (Gomber et al., 2017).

Gomber and fellow researchers have dived deep into the technologies that FinTech companies use to bolster their innovative ideas and these technologies include big data analytics, near-field communication (NFC) technology, blockchain technology, social media networks and peer-to-peer (P2P) technology (Gomber et al., 2017). Nicoletti (2017) also supports the idea that artificial intelligence, Internet of Things (IoT), cloud computing, and robotics are essential technologies for FinTech organizations. However, most of these researchers have not looked at the impact of these FinTechs on financial inclusion.

## **2.6 Research Gaps**

There are various gaps to explore in the subject of FinTechs and financial inclusion. Vincent and Levi (2018) did a detailed case study of FinTech companies' role for financial inclusion in India. This was a study based on the Indian population, creating a gap for more to be done the population in Kenya as per the objectives set out in this research project.

Etim's investigation banking services through mobile avenues and the acceptance of mobile money for financial inclusion. The research study leaned towards exploring the utilization of mobile technologies and the financial products and services provided through them. The researcher examined whether research respondents viewed mobile phones as user-friendly for mobile money transfers, and whether such utilization was welcome and acceptable in society (Etim, 2014). They were seldom used for other tasks like mobile money transfers or mobile banking.

This concentration on the acceptability of mobile phones leaves a gap for other enabled FinTechs to be explored. Most of these FinTechs run based on smartphones and offer the credit, savings, and transactional features that form our objectives. Saliu evaluated the influence of mobile money transfer services on the socio-economic status of the mobile money agents in Kumasi Metropolis. The population was the MM vendors in Kumasi Metropolis, Ghana. The research conclusively indicated a strong correlation between mobile financial services and financial inclusion in the study area (Saliu, 2015). This can also be extended for FinTechs on

the Kenyan perspective, especially regarding the services the FinTechs offer to the population in Kenya.

In Tanzania's Coast region at the Kibaha district council, Ishengoma's work on banking via mobile phones contributed to the literature on financial inclusion. The targeted population for this study consisted of the over 20 million Tanzanian customers subscribed to mobile services and the agents who offered mobile banking systems. This was specific to Tanzania. The findings of a research study carried out in Kenya would bring forth an essential relationship between FinTechs and financial inclusion.

Based on secondary data for the period of eight years from 2006, Ngugi applied a descriptive research technique that empirically explored the variables of mobile banking against financial inclusion in Kenya. The researcher used the statistical tools, specifically multiple regression methods to establish the link between financial inclusion and the variables in mobile banking services (Ngugi, 2012). The gap can be closed by doing similar research in a more recent period, exploring the present array of FinTechs and relating them to financial inclusion. This would also apply to Mutsune (2014). The other gap is in exploring both aspects of banking in terms of credit and savings or investments and the transactional nature.

Most of the studies have been done globally. For example, Vincent and Levi (2018) did a wider scope research study of the FinTech companies' role on the financial inclusion in the Indian set up. However, limited research has been done in the Kenyan context in recent times, leaving a research vacuum. The study brings more insight on the matter by investigating the effect of FinTechs on financial inclusion among Kenyans in a more recent period to provide a more relevant case study and also reflect on the objectives to cover the subject from a credit, savings, and transactional services view.

## **2.7 Summary of Literature**

Both literature and empirical review were discussed in this chapter. In third world countries, the lack or inadequacy of infrastructure or logistical support, financial illiteracy, geographical isolation, and social economic challenges contribute to the financial exclusion of a majority of

the population. According to Etim (2014), these challenges counter various attempts by monetary organizations to try to incentivise financial inclusion by increasing the number of bank branches and investing while educating the masses on adoption of financial innovations (Etim, 2014). The financial innovations coming up are based on new technologies like artificial intelligence and do not rely on the same information and technology used in the conventional systems (Gardeva & Rhyne, 2011).

Many recent research studies indicate a direct contribution of the recent technologies to financial inclusion. The direct contribution has been evident in terms of the improvement in the financial inclusion metrics. Still, questions have come up on the effect of FinTechs and the magnitude of their impact on financial inclusion. This research therefore focuses on studying the impact of FinTechs services on financial inclusion in Kenya. See the summary Table 2.7 below.

**Table 2.7: Summary of Literature Review and Research Gaps**

<b>Author(s)</b>	<b>Focus and context of the Study</b>	<b>Key Findings</b>	<b>Research gaps</b>
Vincent and Levi (2018)	The researcher was seeking to investigate how, from a business model perspective, FinTech companies could improve financial inclusion in India.	The study proved that with the digital wave, half of the financially excluded population can cross over the barrier to join the financially included population. The research also highlighted the plight of players in the bottom half of the market who incur very high operating costs.	The study did a good job on the subject in India, however; it was based on the Indian population, a different scope from the Kenya population setting.
Kathuria, Uppal & Mamta (2009)	The research studied the influence of the penetration of mobile technology on the economic growth witnessed in 19 states in India.	The model showed that Indian states with more mobile penetration rates will more likely develop faster than the rest. At a leveling penetration rate of 25%, there is a limiting point above which network impacts enhance the role of mobile phone technologies on growth.	The research highlighted the influence of the penetration of mobile technologies. However, it concentrated on how economic growth in India has been spurred by the impact of penetration of mobile technologies.

<b>Author(s)</b>	<b>Focus and context of the Study</b>	<b>Key Findings</b>	<b>Research gaps</b>
Gomber et al., (2017)	The research focused on describing the characteristics of FinTech innovations. It also distinguished between the normal formal financial institutions and the modern FinTech outfits, majorly funded start-ups that launch into the financial services industry in India.	FinTechs help consumers develop a closer personal relationship with their providers, for example in the insurance sector and financial consultancy, little attention has been focused on studies in these digital products	The research was a good fact finding mission that brought forth information on services provided by FinTech companies in digital insurance, digital credit, digital currencies, digital payment services, digital investment services and digital financial advice. It did not go to any specific service and its impact on financial inclusion. It is also scoped on the Indian population.
Etim (2014)	The study investigated the impact of mobile banking services and their acceptance in the population of financial included in Nigeria.	The study found out that mobile phones' widest use was in communication, mainly making calls and sending messages, while rarely being used for other tasks like mobile money transfers or mobile banking.	Etim's study was mainly focused on the receptiveness in the use of mobile devices for other tasks like money transfers or mobile banking. Things have changed and these devices host various FinTech applications whose services are explored in this study.
Saliu (2015)	The objective of the study was to investigate how their social welfare and economic status of the mobile money vendors in Kumasi, Ghana was impacted by mobile cash transfer products that had been innovated.	The study indicated that the income levels, living standards, and employment characteristics that define these vendors' socio-economic status were heavily impacted by the mobile cash services. In addition, the study illustrated that mobile financial services positively correlates with financial inclusion in the Ghanaian people population.	The research targeted the mobile money vendors in Kumasi while leaving out the rest of the people in the Metropolis. The research should have covered the whole population without segmenting the mobile money vendors.



<b>Author(s)</b>	<b>Focus and context of the Study</b>	<b>Key Findings</b>	<b>Research gaps</b>
Ishengoma (2011)	The study was on access to banking services via mobile devices and the impact of their distribution and adoption on financial inclusion in Kibaha District, Tanzania	The findings showed a positive relationship between mobile money banking and financial inclusion.	Given that the period is far back, the study research results might not be relevant to the current economic situation, as the research was done more than five years ago.
Ngugi (2012)	The research focused on the topic of mobile banking, while addressing its impact on financial inclusion in Kenya between 2006-2014.	The researcher noted that mobile money transfer services and financial inclusion correlate positively for the population tested. The researcher also noted that the mobile banking services had deepened and increased in scope during that period.	Given that the period is far back, the study research results might not be relevant to the current economic situation as the research was done more than five years ago and was not segmented into FinTech credit, savings, and transaction services.
Mutsune (2014)	Mutsune conducted a research study that examined financial inclusion in the Kenya population based on the variables of mobile banking	In the study findings, the researcher highlighted a significant positive relationship between financial inclusion and mobile banking	Given that the period is far back, the study research results might not be relevant to the current economic situation as the research was done more than five years ago and was not segmented into FinTech credit, savings and transaction services.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter specifies sufficient details on the approach taken by the researcher in preparing for the study, gathering of the required data, and interpreting as well as analyzing the data. The topics highlighted in this chapter include research design, population, sample and sampling design, data and data collection techniques, methodological limitations, data analysis, and presentation of secondary data.

#### **3.2 Research Design**

Research design is the strategy that guides the researcher towards a specific procedure followed in planning, collection, measurement, recording, clean up, and analysis of data (Creswell, 2014). It stipulates the approach used by the researcher in tackling and providing tangible solutions to the research questions (Cooper & Schindler, 2006). In terms of the research design, an approach consisting of a secondary data review was adopted based on a census. Using this method when studying complex issues allows the researcher to uncover richer data (De Lisle, 2011).

The logical application of panel data promotes individual heterogeneity by specifying individual specific factors and allows movement patterns to be monitored closely. This allows for more informative observations to be done with higher degrees of freedom and efficiency (Crew & Kleindorfer, 2006). Besides, there is low bias from individually aggregated data from the banks, which also reports the same information to the CBK.

In addition, the study adopts a descriptive design approach. Descriptive studies are done in this investigative study so that the researcher can be able to obtain information, summarize it, present it, and explore its meaning to give a detailed analysis (Creswell, 2014). Descriptive design is best used when gathering information about people's attitude, behaviors and sentiments (Guest

et al., 2013). The researcher decided to use a descriptive research design to guide the exploration of data on the study variables.

### **3.3 Population**

The target population was made up of all the banks licenced in Kenya as at December 31 2021. The list of these financial institutions is shown in appendix 1. The scope was defined by when FinTech services started growing after the introduction of M-Pesa in 2007 to the most recent reporting period 2021. The population for the study was made up of more than 40 data points per variable compiled from the 39 regulated banks in Kenya, as per Appendix 1. This is according to the CBK (2021) annual report for the end of the 2021 financial year. The data points were 42-44 per variable because some banks had more than one FinTech product, for example, Equity Bank Kenya Limited. Also, different banks developed these products in different years, and some earlier years did not have these FinTech products.

### **3.4 Sample and Sampling Design**

Due to the nature of the population, a census data approach was adopted. This is a Time Series format that is considered suitable for correlational examinations, other than the more accurate randomized experiments (Lewis-Beck et al., 2003). Data was collected from secondary sources as determined by the availability of reliable information, hence improving the external validity of the research. The data on credit, savings and transactional FinTech services was provided by the regulated financial institutions that have invested in the FinTech sector, enhancing the reliability of the findings across the FinTech sector. For financial inclusion data, all research that needs to be considered was used for the period 2007 to 2021. Data scope limitations were present in the study, as the study was only based on data gathered from the primary sources at a specific time from the regulated financial institutions and the CBK. As such, it would be more comprehensive and tailored had the study been based on the original documentation.

### **3.5 Data and Data Collection Techniques**

The researcher investigated and defined the relationship between FinTechs and financial inclusion among Kenyans using secondary data between 2007 and 2021. Data on the volume

and value of transactions that FinTechs have enabled was extracted from the CBK reports and published audited financial statements of regulated banks that contribute to transactions with the end user. The data on the registered number of people on FinTech credit and savings subscriptions, number and value of transactions, was retrieved from the audited Annual Financial Statements of Banks in Kenya. Data on financial inclusion was gathered from the CBK, and its supervised journals with related data, specifically, the financial access surveys between the years 2007 to 2021.

Financial inclusion data reflects the measure with which people as well as organizations can reasonably and timely access to financial services required to support their existence and livelihoods. We relied on data provided by the Central Bank of Kenya that works with other partners in regular studies on the financial inclusion indices using tools like the Finaccess survey and their expertise in the market. The Financial Inclusion index is a demand-side index that allows for in-country analysis. It includes data across the country and is based on numerous indicators from at least 1,000 people who are at least fifteen years old in every county. The index ranges from zero to 100 percent. A value of zero would imply imperfect inclusion, while that of 100 means perfect inclusion.

The Central Bank of Kenya is the banking sector authoritative source as it is in charge of their supervision. This facilitated provision of reliable and accurate information used in the study. The nature of the explorative study blended well with the method of information gathering as it empowered the researcher to focus on specific areas, obtain a comprehensive understanding of the topic, and respond to the research questions. The data collection sheet format used is attached in appendix 2.

### **3.6 Data Analysis and Presentation**

#### **3.6.1 Data Analysis and Presentation of secondary data**

Descriptive statistics and inferential statistics were used to examine and interrogate the information collected. Descriptively, the data was analyzed using trend analysis for the period 2007 to 2021, with a focus on the variables under study. A causal association was drawn between

the FinTech services and financial inclusion using Pearson's correlation and regression analysis methods. Moreover, the relationships above were drawn using IBM's Statistical Package for Social sciences based on the regression and correlation analysis functionality between the dependent variable (financial inclusion) and each independent variable.

The strength of the influence the independent variables had on financial inclusion was established using Pearson's correlation methodology. ANOVA (Analysis of Variance), the fitness of the model (R Square), and regression of coefficients illustrated the trends and explanations for the data relationships. Figurative and tabular formats were used to present the data while the fitness of the model was investigated using SPSS. Analysis of variance was done to account for the overall significance of the model in the research study.

In particular, the following regression model was used;

$$Y = \alpha + \beta_c X_c + \beta_s X_s + \beta_t X_t + \mu$$

Where;

$X_c$  = Natural unit of the quotient of value of FinTech credit services transactions divided by number of FinTech credit services transactions

$X_s$  = Natural unit of quotient of value of FinTech savings services transactions divided by the number of savings FinTech services transactions

$X_t$  = Natural unit of of quotient of value of FinTech transactions divided by the number of FinTech services transactions

$Y$  = Financial Inclusion - Accessibility to formal financial services quantified in terms of the number of deposit bank accounts per 1000 people in the adult population as per the Central Bank of Kenya

Where the following are defined:

$\alpha$  = constant

$\mu$  = error term

$\beta_c, \beta_s, \beta_t$  = beta coefficients

### 3.6.2 Operationalization and Measurement of the Study Variables

In the current study, FinTech transaction services, FinTech credit services and FinTech savings services represent the independent variables while financial inclusion is the dependent variable.

Table 3.6.2 below shows the operationalization of the variables.

**Table 3.6.2: Operationalization of Study Variables**

Type of Variable	Variables	Operationalization	Measurement	Hypothesized direction
Dependent	Financial Inclusion	Determines the level of accessibility to formal financial services.	Quantified in terms of the number of deposit bank accounts per 1000 people in the adult population as per the Central Bank of Kenya	Positive
Independent Variable	FinTech transaction services	Assess the value and number of FinTech transaction services as a proportion of total bank transactions.	Unit of the quotient of value of FinTech transactions divided by the total number of FinTech services transaction accounts as a percentage of the total value of bank transactions	Positive
	FinTech credit services	Assess the value and number of FinTech credit services as a proportion of total bank credit transactions.	Unit of the quotient of value of FinTech credit services transactions divided by number of FinTech credit services accounts as a percentage of the total value of bank credit accounts	Positive
	FinTech savings services	Assess the value and number of FinTech savings services as a proportion of total savings transactions.	Unit of the quotient of value of FinTech savings services transactions divided by the number of savings FinTech services accounts as a percentage of the total value of bank savings accounts	Positive

### 3.6.3 Diagnostic Tests

Before interpretation of the results, a series of diagnostic tests were done. To evaluate the pattern of distribution of the data, a test of normality was done. Data that is not normal might lead to type 1 errors by churning out specific statistically significant estimates that are likely to differ from zero (Yadgarov et al., 2021). In as much as auto-correlation functions depend on lag, they should not vary depending on the timing of the calculation (Niederman & Salvatore, 2019).

Moreover, all moments of expectations, variances, third order and higher, should be similar anywhere. Autocorrelation testing of the data was done using the Durbin-Watson Test.

The heteroscedasticity test is used to investigate differences in residual variances from the observation time to the subsequent periods. To determine whether data has a heteroscedasticity issue, a Breusch-Pagan test can be done. The study used the Breusch-Pagan test, which was based on a regression of the absolute residuals of independent variable. By running a regression and storing the residual values, the dependent variables of the unstandardized residuals were obtained.

The study also involved a multicollinearity test. Multicollinearity occurs if one or many variables are linearly related at a high degree to another variable. When multicollinearity exists in a group of variables, it interferes with the estimation of the coefficients between the related variables resulting in exaggerated variances and standard errors and reduced t-scores (Komlos, 2019). Despite this issue, multicollinearity does not lead to bias in fit while determining the equation. Where R is high, above 0.80, the two variables are highly correlated and multicollinearity is likely to become an issue (Cameron & Bagchi, 2021). With the heteroscedasticity in the data noted, the Hausman test would be essential in checking the fixed and random effects and it would help decide on the best model to be used (Cameron & Bagchi, 2021). From the research by Cameron and Bagchi, 95% confidence level is recommended from the analysis of the previous studies in evaluating the significance of the coefficient.

## CHAPTER FOUR

### FINDINGS, PRESENTATION AND DISCUSSION

#### 4.1 Introduction

This chapter shows a presentation of the data analysis, the subsequent findings, followed by a discussion of the secondary data geared towards addressing the three objectives outlined in Chapter 1. Descriptive statistics results were presented then, diagnostic tests, correlation and regression results were shown.

#### 4.2 Descriptive Statistics

Table 4.2 presents the descriptive statistics on the number of FinTech subscriptions, Number of FinTech transactions, and value of FinTech transactions in the period from 2007 to 2021. Table 4.2 presents the descriptive statistics of the absolute variables.

**Table 4.2 : Descriptive Statistics**

Statistics					
	Number of FinTech Accounts (Millions)	Number of FinTech Transactions (Millions)	Value of FinTech transactions (KSh billions)	Value of FinTech Credit - Transactions (KSh billions)	Value of FinTech Savings Transactions (KSh billions)
Mean	29.5232	1156.0744	3078.8771	211.0361	347.1709
Std. Deviation	21.9542	1009.2210	3030.9963	470.9107	489.3603
Minimum	5.0506	5.4703	16.3188	.0000	.0000
Maximum	72.3476	3309.3400	11191.6700	1830.4983	1303.2388

For the years 2007 to 2021, the researcher explored the descriptive statistics for the FinTech services subscriptions over the years. The year 2007, according to the reports, recorded the least number of FinTech subscribers, 5.05 million accounts while the year 2021 recorded the highest, 868.17 million subscriptions. This is due to the multiplicity of FinTech products held even on one FinTech platform, for example, NCBA has Mshwari, Fuliza and Loop. The arithmetic mean



for FinTech product subscribers over the years was 354.28 million with a standard deviation of 263.45 million accounts.

From the findings, 2007 recorded the least number of FinTech transactions of 5.47 million transactions with 2021 recording the highest, 3.309 trillion transactions. For the number of FinTech transactions, the arithmetic mean was 1.16 billion. The standard deviation of these FinTech transactions was 1 billion transactions.

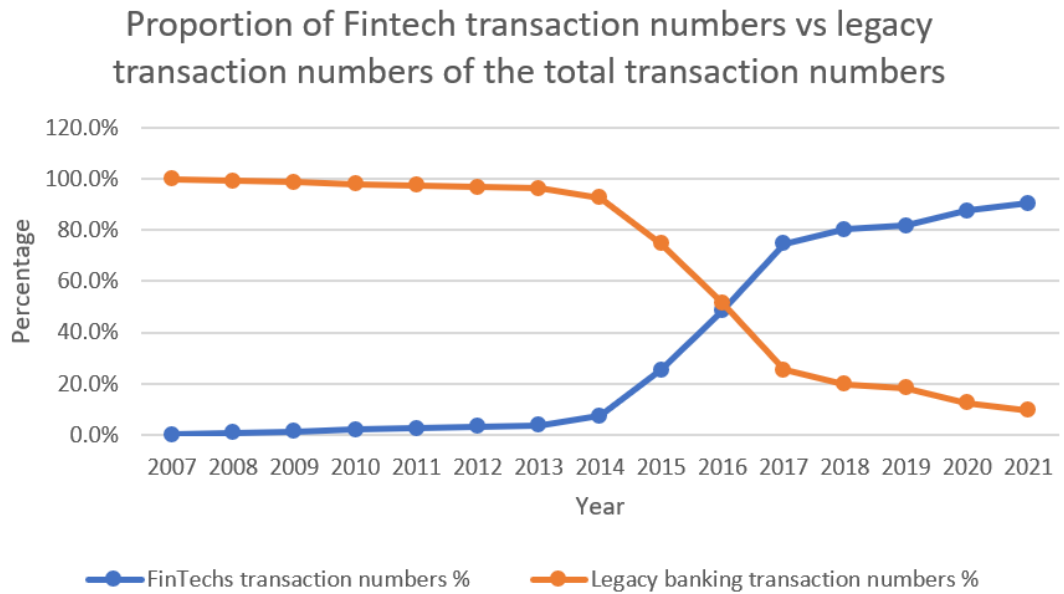
The researcher then explored the descriptive statistics for the value of FinTech transactions from 2007 to 2021. 2007 had the least value of FinTech transactions at 16.32 billion transactions while 2021 recorded the highest value of transactions at 11.19 trillion. For the value of FinTech transactions, their arithmetic mean was 3.08 trillion. The FinTech transactions have a standard deviation of 3.03 trillion. On the other hand, the value of savings and credit transactions trailed that of other transfer transactions.

There were no credit transactions till 2011, with the inception of the M-Pesa platform, which had the least value of credit FinTech transactions of 3.29 billion. The year 2021 recorded the highest value of 1.83 trillion, in line with the population and subscriber growth. The trend is very similar to savings too, in the sense that there were no savings transactions till 2011, which had the least value of credit FinTech transactions of 3.92 billion, with 2021 recording the highest value of 1.04 trillion.

#### **4.2.1 Proportion of FinTech services relative to the total number and value of transactions**

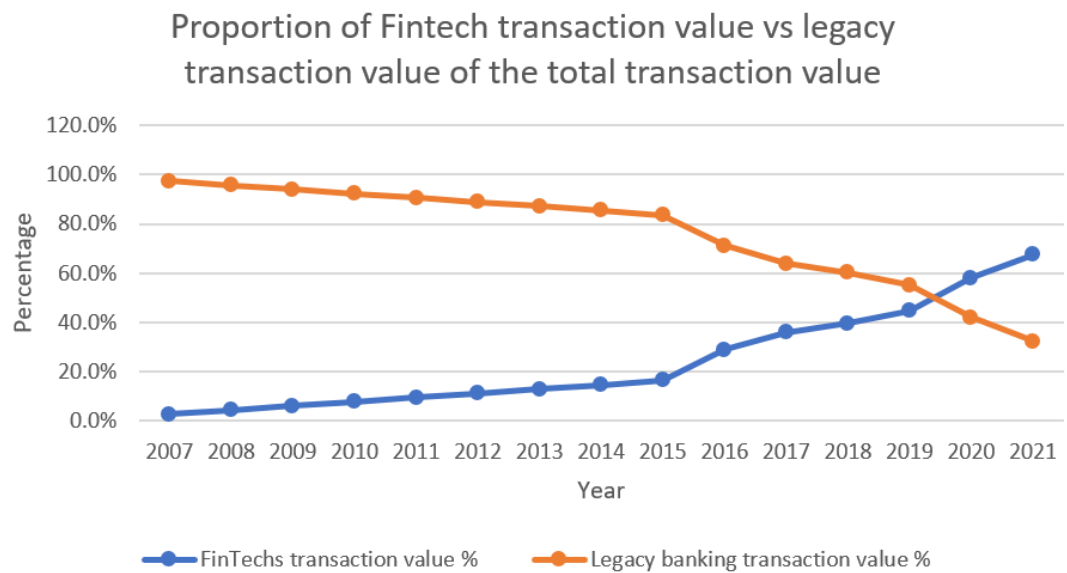
We explored the data to establish the contribution of FinTech services vs legacy banking services (agency, ATM, branches etc) to the total transactional, credit and savings transaction services. See the figures below illustrating the findings.

**Figure 4.2.1 Proportion of FinTech transaction numbers vs legacy transaction numbers of the total transaction numbers**



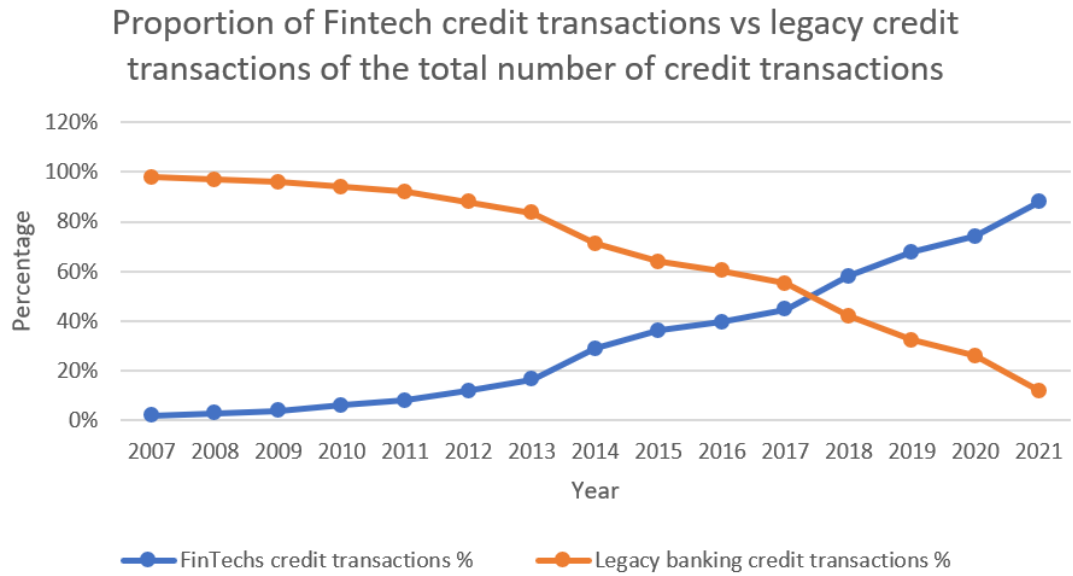
The FinTech transaction services have grown in transaction numbers from 2007 where they were less dominant to about 90% of the transactions in 2021.

**Figure 4.2.2 Proportion of FinTech transaction value vs legacy transaction value of the total transaction value**



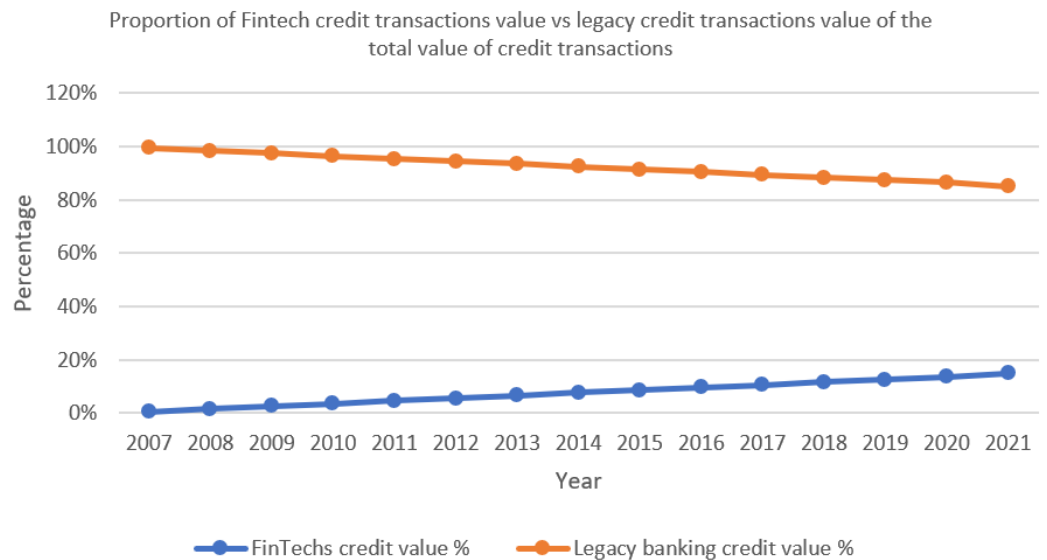
The FinTech transaction services have grown in transaction value from 2007 where they were less dominant to slightly over 65% of the total transaction value in 2021.

**Figure 4.2.3 Proportion of FinTech credit transactions vs legacy credit transactions of the total number of credit transactions**



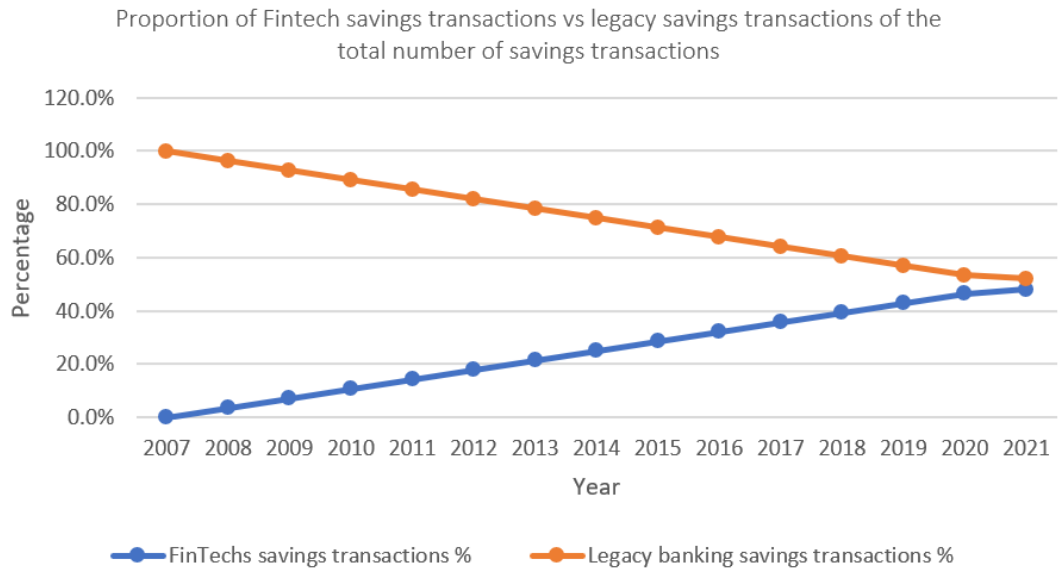
The number of FinTech credit transactions has increased from 2007 to surpass the legacy banking transactions. 88% of banking transactions are done using FinTech outfits in the banks.

**Figure 4.2.4 Proportion of FinTech credit transactions value vs legacy credit transactions value of the total value of credit transactions**



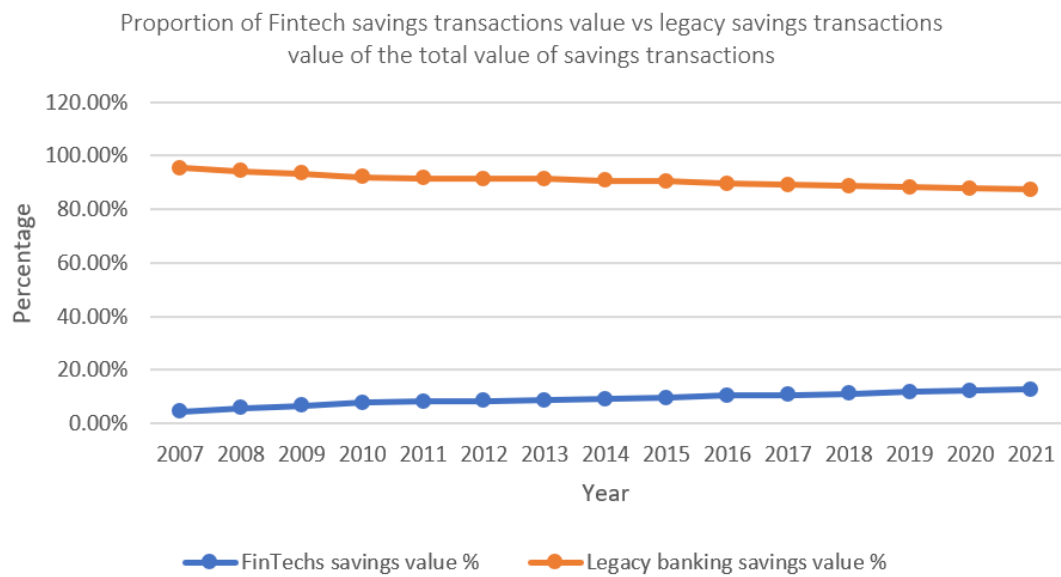
The value of FinTech credit transactions has increased from 2007 to 2021. However, in as much as these have eaten into the legacy banking transactions value, their value is still lower. 85% of the value of credit banking transactions are done using the legacy banking methods.

**Figure 4.2.5 Proportion of FinTech savings transactions vs legacy savings transactions of the total number of savings transactions**



The number of FinTech savings transactions has increased from 2007 to come very close to the number of legacy banking transactions. 52% of the number of savings banking transactions are done using legacy banking methods.

**Figure 4.2.6 Proportion of FinTech savings transactions value vs legacy savings transactions value of the total value of savings transactions**



There has also been a steady increase in the value of FinTech savings transactions from the year 2007 to 2021 compared to the decline in the savings value through the other legacy banking methods. Still, 87% of the value of savings banking transactions are done using legacy banking methods.

### 4.3 Diagnostic tests

Before interpretation of the results, diagnostic tests were conducted for normality, multicollinearity, heteroscedasticity and autocorrelation.

#### 4.3.1 Test of Normality

The researcher sought to assess the normality of the data distribution. The findings were presented in Tables 4.3.1 a and 4.3.1 b.

**Table 4.3.1 a: Tests of Normality**

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unit value of FinTech Transactions/Unit number of FinTech Transaction accounts	.159	15	.200*	.950	15	.527
Unit value of FinTech credit transactions/Unit number of FinTech credit accounts	.175	15	.200*	.892	15	.071
Unit value of FinTech Savings transactions/Unit number of FinTech savings accounts	.204	15	.092	.850	15	.084

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Since the dataset had fewer than two thousand elements, the most preferred test was the Shapiro-Wilk. This resulted in a significance level for the unit of the quotient of FinTech transaction value, credit value and savings value divided by the respective product accounts to result to 0.527, 0.071 and 0.084 respectively. These are all higher than 0.05 implying that the data originated from a normal distribution and is suitable for the study. Despite the higher elements required by the Kolmogorov-Smirnov test, its results are similar to the Shapiro-Wilk test.

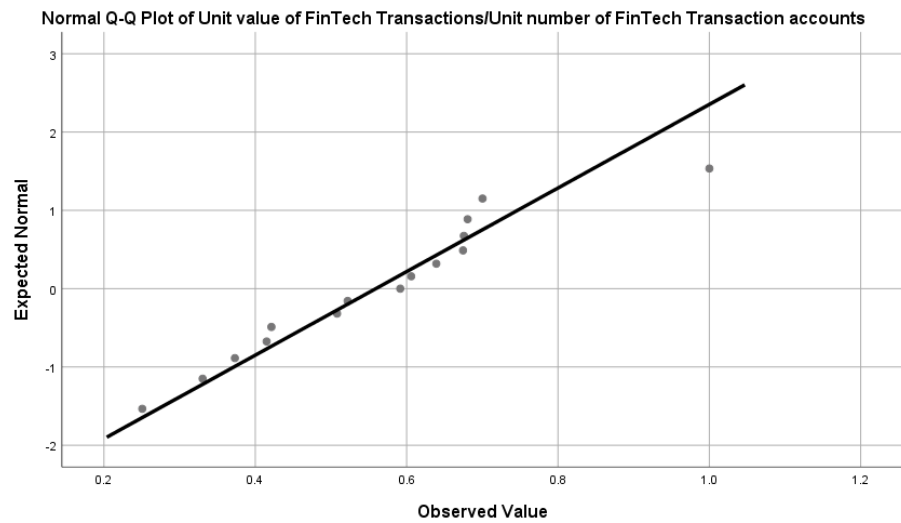
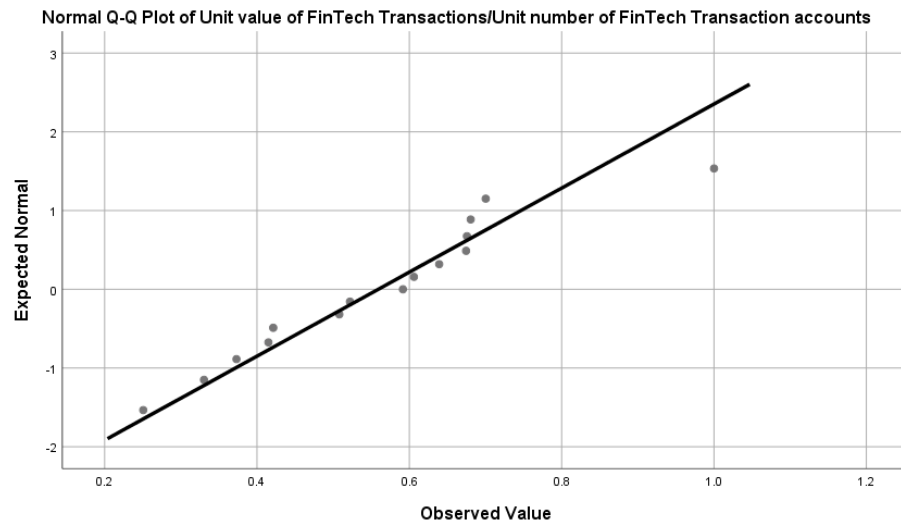
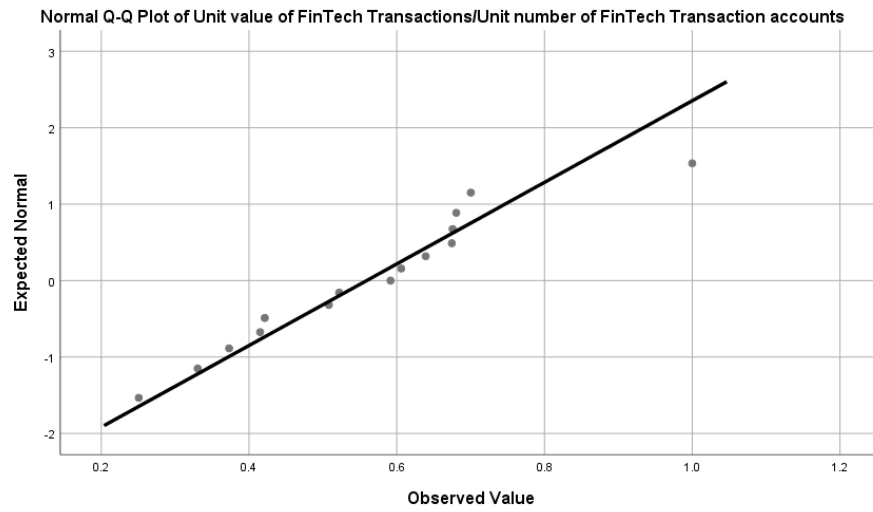
**Table 4.3.1 b: Skewness and Kurtosis**

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
Unit value of FinTech Transactions/Unit number of FinTech Transaction accounts	.506	.580	.920	1.121
Unit value of FinTech Credit transactions/Unit number of FinTech credit accounts	.462	.580	-1.082	1.121
Unit value of FinTech Savings transactions/Unit number of FinTech savings accounts	.588	.580	-.766	1.121

From the skewness Z-value analysis dictates that normality should lie between -1.96 to 1.96.

The data majorly aligns to normality. The differences in the K-S statistic are because of the smaller populations and a small sample size would normally result in low statistical power for normality tests. Moreover, from our observation of the Q-Q plots (Figure 4.3.1) they approximately model a normal distribution.

**Figure 4.3.1: Skewness and Kurtosis : Q-Q Plots**



### 4.3.2 Multicollinearity Test

The study evaluated the Tolerance and the Variance Inflation Factor (VIF) in the dataset as a variance measurement index to check the state of inter-associations among the independent variables in the data. These are based on the R-squared value, where a predictor is regressed on all other predictors in the model. The cut-off value for tolerance is 0.10 while the VIF should not be over 10. If the tolerance is less than 0.1 or VIF larger than 10, the variables should be rechecked. From the results in table 4.5.3, the Unit of FinTech transactions value/transactions volume had a tolerance of 0.354 and VIF of 2.826, both within the required limits. FinTech credit transactions recorded a tolerance of 0.371 and VIF of 2.693 while FinTech savings transactions had a tolerance of 0.457 and VIF of 2.190. This implies that none of the three variables had multicollinearity issues.

### 4.3.3 Heteroscedasticity Test

Homoscedasticity occurs due to differences in size of error terms in independent variables of the study. When heteroscedasticity increases, the degrees of supposition that lower the impact of homoscedasticity are lowered. The Breusch-Pagan test for heteroscedasticity was done based on the recalculated dependent variable, being a square of the residual against the independent variables. From the ANOVA table presented as Table 4.3.3, the significance is greater than the p value of 0.05, hence there is no heteroscedasticity.

**Table 4.3.3: ANOVA Table - Heteroscedasticity test**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.000	3	.000	.922	.462 <sup>b</sup>
	Residual	.000	11	.000		
	Total	.000	14			
a. Dependent Variable: SQRES						
b. Predictors: (Constant), Unit value of FinTech Savings transactions/Unit number of FinTech savings accounts, Unit value of FinTech credit transactions/Unit number of FinTech credit accounts, Unit value of FinTech Transactions/Unit number of FinTech Transaction accounts						



#### 4.3.4 Autocorrelation Test

The researcher assessed autocollinearity using the Durbin-Watson test. The test specifies that the value lies between 0 and 4. If the constant is 2, there is no auto-correlation. If it is less than 2, then there is positive autocorrelation and if higher than 2, then there is negative autocorrelation. From the model summary table 4.5.1, the Durbin-Watson test result is 1.564 implying that the data is positively auto-correlated. Generally, if the Durbin–Watson constant is below 1.0, there is an issue as such small values of d show that the successive error terms are positively correlated. Since the value is higher than 1 and below 4, there are no issues noted.

**Table 4.3.4: Model Summary showing Durbin-Watson Test**

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.966 <sup>a</sup>	.933	.915	.0436594092	1.564
a. Predictors: (Constant), Unit value of FinTech Savings transactions/Unit number of FinTech savings accounts, Unit value of FinTech credit transactions/Unit number of FinTech credit accounts, Unit value of FinTech Transactions/Unit number of FinTech Transaction accounts					
b. Dependent Variable: FI					

#### 4.4 Pearson’s Correlation Analysis

Bivariate correlation indicates the relationship between two variables. The correlation varies from 1 to -1 whereby 1 indicates a strong positive relationship while a -1 on the other end indicates a strong negative relationship. A zero coefficient shows that there is no trending association between the two variables being compared. The more the relationship goes towards zero, the weaker the correlation becomes. Table 4.4 shows a presentation of the results.

**Table 4.4: Pearson’s Correlation**

Correlations		
		FI
Pearson Correlation	FI	1.000
	Unit value of FinTech Transactions/Unit number of FinTech Transaction accounts	.868
	Unit value of FinTech credit transactions/Unit number of FinTech credit accounts	-.155
	Unit value of FinTech Savings transactions/Unit number of FinTech savings accounts	.838

Other than being positive, the correlation relationship between FinTech transaction services and financial inclusion was strong (0.868). The FinTech credit services and financial inclusion were weakly and negatively correlated (0.155) while FinTech savings services and financial inclusion were also strongly and positively (0.838).

**4.5 Regression Analysis**

**4.5.1 Fit of Model**

Table 4.5.1 below illustrates how the regression model fits while bringing forth the relationships between the variables of the study.

**Table 4.5.1: Fit of Model**

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.966 <sup>a</sup>	.933	.915	.0436594092	1.564
a. Predictors: (Constant), Unit value of FinTech Savings transactions/Unit number of FinTech savings accounts, Unit value of FinTech credit transactions/Unit number of FinTech credit accounts, Unit value of FinTech Transactions/Unit number of FinTech Transaction accounts					
b. Dependent Variable: FI					

The study results indicate that the independent variables, FinTech transaction services, FinTech credit services, and FinTech savings services, satisfactorily explain financial inclusion. The R value in the R column, 0.966 implies a high correlation coefficient. This inference is supported by a solid R squared of 0.933, indicating how much the independent variables illustrate the total variation in financial inclusion, the dependent variable. This concludes that 93.3% of financial

inclusion is predicted by the independent variables, FinTech transaction services, FinTech credit services, and FinTech savings services.

#### 4.5.2 Analysis of Variance

To illustrate how well the regression model fits the data, the Analysis of Variance (ANOVA) findings have been presented in Table 4.5.2.

**Table 4.5.2: Analysis of Variance**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.260	3	.087	18.168	.000 <sup>b</sup>
	Residual	.052	11	.005		
	Total	.312	14			
a. Dependent Variable: FI						
b. Predictors: (Constant), Unit value of FinTech Savings transactions/Unit number of FinTech savings accounts, Unit value of FinTech credit transactions/Unit number of FinTech credit accounts, Unit value of FinTech Transactions/Unit number of FinTech Transaction accounts						

For this study, the model was a good fit for the data and came out as statistically significant. This was supported by a probability (p) value of 0.000 as indicated on the “Sig.” column. The p value from the results turned out to be less than the set conventional p value of 0.05. With that significance level, the independent variables statistically and significantly predict the dependent variable. These findings indicate that FinTech transaction services, FinTech credit services, and FinTech savings services are good predictor variables of financial inclusion, the dependent variable.

#### 4.5.3 Coefficients

Based on the data in the study, regression coefficient results was presented in Table 4.5.3.

**Table 4.5.3: Coefficients**

Coefficients <sup>a</sup>								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.312	.078		3.998	.002		
	Unit value of FinTech Transactions/Unit number of FinTech Transaction accounts	.516	.166	.647	3.117	.010	.354	2.826
	Unit value of FinTech credit transactions/Unit number of FinTech credit accounts	-.043	.098	-.088	-.434	.672	.371	2.693
	Unit value of FinTech Savings transactions/Unit number of FinTech savings accounts	.129	.058	.411	2.247	.017	.457	2.190

The findings of the study indicate a positive relationship between the FinTech transactional services and FinTech savings services and the dependent variable (financial inclusion) based on the respective beta coefficients of 0.516, -0.043 and 0.129. However, they indicate a negative relationship between FinTech credit services and financial inclusion, as evidenced by the negative coefficient of 0.043. The results indicate that if the FinTech transactional services increased by a unit of one unit, subsequently, financial inclusion would increase by 0.516 units. From the same results, if FinTech credit services value increased by a unit of one unit, this would lead to a decrease in financial inclusion by 0.043 units. An increase in the savings FinTech services by a unit of one unit results in an increase in financial inclusion by 0.129 units.

From a coefficient significance perspective, the three independent variables FinTech transactional services, FinTech credit services and FinTech savings services have significance levels of 0.010, 0.671 and 0.017. The scientific probability significance level is 0.05 implying

that the statistic significance of a variable to be satisfied, it has to have lower than the 0.05 significance target. These regression results affirm that FinTech savings services and FinTech transaction services were essential determinants of financial inclusion. However, FinTech credit services had a significance higher than the 0.05 required hence were not significant determinants of financial inclusion.

The model was as follows:

$$Y = \alpha + \beta_c X_c + \beta_s X_s + \beta_t X_t + \mu$$

Where;

$X_c$  = Natural unit of value of FinTech credit-oriented transactions divided by number of FinTech credit transactions- number of FinTech credit services transactions

$X_s$  = Natural unit of value of FinTech savings transactions divided by the number of investment/savings FinTech services transactions- number of transactions done by people who have subscribed to the FinTech savings services

$X_t$  = Natural unit of value of FinTech transactions divided by the number of FinTech services transactions - number of transactions done by people who have subscribed to the FinTech transaction services.

$Y$  = Financial Inclusion - Accessibility in terms of the number of deposit bank accounts (per 1000 adult population) as per the Central Bank of Kenya. Accessibility and usage of financial services as per the World Bank data 2007-2021. Financial inclusion refers to the extent or depth to which financial products and services are used as determined by frequency, regularity, and duration of their utilization over time.

$\alpha$  = constant

$\mu$  = error term

$\beta_c, \beta_s, \beta_t$  = beta coefficients

Overall, the regression model is as follows:

Financial Inclusion (Accessibility and usage of financial services) =  $0.312 + 0.516^*$  unit value of FinTech Transactions divided by the number of FinTech Transaction accounts -  $0.043^*$  unit value of FinTech credit transactions divided by the number of FinTech credit accounts +  $0.129^*$  unit value of FinTech Savings transactions divided by the number of FinTech savings accounts.

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

As a result of the research, there were a number of findings. The year 2007 recorded the least number of FinTech transactions, 5.47 million transactions valued at 16.32 billion while 2021 had the highest, 3.31 billion transactions valued at 11.19 trillion. The arithmetic mean for FinTech transactions was 1.16 billion, with a standard deviation of 1.01 billion transactions. The arithmetic mean for the value of FinTech transactions was 3.08 trillion, with a standard deviation of 3.03 trillion transactions. From the study, a positive coefficient of variation was also established between the Natural unit of the quotient - value of FinTech transactions divided by the number of FinTech services accounts and the dependent variable, financial inclusion as shown by (Beta value = 0.516).

From the findings, there were no FinTech credit transactions between the year 2007 and 2010. This period recorded the zero credit FinTech transactions, till 2011 that recorded 395 thousand credit transactions valued at 3.29 billion. The year 2021 recorded the highest, 2.4 billion transactions valued at 1.83 trillion. The arithmetic mean of the value of credit FinTech transactions was 211.04 billion and the standard deviation was 470.91 billion. The research realized a negative coefficient, as evidenced by a beta value of 0.043. This was the unfavorable coefficient of variation between the unit value of credit FinTech transactions divided by the number of credit FinTech services accounts and financial inclusion.

Moreover, from the findings, there were no FinTech savings transactions between the year 2007 and 2010. This period recorded the zero credit FinTech transactions, till 2011 that recorded 395 thousand savings transactions valued at 3.92 billion. The year 2021 recorded the highest, 1.8 billion transactions valued at 1.3 trillion. This indicates a declining trend in savings FinTech

transactions. The arithmetic mean of the value of savings/investment FinTech transactions was 347.17 billion and the standard deviation was 489.36 billion. Evidenced by a beta value of 0.129, the study resulted in a positive variation coefficient between the unit value of savings FinTech transactions divided by the number of savings FinTech services accounts and the financial inclusion index.

The research findings are similar to the results arrived at by Ishengoma in 2011, who conducted a study scoped around Kibaha District in Tanzania, investigated banking via mobile phone's system coverage for financial benefits. The study found that volumes of transactions done using mobile platforms were significant contributions to financial inclusion. The study findings also matched those of Mago and Chitokwindo who based their study in Masvingo Province in the year 2014. They investigated the influence of mobile banking on financial inclusion among Zimbabweans and concluded that a favorable relationship exists between the value of mobile transactions and financial inclusion in the population.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

The chapter has the primary purpose of aligning the findings with the objectives. The relationship concluded from the research study and its variables was tied to the research objectives. A discussion of the study limitations, suggestions for recommendations and further study were then done.

#### 5.2 Summary of Findings

The main objective of the research study was to establish the effect of FinTech services on financial inclusion in Kenya. The main objective was split into the sub-objectives: to explore the effect of credit FinTech services, savings, and transactional FinTech services on financial inclusion in Kenya.

The main research question was, how are FinTech services perceived to be contributing to the broadening of financial inclusion? This research study sought to respond to the three key questions: What is the effect of credit FinTech services on financial inclusion in Kenya? What is the effect of savings FinTech services on financial inclusion in Kenya? What is the effect of transactional FinTech services on financial inclusion in Kenya? Research findings indicated a regular increase in the number of FinTech accounts and subscriptions since 2007.

However, FinTech credit services and savings services picked up in 2011 and have had a steady rise till the end of the year 2021. The correlation results indicated that the relationship between FinTech credit services and financial inclusion was negative though not statistically significant. Regression results indicate a negative association between the FinTech credit services and the dependent variable (financial inclusion). The outcome further indicates that if the number of credit FinTech services increase by a unit of one unit, there will be a subsequent decrease in financial inclusion by 0.043 units. However, the regression findings indicated that the credit FinTech services were not statistically significant, hence not an important determinant of financial inclusion.



The second research query was: What is the effect of the number of savings FinTech transactions on financial inclusion in Kenya? Research findings showed that there was a regular increase in the number and value of savings FinTech services. The correlation results indicate that the relationship between the savings/investment FinTech services and financial inclusion was weak, positive, and was statistically significant. Regression analysis indicated a positive relationship between the number of savings FinTech services and the dependent variable (financial inclusion). The results further indicate that an increase in the number of FinTech savings transactions by the unit of one unit leads to an increase in financial inclusion by 0.129 units. Regression findings show savings FinTech transactions were statistically significant; hence, the variable was critical in determining financial inclusion.

The third query the study sought to answer was: What is the effect of transactional FinTech services on financial inclusion in Kenya? Research findings showed a constant increase in the number or subscriptions and value of FinTech transactions from the years 2007 to 2021. The correlation results show that the relationship between FinTech transactional services and financial inclusion was solid and positive. This was statistically significant, and also a stronger relationship at 0.516 compared to the other independent variables.

The results further indicate that an increase in the FinTech transactions services by the unit of one unit leads to an increase in financial inclusion by 0.516 units. The regression findings show that the value of FinTech transactions was statistically significant, and the variable was very critical in determining financial inclusion. Its contribution contributes to more than 51% of the variation and outweighs that of the other two variables.

### **5.3 Conclusions**

From the findings of the research, it can be concluded that all independent variables; FinTech credit services, FinTech savings services, and FinTech transactional services satisfactorily explain financial inclusion. It can also be concluded that in getting to know the extent of financial inclusion, it is critical to understand the effect of the unique favorable digital infrastructure and environment geared towards enhancing financial inclusion. Above and

beyond, the research has established that FinTech services increase financial inclusion, with the FinTech transaction services taking the lead.

#### **5.4 Policy Recommendations**

The researcher urges the regulator to enhance the policies and regulations around the FinTech space, starting with the prevalent FinTech service providers, especially in the credit and savings product offerings. The Central Bank of Kenya (Digital Credit Providers) Regulations, 2022 were released in March 2022, but there is a need for training and education of the stakeholders (*Central Bank of Kenya (Digital Credit Providers) Regulations 2022 / CBK, 2022*). The regulation place an onus on DCPs to carry out due diligence on a customer's ability to repay loans before advancing the same to the customer instead of using profane language and uncouth collection means after default. This will ensure the players are compliant and that the guidelines are clear. Also, the Central Bank also needs to further monitor the liquidity of these digital credit providers as a section of the population will use them for savings products. The CBK should enhance their control over these agencies to ensure they do not use risk mitigating measures to generalize credit provision through blanket blacklisting that might influence penetration of FinTech services. Through the Central Bank of Kenya, the government should deliberately outline policies that enhance financial inclusion without prohibiting or hindering the autonomy of the players to enable more access to the services. The government should also develop policies that encourage innovations to breed more value into the ecosystem and effectively benefit the end users. The banking regulator should also enhance segmented reporting of the various revenue channels to boost availability of information from registered digital credit providers to sharpen the focus of policy improvements focused on financial inclusion.

## **5.5 Recommendations for Further Study**

This study is not yet exhaustive in context and nature. There is a need for more research based on other financial innovations like internet banking platforms and agencies, etc., to conclude on whether the findings mirror the trends shown in this study. Another research with a larger scope of FinTechs and financial innovations can be done to show how other financial innovations contribute to financial inclusion.

Scoping can be expanded to the whole of the East African Region to investigate whether the same variables playing across the different economies could influence the findings to match what the study revealed or not. A new study can also be done to shed light on the operational and environmental challenges facing FinTechs in the entire region or in Kenya, to highlight the business risks, benefits and challenges in the economic setup.

At a lower level, another research study can be done in a smaller regional scope, e.g., counties, subcounties, urban or even a rural context to confirm if the findings tally with the country study results.

As a follow up to the findings of the study, a research can be done to explore why credit FinTech services do not correlate positively with financial inclusion while investigating the policies and business practices that can enhance the credit services impact on financial inclusion.

## REFERENCES

- Abdul, R. (2019). *FinTech as a Disruptive Technology for Financial Institutions*. IGI Global.
- (“FinTech: The New DNA of Financial Services - Pranay Gupta, Mandy Tham Tze-Minn Tham, T Mandy Tham - Google Books,” n.d.)
- African Development Bank. (2014). Kenya Country Strategy Paper 2014-2018. *African Development Bank Country Reports*, Available Online:  
<https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/2014-2018 - Kenya Country Strategy Paper.pdf> [Accessed 26 April 2019]
- Aitken, R. (2015). *Fringe Finance: Crossing and Contesting the Borders of Global Capital*. 711 Third Avenue, New York, NY 10017: Routledge Taylor & Francis Group.
- Alliance for Financial Inclusion (AFI) (2013). *Defining and Measuring Financial Inclusion*, African Development Bank (AfDB), African Development Bank Group, 15, avenue du Ghana, Angle des rues Pierre de Coubertin et Hedi Nouira, BP 323, 1002 Tunis Belvédère, Tunisia
- Back, P. (2013). *Innovation by Individuals: A Review on Lead User Characteristics*. GRIN Verlag.
- Besley, S., & Brigham, E. F. (2014). *Principles of Finance*. Cengage Learning.
- Bhakkad, D. (2018). *Changing Senario of Business and E-Commerce*. Prashant Publications.
- Bijaoui, I. (2017). *Multinational Interest & Development in Africa: Establishing a People's Economy*. Palgrave Macmillan.
- Boulware, R. (2014). *Encyclopedia of American Business*. Infobase Publishing.
- Buckley, P. J. (2012). *Innovations in International Business*. Palgrave Macmillan.
- Camara, N., Peña, X., & Tuesta, D. (2014). *Factors that matter for financial inclusion: Evidence from Peru* (No. 1409) , 512-544

- Cameron, J., & Bagchi, P. (2021). A test for heteroscedasticity in functional linear models. *TEST*, 31(2), 519–542. <https://doi.org/10.1007/s11749-021-00786-8>
- Carol, R., & Mehta, K. (2015). *Financial Inclusion at the Bottom of the Pyramid*. Friesen Press.
- Central Bank of Kenya (Digital Credit Providers) Regulations 2022 | CBK. (n.d.). Retrieved September 6, 2022, from <https://www.centralbank.go.ke/2022/03/21/central-bank-of-kenya-digital-credit-providers-regulations-2022/>
- Chithra, N. & Selvam, M. (2013). *Determinants of Financial Inclusion: An Empirical Study on the Inter-State Variations in India*. Available at SSRN: <http://ssrn.com/abstract=2296096> or <http://dx.doi.org/10.2139/ssrn.2296096>  
*Research in Business and Economics Journal* Volume 9 PP 11-21
- CIA. (2017). Kenya -The World Factbook, Central Intelligence Agency Website, Available Online: <https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html>  
[Accessed 25 April 2019]
- Cooper, D.R & Schindler, P.S (2006). *Business Research Methods*, 9th, edition.  
McGraw-Hill Publishing, Co. Ltd. New Delhi-India 123-161
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approach* (2nd Ed.). Thousand Oaks, CA: Sage.69-88
- Crew, M. A., & Kleindorfer, P. R. (2006). *Regulatory and Economic Challenges in the Postal and Delivery Sector*. Springer Science & Business Media.
- Cullity, M. M. (2010). *Alternative Entry Programs to University for Mature Age Students: Program Characteristics that Encourage Or Inhibit Mature Student Participation*. UoM Custom Book Centre.
- Das, R. C. (2018). *Microfinance and Its Impact on Entrepreneurial Development, Sustainability, and Inclusive Growth*. IGI Global.

Data Catalog. (n.d.). Retrieved August 20, 2022, from

<https://datacatalog.worldbank.org/dataset/world-development-indicators/>

De Lisle, J. (2011). The Benefits and Challenges of Mixing Methods and Methodologies:

Lessons Learnt from Implementing Qualitatively Led Mixed Methods Research Designs in Trinidad and Tobago. *Caribbean Curriculum*, vol. 18, pp.87–120

Donovan, K. (2012). Mobile Money for Financial Inclusion. In T. Kelly (Ed.), *Information and communication for development*, Washington, DC: World Bank: 61-74.

Etim, A. (2014). Mobile banking and mobile money adoption for financial inclusion, *Research in Business and Economics Journal* Volume 9 PP 1-13

Finkle, V. (2016). Short Article: FinTech Has Bright Future in Developing World, *SAGE*

*Business Reader*, pp.1-3

Gabor, D. & Brooks, S. (2016). The Digital Revolution in Financial Inclusion: International

Development in the FinTech Era, *New Political Economy*, vol. 17, pp. 1-14

Gakure, R., Anene, E., Arimi, I. K., Mutulu, J. & Kiara, P. G. (2013). Factors contributing to low M-kesho adoption among subscribers. *International Journal of Social Sciences and Entrepreneurship*, 1 (6), 84-97

Gardeva, A. & Rhyne, E. (2011). *Opportunities and Obstacles to Financial Inclusion Survey*

*Report*. Center for Financial Inclusion Publication, February 24<sup>th</sup> 2011

Glejser, H. (1969). A New Test for Heteroskedasticity. *Journal of the American*

*Statistical Association*, 64(325), 316–323.

<https://doi.org/10.1080/01621459.1969.10500976>

GDP per capita (current US\$)—Kenya | Data. (n.d.). Retrieved August 21, 2022, from

<https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=KE>

- IMF. (2016). World Economic Outlook: Subdued Demand, Solutions and Remedies, *October 2016 - Occasional Report*, Available Online:  
<http://www.imf.org/external/pubs/ft/weo/2016/02/pdf/text.pdf> [Accessed 25 April 2019]
- Index Mundi. (2016). Kenya Demographics Profile 2016. *Website*, Available Online:  
[http://www.indexmundi.com/kenya/demographics\\_profile.html](http://www.indexmundi.com/kenya/demographics_profile.html) [Accessed 25 April 2019]
- Internet World Stats. (2017). Internet Usage Statistics for Africa. *Website*. Available Online:  
<http://www.internetworldstats.com/stats1.htm> [Accessed 21 April 2019]
- Jerinabi, U., & Santhi, P. (2012). *Creativity, Innovation and Entrepreneurship*. Allied Publishers.
- Kamer, L. (n.d.). *Kenya: Population's median age 2015-2020*. Statista. Retrieved August 21, 2022, from <https://www.statista.com/statistics/1221871/median-age-of-the-population-in-kenya/>
- Keynes, J. M. (1937). The "Ex-Ante" Theory of the Rate of Interest. *The Economic Journal*, 47(188), 663. <https://doi.org/10.2307/2225323>
- Kemibaro, M. (2016). Kenya's Latest 2016 Mobile & Internet Statistics, *Website*, Available Online:  
<http://www.moseskemibaro.com/2016/10/01/kenyas-latest-2016-mobile-internet-statistics/> [Accessed 27 April 2019]
- Kenya Economic Update (KEU)*. (2022). [Text/HTML]. World Bank. Retrieved August 24, 2022, from <https://www.worldbank.org/en/country/kenya/publication/kenya-economic-update-keu>
- Kim, J., Shah, P., Gaskell, J. C., & Prasann, A. (2020). *Scaling Up Disruptive Agricultural Technologies in Africa*. World Bank Publications.

- Komlos, J. (2019). Multicollinearity in the Presence of Errors-in-Variables Can Increase the Probability of Type-I Error. *SSRN Electronic Journal*.  
<https://doi.org/10.2139/ssrn.3338813>
- Lewis-Beck, M., Bryman, A. E., & Liao, T. F. (2003). *The SAGE Encyclopedia of Social Science Research Methods*. SAGE Publications.
- Mulligan, G. (2015). Is Fibre Optic Cable Key to Africa's Economic Growth?, *News Article*,  
Available Online: <http://www.bbc.com/news/business-32079649> [Accessed 26 April 2019]
- Mutsune, T. (2014). *No Kenyan left behind: The case of financial inclusion through mobile banking*. Global Conference on Business and Finance Proceedings, Iowa Wesleyan College.
- Neelamegam, R. (2016). Understanding financial inclusion in India: A case study of Sattur Taluk, Tamil Nadu. *TSM Business Review*, 4(2), 41-48.  
[doi:10.23837/tbr/2016/v4/n2/128863](https://doi.org/10.23837/tbr/2016/v4/n2/128863)
- Nicoletti, B. (2017). The future of FinTech: Integrating finance and technology in financial services. Cham: Palgrave Macmillan. [doi:10.1007/978-3-319-51415-4](https://doi.org/10.1007/978-3-319-51415-4)
- Niederman, F., & Salvatore, M. (2019). The “Theoretical Lens” Concept: We All Know What it Means, but do We All Know the Same Thing? *Communications of the Association for Information Systems*, 44, 1–33.  
<https://doi.org/10.17705/1cais.04401>
- Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review*, 18(4), 329–340. <https://doi.org/10.1016/j.bir.2017.12.003>
- Rogers, E. M. (1962). *Diffusion of Innovations*. Free Press of Glencoe.
- Saliu, I. (2015). Assessing the Impact of Mobile Money Transfer Service on the Socioeconomic Status of the Mobile Money Vendors, A Case of Kumasi Metropolis.



- Schumukler, S., Torre, A., & Gozzi, J. (2017). *Innovative Experiences in Access to Finance: market Friendly Roles for the Visible Hand? Latin America and the Caribbean Region: The World Bank.*
- Sector Statistics Report Q3 2021-2022. (2022). *Communications Authority of Kenya.* Retrieved August 24, 2022, from <https://www.ca.go.ke/document/sector-statistics-report-q3-2021-2022/>
- Simon, K. (n.d.). *Digital 2022: Kenya—DataReportal – Global Digital Insights.* Retrieved August 24, 2022, from <https://datareportal.com/reports/digital-2022-kenya>
- Soederberg, S. (2014). *Debtfare States and the Poverty Industry: Money, Discipline and the Surplus Population.* Routledge Taylor & Francis Group.
- Villasenor, J., West, D., & Lewis, R. (2015). *The 2015 Brookings Financial and Digital Inclusion Project Report: Measuring Progress on Financial Access and Usage.* 1775 Massachusetts Avenue, N.W, Washington D.C: The Brookings Institution.
- World Bank. (2017). *Doing Business 2017, Equal Opportunity for All: Economy Profile 2017, Kenya, A World Bank Group Flagship Report,* Available Online: <http://www.doingbusiness.org/~media/wbg/doingbusiness/documents/profiles/country/kenya.pdf> [Accessed 27 April 2019]
- World Bank. (2015). *Gross domestic product 2015, World bank Data,* Available Online: <http://databank.worldbank.org/data/download/GDP.pdf> [Accessed 27 April 2019]
- Yadgarov, M., Kuzovlev, A., Berikashvili, L., Baeva, A., & Likhvantsev, V. (2021). *Importance of data distribution normality test: theory and practical guide. Anesteziologiya i Reanimatologiya, 2,* 136.  
<https://doi.org/10.17116/anaesthesiology2021021136>

## Appendix 1: Banks in Kenya as at 31 December 2021

1. Absa Bank Kenya Plc.
2. Access Bank (Kenya) Plc.
3. African Banking Corporation Ltd.
4. Bank of Africa Kenya Ltd.
5. Bank of Baroda (K) Ltd.
6. Bank of India.
7. Citibank N.A Kenya.
8. Consolidated Bank of Kenya Ltd.
9. Co-operative Bank of Kenya Ltd.
10. Credit Bank Plc.
11. Development Bank of Kenya Ltd.
12. Diamond Trust Bank (K) Ltd.
13. DIB Bank Kenya Ltd.
14. Ecobank Kenya Ltd.
15. Equity Bank Ltd.
16. Family Bank Ltd.
17. First Community Bank Ltd.
18. Guaranty Trust Bank (Kenya) Ltd.
19. Guardian Bank Ltd.
20. Gulf African Bank Ltd.
21. Habib Bank A.G Zurich.
22. HFC Ltd.
23. I & M Bank Ltd.
24. Kingdom Bank Ltd.
25. KCB Bank Kenya Ltd.
26. Mayfair CIB Bank Ltd.
27. Middle East Bank (K) Ltd.
28. M Oriental Bank Ltd.
29. National Bank of Kenya Ltd.
30. NCBA Bank Kenya Plc.
31. Paramount Bank Ltd.
32. Prime Bank Ltd.
33. SBM Bank Kenya Ltd.
34. Sidian Bank Ltd.
35. Spire Bank Ltd.
36. Stanbic Bank Kenya Ltd.
37. Standard Chartered Bank (K) Ltd.
38. Victoria Commercial Bank Ltd.
39. UBA Kenya Bank Ltd.

Appendix 2: Data Collection Sheet

Year	Name of Financial institution	Total Registered Accounts (Millions)	Total Transaction volumes (Volume Million)	Total Value of transactions (Value KSh billions)	Credit Accounts (millions)	Sum of Credit - Value (KSh billions)	Number of credit transactions	Sum of savings Accounts (millions)	Sum of Number of savings transactions	Sum of Savings Value (KSh billions)	Financial Inclusion

