

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

**JOSEPH CHEGE NJOGU**

**A RESEARCH PROJECT SUBMITTED IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD  
OF THE DEGREE OF MASTER OF SCIENCE IN FINANCE,  
SCHOOL OF BUSINESS, UNIVERSITY OF NAIROBI**

**NOVEMBER 2020**

## DECLARATION

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

Signed:  \_\_\_\_\_

Date: December 7, 2020\

**JOSEPH CHEGE NJOGU**

**D63/88929/2016**

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

Signed:  \_\_\_\_\_

Date: December 7, 2020

**DR HERICK ONDIGO**

**Department of Finance and Accounting**

**School of Business, University of Nairobi**

## **ACKNOWLEDGEMENTS**

I thank God for His grace upon my life throughout the academic journey.

I also thank my wife and children, my extended family and friends for support extended to me, emotionally, and materially. My study period was bearable because of your prayers and support.

I would also like to express my sincere gratitude to my supervisor Dr. Herick Ondigo for his guidance, support, contribution and advice during the research project period. My research project was successful because of his patience, profound knowledge, skills and insights on subject matter.

## **DEDICATION**

I dedicate this study to my beloved family, especially

To my late mother: Grace Wangui Njogu (Nyina wa Muthee)

To my late *Maitu*: Margaret Wairimu Njuguna (*Maitu*)

To my late mother in law: Wamuyu wa Kiragu

To my lovely wife: Mukami wa Chege

To my wonderful daughters: Wamuyu and Njambi

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## **LIST OF ABBREVIATIONS**

<b>ANOVA</b>	Analysis of Variance
<b>ATM</b>	Automated Teller Machine
<b>CBK</b>	Central Bank of Kenya
<b>GDP</b>	Gross Domestic Product
<b>GMM</b>	Generalized Method of Moments
<b>GOK</b>	Government of Kenya
<b>ICT</b>	Information, Communication and Technology
<b>IMF</b>	International Monetary Fund
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>SPSS</b>	Statistical Package for Social Sciences
<b>TAM</b>	Technology Acceptance Model
<b>VIF</b>	Variance Inflation Factors

## ABSTRACT

The utilization of financial technology has significantly increased in the financial sector globally. Evidence shows that development practitioners are continually having the conviction that the outreach arising because of fintech will lead to financial development. In contrast, to the extent that accessibility to financial services is limited, the advantages of financial development are likely to be unavailable to individuals and enterprises. This research sought to determine how financial technology impacts financial development in Kenya. The independent variable for the study was financial technology operationalized as agency banking, mobile banking, internet banking and Mpesa. The control variables were economic growth represented by economic growth rate and interest rates measured as the average bank lending rate on a quarterly basis. The dependent variable was financial development in Kenya given by credit to the private sector as a % of GDP. A period of 10 years between January 2010 and December 2019 was studied through gathering of secondary data. Descriptive design was employed while multiple linear regressions model was useful in the analysis of the association between the variables. The data was analyzed by use of SPSS version 23. An R-Square value of 0.790 was produced from the study results which meant that 79% of the disparity in financial development in Kenya is attributed to the independent variables while 21% of variations of financial development in Kenya was related to other variables that were not part of this study. ANOVA findings showed the F statistic was substantial at 5% with a  $p=0.000$ . Henceforth, the model was appropriate in establishing the relation between the specified variables. In addition, it was revealed that volume of Mpesa transactions, economic growth rate and interest rate had positive substantial values for the investigation while agency banking, mobile banking and internet banking produced positive but insignificant values in the investigation. It is the recommendation of this study that measures should be adopted that will enhance Mpesa, economic growth rate and interest rate as these measures have a substantial influence on financial development in Kenya. The study suggests the need for future researchers to center on other determinants of financial development in Kenya such as institutional quality, political stability, inflation, trade openness among others.

# CHAPTER ONE: INTRODUCTION

## 1.1 Background of the Study

Through the years, financial technology (fintech) has been substantial on the operation of financial institutions and has been the standard by which banks differentiate their products from that of rivals (Cihak & Singh, 2013). The fintech products are availed through electronic medium like ATM machines, mobile devices and the internet. Financial institutions are dependent on modern technology to serve customers efficiently and effectively. From a glance, it is clear that majority of financial institutions have tried to apply fintech platforms to improve their performance (Abdulkarim & Ali, 2019). Evidence shows that development practitioners are continually having the conviction that fintech is necessary in directing funds to efficient uses and risk allocation to those able to use them, thereby improving financial development. In contrast, to the extent that accessibility to financial services is limited, the advantages of financial development are likely to be unavailable to individuals and enterprises (Neaime & Gaysset, 2018).

This study drew support from a number of theories like the diffusion of innovation theory, technology acceptance model, and the financial intermediation theory that have attempted to elaborate the relationships between cost efficiency of banks and mobile banking. Mises (1912), developed the Financial intermediation theory which pose that financial institutions play a major role in the mobilization of deposits and issuance of credit on interest terms to improve their performance, they need to increase deposits from their clients through creation of ways that would make it easy and convenient for customers to transact. Diffusion of innovation is the manner in which an idea is spread through members of a certain social system using a specified medium (Rogers, 1995).

Technology Acceptance Model (TAM) refers to the manner in which clients use an innovation (Davis, 1989). In this investigation, the model will be utilized in identifying how technology acceptance influences fintech developments among financial institutions in Kenya.

In Kenyan financial sector, a lot of dynamism is being witnessed in the business environment, which has been attributed to increased technological growth, competition and globalization. Commercial banks have embraced the use of financial technology platforms to reduce their operational costs and reach a wider market. David-West (2015) posited that financial technology improves the manner in which financial transactions are undertaken and makes it easy for unreached groups to easily access financial services. A positive factor about mobile lending is their ability to offer financial solutions to the lowest income earners that were otherwise excluded from the traditional banking system (Gretta, 2017). Despite the improvements noted in the financial sector in Kenya, credit lending to private sector declined to about 14 % of GDP in 2019 from 18% in 2018 (CBK, 2019). It is therefore imperative to investigate whether financial technology, which has been on the rise has an effect on financial development in Kenya.

### **1.1.1 Financial Technology**

Financial technology is defined as any technological innovation that is impacting the financial sector and its operations (Sheleg & Kohali, 2011). Financial technology could also be referred to as companies that do a combination of financial services and modern technologies and in turn offer internet based and application oriented services that are user friendly, automated, transparent and efficient (Triki & Faye, 2013). Freytag and Fricke (2017) defined financial technology as new technologies that support financial

services. In future it is predicted that banks will utilize social media networks in which customers will be able to use mobile phones to take advantage of investment opportunities to make investments courtesy of technology (World Bank, 2017).

Financial technologies are offering technological solutions that will be convenient, encourage quicker turnaround times and achieve efficiency in operations (Klapper, 2016). Financial Technologies have been able to affect various stakeholders in the financial sector. It has led to improvement of asset management services by offering services that enable customers manage their wealth by using simplified systems, proposing algorithms that aid in the making of decisions and managing portfolios using artificial intelligence by using robots. It has also impacted the banking sector through monitoring savings, credit scores, spending, tax liability, provision of banking services beyond traditional banking, quick transactions through distribution ledger technology, mobile transfers, use of crypto currencies and also mobile lending to individuals and SME's using data analytics (Yang & Liu, 2016).

In terms of operationalization, Demirguc-Kunt et al. (2018) opines that financial technology as applied today in many financial transactions include; mobile banking which is a link amid a mobile cell phone with a staff or company bank account. Internet banking is providing financial services through a website operated by the bank. Peer to peer crediting is a way of loan funding that facilitates people to borrow as well loan funds with no exploit of a bureaucrat bank as a conciliator. Blockchain, which is a digital ledger in which dealings, prepared in crypto currencies are accounted for openly and chronologically and other technology services including, agency banking, credit cards and ATM machines that are used in financial transactions. The current study will

measure financial technology as the amount of funds transacted through mobile banking, internet banking, agency banking and MPesa.

### **1.1.2 Financial Development**

According to World Bank (2017), financial development is described as the advancement of the financial sector with respect to efficiency, debt, stability and accessibility. As indicated by Roubini and Bilodeau (2008), financial development may be defined as enabling infrastructural factors, institutions and policies whose outcome is broad and deep access to capital and financial services and effective financial intermediation. A good financial development measurement is vital in assessing the advancement of financial sector and articulating its subsequent impact on poverty reduction and economic growth (Mehrotra & Yetman, 2015).

Levine et al. (2012) cites four conventional ways that could be used to ascertain financial development which are; the size and market of financial institutions i.e. financial depth, the degree to which financial services are utilized by individuals i.e. access, the financial institutions' efficiency in mediation of resources and facilitation of financial transactions i.e. efficiency and the financial institutions' stability. It is on this basis that various financial development parameters were established.

Ayadi, Arbak and Naceur (2013) used three financial development indicators that can be used for the measurement of financial development. These included: 1) Credit to private sector (%GDP). 2) Bank Deposits (%GDP). 3) Stock Market capitalization (% GDP). While Standley (2008) in measuring financial market development in Sub-Saharan Africa used five indicators to measure financial development namely Deposit money- bank assets (%GDP), Value traded, Credit to private sector (% of GDP); Turnover ratio and Market capitalization (%GDP). The current study will use credit

issued to the private sector by all financial institutions, banks included divided by GDP as the measure for financial development.

### **1.1.3 Financial Technology and Financial Development**

Davis (1989) argues that a change that would have an economic impact is centered around entrepreneurship, market power and innovation. Theories on Finetch revolution result from these arguments. Rogers (1995) further argues that innovation creates a monopoly which is temporary from imitators join and create rivalry which eliminates the monopoly. Hence if financial institutions are to benefit from financial technology and protect themselves over other banks by using innovative products and services, they will surely impact on financial development.

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

Lenka and Sharma (2017) stated that financial access creates jobs for families in the rural areas because the increased involvement of people in economic activities, especially from rural areas would increase their disposable income, increasing their savings and deposits thereby promoting economic development through the multiplier effect. Inability to obtain finance which arises from low fintech adoption affects financial development negatively. This is because of the notion that the absence of

funds inhibits savings and investments in income producing activities from the poor. Contrarily, easy access of finance arising from fintech encourages enterprises to make more investments, accept more risk thereby, stimulating financial development (Neaime & Gaysset, 2018).

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

A report from the Central Bank of Kenya (2019) states that the country's financial sector has encountered considerable growth both in size and complexity which has greatly boosted the economy's overall growth. The sector mainly constitutes of banking, insurance, capital markets, credit and savings cooperatives and pensions. Other key players consist of microfinance institutions, foreign exchange bureaus, foreign exchange bureaus and development finance institutions. Safety nets and resolution organizations additionally exists and incorporate policyholders' compensation funds for the insurance industry, for commercial microfinance bank the Kenya deposits insurance and finally for the capital markets we have the investor compensation fund.

In 2005, the Kenya financial sector deepening programme was founded with the aim of stimulating creation of wealth and reduction of poverty by improving the financial services accessibility for households with lower income and small-scale enterprises. Over the last five years, many financial service providers have experience increased competitions which has led to them developing strategies aimed at reaching the low income segments. This has seen increased technological innovations and this partly explains the increase in fintech adoption. Introduction of agency banking, internet banking as well as mobile banking by commercial banks have brought benefits as they are competing for the mass-market space. Moreover, the government has played a



major role in coming up with suitable regulations aimed at facilitating banking for low income and strengthening microfinance institutions. All these have improved fintech in the country which is hypothesized to improve financial development (CBK, 2018).

The fintech in Kenya is continually transforming and shaping the financial industry. The banking industry in Kenya has put more emphasis on mobile lending and agency banking as a strategic tool in achieving the corporate objective of profit maximization and cost minimization. The big question is whether there is improvement in financial development arising from adoption of Fintech. Since 2008 KCB Bank group introduced KCB Mpesa in an effort to enlarge its customer base. Other banks such as Equity bank among others have followed suit.

## **1.2 Research Problem**

Globally, there has been widespread use of financial technology in the financial sector. The result of this has been the increasing of efficiency in operations in the banking sector like; securities trading, product innovations, internet and electronic payment among others, which have encouraged minimization of costs. This has consequently improved global service delivery by banks (Babajide et al., 2015). Finance is a crucial aspect of the process of development (Kim, Yu & Hassan, 2018). Evidence shows that development practitioners are continually having the conviction that the outreach arising because of fintech will lead to financial development. In contrast, to the extent that accessibility to financial services is limited, the advantages of financial development are likely to be unavailable to individuals and enterprises (Neaime & Gaysset, 2018).

Kenya's vision 2030 key elements were establishment of international financial services' centers and deepening of capital markets as flagship projects for attainment

of growth targets (GOK, 2007). The Vision 2030 for financial sectors envisages a globally competitive and vibrant financial sector leading to high levels of savings and financing of investment needs of Kenya. One of the specific goals have been to increase bank deposits to 80% from 44% of GDP and decrease the share of population that lack financial access from 85% to below 70%. Despite the improvements noted in the financial sector in Kenya, credit lending to private sector declined to about 13% of GDP in 2019 while fintech has been on the rise (CBK, 2019). It is therefore imperative to examine the effect that fintech has on financial development in Kenya.

International studies in this area have mainly concentrated on other determinants of financial development and not necessarily financial technology. Le, Chuc and Hesary (2019) looked on the influence of financial inclusion on financial efficiency and sustainability in Asia and found that financial efficiency is negatively affected by increased financial inclusion whilst it influences financial sustainability positively. Kim, Zoo, Lee and Kang (2019) reviewed 54 academic research papers on the relation between mobile services, inclusion, and development. Findings show that majority of the literature reviewed covered three key areas: delivery, environmental conditions, and mobile services. The areas reviewed showed a bias towards institutional and individual conditions in implementing mobile financial services. A study by Alatrash, Minten, Leff, Van Schoot and Soupre (2014) on financial development and macro- economic volatility in Barcelona shows a hump-shaped relationship for nations with financial sectors of high quality, implying that large financial sectors give diversification opportunities, which outweigh the stability risks that inhibit financial development.

Locally, existing studies have mainly focused on other determinants of financial development without considering how fintech influences financial development or have

considered the influence of fintech on other variables. Ndiang'ui (2019) focused on the influence of macro-economic variables on financial development in Kenya. Abdulkadir (2018) focused on how financial technology impacts performance of Kenyan banks. So was Kemboi (2018). Ochieng' (2018) focused on effect of government local borrowing on financial development in Kenya. From the foregoing, it is clear that although there are related local studies in this area, most of them did not focus on the influence of fintech on financial development in Kenya, which was the focus of the current study. This research focused on how financial technology impacts financial development in Kenya by answering the research question: What is the effect of financial technology on financial development in Kenya?

### **1.3 Research Objective**

The study's objective was to determine the effect of financial technology on financial development in Kenya.

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

The study's results will be used as a source of reference by future researchers, students and scholars with the intent to undertake related studies. It will also be beneficial to the researchers and scholars when seeing to identify other key research areas by making citations of associated topics requiring additional studies and empirical investigations to seek study gaps.

The government and its bodies like CBK, Capital Markets Authority will benefit in the formulation and implementation of policies and regulations that governs operations in the financial system. Good policies in terms of macroeconomic factors and other variables that will be found to have an influence on financial development will

contribute to the advancement of financial development and improvement of the economy as a whole.

The study's findings will also be beneficial to investors in the financial markets as they will get a deeper understanding on the role performed by financial technology on financial development and take the necessary actions to maximize their returns. Furthermore, the survey shall make contributions to theory in terms of financial technology and financial development.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This section contains a review of the theories forming the study's foundation. Additionally, previous studies by researchers in this area and those related to it will be discussed. In addition, determinants of financial development will be discussed in this chapter and the conceptual framework exhibiting how the study variables relate and lastly the literature review summary concludes the chapter.

### **2.2 Theoretical Framework**

Theoretical framework provides a foundation for understanding the theoretically expected relationship among the study variables and in this case fintech and financial development. The applicable theories for this research are; intermediation theory, Technology Acceptance Model (TAM) and diffusion of innovation theory.

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

The theory by Mises (1912) states that the role played by financial institutions is like banks is very crucial in the intermediation process. The purpose played by the banks is to mobilize clients with excess funds and issue to those shortages at a cost called the interest. The result of this process is the creation of liquidity because money is obtained from clients with funds maturing in the short-term and issue them to clients that require money for the long term (Dewatripont et al., 2010). Mises (1912) noted that the role played by banks in the process of negotiating credit is characterized by issuing money that has been borrowed.

The process of intermediation conducted through the borrowing and issuance of money can therefore be considered to be the primary business of banks. Mises (1912), stated

that by involving banks in the process of intermediation, they are hence denied the role of money creation and withdrawing from the process gives them the opportunity to engage in the creation of money. Allen & Santomero (2001) make criticisms against the theory stating that it considers risk management to be a new trend in the finance sector hence putting the participation costs concept as a priority.

The financial intermediary model's contribution to this research is that it highlights the role played by monetary intermediaries including banks, the stock market and other financial firms that act as agents to community members and bridge the liquidity gap. The financial intermediaries further, play a critical role in financial technology through circulation of resources using technology leading to financial deepening and consequently financial development.

### **2.2.2 Diffusion of Innovation Theory**

Rogers (1962) was the pioneer of this theory. An innovation is an idea, practice or object which is newly brought into a social framework and on the other hand, innovation diffusion is the manner in which the novel idea is transferred into the social system via predetermined channel over a period of time. In this context, this theory describes how new inventions, for example, mobile and internet banking are used in a social system (Clarke, 1995).

Rogers (1995) extended the theory by stating that there was not enough research on diffusion the technological arena and further explained that technology cluster had more distinct features of technology that are believed as being thoroughly interconnected. For this reason, individuals and communities should be educated on the benefits and drawbacks of adoption or refusal to adopt innovation, that is, the consequences. Rogers (2003) clearly states that there is need for interpersonal relationships since diffusion

involves a social process. Robinson (2009) criticizes the diffusion of innovations in that it takes a drastically diverse outlook as compared to other theories of change. It does not focus on trying to get people to change but rather sees change as being largely about the progression or reinvention of products and character so that they fit better to what the individual want or need. The concept behind this theory is that people do not change but that innovations must be in line with the needs of the people.

According to Sevcik (2004), the process of innovation adoption takes time and it is not something that happens instantaneously. Additionally he argues that, innovation diffusion is largely affected by the change resistance as it delays the process of innovation adoption. This process is affected by characteristics like complexity, compatibility, relative advantage, observability and triability (Rogers, 1995). Rogers further contends that, how an organization perceives these attributes determines the level of new innovation adoption. If a Kenyan institution recognizes the advantages derived from internet banking, then an effort will be made to adopt the innovation in the presence of other prerequisite tools. The adoption of innovation is much more swift in institutions with IT systems departments and access to the internet compared to those without. The theory is relevant in this context since it elaborates how innovations like fintech are useful to organizations.

### **2.2.3 Technology Acceptance Model**

This model was advanced by Davis (1989) and is also called the TAM. This model mainly looks into the adoption behavior of clients and evaluation that is normally done for the reason of establishing a system to be applied that will not only be useful to the customers but also provide them with convenience. Prior researchers have investigated the principal concept of validity of TAM in gauging individual's acceptance and drew

the conclusion that, TAMs principal concept fail in explaining how acceptance by users is influenced by technology and factors affecting its use (Moon & Kim, 2015). Davis (1989) contends that, anticipated usefulness refers to the belief by an individual that the technology adopted will significantly improve job performance after its adoption. Perceived effortlessness of use indicates how easy it is for the individual to learn how to use the new technology and information system. TAM emphasizes on ease of use as a way of forecasting the usefulness of a system (Gefen, Karahanna & Straub, 2013).

Pikkarainen, Pikkarainen, Karjaluoto and Pahnla (2014) undertook a study in Finland to determine the real effect of predicted usefulness and concluded that, it endeared use of inventive, self-servicing, independence and user friendly to users through the banking system to provide financial services to clients in the twenty first century. Gerrard and Cunningham (2013) observed that, the perceived usefulness hinged on the rendered banking services. The services comprised of loan applications, making utility bill payments, checking balance, transferring fund abroad and obtaining relevant information regarding mutual; funds.

Many researchers opine that, the perceived usefulness of a technology is important when deciding whether to adopt it. Tan and Teo (2013) are of the opinion that, adoption of a technology is impacted by its perceived usefulness. In conclusion, when usage of electronic banking practices has a higher perceived usefulness the likelihood of it being adopted will also be high (Potaloglu & Ekin, 2015). The key driver of electronic banking acceptance are perceived as the TAM variables. This theory is relevant as it explains that for financial technology to be adopted, it must gain acceptance by users and this will be based on ease of use. It therefore implies that if financial technology



does not gain acceptance, then its adoption will be low and as such might not have a significant influence on financial development.

## **2.3 Determinants of Financial Development**

There are various variables that influence financial development in a given country. Majority of these factors have an effect on the economy which then has a spiral effect on the financial system and in essence financial development. The main variables expected to affect financial development are discussed in this section and they include; financial technology, economic growth, balance of payments and interest rates (Athanasoglou, Brissimis & Delis, 2005).

### **2.3.1 Financial Technology**

Fintech can be described as technology-enabled financial solutions that cover up the whole commodities' scope conventionally offered by banks (Arner 2015). FinTech is also explained as a new form monetary service trade that merges IT with monetary services such as remittances, payments and also management of assets (Lee & Kim, 2015). A financial business comprised of firms that exploit technology to create efficient to the monetary systems (McAuley, 2015)

The appearance of technology has resulted to better methods of doing businesses in the modern era (Stiroh, 2001). Ongori and Migiro (2010) argued that ICT has conveyed an absolute change of standards on the performance of financial institutions and on the delivery of services to the clients in the banking business. In a proposal to take up with worldwide growth, advance the delivery of customer services, as well as lessen the transaction costs, banks have ventured enormously in technology moreover has broadly accepted financial technology networks for delivering an extensive array of value added commodities. Financial technology acts as a catalyst for improved production as well

as monetary advance at the firm's intensity (Brynjolfsson & Hitt, 1996). Financial technology makes commodities more accessible and inexpensive by lessening costs of trading for the banks (Barnes, 2014).

### **2.3.2 Economic Growth**

This is the increment in the inflation-adjusted market value of commodities produced in a nation over a given time frame (IMF, 2012). Ideally, it is measured by determining the percent rise in real GDP and this is done on an annual basis. The economic growth rate refers to geometric annual growth rate in GDP at the beginning and end of a financial period. Undisputedly, this rate of growth is the average trend in GDP output across the period, which ideally neglects GDP fluctuations within the trend (Osoro & Ogeto, 2014).

A scholarly article by Patrick (1966) depicts a dual causal links between economic growth and financial sector development. The components of granger functioned simultaneously. He labeled the two associations as supply-leading and demand following hypotheses. The demand-following approach however posited a causal association from economic growth and financial growth thus providing more evidence on the association. Economic growth grew and increased need for financial services boosted the financial sector's growth. According to demand-following hypothesis, the financial markets developed and advanced due to higher demand for their services accruing from the expanding real economy. The development of financial markets was perceived as a mere response to an economy that is growing. The expansion and growth of the real sector generates new set of demands from the financial markets which in turn increases new financial services' demand thus increasing pressures to establish more sophisticated and large financial institutions to upcoming demands for the

services that make financial deepening a growth component in the economies' real sector (Cull, 1998).

### **2.3.3 Interest Rates**

The government in the developing countries is the one which spearheads investment and real interest rate is the key factor which influences investment. Interest rates might affect the financial growth that subsequently might lower the growth rate. In the event of high interest rates in the financial markets, many people feel discouraged from getting loans for investments and other development activities will be stagnated (Quinn & Toyoda, 2008).

However, no logical conclusion has been derived from studies on the association between interest rate, finance development and growth in most developing nations (Obstfeld, 2009; Kose et al., 2009; Quinn & Toyoda, 2008). These diverse findings have mainly been attributed to differences in the type of interest rate measure, country coverage, the sample period, and methodologies employed.

### **2.3.4 Balance of Payments**

Balance of payments greatly influences globalization in the modern world which thereafter leads to financial development. Liberalized trade together with capital flows is a big incentive for financial and industrial incumbents to drive towards financial development (Rajan & Zingales, 2004). This was attributed with the decline of the government's role in the financial sector which resulted in unregulated openness. This forced the financial and industrial incumbents to seek finance from unrestricted foreign markets for funding. Incumbents advocated for financial development since it attracted new opportunities from open financial markets thus generating higher profits that

diluted the effects intensified competition. They therefore posit that trade openness is positively correlated with financial development.

Trade liberalization, which is allowing the domestic markets access of foreign goods can influence financial development. Through this, as pointed by Zingales and Rajan (2004) in their article Saving Capitalism from the Capitalists, political power of entrenched business interest which may block institutional changes can be weakened. Trade liberalization lowers the capital base of firms and increases firms' competitiveness thus increasing access from the external sources of capital. Therefore, they embrace the reforms that facilitate more efficient and deeper financial system. This agrees with the outcomes that a positive association exists between a deeper financial sector and trade openness (Svaleryd & Vlachos, 2002; Rajan & Zingales, 2004). Financial deepening is also promoted free trade as corruption practices are minimal. Corruption prevails during high tariffs since importers exhibit incentives for payment of customs officials to evade tariffs through smuggling.

## **2.4 Empirical Review**

Local and international studies have been documented in support of the relationship between fintech and financial development, with varied results.

### **2.4.1 Global Studies**

Khalifaoui (2015) undertook an investigation to find the main financial development determinants in growing economies. The findings identified institutional variables (financial and banking sector) and the degree of human and economic development as the core determinants while the core determinants of financial development in growing nations were identified as legal framework, economic stability and other components of the institutional framework. Financial development was measured using the level of

lending advanced to the private sector while the variables employed for banking and financial sector included financial structure, inflation, non-performing loans, broad money, legal framework, market capitalization, trade openness, index for credit information and current account deficit.

Rasheed et al. (2016) study the role that inclusion plays in promoting financial development. An analysis of financial development determinants is made using a system generalized method of moments (System GMM) for 97 countries from 2004 to 2012. The empirical findings show that inclusion is a substantial element of financial development. In particular, they find a substantial positive association amongst the two. The GDP per capita shows a positive substantial relation with financial development. The stock market which is the market based indicator is an insignificant determinant of financial inclusion. This study did not consider the effect of financial technology measures on financial development.

Chinoda and Akande (2019) studied financial inclusion, mobile phone diffusion and economic growth in Africa. A structural equation model simultaneously analyzed the diffusion of mobile phones, financial inclusion, and economic growth for 32 African nations from 2004 to 2016. The results revealed that inclusion has an effect on economic growth through mobile phones. The study did not consider how these variables influence financial development.

Le, Chuc and Taghizadeh-Hesary (2019) examine the financial inclusion trend in Asia and how it impacts financial efficiency and sustainability. 31 Asian nations in the period 2004 to 2016 were selected for the study. Three Indicators are made using principal component analysis based on normalized variables. The results show a variation in trend across nations with unclear patterns in a variety of cases. The findings concur

with different normalization techniques. Additionally, the financial inclusion impact on the two variables is analyzed by using the feasible generalized least squares. Results from the estimates show that increased inclusion has a negative effect on financial efficiency while positively influencing sustainability. This study did not establish whether financial technology translates to financial development.

In determining the crucial issues and gaps in their study, Kim, Zoo, Lee and Kang (2019) reviewed 54 academic research papers on the relation between mobile services, inclusion, and financial development. Findings show that majority of the literature reviewed covered three key areas: delivery, environmental conditions, and mobile services. At the early stages of the study, the areas reviewed showed a bias towards institutional and individual conditions in implementing mobile financial services, as opposed to actual supply and demand by users, and its societal impact. The selection of the study methods also indicated little variation and depth.

#### **2.4.2 Local Studies**

Kemboi (2018) endeavored to find the association amongst financial technology and financial performance of the 43 banks in Kenya. The independent variables in the study were mobile banking, internet banking and agency banking. The target population of this study was the 43 banks in Kenya. The study analyzed secondary data collected from reports published annually for the years 2013 to 2016, during which adoption of financial technology was highly adopted by banks. The study used descriptive statistics analyzed, multiple regressions was also used to study how financial performance and financial technology relate. The study found that adoption of mobile banking, online or internet banking and agency banking impacted the financial performance of banks

positively. The study concluded that banks should invest in financial technology to enhance their operational efficiency and effectiveness.

Abdulkadir (2018) aimed on examining the effect of financial technology on performance of Kenyan banks. Financial technology was determined by the number of transactions that were undertaken through mobile banking and transactions undertaken through internet banking. Data was obtained from 35 commercial banks. Size of the commercial bank and capital adequacy ratio acted as the control variables of the study. Secondary data was gathered for all the commercial banks in Kenya for descriptive research design that was used in the study. In establishing the association amongst the variables Pearson moment correlation was utilized whereas the nature of the association was established using regression analysis. The study concluded that, a positive significant effect of financial technology on financial performance was observed.

Ochieng (2018) aimed on determining the influence of government domestic borrowing on financial development in Kenya. Secondary data was selected in this study that was gathered for a 10 years done on a quarterly basis for the period ranging January 2008 to December 2017. In analyzing the relationship of the variables descriptive research design together with multiple linear regression was applied. The results established that independently, interest rates, economic growth, trade openness and inflation rates are insignificant determiners of financial development in Kenya while government domestic borrowing has a substantial impact on development.

Midigo (2018) explored how investment banking impacts development in Kenya. 21 Kenyan banks formed the population of study. The study applied secondary data of 10-year quarterly basis period during the timeframe January 2008 to December 2017. In analyzing the variables relationship, multiple linear regression together with descriptive

cross sectional research design was used. The results revealed that only corporate finance service is a statistically significant determinant of financial development in Kenya.

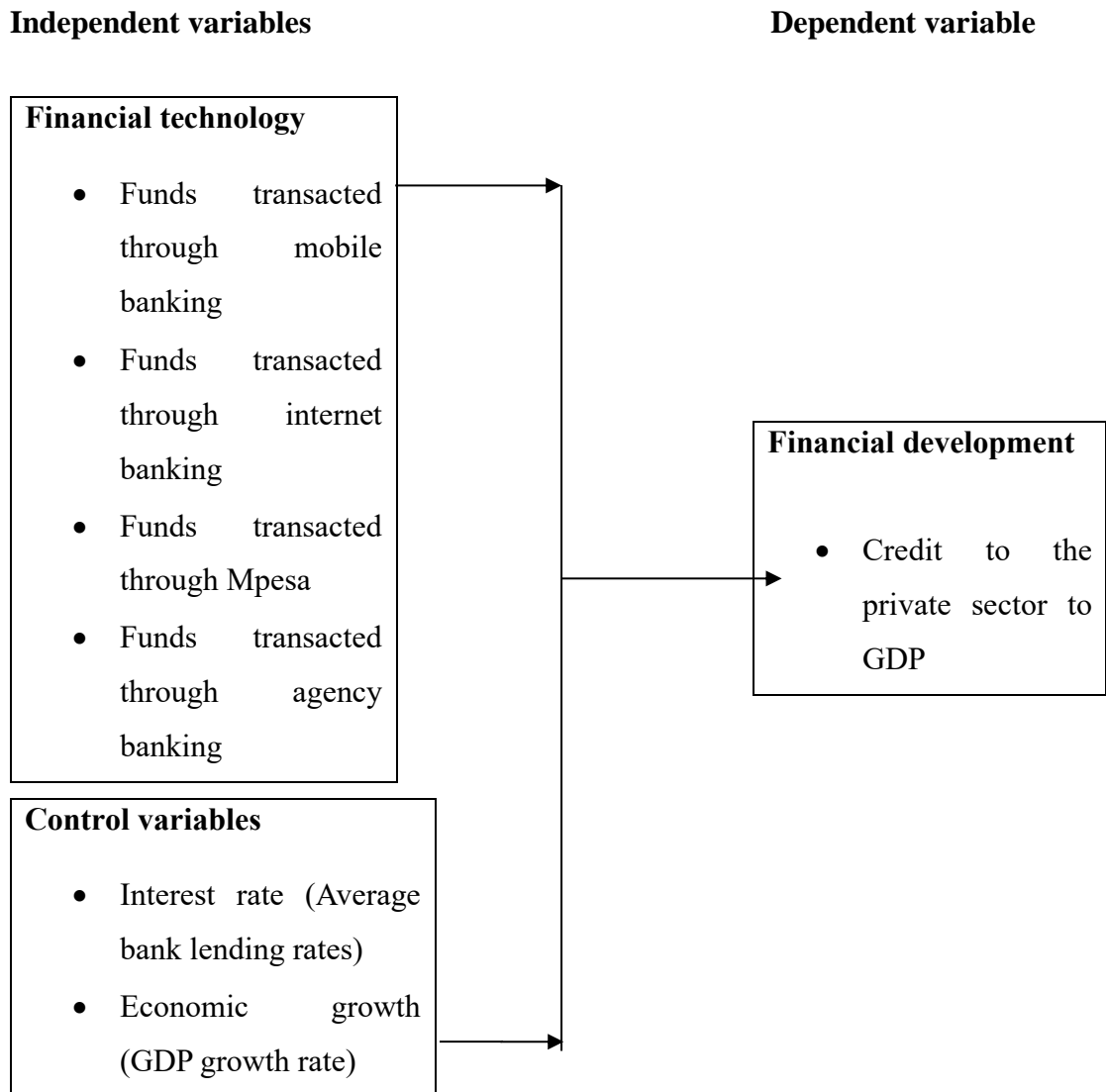
Ndiang'ui (2019) concentrated on determining the effect of selected macro-economic variables on financial development in Kenya. This study applied secondary data that was gathered for a 10 years done on a quarterly basis for the period ranging January 2009 to December 2018 on a quarterly basis. In analyzing the relationship of the variables a descriptive research design together with multiple linear regression was applied. The results revealed that individually interest rates both positively and significantly influence the Kenyan financial development while government domestic borrowing significantly and negatively influences the Kenyan FD.

## **2.5 Conceptual Framework**

The model illustrates the expected association existing between the variables. The predictor variable will be financial technology as characterized by agency banking, MPESA, mobile banking and internet banking. The control variables will be interest rates, economic growth and exchange rate. The dependent variable will be credit to the private sector to GDP to indicate financial development.



**Figure 2.1: The Conceptual Model**



**Source: Researcher (2020)**

## **2.6 Summary of the Literature Review and Research Gap**

Several theoretical frameworks have explained the expected relation amongst macro-financial technology and financial development. Theories used are; financial intermediation theory, technology acceptance model and diffusion of innovation theory. Some of the key determinants of financial development have also been reviewed. A number of domestic and global studies existing on financial technology and financial development have been reviewed with the resultant findings discussed.

From the review of literature, it was discovered that the existing studies have mainly focused on other determinants of financial development without considering how fintech influences financial development or have considered the influence of fintech on other variables. Ndiang'ui (2019) focused on the influence of macro-economic variables on financial development in Kenya. Abdulkadir (2018) focused on the influence of financial technology on financial performance of commercial banks in Kenya. So was Kemboi (2018). Ochieng' (2018) focused on effect of government local borrowing on financial development in Kenya. From the foregoing, it is clear that although there are related local studies in this area, most of them did not focus on the influence of fintech on financial development in Kenya, which was the focus of the current study. This research focused on the effect of financial technology on financial development in Kenya by answering the research question: What is the effect of financial technology on financial development in Kenya?

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

In determining the effect of financial technology on financial development, the study ought to have a research methodology, which lays out the procedure through which the research will be conducted. Four sections are incorporated in this chapter that includes the research design, the procedure of collecting data, the diagnostics tests to validate the data and lastly the technique of analyzing the data.

### **3.2 Research Design**

A descriptive design was utilized in this study to investigate the effect of financial technology on financial development in Kenya. The research used a descriptive research design as it enabled obtaining of the state of affairs as the actually exists (Khan, 2008). The researcher was well familiar with the area under scrutiny but wish to learn more with respect to the nature of association amongst the study variables hence the research design is the most suitable. More so, the aim of descriptive research was provision of an authentic and correct representation of the study variables and this aid when it comes to responding to the research questions (Cooper & Schindler, 2008).

### **3.3 Data Collection**

This study relied exclusively on secondary data. The secondary data for the study was retrieved from KNBS publications and from the CBK website. The quantitative data collected comprised total private sector credit on a quarterly basis, amount transacted through agency banking outlets in the country, amount transacted through MPESA, amount transacted through mobile banking, amount transacted through internet banking and the central bank lending rate which was collected from CBK website. Data on GDP and GDP growth rate was collected from KNBS on a quarterly basis. Ten years

secondary data was obtained on a quarterly basis as from January 2019 to December 2019.

### **3.4 Diagnostic Tests**

To determine the viability of the study model, the researcher carried out several diagnostic tests, which included normality test, stationarity test, test for Multicollinearity, test for homogeneity of variances and the autocorrelation test. Normality tests the presumption that the residual of the response variable has a normal distribution around the mean. The test for normality was done by the Kolmogorov-Smirnov test. In the case where one of the variables was not normally distributed it was transformed and standardized using the logarithmic transformation method. Stationarity test was used to assess whether statistical properties for example variance, mean and autocorrelation structure vary with time. Stationarity was found using augmented Dickey Fuller test. In case, the data fails the assumption of stationarity, the study used robust standard errors in the model (Khan, 2008).

Autocorrelation measures how similar a certain time series is in comparison to a lagged value of the same time series in between successive intervals of time. This was measured by the Durbin-Watson statistic and incase the assumption was violated the study employed robust standard errors in the model. Multicollinearity occurs when an exact or near exact relation that is linear is observed between two or several predictor variables. Variance Inflation Factors (VIF) and the levels of tolerance were used. Any multicollinear variable should be dropped from the study and a new measure selected and substituted with the variable which exhibits co-linearity. Heteroskedasticity tests if the variance of the errors from a regression is reliant on the independent variables. The study assessed for heteroskedasticity using the Levene test and incase, the data fails the

assumption of homogeneity of variances the study used robust standard errors in the model (Burns & Burns, 2008).

### **3.5 Data Analysis**

After the data was collected from the numerous sources, it was arranged in a way that was able to assist to address the research objective. The SPSS computer package version 23 was applied in analyzing the data. Descriptive statistics were used to calculate the measures of central tendency as well as dispersion together with standard deviation for each variable. Inferential statistics on the other hand entailed correlation and regression analysis. Correlation analysis involved establishing the degree of association amongst the study variables whereas regression analysis entailed knowing the cause and effect amongst the variables. A multivariate regression analysis was utilized in determining how the dependent variable (financial development) and independent variables: agency banking, mobile banking, internet banking, economic growth and interest rates relate.

#### **3.5.1 Analytical Model**

To determine the relative significance of each of the explanatory variables with respect to financial development in Kenya, a multivariate regression model was applied.

The study employed the following multivariate regression model;

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

**Where:**

Y was financial development as measured by total credit issued to the private sector divided by GDP on a quarterly basis.

$\alpha$  was the regression constant (parameter of the function)

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$  and  $\beta_6$  are the coefficients of independent variables

X<sub>1</sub> was agency banking given by natural logarithm of the total amount of funds transacted through agency banking outlets on a quarterly basis

X<sub>2</sub> was mobile banking given by natural logarithm of the total amount of funds transacted through mobile banking accounts on a quarterly basis

X<sub>3</sub> was MPESA as measured by natural logarithm of funds transacted through MPESA on a quarterly basis

X<sub>4</sub> was internet banking given by total amount of funds transacted through internet banking on a quarterly basis

X<sub>5</sub> was economic growth given by GDP growth rate on a quarterly basis

X<sub>6</sub> was interest rates given by average bank lending rates on a quarterly basis

ε was the error term

### **3.5.2 Tests of Significance**

Parametric tests were conducted in order to determine the statistical significance of the overall model as well as individual parameters statistical significance. The F-test which was obtained from ANOVA was applied in establishing the overall model statistical significance while that of the individual variables was obtained from the t-test.

## **CHAPTER FOUR: DATA ANALYSIS, RESULTS AND FINDINGS**

### **4.1 Introduction**

This section presents the analysis, findings and interprets the secondary data collected from CBK and KNBS. The research studied how financial technology impacts financial development in Kenya. Independent variables included agency banking, mobile

banking, Mpesa, internet banking, economic growth and interest rates while the financial development was the dependent variable given by credit to the private sector as a % of GDP. Regression was adopted to determine how the variables related in relation to the study's objectives. ANOVA tested the goodness of fit of the analytical model. The results were presented in tables and figures.

#### 4.2 Descriptive Analysis

Descriptive statistics shows the mean, maximum and minimum values of variants which are used with their standard deviations for this work. The illustration below is the presentation of the statistics for the study variables. Analysis of the variants under study was produced by the SPSS software within ten years (2010 to 2019) basis, every three months.

**Table 4.1: Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
Financial development	40	.2099	.3427	.294885	.0360242
Agency banking	40	10.1642	12.3276	11.562058	.6444188
Mobile banking	40	16.0885	17.8684	17.097315	.4149844
Mpesa	40	5.1818	6.5191	6.166365	.3405952
Internet banking	40	6.9295	7.3759	7.211750	.1380305
Economic growth	40	.0919	.1232	.108315	.0081762
Interest rates	40	5.8333	18.0000	9.585415	2.8841915
Valid N (listwise)	40				

**Source: Research Findings (2020)**

#### 4.3 Diagnostic Tests

The data collected was subjected to diagnostic tests. The study presumed a 95% confidence interval or 5% level of significance so as to make variable deductions on the data adopted. Diagnostic tests were useful for ascertaining the falsity or truth of the data. Therefore, the nearer to 100% the confidence interval, the more accurate the data

used is presumed to be. In this case, the tests conducted were normality test, Multicollinearity test, heteroskedasticity tests and autocorrelation.

#### 4.3.1 Normality Test

The normality test of the data was done using the Kolmogorov-Smirnov test. The threshold was 0.05. A probability greater than this meant that data had a normal distribution.

**Table 4.2: Normality Test**

	Kolmogorov-Smirnov		
	Statistic	Df	Sig.
Financial development	0.486	40	0.234
Agency banking	0.326	40	0.112
Mobile banking	0.408	40	0.207
Mpesa	0.394	40	0.179
Internet banking	0.272	40	0.063
Economic growth	0.368	40	0.138
Interest rates	0.124	40	0.057

**Source: Research Findings (2020)**

The findings above indicated that data was normality distributed since the p values were greater than 0.05. Therefore, the null hypothesis of normal distribution was accepted meaning the researcher failed to reject the null hypotheses.

#### 4.3.2 Multicollinearity Test

William et al. (2013) defined this property as the existence of correlations among predictor variables. VIF tested this property. Field (2009) noted that VIF values above 10 indicate the presence of this property.

**Table 4.3: Multicollinearity Test**

Variable	VIF	1/VIF
Agency banking	1.30	0.771
Mobile banking	1.27	0.785
Mpesa	1.02	0.978



Internet banking	1.20	0.833
Economic growth	1.28	0.781
Interest rate	1.32	0.758

**Source: Research Findings (2020)**

The results in Table 4.3 illustrates the results of the VIF test which were found to be lower than 10 and therefore according to Field (2009) multicollinearity does not exist.

#### 4.3.3 Heteroskedasticity Test

The error process may be Homoskedastic among cross-sectional units, but have different variances across units: this is referred to as group wise Heteroscedasticity. The hettest command is used in calculating Breuch Pagan for group wise Heteroscedasticity among residuals. The null hypothesis states that  $\sigma^2_i = \sigma^2$  for  $i = 1 \dots Ng$ , where Ng is the number of cross-sectional units.

**Table 4.4: Heteroskedasticity Test**

<b>Modified Wald test for group wise heteroskedasticity in fixed effect regression model</b>
H0: $\sigma(i)^2 = \sigma^2$ for all i
chi2 (40) = 168.34
Prob>chi2 = 0.0841

**Source: Research Findings (2020)**

The results in Table 4.4 indicate that the null hypothesis of Homoskedastic error terms is not rejected as supported by a p-value of 0.0841.

#### 4.3.4 Autocorrelation Test

Because of the inefficiencies caused by serial correlation in models which produces biases in standard errors, the Durbin Watson test for autocorrelation was adopted which identifies serial correlation in the idiosyncratic error term in a model.

**Table 4.5: Autocorrelation Test**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.889 <sup>a</sup>	.790	.752	.0179489	2.400

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

**Source: Research Findings (2020)**

The Durbin Watson statistic of 2.400 is between 1.5 and 2.5 implying that serial correlation does not exist.

#### **4.4 Correlation Analysis**

This is critical in the establishment of a relation between two variables that lies between a perfect positive and strong negative correlation. Pearson correlation was useful to this end in determining the relation between financial development and the independent variables for this study. The correlation of agency banking against financial development is 0.450 implying that agency banking exhibits a moderate positive association with financial development in Kenya. The association is also significant as shown by a p value of 0.000. Mobile banking has a moderate positive and significant correlation with financial development.

Internet banking and Mpesa also exhibited a moderate positive and significant association with financial development as shown by 0.493 and 0.383 respectively. The association is significant as the p values are less than 0.05. Economic growth rate and interest rates exhibited positive and significant association with financial development in Kenya as evidenced by positive correlation coefficients and p values below 0.05.

#### **Table 4.6: Correlation Analysis**

		FD	Agency banking	Mobile banking	Mpesa	Internet banking	Interest rate	Economic growth
FD	Pearson Correlation	1						
	Sig. (2-tailed)							
Agency banking	Pearson Correlation	.450**	1					
	Sig. (2-tailed)	.004						
Mobile banking	Pearson Correlation	.491**	.349*	1				
	Sig. (2-tailed)	.001	.000					
Mpesa	Pearson Correlation	.383*	.342*	.244*	1			
	Sig. (2-tailed)	.015	.000	.000				
Internet banking	Pearson Correlation	.493**	.382*	.313*	.963**	1		
	Sig. (2-tailed)	.001	.000	.000	.000			
Interest rate	Pearson Correlation	.412**	.325*	.203	.310	.269	1	
	Sig. (2-tailed)	.008	.040	.209	.052	.094		
Economic growth	Pearson Correlation	.506**	.240*	.285*	.301*	.297*	.211	1
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.191	

Source: Research Findings (2020)

#### 4.5 Regression Analysis

To assess the effect of financial technology on financial development in Kenya, the below model was used.

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

A regression analysis was undertaken that had findings as stipulated below.

**Table 4.7: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.889 <sup>a</sup>	.790	.752	.0179489	2.400

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

**Source: Research Findings (2020)**

In the regression model summary table, the coefficient of determination that is denoted by R square is given as 0.790. It shows the strength in which the model is able to forecast the dependent variable. The value indicates that 79% of the variations in financial development in Kenya can be described by the model. The other 21% can only be described by other factors that are not in the model. The R value of 88.9% denotes the relationship between the selected predictor variables and financial development in Kenya.

**Table 4.8: Analysis of Variance**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.040	6	.007	20.684	.000 <sup>b</sup>
	Residual	.011	33	.000		
	Total	.051	39			

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

**Source: Research Findings (2020)**

The significance of the model is established by matching the p value with the alpha value. The model is said to be insignificant when the value of p is higher than that of the alpha while the vice versa is true. The regression analysis is undertaken at 95 degrees of freedom which means the alpha value is 0.05. According to table 4.8, the p

value is shown as 0.000 which shows that it is less than the alpha value. We therefore conclude that the association amongst the independent variables and financial development in Kenya is statistically significant.

In order to determine whether to reject or not to reject the null hypothesis we compare the F statistic and the calculated value of F as shown in the table 4.8. If the calculated value is higher than the F statistic, the null hypothesis will be rejected. According to the topic under study, the null hypothesis states that there is no effect of the selected independent variables on financial development in Kenya. The calculated value of F is 20.684 while the F statistic at an alpha of 0.05 and 6, and 40 degrees of freedom is 3.6. The calculated value is higher than the F statistic which means we reject the null hypothesis. We therefore conclude that there is a statistically significant effect of selected variables on financial development.

**Table 4.9: Model Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
	1.293	1.216		1.063	.295
(Constant)					
Agency banking	.028	.042	.501	.660	.514
Mobile banking	.108	.071	1.240	1.523	.137
Mpesa	.226	.055	2.140	7.863	.000
Internet banking	.079	.150	.302	.523	.604
Economic growth	.014	.002	.531	4.145	.000
Interest rates	.002	.001	.374	3.655	.001

a. Dependent Variable: Financial development

**Source: Research Findings (2020)**

The model can thus be written as:

$$Y = 1.293 + 0.028X_1 + 0.108X_2 + 0.226X_3 + 0.079X_4 + 0.014X_5 + 0.002X_6$$

Where,

Y = Financial development

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

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

X<sub>3</sub> = Mpesa

X<sub>4</sub> = Internet banking

X<sub>5</sub> = economic growth

X<sub>6</sub> = interest rates

This model may therefore be used to show the effect of any of the independent variables on financial development in Kenya, when the variable is increased by 1 unit and all other variables are kept constant.

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

The study undertook a linear regression model on data collected in determining how financial development in Kenya is influenced by financial technology. Diagnostic tests were first conducted on the data in order to determine presence of collinearity or presence of residuals in autocorrelations. Collinearity test undertaken showed that all variables had VIF values of less than 10 and therefore there was no collinearity among the variables. The Durbin Watson value was 2.010 which is less than 2.5 and therefore there were no residuals or autocorrelations that would imply error in the model.

The Pearson correlation showed that the correlation of agency banking with financial development was 0.450 implying that agency banking exhibits a moderate positive association with financial development in Kenya. The association is also significant as shown by a p value of 0.000. Mobile banking has a moderate positive correlation with financial development. Internet banking and Mpesa also exhibited a moderate positive and significant association with financial development. Economic

growth rate and interest rates also exhibited positive and significant association with financial development in Kenya as evidenced by positive correlation coefficients and p values less than 0.05.

Regression analysis undertaken discovered that the model would predict 79% of variations in financial development in Kenya. The other 21% however would be because of factors not in this model. The analysis showed that p value was less than the alpha value and therefore the relationship was significant. The calculated value of F was higher than F statistic making the null hypothesis to be rejected. In conclusion the findings of the study were that there is a significant effect of the selected independent variables on financial development in Kenya.

The findings of the study support a study done by Ndiang'ui (2019) who concentrated on determining the effect of selected macro-economic variables on financial development in Kenya. Secondary data was utilized in the study that was gathered for a 10 years done on a quarterly basis for the period ranging January 2009 to December 2018 on a quarterly basis. In analyzing the relationship of the variables a descriptive research design together with multiple linear regression was applied. The results revealed that individually interest rates both positively and significantly influence the Kenyan financial development while government domestic borrowing significantly and negatively influences the Kenyan FD.

The findings are also in agreement with Rasheed et al. (2016) who studied the role that inclusion plays in promoting financial development. An analysis of financial development determinants is made using a system generalized method of moments (System GMM) for 97 countries from 2004 to 2012. The empirical findings show that inclusion is a substantial element of financial development. In particular, they find a

substantial positive relation between the two. The GDP per capita shows a positive substantial relation with financial development. The stock market which is the market based indicator is an insignificant determinant of financial inclusion.



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

### **5.1 Introduction**

The section presents the summarized findings, conclusions reached, and recommendations for policy and practice. It also highlights limitations faced and suggestions for additional studies.

### **5.2 Summary**

The regression analysis undertaken by the study showed a substantial impact of selected independent variables on financial development in Kenya. The regression model that was used was also strong as it predicted 79% of financial development in Kenya. Of the four measures of financial technology, only Mpesa exhibited positive and statistically significant influence on financial development in Kenya. Mobile banking, agency banking and internet banking had a positive but weak impact on financial development in Kenya.

The other independent variables in the regression model were economic growth rate, and interest rates that were the control variables. Economic growth rate had a substantial impact on financial development in Kenya implying that an increased economic growth rate leads to increased financial development. Interest rate was also found to have a positive substantial impact on financial development in Kenya in Kenya implying that an increment in interest rate translates to significant increase in financial development in Kenya.

The study showed that the p value was below the alpha value of 0.05 at 0.000 implying that the model was sufficient. The F statistic was also less than the calculated value of

F at 20.684 as the critical F value was at 3.6. The results were applied to determine the significance of the association amongst the variables and whether or not to reject or accept the null hypothesis.

### **5.3 Conclusion**

As indicated by the findings, various conclusions are made. Of the four measures of financial technology adopted for this study, only the volume of transactions through Mpesa has a significant positive effect on financial development in Kenya. Although agency banking and mobile banking has a positive effect on financial development in Kenya, the effect is not statistically significant and therefore cannot be used to enhance financial development in Kenya. Number of ATM transactions also exhibited a positive but not statistically significant influence on financial development in Kenya implying that although ATM transactions has a positive influence on financial development, the influence is not statistically significant.

The regression model had a coefficient of determination (R Squared) of 0.790, which means that the model could explain up to 79% of the variations in financial development in Kenya. Other variations in the financial development in Kenya represented by 21% are explained by other factors outside the model. The model was found to be statistically significant and we can therefore conclude that the model is fairly good in predicting financial development in Kenya.

Value of Mpesa transactions had a substantial influence on financial development in Kenya implying that the more the Mpesa transactions there is in the country, the more the number of individuals who can access funds and this leads to financial development in Kenya. Economic growth also exhibited a positive and significant association with

financial development in Kenya and this implies that as a country records growth in GDP, financial development in Kenya increases.

It was also concluded that interest rate significantly affects financial development in Kenya. This implies that when the banks are able to charge a high interest rate, this will improve financial development in Kenya as evidenced in this study. This can be explained by the fact that increased interest rates implies that more interest income to the bank and also protects them from default risk.

This study concurs with Abdulkadir (2018) who looked at the effect of financial technology on performance of Kenyan banks. Financial technology was determined by the number of transactions that were undertaken through mobile banking and transactions undertaken through internet banking. Data was obtained from 35 commercial banks. Size of the commercial bank and capital adequacy ratio acted as the control variables of the study. Secondary data was gathered for all the commercial banks in Kenya for descriptive research design that was used in the study. In establishing the association amongst the variables Pearson moment correlation was utilized whereas the nature of the association was established using regression analysis. The study concluded that, a positive significant effect of financial technology on financial performance exists.

#### **5.4 Recommendation for Policy and Practice**

The study revealed that financial development in Kenya is positively and significantly influenced by the value of Mpesa transactions in the country. This implies that more MPesa transactions are likely to record higher financial development compared to low number of Mpesa transactions. Therefore, the study recommends that policy makers such as the CBK and other government agencies should come up with policies that

make it easy for Mpesa transactions and other related form of money transfer such as Airtel money and Telkom cash to improve, as this will have a significant positive contribution on financial development in Kenya.

The study revealed that there exists a positive and significant influence of interest rates on financial development in Kenya. Thus, an increment in interest rates would on average result to an improvement in financial development in Kenya. This study recommends that government and other policy makers should formulate policies that allow for interest rates to be determined by laws of demand and supply and the risk factor associated with a loan.

The study results revealed that there is a positive influence of economic growth on financial development in Kenya. The influence is also statistically significant. The study recommends the need to come up with measures that can boost economic growth as this will have an effect on the financial development in Kenya. Such measures would include boosting infrastructure development, creating a conducive environment for doing business and ensuring political stability.

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

This research study scope was ten years ranging 2010-2019. It is not guarantee that the study findings would be the same for a period longer than 10 years. More so, it is not guaranteed that the findings would extend beyond 2019. A period longer than ten years would add on to the reliability of the findings since it would consider most economic dynamics such as recessions and booms.

Another limitation of this study is the data used. It cannot be ascertained that the outcomes presented in this study are the reality of the circumstances. The data utilized is only assumed to be accurate. The metrics used may continue to vary year to year

depending on the conditions prevailing. In addition, this study did not exhaust all factors that affect financial development in Kenya but instead centered on selected determinants of financial development in Kenya largely because of the challenge in obtaining data.

To undertake data analysis, this study utilized a multiple regression model, because of the deficiencies arising from use of regression model for instance misleading and erroneous findings when the value of the one or more of the variables changes, it is not possible for the researcher to generalize the findings with accuracy. The hypothesized association amongst the variables might change as more data continue to be added in the regression model.

#### **5.6 Suggestions for Further Research**

Since the current study used secondary data in studying financial technology and financial development in Kenya, this study recommends that a further study be conducted which considers primary data collected by use of interview guides or questionnaire and broaden the context to include various players in the financial sector in order to add on to this study.

The study did not exhaust the independent variables influencing financial development in Kenya and a recommendation is given that more studies be carried out to factor other variables such as exchange rates, public debt, political stability, money supply, educational levels among other variables. By determining how each variable affect financial development in Kenya it will aid policy makers in controlling financial development in Kenya.

This study covered the last ten years 2010-2019 because this was the latest available data. This study suggests that further study be done covering more years for example

from 1963 to data so as to complement or disapprove the current study findings. Also future studies might broaden the context to include countries in East Africa community or Africa instead of Kenya alone. To conclude, because of the deficiencies of regression model, same study may be done but use other models for example Vector Error Correction Model (VECM).

## REFERENCES

- Abdulkadir, I. (2018). *Effect of financial technology on financial performance of commercial banks in Kenya*, Unpublished MSc Research Project, University of Nairobi
- Abdulkarim, F., & Ali, H. (2019). Financial inclusions, financial stability, and income inequality in OIC countries: A GMM and quantile regression application. *Journal of Islamic Monetary Economics and Finance*, 5(2), 419-438
- Alatrash, Y., Leff, D., Minten, T., Soupre, M., & Van Schoot, D. (2014). *Financial Development and Macroeconomic Volatility*. Mimeo, Barcelona Graduate School of Economics and Universitat Pompeu Fabra.
- Allen, F., & Santomero, A.M. (2001). What do financial intermediaries do? *Journal of Banking & Finance*, 25, 271–294.
- Amer, S. (2015). FinTech in China: From the Shadows? *Journal of Financial Perspectives*, 35, 78-91
- Athanasoglou, P., Brissimis, S., & Delis, M. (2005). Bank-Specific, Industry-Specific and Macroeconomics Determents of Bank Profitability, *Bank of Greece*, No. 25
- Ayadi, R., Arbak, E. & Naceur S. (2013a). Financial development, bank efficiency and economic growth across the Mediterranean, MEDPRO Technical Paper No. 30, MEDPRO FP7 project.
- Baba, F., & Nasieku, A.M. (2001). What do financial intermediaries do? *Journal of Banking & Finance*, 25(3), 271–294.
- Babajide, A. A., Adegboye, F. B., Omankhanlen, A. E., (2015). Financial Inclusion and economic growth in Nigeria. *International Journal of Economics and Financial Issues*, 5(3).
- Bames. (2014). Internet Banking, *Journal of Financial Services Research*, 29, 95-117.
- Burns, N. & Burns, S. (2008). *The Practice of Nursing Research: Conduct, Critique and Utilization: 5<sup>th</sup> Edition*: St Louis, Elsevier Saunders
- Central Bank of Kenya (2018). *Statistical bulletin*. Nairobi: Government press.
- Central Bank of Kenya (2019). *Statistical bulletin*. Nairobi: Government press.
- Christopher, G. C., Mike, L. Visit & Amy, W. A (2005). Logit Analysis of Electronic Banking in New Zealand. *International Journal of Bank Market*, 24, 360- 383
- Cihak, M., & Singh, P., (2013). *An analysis of national financial inclusion strategies*. Washington, D.C: World Bank.
- Cooper, D. R., & Schindler, P. S. (2008). *Business research methods*. New Delhi: Tata McGraw-Hill Publishing Company Limited
- Crook, H. (2008). *Open Services Innovation*. London: John Wiley & Sons



- David-West, O. (2015). The path to digital financial inclusion in Nigeria: Experiences of Firstmonie. *Journal of Payments Strategy & Systems*, 9(4), 256-273
- Davila, T. (2014). *The innovation strategy big companies should pursue*. Harvard Business School Publishing
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–339
- Demirguc, A. K. & Klapper, L. (2012). Measuring financial inclusion: Explaining variation in use of financial services across and within countries. *Brookings Papers on Economic Activity*, 1(1), 279-340.
- Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). The global Findex database 2017: Measuring financial inclusion and the fintech revolution. The World Bank.
- Dewatripont, D., Rochet, C., & Tirole, W. (2010). Financial intermediation and delegated monitoring. *Review of Economic Studies*, 51, 393-414
- Freytag, A., & Fricke, S. (2017). Sectoral linkages of financial services as channels of economic development—An input–output analysis of the Nigerian and Kenyan economies, *Review of Development Finance*, 7(1), 36-44
- Government of Kenya (2007). Economic Surveys, various Issues. Nairobi. Government Printer
- Gretta, S.A.A. (2017). Financial inclusion and growth. *The Business and Management Review*, 8(4), 434-445.
- Hannig, A., & Jansen, S. (2010). *Financial inclusion and financial stability: Current policy issues*. Asian Development Bank Institute Working Paper
- Kemboi, B. (2018). *Effect of financial technology on financial performance of commercial banks in Kenya*, Unpublished MBA Research Project, University of Nairobi
- Khan, J. A. (2008). *Research Methodology*. New Delhi. APH Publishing Corporation
- Khan, W. A., & Sattar, A. (2014). Impact of Interest Rate Changes on the Profitability of four Major Commercial Banks in Pakistan. *International Journal of Accounting and Financial Reporting*, 4(1), 142-147
- Kim, D. W., Yu, J. S., & Hassan, M. K. (2018). Financial inclusion and economic growth in OIC countries. *Research in International Business and Finance*, 43, 1e14.
- Kim, M., Zoo, H., Lee, H., & Kang, J. (2019). Mobile financial services, financial inclusion, and development: A systematic review of academic literature, *The Electronic Journal of Information Systems in Developing Countries*, 84(5), 1-17

- Klapper, L., (2016). *Financial Inclusion has a big role to play in reaching the SDG's* [Online]. Washington DC: Consultative Group to Assist the Poor.
- Kohali, A. & Sheleg, A. (2011). *Alternative banking channels*. Tefen Tribune, Spring Issue, 2011.
- Le, T., Chuc, A., & Taghizadeh-Hesary, F. (2019). Financial inclusion and its impact on financial efficiency and sustainability: Empirical evidence from Asia, *Borsa Istanbul Review*, 19(4), 310-322
- Lee, K. S., Lee, H. S. and Kim, S. Y. (2007), Factors Influencing the Adoption Behavior of Mobile Banking: A South Korean perspective, *Journal of Internet Banking and Commerce*, 12, 22-28
- Lenka, S.K., & Sharma, R. (2017). Does financial inclusion spur economic growth in India? *The Journal of Developing Areas*, 51(3), 215-228.
- Levine, R. Loayza, N. & Beck, T. (2012). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics*, 46(1), 31-77.
- Mehrotra, A., & Yetman, J. (2015). Financial inclusion-issues for central banks. BIS Quarterly Review. London: Department for Business Innovation and Skills.
- Mises, J. (1912). Financial Development, Growth, and the Distribution of Income. *Journal of Political Economy*, 98 (5): 1076-1107.
- Ndiang'ui, J. (2019). *Effect of selected macro-economic variables on financial development in Kenya*. Unpublished MBA Project, University of Nairobi
- Neaime, S., & Gaysset, I. (2018). Financial inclusion and stability in MENA: Evidence from poverty and inequality. *Finance Research Letters*, 24(1), 230-237
- Ochieng, E. (2018). *Effect of government domestic borrowing on financial development in Kenya*. Unpublished MBA research project, University of Nairobi
- Ongori, H. & Migiro, S.O. (2010). Information and Communication technology adoption: a literature review. *Journal of Chinese Entrepreneurship*, 93-104.
- Patrick, H.T. (1966). Financial Development and Economic Growth in Underdeveloped countries', *Economic Development and Cultural Change*, 14(1), 174-189.
- Quinn, D. & Toyoda A. (2008). Does Capital Account Liberalization Lead to Growth? *Review of Financial Studies*, 12(3), 11-24
- Rasheed, B., Law, S.-H., Chin, L., & Habibullah, M. S. (2016). The role of financial inclusion in financial development: International evidence. *Abasyn University Journal of Social Sciences*, 9(2), 330-348
- Robinson, L., (2009). *A summary of diffusion of innovations*. Retrieved from [www.enablingchange.com.au/summary\\_diffusion\\_Theory](http://www.enablingchange.com.au/summary_diffusion_Theory)

- Rogers, E. M. (1995). A prospective and retrospective look at the diffusion model. *Journal of Health Communication*, 9(1), 13-19.
- Rogers, E. M., (1962). *The diffusion of innovations*. Free Press: New York.
- Rogers, E. M., (2003). *The diffusion of Innovation (5th Edition)*. Free Press: New York.
- Roubini, N. & Bilodeau, J. (2008). *The Financial Development Index: Assessing the World's Financial Systems*. The financial development report 2008. Geneva Switzerland: World Economic Forum.
- Sheleg, A. & Kohali, A (2011). *Alternative banking channels*. Tefen Tribune, Spring Issue, 2011.
- Standley, S. (2008). What are the determinants of financial market development in sub-Saharan Africa? *Private Sector Development*, 12(1) 17-26.
- Stiroh, K.J. (2001). Investing in Information Technology: Productivity Payoffs for U.S. Industries. *Current Issues in Economics & Finance*, 6, 1-6
- Triki & Faye (2013). *Financial inclusion in Africa*. Ghana: African Development Bank.
- Wernerfelt B. (1984). Alternative methods of learning and process improvement in manufacturing, *Journal of Operations Management*, 16, 1-20.
- World Bank (2017). *The Findex Global Database 2017* [Online]. Washington D.C: World Bank. Available from: [datatopics.worldbank.org/financialinclusion/](http://datatopics.worldbank.org/financialinclusion/) [Accessed 20 October 2019].
- Zins, A., & Weill, L. (2016). The determinants of financial inclusion in Africa, *Review of Development Finance*, 6(1), 46-57

## APPENDICES

### Appendix I: Research Data

Year	Quarter	Financial development	Agency banking	Mobile banking	Mpesa	Internet banking	Economic growth	Interest rates
2010	1	0.2183	10.1642	16.0885	5.1818	6.9295	0.0919	8.4167
	2	0.2264	10.3364	16.1704	5.3083	6.9393	0.0938	8.0833
	3	0.2157	10.4362	16.4847	5.4553	6.9622	0.0968	7.7500
	4	0.2314	10.5511	16.5934	5.5910	6.9689	0.0984	7.2500
2011	1	0.2617	10.4606	16.6497	5.7652	6.9866	0.0985	6.9167
	2	0.2859	10.5852	16.7027	5.8406	7.0229	0.0987	6.7500
	3	0.2827	10.7113	16.7389	5.8749	7.0388	0.0993	6.0000
	4	0.2883	10.8026	16.7749	5.9243	7.0570	0.1001	6.0000
2012	1	0.3120	10.8951	16.7576	5.9454	7.0622	0.1001	5.8333
	2	0.3177	10.9858	16.7948	5.9584	7.0901	0.1028	6.0833
	3	0.2911	11.0817	16.7888	5.9713	7.1107	0.1037	6.5000
	4	0.3029	11.2168	16.8332	5.9839	7.1483	0.1044	15.1667
2013	1	0.2099	11.3970	16.8997	6.0162	7.1499	0.1045	18.0000
	2	0.3146	11.5132	16.9688	6.0753	7.1608	0.1053	18.0000
	3	0.3229	11.5919	16.9951	6.1377	7.1801	0.1056	15.3333
	4	0.3315	11.6315	17.0298	6.2086	7.2019	0.1057	11.6667
2014	1	0.3185	11.6536	17.0746	6.2186	7.2123	0.1063	9.5000
	2	0.3262	11.6817	17.0721	6.2344	7.2327	0.1065	8.8333
	3	0.3379	11.7263	17.0846	6.2596	7.2556	0.1071	8.5000

<b>Year</b>	<b>Quarter</b>	<b>Financial development</b>	<b>Agency banking</b>	<b>Mobile banking</b>	<b>Mpesa</b>	<b>Internet banking</b>	<b>Economic growth</b>	<b>Interest rates</b>
	4	0.3421	11.7329	17.0502	6.2897	7.2745	0.1071	8.5000
2015	1	0.3214	11.7535	17.0548	6.3226	7.2752	0.1072	8.5000
	2	0.3271	11.7771	17.0877	6.3315	7.2807	0.1072	8.5000
	3	0.3359	11.8208	17.1126	6.3578	7.2944	0.1083	8.5000
	4	0.3427	11.8658	17.1506	6.3716	7.3284	0.1094	8.5000
2016	1	0.3298	11.9110	17.2087	6.3835	7.3311	0.1097	8.5000
	2	0.3149	11.9673	17.2615	6.3936	7.3330	0.1114	9.0000
	3	0.3192	12.0525	17.3072	6.4019	7.3369	0.1114	11.5000
	4	0.3046	12.0432	17.3543	6.4085	7.3402	0.1121	11.5000
2017	1	0.3111	11.9519	17.3276	6.4151	7.3291	0.1126	11.5000
	2	0.3029	12.0033	17.3484	6.4216	7.3304	0.1136	10.8333
	3	0.3072	12.0329	17.3751	6.4265	7.3238	0.1140	10.5000
	4	0.3262	12.0817	17.4154	6.4329	7.3251	0.1165	10.5000
2018	1	0.2813	12.1655	17.4670	6.4409	7.3232	0.1174	10.0000
	2	0.2790	12.2085	17.5420	6.4473	7.3218	0.1179	10.0000
	3	0.2795	12.2164	17.5878	6.4520	7.3212	0.1188	10.0000
	4	0.2730	12.2453	17.6540	6.4615	7.3165	0.1191	10.0000
2019	1	0.2765	12.2715	17.6635	6.4677	7.3238	0.1210	9.5000
	2	0.2756	12.3276	17.7345	6.4723	7.3258	0.1224	9.0000
	3	0.2745	12.3157	17.8190	6.4862	7.3492	0.1228	9.0000
	4	0.2753	12.3157	17.8684	6.5191	7.3759	0.1232	9.0000

