

**EFFECT OF FINANCIAL TECHNOLOGY ON FINANCIAL PERFORMANCE
OF LISTED BANKS IN KENYA.**

BY

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DECLARATION

This project is my original work and has not been presented in any other University or Institution. No part of this research should be presented without the author's consent or the Management University of Africa.

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DEDICATION

I dedicate this project to my both my parents and my siblings for they have been a real guidance to me. They've dedicated all their time and resources in helping me with my studies and get to where I am now.

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First, I want to thank the Almighty Allah for bringing me this far and keeping me sound and safe with good life during the entire research period.

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ABSTRACT

Commercial banks have embraced use of financial technology in their operations. Some of the main goals with the use of financial technology have increased financial performance and operational efficiency. With this fact in light, the research paper focused on establishing how the integration of financial technology by commercial banks helps in increasing their financial performance. This study adopts a descriptive research design in developing a relationship between the study variables. The target population encompassed 43 commercial banks in Kenya but the target sample used in the study is 31 commercial banks. The findings indicate that financial technology has a statistically significant direct relationship with banks financial performance in form of Return on assets. The correlation analysis showed that mobile banking has a strong positive relationship with financial performance($r=0.618$). The study also found Internet performance($r=0.720$). The findings also indicate that other factors such as capital adequacy and bank size play a part in the influence of financial performance. All the four factors used in the model accounted for 69.2% of the total observation in the variations on financial performance of commercial banks in Kenya. The remaining 30.8% is explainable by other factors not included in the model adopted by the study. The study recommends that the commercial banks need to focus on increasing the uptake of internet banking and mobile banking in order to increase their financial performance. There are other viable suggestions for further research which include study of the effect of financial technology on the operational efficiency of commercial banks. Further research on other factors that impact the financial performance of commercial banks in other countries should be done to account for the variation in financial performance not explained by financial variables used in this study.

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LIST OF ABBREVIATIONS AND ACRONYMS

ADF- Augmented Dicker-Fuller test

ANOVA- Analysis of variance

ATM- Automated teller machine

CBK- Central Bank of Kenya

EY- Ernst &Young

FIN TECH- Financial Technology

FIT- Financial Intermediation Theory

IBM- International Business Machines Corporation

ICT- Information Communications Technology

IT- Information Technology

KPMG- Klynveld Peat Marwick Goerdeler

PWC- PricewaterhouseCoopers

ROA- Return on Assets

ROE- Return on Equity

SPSS- Statistical package for social sciences

TAM-Technology Acceptance Model

TRWA- Total Risk Weighed Assets

VIF- Variance inflation factor

CHAPTER ONE: INTRODUCTION

1.1 Background

Financial Technology (Fintech) has been transforming banks globally. Fintech driven changes have gradually been generating paradigm shifts and altering industry structure. (Kagan, 2019) States that Fintech is used to describe new technology that seeks to improve and automate the delivery and use of financial services and helps companies better manage their financial processes and operations. Banks have been forced to innovate to increase their efficiency and effectiveness. Banks have been able to harness Fintech in areas such as mobile money transfers, internet banking and mobile banking. Through Fintech, banks have been able to remotely process customer transactions without many human interventions leading to reduced staff costs and idle time. There have been various theories that explain the relationship between financial technology and financial performance, as espoused by scholars. The Technology Acceptance model developed (TAM) by Davis (1989) proposes that perceived ease and perceived usefulness predict the acceptance of information technology. Since its inception, the model has become the most widely applied model of user acceptance and usage (Ma & Liu, 2004). TAM can be used to measure consumers' willingness or intention to use Financial Technologies provided by banks. It also explains the factors a bank will consider before taking up a financial technology solution. This can be done by taking into account the positive effects brought about by Fintech adoption Vis a Vis cost implications in accepting the said technology and then come up with a decision on whether to accept or reject. TAM can predict the consumer intention to use mobile banking (Chitungo & Munongo, 2013). The Financial Intermediation Theory is the other theory we have. It highlights the role of financial intermediaries in the economy and the fact that we have information asymmetry. Financial intermediaries are firms that borrow from consumers or savers and lend to those that need resources for investment (ANDRIE

1.1.1 Financial Technology

Fintech is used to describe new technology that seeks to improve and automate the delivery and use of financial services and helps companies better manage their financial processes and operations (Kagan, 2019). Fintech is a new sector in the finance industry that incorporates the whole plethora of technology that is used to facilitate trades, corporate

business or interaction and services provided to the retail consumer (Ion, Alexandra, 2016). According to (Lee & Kim, 2015) Fintech is portrayed as a new form of monetary service trade that merges IT with fiscal services similar to payments, remittances and also management of assets. Fintech is increasingly becoming an important part of the banking financial ecosystem. Both banks and customers are looking for convenience and speed at a reduced cost. Access to monetary services as well as products is a growing need especially for far flung communities who have been locked out from the traditional conventional banking system. Fintech allows banks to provide more convenience for borrowers and allows banks to screen potential borrowers using improved statistical model from big data analytics. According to Boot (as cited by Navaretti, Calzolari & Pozzolo, 2017), Fintech represents a serious challenge for the traditional banking business model because of the “disaggregation of the value chain could follow from online platform becoming the preferred customer interface.” Fintech has impacted banking sector through monitoring of savings, credit scores, spending, tax liability, faster transaction through distribution ledger technology, mobile transfers, use of crypto currency and also mobile lending to individuals (KPMG, 2016). To measure the extent of financial technology innovations on the banks, we will measure how much of data analytics involving personal data from the customers is used by the banks. The use of data analytics is key especially in lending (Kemboi, 2018). The emergence of mobile phones to transfer funds electronically has significantly altered banking services in Africa (Chipeta & Muthinja, 2018). Data from CBK (2015) shows that mobile payments in Kenya has overtaken all electronic card payments combined in terms of number of transactions and value of transactions (Chipeta & Muthinja, 2018). In order to effectively measure the variable, we will measure the value and number of transactions emanating from the mobile and internet banking.

1.1.2 Financial performance

A firm is evaluated on a multi-dimensional basis by different stakeholder groups who hold diverse interests. Financial performance entails monetary aspects of the firm in form of profitability, liquidity, operational efficiency and cash flows patterns (Nawaz, 2017). For a given period of time, financial ratios are used to measure firm’s financial performance and the ratios utilize data which is available across all the firms. Return on assets, return on equity, operating efficiency ratio, loans to deposits and debt to equity ratios are

commonly used in evaluating financial performance of a commercial bank. For most limited liability companies, their main objective is maximization of shareholders wealth. The management is tasked to carry out operations and make decisions which improve the value created from shareholders' investments in the company. Return on assets indicates the company's ability to generate revenue by utilizing its asset base. This measure has no bias against the size of the firm since firms with many assets are expected to generate more revenue. Return on equity focuses on providers of capital by determining the value they get by sacrificing consumption and committing their funds to the company (Nawaz, 2017). Operating efficiency ratio shows the rate at which operating revenue is generated while incurring related expenses. Managerial and operational efficiency is key to achieving a sound operating efficiency ratio. Loan to deposit ratio is a liquidity measure which evaluates a bank's ability to meet future customer withdrawals by matching the loans issued against deposits received in a certain period. The research paper seeks to establish how financial technology links up with financial performance.

1.1.3 Financial technology and financial performance

In the wake of an information technology era, the banking industry is experiencing turbulent changes and disruptions on its operations and sustainability of consumer needs. Financial technology has changed most traditional banking practices and replaced them with new efficient platforms. Mobile banking and internet banking have hit the sector tremendously and changed entirely how banks serve and relate with their customers. These changes definitely have impacted financial performances of commercial banks. Firms which intend to beat their counterparts and gain competitive advantage need to invest extensively on research and development to get an understanding of market trends and emerging customer needs. Banks have to continually design innovative products which serve ever changing customer needs in order to maintain or gain market share (Scott, 2017). Sound financial performance is proxy to adopting financial technology and leveraging on its benefits while keeping an eye on possible threats. Smart phones have gained a significant popularity among the population almost becoming a necessity (Scott, 2017). They form the basis of mobile banking and serve the traditional role of a banking hall. Investments geared towards developing sophisticated mobile apps has proved to bear fruits of increased customer base, efficient customer service and increased number of

transactions at a significantly reduced cost. Profits, revenues and operational efficiency improve while expenses are on a reducing trend and the final outcome remains improved financial performance. Modern customers value customer service levels and it is the criteria used to identify firms they relate with across all industries. Banks which offer their services at the convenience of the customer subsequently gain approval and trust of the customer. Internet banking is key to establishing a range of options through which customers can get all the services they require anytime anywhere. Financial performance is improved through regular transactions and positive advocacy when customers are happy with a firm's services (Scott, 2017).

1.1.4 Banking sector in Kenya

The Kenyan banking sector comprises of both locally owned banks and those that are foreign-owned. As on the last day of December 2018, the banking industry embodied the CBK, the regulator responsible for governing the sector and forty-four banks. Of the forty-four operational banks, thirty-one are locally owned, and the remaining thirteen are foreign owned. The locally owned banks further comprise of three in which the state government has majority control over, twenty-seven of which the private have ownership and a single mortgage financial institution. The banking sector in Kenya dominates the commercial area as a whole. The success of the financial industry is dependent majorly on the banking sector. As such, a poor performance record of the banking sector would imply a stagnation or reduction in the economic growth of Kenya. As an integral part of bank performance, operational efficiency is critical. Operational efficiency implies the maximization of profits through the reduction of costs. Majority of the commercial banks in Kenya and beyond, devise numerous ways for the reduction of operational costs. The most recent of these ways is through the advent of fintech. Commercial banks in Kenya are increasingly adopting internet banking and mobile banking with the hope of drastically reducing their operational costs, hence attaining operational efficiency and therefore maximizing their return on Assets.

1.2 Research problem

Mobile and internet banking, the independent variables affect financial performance through operational efficiency, increased market penetration and improved customer service levels. Measures of financial performance are mainly profitability and value

creation for shareholders. Control variables such as size of the bank, management efficiency and asset quality help determine impact of financial technology on profitability when they are held constant throughout a certain period of investigation.

The banking business models today are shifting from commercial and financial policies that use to directly impact their markets and are adopting digital products to provide financial services. In other words, they are invading the traditional banking sector by remodeling it in line with the current technology developments (Costin & Alexandru, 2018). In an article written in Business matters, the author states that there has been a progress in the investment sector towards financial technology showing growth by 45 percent annually with 10.3 billion pounds being spent in startups within a year. The banking sector has been attracted to Fintech to increase on their profits and cut costs as it is able to serve a wide range of customers due to the quality of services. Globally, in Russia there are an increasing number of financial technology services, online banking and mobile wallets are among the many innovations. The new technology inventions pave way for the banks in Russia will go through to achieve the beneficial profits and opportunism that are birthed by the modern technological sector (Kolesova and Girzheva, 2018). The annually fintech adoption index ranking published by the EY showed ranking in 27 different ranking of adopting the new digital financial services were as follows; the top position was a tie between China 87% and India 87%, followed by a tie between Russia and south Africa with 82% then Columbia while the least being Japan which is 34% (Alois, 2019).It is without doubt that financial technology is accepted across the world and it is growing every day. This due to the widely uses of smart phones and easily accessible internet.

There are about 167 fintech startups in Kenya today that provide financial services by making use of modern technology. This poses a stiff competition towards the commercial banks, due to the cheap services fintech offer to the unreachable customers like the youths and the poor. Fintech provide financial services like small loans to the customers who lack securities or have poor credit rating to take a loan. They also provide personal finance management tools. With the 24/7 access of information and availability of androids, fintech has become unstoppable. A study conducted in PWC (2019) shows over 90% of banks expects growth in applying mobile applications, much higher than any other financial

sector. Traditional bank services are shifting to online and mobile banking to reach out to customers.

Mobile and internet banking is a significant platform in the banking sector which is less researched on despite the disruption it is causing in the industry. There is a need to carry out extensive research in the area. This research paper seeks to determine the impact of financial technology on the financial performance of commercial in Kenya.

1.3 Research Objective

The general objective of this research is to investigate the effects of Information technology on financial performance of commercial banks in Kenya. The specific objectives are to;

- Assess the effects of Mobile Banking on the Financial performance of commercial banks in Kenya
- Assess the effects of Internet Banking on the Financial performance of commercial Banks in Kenya
- To determine the effect of self-service banking on the financial performance of Commercial banks in Kenya.

1.4 Research Questions

- What is the effect of Mobile Banking on the financial performance of commercial banks in Kenya?
- What is the effect of Internet Banking on the financial performance of commercial Banks in Kenya?
- What is the effect of self-service banking on the financial performance of Commercial banks in Kenya?

1.5 Significance of the study

This research has been designed to explore and dig deeper into the financial service industry. The research approach used will help give a clear analysis and point out the impact financial technology is having on the financial service industry and what the existing providers within the industry need to integrate in order to improve service delivery and solve financial problems as they arise. It also provides an understanding of what the existing companies in financial market as well new entrants in the market are doing to support fintech in the economy. The research will help in providing recent information and

data that is needed by the players in the financial industry to better their operations. Through this research different parties in the industry as well in the entire economy stand to benefit in different ways as follows:

Consumers in the economy will benefit by acquiring better service delivery from banks. The introduction of internet-based banks means that there is no physical links between consumer and the banks prompting stiff competition between different banks for customers. This calls for the bank to create efficient and improved services delivery in order to fully satisfy and attract more customer.

The banking sector also will benefit by reducing the losses associated with the borrowers defaulting to honor their debts. Fintech will provide banks with a better organized data through the efficient and effective banking system that gives an improved understanding of the borrowers' true credit risks and allow the offering of the banks products better aligned to the risk profile of the consumer. This insight helps banks to reduce credit risks resulting from unfaithful customers.

1.6 Scope of the Study

The study was carried out to investigate effects of information technology on financial performance of the commercial banks in Kenya.

Fintech provides financial services like small loans to customers who lack securities or have poor credit rating to take a loan and also provides personal finance management tools. These were some of the activities being investigated in the study.

The study showed over 90% of banks expect growth I applying mobile application much higher than any other financial sector.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature, concepts and theories related to the study from existing literature. Empirical analysis on the effect of financial technology on the banks financial performance is analyzed. A theoretical review of the theories relevant to the topic is also analyzed. A conceptual model of the relationship between the independent and dependent variables is illustrated and finally a summary of the literature review is concluded.

2.2 Theoretical Review

This section discusses the various theories that help us connect relationship between financial technology and financial performance. We will focus on two theories, namely; Financial Intermediation Theory and Technology Acceptance Model (TAM) which are the most relevant to this study.

2.2.1 Technology Acceptance Model (TAM)

This theory was developed in 1989 by Davis and has been used in multiple studies to find out the acceptance of technology in various organizations. TAM is recognized as a powerful and parsimonious theory for predicting and explaining consumer propensity to use technology and actual usage (McKechnie, Winklhofer and Ennew, 2005). TAM is constructed on the foundations of perceived usefulness and ease of use. Usefulness refers to the individual belief to improve job performance using particular new technology and information system. Ease of use indicates how easy an individual learns how to operate or use the new technology (Davis et al., 1989; Gefen et al., 2003). The model therefore puts a great emphasis on how perceived ease of use and usefulness would positively affect performance. (Chitungo & Munongo, 2013) argue that TAM can predict the consumer intention to use mobile banking. Legris, Ingham and Collerete (2003) argued that they proved that TAM is a model that can help clarify and envisage customer actions of information technology. TAM has been used as the theoretical basis for many empirical studies of user technology acceptance and has accumulated ample empirical support (Hu et al., 1999). Sabi (2014) explained TAM as the most relied and applied theory as evidenced by the thirty-one articles he reviewed. Results many other studies suggest that TAM can provide adequate explanation and/or prediction of user acceptance of IT (Hu et al., 1999). In order to foster individual intentions to use technology, it is important to cultivate a

positive attitude towards using technology. In this study, TAM is a relevant factor in the adaptation of Fintech by commercial banks. How the banks and customers react to newly introduced technology is a key factor in its adaptation. In turn banks will evaluate the cost of technology. It will enhance their data analytics, credit scoring and innovation hence increasing efficiency and effectiveness leading to an increase in stakeholder wealth performance.

2.2.2 Financial Intermediation theory (FIT)

The theory regarding financial intermediation was in 1960 with the work of Gurley and Shaw. The financial intermediation theory is based on the theory of informational asymmetry and the agency theory. In principle, the existence of financial intermediaries is explained by the existence of the following categories of factors: high cost of transaction, lack of complete information in useful time; and the method of regulation (ANDRIEŞ & Cuza, 2009). Scholten and Wensveen (2003) argue that a well-functioning intermediary is necessary for creation of financial of financial goods and services.. Presence of intermediary is necessary in pricing and covering of direct and indirect costs. Financial intermediaries exist because of imperfect markets characterized by asymmetric in information. In financial markets, there is informational asymmetry between the lenders and borrowers. Normally, the depositors are risk averse and are uncertain about their future needs of consumption and thus do not know to whom to lend money to, while Borrowers are aware of their financial needs to acquire financing. Banks are financial intermediaries. Commercial bank attracts deposits (indebting itself towards depositors) and grants loans (creating debts in relation to their clients – the fund users), (ANDRIEŞ & Cuza, 2009). The Central bank is therefore needed to regulate the banks. Intermediaries exist because of high cost of transaction and lack of complete information in useful time. Banks utilize financial technology to facilitate service delivery and operations of banks. Banks also utilize Fintech to eliminate information asymmetry by providing real time data to customers. This has led to increase in trust and confidence between banks and clients due to transparency and free flow of information which in turn led to reduction of costs and customer retention.

2.3 Determinants of financial performance

The financial performance of banks is impacted by both internal processes and external factors prevailing in the sector. Financial technology is a significant factor, and this research paper seeks to establish its impact on commercial bank's financial performance. Other determinants include the size of the firm, management efficiency, capital adequacy, asset quality, earnings quality, and liquidity management.

2.3.1 Size of the firm

The aspect of size in commercial banks influences how the firm leverages economies of scale. Large banks can invest in capital intensive infrastructure, research and development thus improving operational efficiency (Petria, Capraru & Ihnatov, 2015). This measure reduces operational costs significantly. A diverse customer base is a source of risk reduction. The bank obtains sustainable deposits from customers thus increasing its liquidity. Loans can be extended to large corporate and the government, which have low default risk resulting in increased interest income.

2.3.2 Management efficiency

Managerial efficiency is pegged on how human resources of the bank conduct operations and their decision making process. It is a qualitative measure of management team commitment and achievement of the firm's objectives (Ahamed, 2017). Strategy formulation and implementation by the top management team significantly impact the direction of the firm and its goal achievement. Investment decisions and risk preferences determine the level of financial performance. Knowledge management and leadership styles adopted by the firm influence the overall profitability of the bank.

2.3.3 Capital adequacy

Capital adequacy is a form of regulatory requirement which measures the amount of capital held by a bank against the firm's inherent risk. The monitoring of this ratio is done to ensure the bank can bear contingent losses attached to its capital without a shock or financial distress. It is a form of consumer protection. Previous studies have discovered a positive relationship between capital adequacy ratio and profitability for banks in Europe (Petria, Capraru & Ihnatov, 2015).

2.3.4 Asset quality

Firms in every sector utilize their assets to generate revenues; banking industry is not an exception. The main assets for banks are loans advanced to customers. Loans represent the riskiest assets within a bank's balance sheet. This is justified by the provision made for non-performing loans in the financial statements. Banks have to employ critical analysis and artificial intelligence to screen borrowers and make informed lending decisions (Ahamed, 2017) Loan portfolio for a bank determines the level of interest income in the relevant period depending on the riskiness of the loans. Interest income is a major component of a bank's revenue and affects financial performance.

2.3.5 Earnings quality

It is a criterion used to assess how repeatable and controllable a firm's earnings are in order to give a better estimate of a firm's future cash flows. Earnings quality as identified Earnings quality is a fundamental concept. It refers to the ability of reported earnings to predict by a firm using a list of measures such as long earnings persistence, predictability, asymmetric loss recognition, various forms of benchmark beating, smooth earnings, magnitude of accruals, income decreasing accruals, absolute, value of discretionary or abnormal accruals and the extent to which accruals map into past and future cash flows of a firm.

In addition to the proliferation of measures, there are a number of vexing questions that have been difficult to address with archival work because answers often rely on managerial focus, which is not observable and is difficult to infer. A related problem is that archival work cannot satisfactorily decompose the portion of earnings that is manipulated from portion attributable to the unobservable. In this project therefore; we provide new insights of how to integrate fintech in financial service industry in order to solve the problems associated with inconsistencies of earnings quality.

2.4 Empirical review

International and local research conducted on the topic reveal the cause and effect relationship between adopting financial technology and the subsequent financial performance success. In China, emergence of financial technology startups has driven rapid adoption of technology by commercial banks. Banks are seeking to attain operational efficiencies and creating competitive advantage over these startups. The researcher

develops a six dimension design of innovation strategies with different weights and tries to formulate interrelationships among the components. Determination of financial performance is through four classifications of banks; state owned banks, city commercial banks, joint stock, and credit cooperatives (Zhao & Wang, 2019). The model results into ranking of innovations according to their impact on financial performance. From the greatest impact to the least is; new business clients, new service lines, organizational structure innovation, technological improvements , new customer interaction platforms, and new revenue models. A study conducted in Nigeria to investigate the effect of digitalization on financial performance of commercial banks used purposive research design method. 370 Employees drawn from commercial banks were given structured questionnaires and their feedback analyzed using SPSS. The findings established a positive relationship between digitalization and financial performance of commercial banks (Agboola, Esse & Betek, 2019). The research paper proposes a well-structured and systematically implemented digitalization system in a commercial bank can achieve significant favorable impact on performance of the bank. The research paper on effect of information and communication technology on commercial bank performance in Lebanon was conducted on 50 banks. The main source of data was financial statements and annual reports of the commercial banks. Common ICT innovations investigated were internet banking, mobile banking, ATMs, debit and credit cards. The findings established mobile banking had the greatest impact on bank performance with other variables having less impact (Mahboub, 2018). The study proposes provision of services through mobile applications for banks to attract and retain more customers. A local study on effect of technological innovation on performance of commercial banks in Kenya adopted a descriptive research design covering all the banks in the country. Financial information obtained from the central bank is the source of data and it is analyzed using multiple regression analysis. The findings established significant positive relationship between banks' profitability and adoption of technological innovations (Wachira & Ondigo, 2016). Customer service departments in the banks require greater use of technology than other functional units.

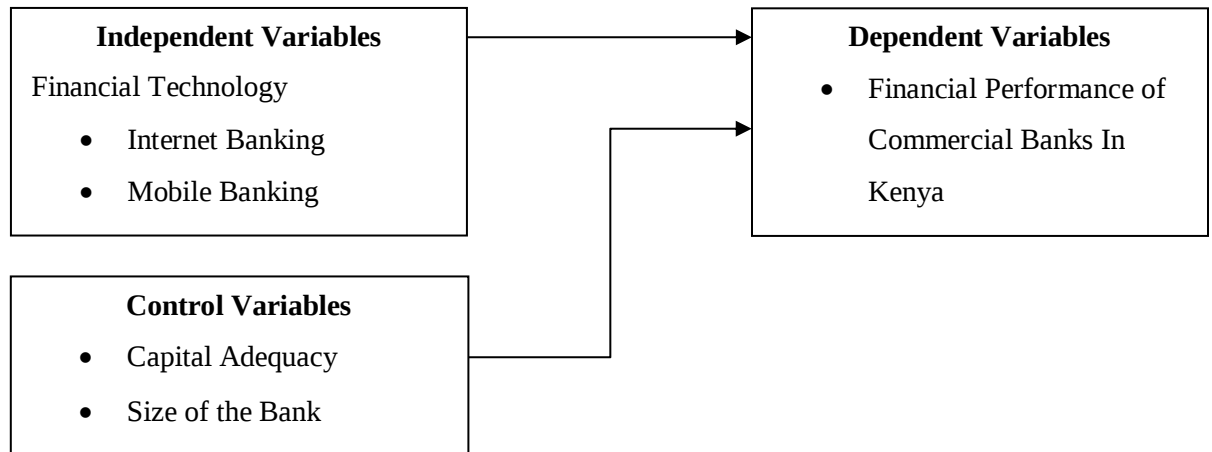
Research paper on effect of effect of internet banking on financial performance of commercial banks in Kenya adopts a descriptive design targeting 40 banks in the country.

Data is collected from financial statements and analyzed using multiple regression analysis. The results of the study indicated that internet banking transactions impacted greatly the return on assets hence profitability (Mulwa, 2017). There is a significant positive relationship between profitability of the banks and online customer deposits.

2.5 Conceptual Framework

Conceptual framework shows the relationship between dependent variable and independent variable. Independent variable in this study is financial technology variables for example Internet and mobile banking which will be measured by number and volume of transactions. Financial performance of commercial banks in Kenya being the dependent variable indicated by the Return on Assets (ROA). Capital adequacy, size of the bank and management efficiency will be used in this study as control variables. An effect of financial technology and financial performance variables is as shown below;

Figure 1: Conceptual Framework



2.6 Summary of Literature Review

(Zhao & Wang, 2019) carried out research on impact of technology adoption by commercial banks in China. The researcher developed a six dimension design of innovation strategies with different weights and established that through adoption of technology Banks' have attained operational efficiencies, cost reduction and created competitive advantage. (Agboola, Esse & Betek, 2019) assessed effect of digitalization on financial performance of commercial banks in Nigeria. The study established a positive relationship between digitalization and financial performance of commercial banks enabling Banks' to attain its goal of maximizing profit and providing core customer focused services such as convenient Mobile banking services. Locally, (Wachira & Ondigo, 2016) carried out a research on effect of technological innovation on performance of commercial banks in Kenya adopted a descriptive research design covering all the banks in Kenya. The findings established significant positive relationship between banks' profitability and adoption of technological innovations which is aimed at improving efficiency and enhance cost reduction. In summary, the above study has argued that Fintech affects financial performance of commercial banks. Nevertheless it is not clear how and to what extent Fintech in terms of Mobile money and internet banking affects Return on Assets of commercial banks in Kenya which is the breach that this study intends to seal.. This design creates a relationship between the two variables and reports on one variable

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

Research methodology outlines tools, methods and steps used to collect data, analyze, interpret, and report the findings of the study. The components of this chapter include research design, population, sampling design, and data collection methods and data analysis techniques.

3.1.1 Research design

The research paper adopted a descriptive design. Descriptive research design entails answering the question “what underlies a certain factor” without influencing any variables. The study seeks to observe use of financial technology in commercial banks in Kenya and describe its effect on profitability of the bank’s influence on the other. Data used spans over a six year period hence a cross sectional approach. Secondary data is used sourced from financial statements, managerial reports, regulatory bodies’ websites and industry reports. Mainly quantitative data is used in the research paper. The study leads to correlation relations between dependent and independent variables.

3.1.2 Population and sampling

Population refers to the entire collection of items, elements or individuals whom the researcher is interested in are subject to investigation. This study targets Kenyan commercial banks. There were 43 commercial banks in the country according to the central bank of Kenya as at 31st December 2018. A systematic sampling approach is adopted which incorporates only listed banks with the Nairobi securities exchange and licensed by CBK. 12 banks meet this criterion. The main reason for using listed banks is because they have clear data presented in their reports while the rest have in-consistent information, not adopted internet and mobile banking and are therefore not considered in this research paper.

3.1.3 Data collection

The study adopted secondary data available at Nairobi securities exchange website in form of audited financial statements. CBK banking sector annual reports for the period between 2013 and 2018 are also incorporated. This data is available for download in the CBK website. Investor briefing reports was also used. Quantitative data include size of the firm, capital adequacy and return on assets.

3.1.4 Data analysis

Variables under investigation are categorized into dependent variable which entails mobile banking and internet banking, while independent variable is profitability presented as return on assets. The variables are evaluated on a six year period basis for each commercial bank. Data analysis was performed using IBM's SPSS software. The results of data analysis are presented on frequency distribution tables, charts, histograms, and measures of central tendency. Quantitative results are displayed on tables for easy comparison and interpretation. Multiple linear regressions are used to determine the relationship between profitability (return on assets) which is the dependent variable and the independent variables (value of mobile banking and internet banking transactions). The model is used to predict financial performance of commercial banks given different levels of financial technology application.

Table 1: Variable Measurement

Variable	Measurement
Financial Performance	Return on assets
Mobile banking	Value of transactions on mobile platforms
Internet banking	Value of transactions via Internet banking
Size of the firm	Total assets of the bank
Capital adequacy	Total capital/ TRWA

3.2 Regression Model

The multiple regression models used show the relationship between return on assets and the five independent variables listed below. The model is given by.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \alpha$$

Where;

Y-Financial Performance represented as Return on Asset which is given by Net income / total assets per year.

X1- Total Value of transactions on mobile platforms per year

X2- Total Value of transactions via internet banking per year

X3- Total assets of the bank

X4- Total value for capital adequacy rate given by Total capital/ TRWA

α - Random error, normally distributed about a mean of 0 with a confidence interval of 5 %.

β_1 - β_6 –Regression coefficients the amount by which Y is changed for every unit the dependent variable is changed.

β_0 – Constants, defined as the long term interest rates without including the independent variables or Y intercept.

3.3 Test of significance

Coefficient of determination, R^2 is applied to measure the extent to which changes in financial technology usage are responsible for the resulting variations in profitability of a bank. Analysis of variance (ANOVA) determines the level of reliance which can be placed on the model. At a significance level of 5 % hypothesis is tested for significance. Relationship existing between financial technology and financial performance are established using the T-statistic table.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter provides the information processed from financial statements of listed commercial banks in Kenya and CBK's Bank Supervision Reports on the impact of financial technology on the financial performance of commercial in Kenya. The section handles analysis of data and the interpretation of results. Data was analyzed with the aid of Statistical Package for Social Sciences (SPSS) and XLSTAT.

4.2 Descriptive Statistics

Table 2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ROA	155	-.0900	.0840	.01814	.02655
Mobile Banking Transactions	155	.0000	2.5664	1.9860	.6678
Internet Banking Transactions	155	-.0223	3.8689	1.5112	.9299
Size	155	.0000	5.8404	3.7536	1.2941
Capital Adequacy	155	.0000	.5860	.1675	.1014
Valid N (list wise)	155				

The table above represents descriptive statistics of 31 banks that had operated over the five-year period with reference to their return on assets, value of mobile banking transactions, value of internet banking transactions, size and capital adequacy (2014-2018). From the findings in the table, the mean ROA was 1.81%. The mean value for mobile banking transactions variable was 1.9860 while the mean for internet banking transactions variable was 1.5112. The mean size over the period was 3.7536. The mean capital adequacy was 0.1675. Moreover; the highest ROA was 8.40% while the lowest was -0.90%. The largest size was 5.8404 and the smallest size was 0. The highest value for mobile banking transactions variable was 2.5664 whereas the least was 0. The highest value for internet

banking transactions variable was 3.8689 while the lowest was -0.0223. The highest value for capital adequacy variable was 0.1675 whereas the least was 0.

4.3 Correlation Analysis

Table 3: Pearson correlation coefficient

			Mobile Banking ROA	Internet Banking Transactions	Size	Capital Adequacy
ROA	Pearson	1	.618	.720	.473	.074
	Correlation					
	Sig. (2-tailed)		.000	.000	.000	.360
	N	155	155	155	155	155
Mobile Banking Transactions	Pearson	.618	1	.201	.170	.267
	Correlation					
	Sig. (2-tailed)	.000		.063	.299	.081
	N	155	155	155	155	155
Internet Banking Transactions	Pearson	.720	.201	1	.132	.028
	Correlation					
	Sig. (2-tailed)	.000	.063		.227	.727
	N	155	155	155	155	155
Size	Pearson	.473	.170	.132	1	.161
	Correlation					
	Sig. (2-tailed)	.000	.299	.227		.055
	N	155	155	155	155	155
Capital Adequacy	Pearson	.074	.267	.028	.161	1
	Correlation					
	Sig. (2-tailed)	.360	.081	.727	.055	
	N	155	155	155	155	155

A correlation coefficient, represented by r , enables one to measure the magnitude of the linear relationship between ranked or numerical variables. This coefficient takes the values between -1 (perfect negative correlation) and $+1$ (perfect positive correlation). The correlation table reveals that there is a statistically significant relationship between the ROA and mobile banking transactions ($r=0.618$, $p<0.05$), ROA and internet banking transactions ($r=0.720$, $p<0.05$). The relationship between ROA and size of the bank ($r=0.473$, $p<0.05$) is also statistically significant. However, the relationship between ROA and capital adequacy ($r=0.074$, $p>0.05$) is statistically insignificant.

4.4 Diagnostic Test

4.4.1 Normality

Table 4: Tests of Normality

<i>Tests of Normality</i>			
	Shapiro-Wilk		
	Statistic	Df	Sig.
ROA	.965	155	.001
Mobile Banking Transactions	.750	155	.000
Internet Banking Transactions	.943	155	.000
Size	.807	155	.000
Capital Adequacy	.927	155	.000

To test for normality, the Shapiro-Wilk test of normality statistic was used. The test interpretation was based on the null and alternative hypothesis, and the significance level α .

The null hypothesis was that the variable from which the sample was extracted follows a normal distribution. The alternative hypothesis was that the variable from which the sample was extracted does not follow a normal distribution. Thus, given a p value (significance level α) of below 0.05, the null hypothesis is rejected for return on assets, mobile banking transactions, internet banking transactions, size and capital adequacy variables, which means that there is a statistically significant difference between each variable and

normal distribution. We accept the alternative hypothesis and presume that there is statistically significant difference between these variables and normal distribution, meaning that their values were not normally distributed. This is revealed on the table above.

4.4.2 Multicollinearity Test

The study presumed a 95% confidence interval (5% significance level) for the data to be analyzed. A test for Multicollinearity was performed. Multicollinearity refers to the presence of significant correlations between the independent variables. From the findings, all predictor variables had tolerance values greater than 0.2 and VIF (variance inflation factor) values of less than 10. This is revealed on the table below. Thus, Multicollinearity among the independent variables does not exist.

Table 5: Multicollinearity Test for Tolerance and VIF

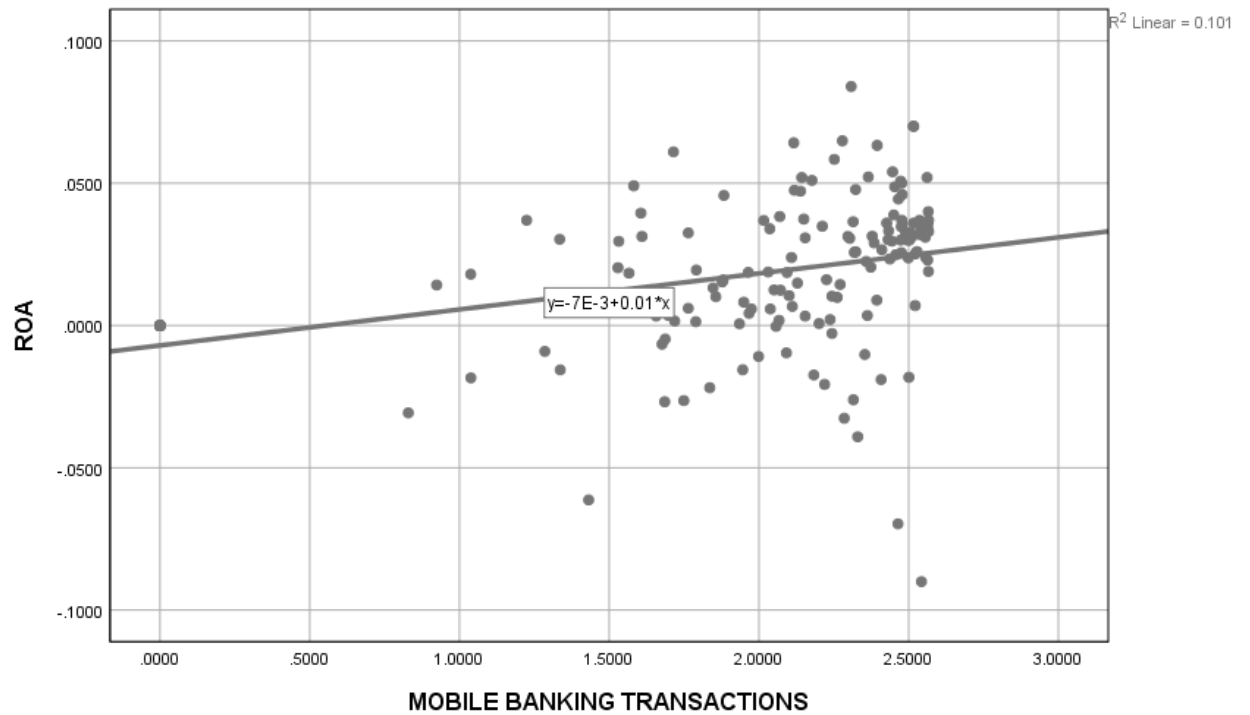
Multicollinearity statistics				
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4.4.3 Linearity Test

Statistic	Mobile Banking Transactions	Internet Banking Transactions	Size	Capital Adequacy
R ²	0.787	0.570	0.788	0.126
Tolerance	0.213	0.430	0.868	0.874
VIF	4.687	2.324	4.720	1.144

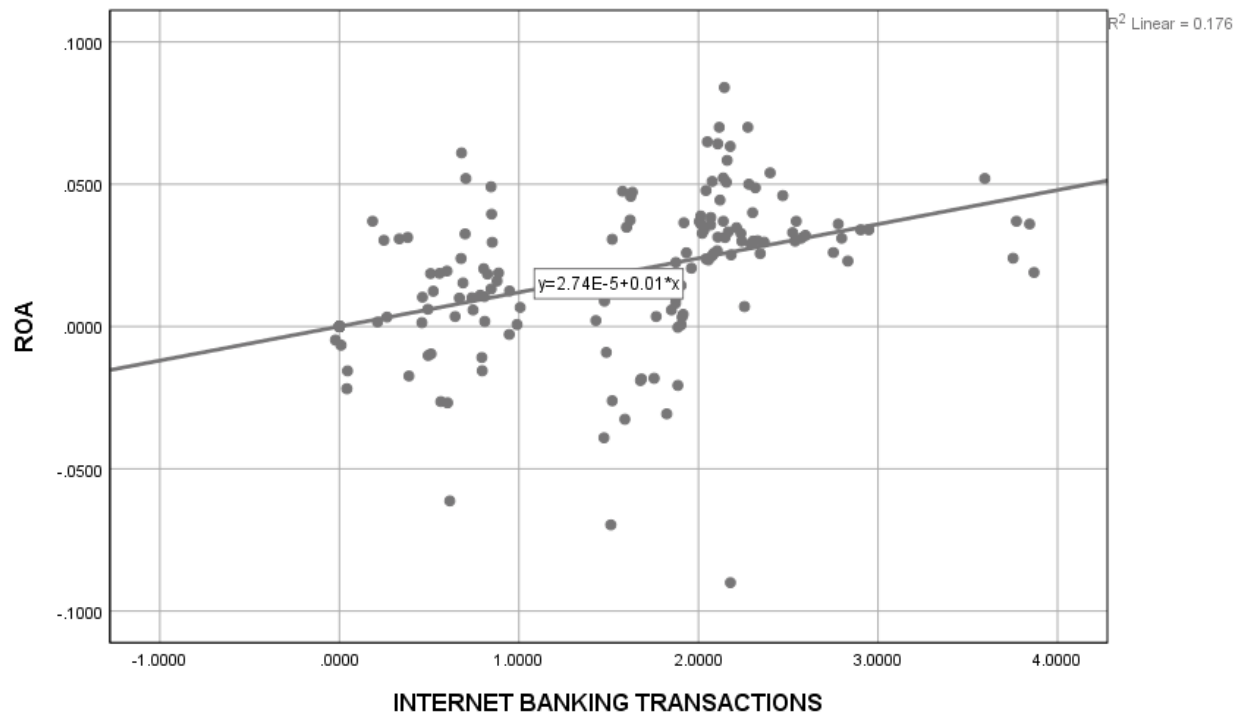
Linearity test purposes to determine whether the relationship between independent variables and the dependent variable is linear or not. Scatter plots were constructed between ROA and each of the predictor variables.

Figure 2: Scatter plot of ROA against Mobile Banking Transactions



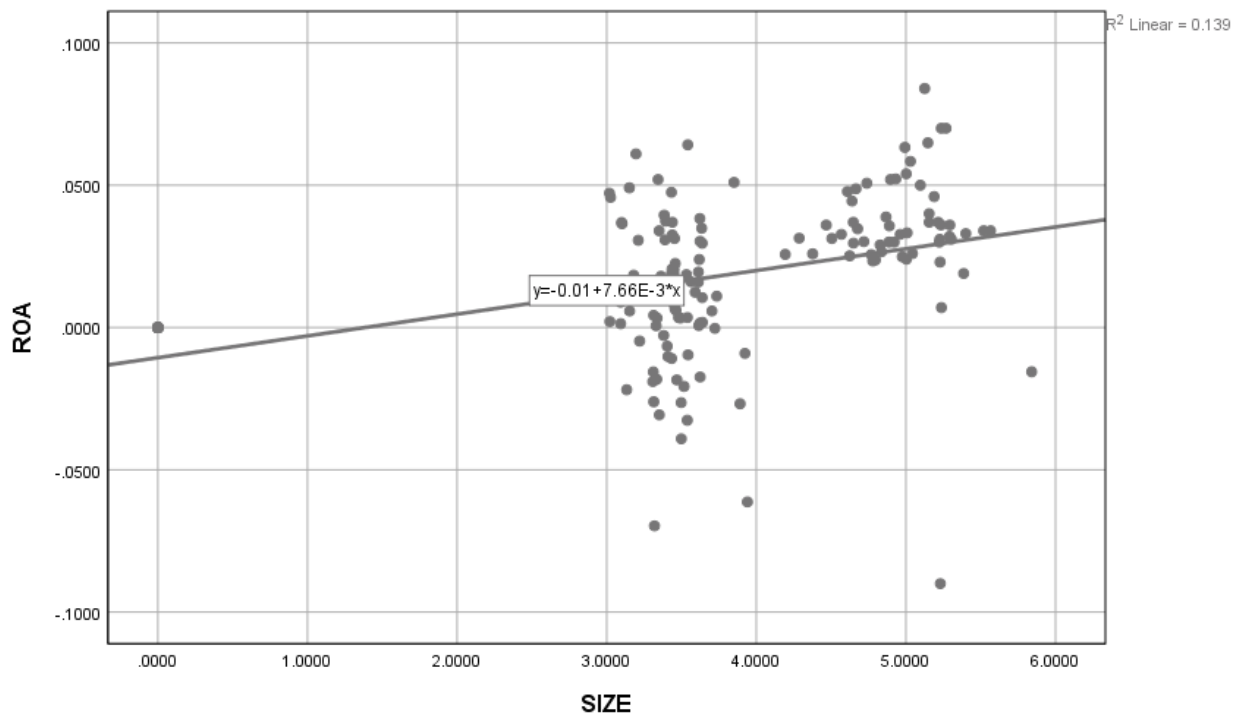
From the above scatter plot, it is evident that there exists a linear relationship between ROA and Mobile Banking Transactions.

Figure 3: Scatter plot of ROA against Internet Banking Transactions



Based on the above scatter plot, linearity exists between ROA and Internet Banking Transactions.

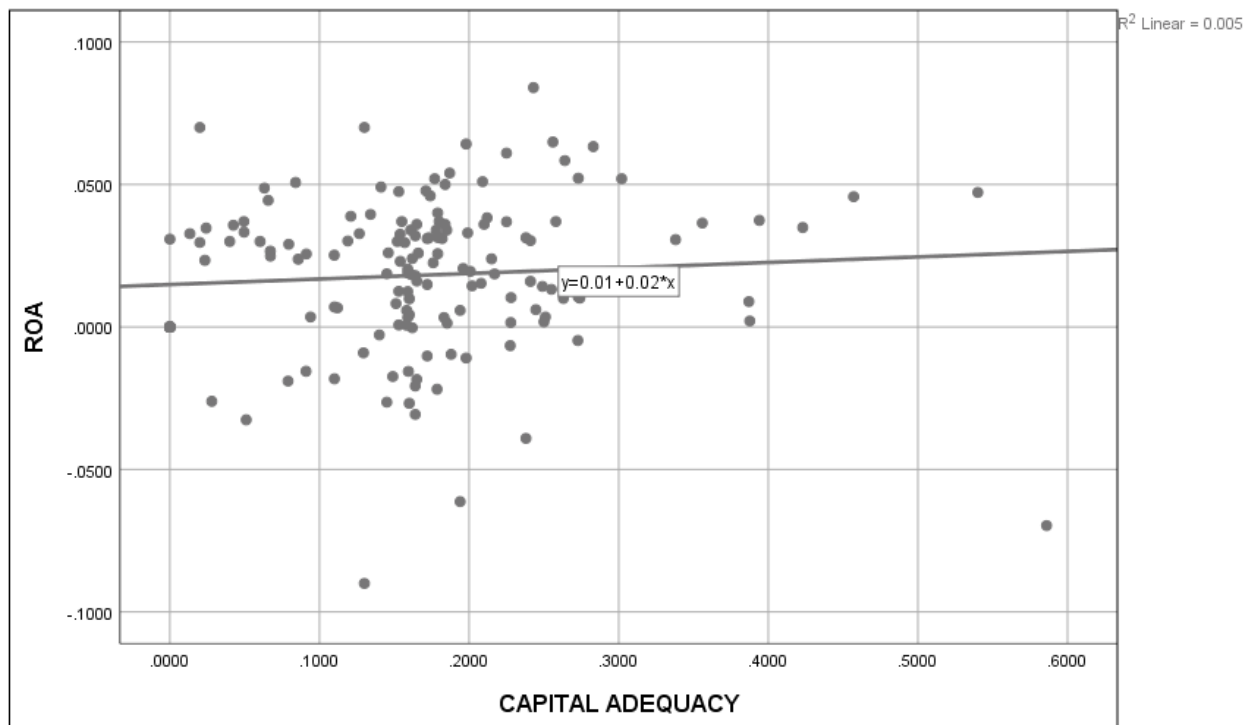
Figure 4: Scatter plot of ROA against Size



Based on the above scatter plot, linearity exists between ROA and size of the bank.

Figure 5: Scatter plot of ROA against Capital Adequacy

The figure below depicts that there exists a linear relationship between return on assets and capital adequacy



4.4.4 Autocorrelation Test

Table 6: Durbin Watson Test

Durbin-Watson test (Order = 1):

DW	1.987
Rho	0.270
P-value	0.084
Alpha	0.05

Test interpretation:

H0: The residuals are not auto correlated (order=1)
Ha: $\rho \neq 0$
As the computed p-value is greater than the significance level $\alpha=0.05$, one cannot reject the Autocorrelation test was done using XLSTAT to check if there is correlation of error terms across time periods. Durbin Watson test was used to test for autocorrelation. The statistic was revealed to be 1.987 indicating that the variable residuals were not serially correlated since the value lies within the acceptable range of between 1.5 and 2.5.

4.4.5 Test for Stationarity

A stationary time series is one whose statistical properties such as mean, variance, among others are all constant over time. Most statistical forecasting methods are based on the assumption that the time series can be rendered approximately stationary (that is, "stationarized") through the use of mathematical transformations. A stationarized series is relatively easy to predict: you simply predict that its statistical properties will be the same in the future as they have been in the past. A unit root test tests whether a time series variable is non-stationary and possesses a unit root or not. The null hypothesis is generally defined as the presence of a unit root and the alternative hypothesis is either Stationarity, trend Stationarity or explosive root depending on the test used. A commonly used test is the augmented Dickey–Fuller test. This tests the null hypothesis that a unit root is present in a time series sample. The alternative hypothesis is usually Stationarity or trend-Stationarity. The ADF test was done using XLSTAT.

Table 7: Augmented Dicker-Fuller Test

Dickey-Fuller test (ADF (stationary))					
	ROA	Mobile Banking Transaction s	Internet Banking Transaction s	Size	Capital Adequacy
Tau (Observed value)	-5.170	-2.786	-3.267	-2.974	-5.170
Tau (Critical value)	-0.840	-0.840	-0.840	-0.840	-0.840
p-value (one-tailed)	0.000	0.199	0.074	0.141	0.000
Alpha	0.05	0.05	0.05	0.05	0.05
Test interpretation: H0: There is a unit root for the series. Ha: There is no unit root for the series. The series is stationary.					

As computed above, the P value (0.000) for ROA is below the significance level alpha of 0.05. Therefore, we should reject the null hypothesis, H₀, which states that there is a unit root for the series. Thus, the series is stationary. The computed p-value (0.199) for Mobile Banking Transactions is greater than the significance level alpha=0.05, hence one should accept the null hypothesis H₀. This series is thus not stationary. As the computed p-value (0.141) for size of bank is higher than the significance level alpha of 0.05, one should accept the null hypothesis H₀, and reject the alternative hypothesis H_a, which states that there is a unit root for the series. Therefore, the series for size of bank is not stationary. The computed p-value (0.074) for Internet Banking Transactions is greater than the significance level alpha=0.05, thus one cannot reject the null hypothesis H₀. This series is not stationary. The computed p-value (0.000) for Capital Adequacy is less than the significance level alpha=0.05, consequently, one should reject the null hypothesis H₀. Therefore, the series is stationary.

4.4.6 Test for Heteroscedasticity

A test for Heteroscedasticity was done. Heteroscedasticity occurs when the standard errors of a variable, observed over a given duration, are non-constant. It is a violation of the linear regression assumptions if detected from the variables. Homoscedasticity on the contrary implies that the regression model may be well defined, thus providing a good explanation of the dependent variable's performance. To test it in the data, the White's test was performed using XLSTAT and the results shown on the table below.

Table 8: White Test

White test:	
LM (Observed value)	53.976
LM (Critical value)	23.685
p-value (Two-tailed)	0.086
Alpha	0.05
Test interpretation: H0: Residuals are homoscedastic Ha: Residuals are heteroscedastic	
As the computed p-value is greater than the significance level $\alpha=0.05$, one should accept the null hypothesis H0, and reject the alternative hypothesis Ha.	

The test interpretation was based on the null and alternative hypothesis, and the significance level α . The null hypothesis was that the residuals were homoscedastic. The alternative hypothesis was that the residuals were heteroscedastic. Therefore, given a p value (significance level α) of greater than 0.05, the null hypothesis is accepted for ROA, mobile banking transactions, internet banking transactions, size and capital adequacy variables, which means that the residuals were not Heteroscedasticity. We reject the alternative hypothesis and deduce that the residuals were Homoscedasticity.

4.5 Regression Analysis

Table 9: Model Summary

<i>Model Summary</i>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.832 ^a	.692	.671	.0241716
a. Predictors: (Constant), Capital Adequacy, Internet Banking Transactions, Mobile Banking Transactions, Size				

From the results in the above table, the adjusted R squared (R^2) is the coefficient of determination which shows the variance in ROA due to changes in capital adequacy, internet banking transactions, mobile banking transactions and size of the bank. It is 0.671, which means that 67.1% of the total variance in ROA has been explained by this model's predictor variables. The R squared (R^2) is 0.692 which depicts that 69.2% of the variation or changes in the ROA was explained by the changes in the capital adequacy, internet banking transactions, mobile banking transactions and size of the bank.

<i>ANOVA^a</i>						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.020886	4	.005221	8.937	.000 ^b
	Residual	.087640	150	.000584		
	Total	.108526	154			
a. Dependent Variable: ROA						
b. Predictors: (Constant), Capital Adequacy, Internet Banking Transactions, Mobile Banking Transactions, Size						

To determine the goodness of fit of the model, ANOVA analysis was done. From the above table, the significance level of the model is 0.000 (below 0.05) which displays that the model is statistically significant for predicting how capital adequacy, internet banking transactions, mobile banking transactions and size of the bank affect financial performance (ROA) of Kenyan banks. The sum of squares based on regression was 0.020886, which was divided by the degrees of freedom, 4, to obtain the regression mean square of 0.005221. The residual or error sum of squares was 0.087640, which gave a mean square of 0.000584 after its division by degrees of freedom of 150.

Table 10: Regression Coefficients

<i>Coefficients^a</i>						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.006	.007		-.931	.353
	Mobile Banking Transactions	.006	.006	.154	2.967	.025
	Internet Banking Transactions	.010	.003	.350	3.128	.002
	Size	.005	.003	.240	2.506	.034
	Capital Adequacy	.017	.021	.066	.846	.399
a. Dependent Variable: ROA						

From the above results, the following regression model was established;

$$Y = -0.006 + 0.006X_1 + 0.010X_2 + 0.005X_3 + 0.017X_4$$

From the findings of the regression analysis, it was found that holding the capital adequacy, internet banking transactions, mobile banking transactions and size at constant zero, the ROA would be -0.6%. The model further reveals that a unit increase in mobile banking transactions would lead to an increase in ROA by a factor of 0.006. A unit increase in

internet banking transactions would lead to an increase in ROA by a factor of 0.010, and a unit increase in the size would lead to an increase by the 0.005 factor. A unit increase in capital adequacy would lead to an increase in ROA by a factor of 0.017. It is evident that internet banking transactions, mobile banking transactions and size are statistically significant at 5% level of significance ($p < 0.05$), while capital adequacy is not statistically significant ($p > 0.05$). Since the t-test values for internet banking transactions, mobile banking transactions and size variables are above the absolute value of 2, and then the relationship between these variables and the ROA is statistically significant. However, the relationship between capital adequacy and ROA is statistically insignificant due to the low value of $t(t=0.846)$ which is below the absolute value of 2.

4.6 Summary and Interpretation of the Findings

The findings reveal that the internet banking transactions, mobile banking transactions and size of the bank have significant effect on the financial performance of banks in Kenya. The capital adequacy of the bank has insignificant impact on its financial performance. Furthermore, the model suggests that 69.2% of changes in the ROA is explained by these independent variables, thus 30.8% is explained by other factors.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter gives a summary of the data findings outlined in the previous chapter, conclusions and policy recommendations. Therefore, the chapter is structured into a summary of findings, conclusions, limitations, recommendations and suggestions for further future studies.

5.2 Summary of findings

The study analyzed the impact that financial technology has on the financial performance of banks in Kenya. The correlation analysis showed that mobile banking transactions have a strong positive relationship with financial performance($r=0.618$). Furthermore, it is statistically significant in relationship to ROA since its p value was less than 0.05($p=0.000$). Regression analysis showed that mobile banking transactions are directly related to financial performance. This implies that any reduction in mobile banking transactions has a negative effect on the ROA, hence financial performance, of the banks. An increase in mobile banking transactions leads to an increase in ROA, thus positively affecting a commercial bank's financial performance.

Additionally, the study intended to establish how size of the bank affects its financial performance in Kenya. The results from correlation analysis exhibited that the size of the bank has a moderate positive relationship with ROA($r=0.473$).

It is statistically significant in relationship to the ROA since its p value was 0.000, which is below 0.05. Regression analysis presented how the size of the bank is positively related to the ROA. This suggests that any reduction in the size of the bank has a negative effect on the ROA, thus negatively affecting financial performance. An increase in the size of the bank leads to an increase in the ROA, which leads to an increase in financial performance. Moreover, the study analyzed how capital adequacy affects the commercial banks' financial performance in Kenya. The results from correlation analysis unveiled that capital adequacy has a weak positive relationship with ROA($r=0.074$). It is statistically insignificant in relationship to the ROA since its p value was 0.360, which is greater than 0.05. Regression analysis revealed how the capital adequacy is positively related to the ROA. This suggests that any reduction in the capital adequacy of the bank has a negative

effect on the ROA, thus negatively affecting financial performance. An increase in the capital adequacy of the bank leads to an increase in the ROA, which leads to an increase in financial performance.

The study aimed to establish how internet banking transactions influence banks' financial performance. The findings from correlation analysis disclosed that internet banking transactions have a strong positive relationship with financial performance ($r=0.720$). It is statistically significant in relationship to ROA since its p value was 0.000, which is less than 0.05. Regression analysis displayed how internet banking transactions is positively related to banks' financial performance. This implies that any decrease in internet banking transactions has a negative effect on the ROA, thus financial performance, of the banks. An increase in internet banking transactions leads to an increase in ROA of these financial institutions, thus increasing their financial performance. The model summary revealed that the value, adjusted R squared (R^2), is 0.671, which means that 67.1% of the total variance in the ROA has been explained by the independent variables. The R squared (R^2) is 0.692 which means that 69.2% of variation in the ROA was explained by the changes in the predictor variables used in the model.

The model is statistically significant. From the findings, it asserts that financial technology has a significant impact on the financial performance of commercial banks in Kenya.

5.3 Discussion of study

The study found a significant relationship between financial technology and the financial performance of commercial banks in Kenya. This is in line with a previous study conducted by Wachira and Ondigo (2016) which found a significant relationship between technological innovation and the performance of commercial banks in Kenya. Moreover, the study was in line with that conducted by Agboola, Esse and Betek who discovered that there is a positive relationship between digitalization and financial performance of commercial banks enabling Banks' to attain its goal of maximizing profit and providing core customer focused services such as convenient Mobile banking services.

The results of the study may differ from previous studies due to the difference in the time period covered, population of the study and choice of variables.

5.4 Conclusion

The study established that financial technology in commercial banks of Kenya affected their financial performance as evidenced by the regression model which, indicated by the adjusted R-square, showed a strong relationship between the variables given a value of 0.671. The model accounted for 69.2 % of the total observations in the financial performance of commercial banks in Kenya.

5.5 Limitations of the Study

The study used a single measure of financial performance i.e. return on assets (ROA). Nevertheless, there are other financial performance measures such as return on equity (ROE), among others.

The study also concentrates on the banking industry which makes the findings inapplicable in other industries such as manufacturing and insurance.

Due to time constraints, the study utilized secondary data from the CBK bank supervision reports and individual banks' annual reports for the five years which was not long enough to take care of the variations in the variables as well as recent issues affecting commercial banks in Kenya.

5.6 Recommendations

Based on the study's findings, investment managers in the banking sector should increase their investment in financial technologies due to the high positive effect they have on the banks' profitability.

The Central Bank of Kenya should review regulations for commercial banks to encourage them to invest in financial technology and digitization of transactions. Furthermore, the banks should also review their capital adequacy requirements based on the study's findings that found a positive relationship with their performance.

5.7 Suggestions for Further Research

This research intended to establish the influence of financial technology on the financial performance of commercial banks. Therefore, further research is recommended on technological factors that influence the performance of investment firms. This will enable management, investment consultants and researchers in these firms to identify factors that determine the success or failure of use of technology and digitization that would help in

proper investment decision making. Further research on other factors that impact the financial performance of commercial banks in other countries should be done to account for the variation in financial performance not explained by financial technology variables used in this study.

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