

**THE EFFECT OF FINANCIAL TECHNOLOGY ADOPTION ON THE
FINANCIAL PERFORMANCE OF MICROFINANCE BANKS IN KENYA**

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DECLARATION

I, the undersigned, hereby affirm that the aforementioned project is entirely my own and that it has not been submitted to any educational establishment of a higher level for evaluation.


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This project has been submitted for review with my authorization as the supervisor at the university.

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DEDICATION

I would want to thank God Almighty, my maker and my rock, and the giver of all insight, understanding, and wisdom, for inspiring me to write this. He has sustained me throughout this program, and I have achieved great heights because of Him. I'd also want to express my gratitude to my family for their unending love and encouragement, which has pushed me to do all in my power to see this project to a successful finish. I pray that God blesses you.

TABLE OF CONTENTS

DECLARATION.....	ii
ACKNOWLEDGEMENT	iii
DEDICATION	iv
TABLE OF CONTENTS	v
LIST OF FIGURES	viii
LIST OF ACRONYMS AND ABBREVIATIONS	x
ABSTRACT.....	xi
CHAPTER ONE INTRODUCTION.....	1
1.1 Background of the Study	1
1.1.1 Financial Technology Adoption	2
1.1.2 Financial Performance	3
1.1.3 Microfinance Banks	4
1.2 Research Problem.....	5
1.3 Research Objectives	7
1.4 Value of the Study.....	8
CHAPTER TWO: LITERATURE REVIEW.....	9
2.0 Introduction.....	9
2.1 Theoretical Review.....	9
2.1.1 Technology Acceptance Model.....	9
2.1.2 Innovation Diffusion Theory.....	10
2.1.3 Resource Based Theory	12
2.2 Determinants of Financial Performance	13
2.3 Financial technology	13
2.3.1 Size of the firm	13
2.3.2 Capital Adequacy	14
2.3.3 Assets Quality	14
2.3.4 Management Efficiency.....	15

2.3.5 Earning quality	15
2.3.6 Liquidity management	16
2.4 Empirical Review	16
2.4.1 International Evidence	16
2.4.2 Local Evidences	19
2.5 Conceptual Framework.....	20
2.6 Summary of Literature Review and Research Gaps	22
CHAPTER THREE: RESEARCH METHODOLOGY	23
3.0 Introduction.....	23
3.1 Research design.....	23
3.2 Population	24
3.3 Data Collection Methods	24
3.4 Data analysis	25
3.4.1 Diagnostic tests.....	25
3.4.2 Analytical Model	26
3.4.3 Test of Significance	27
CHAPTER FOUR: DATA ANALYSIS RESULTS AND FINDINGS.....	28
4.1 Introduction.....	28
4.2 Descriptive Statistics	28
4.2.1 Return on Assets	29
4.2.2 Mobile Banking	29
4.2.3 Internet Banking	30
4.2.4 Capital Adequacy.....	30
4.2.5 Banks Size	31
4.3 Diagnostic Tests.....	32
4.3.1 Normality Test	32
4.3.2 Multicollinearity Test.....	33
4.3.3 Homoscedasticity	33
4.4 Correlation Analysis.....	34

4.5 Regression Analysis	36
4.6 Discussions of the Findings	38
CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	40
5.1 Introduction.....	40
5.2 Summary of Findings	40
5.3 Conclusion	41
5.4 Recommendations for Policy and Practice	42
5.5 Limitations of the Study	43
5.6 Suggestions for Further Research	43
REFERENCES.....	45
APPENDICES	48
APPENDIX I: DATA COLLECTION FORM.....	48
APPENDIX II: LIST OF MICROFINANCE BANKS IN KENYA	49
APPENDIX III: DATA SUMMARY	50

LIST OF FIGURES

Figure 4.1: Return on Assets	29
Figure 4.2: Mobile Banking.....	29
Figure 4.3: Internet Banking.....	30
Figure 4.4: Capital Adequacy	31
Figure 4.5: Bank Size	31

LIST OF TABLES

Table 4.1: Summary statistics	28
Table 4.2: Normality test	32
Table 4.3: Multicollinearity Test	33
Table 4.4: Autocorrelation.....	34
Table 4.5: Correlation Analysis	35
Table 4.6: Model Summary	36
Table 4.7: Analysis of Variance	36
Table 4.8 Regression Coefficients	37

LIST OF ACRONYMS AND ABBREVIATIONS

ATMs	Automated Teller Machines
FinTech	Financial Technology
CRM	Customer Relationship Management
CBK	Central Bank of Kenya
KCB	Kenya Commercial Bank
IT	Information Technology
MFBs	Microfinance Banks
NIMs	Net Interest Margins
ROA	Return on Assets
ROE	Return on Equity
SMS	Short Messaging Service
TAM	Technology Acceptance Model

ABSTRACT

The microfinance industry in Kenya is regarded as one of the most dynamic in all of Sub-Saharan Africa. It provides assistance to those who are economically disadvantaged via a wide branch network as well as a variety of institutional businesses. The growth of a traditional banking and financial services industry in Kenya has been hampered by a number of factors that are interconnected and mutually inhibiting. As a result, Kenya has seen an increase in the demand for microfinance. Some of the causes that have been holding back Kenya's banking and finance industry in recent years include the sector's own structure and makeup, a lack of proper regulation and control, and the conservative commercial business practices of profit-focused financial institutions. All three of these things have played a role in the industry not living up to its promise. The study's goal is to analyze how microfinance institutions in Kenya have fared economically after adopting new financial technologies. Two theories underpin this study: the potential for disruptive innovation and the weight of consumer demand. Financial technology (FinTech) is now increasing at an exponential pace, and this will have a significant influence on the banking industry. The present investigation made use of a descriptive study design since its primary objective was to explain the appearance of a particular behavioral trait in response to the influence imposed by an independent variable. The population of the research consisted of all 14 microfinance institutions that were operational throughout the time period between 2018 and 2022. The findings also indicate that there is a positive considerable link between internet banking ($r= 0.434$, p value <0.05), capital sufficiency ($r= 0.612$, p value <0.05), bank size ($r= 0.382$, p value <0.05), and financial success. This indicated that greater levels of financial performance among Kenyan microfinance institutions are associated to mobile banking, internet banking, enough capital, and the size of the bank. R Square was 0.402 in value. This indicated that financial technology use, capital adequacy, and bank size were responsible for 40.2% of the difference in ROA-measured financial performance. It's possible that exogenous causes are responsible for the 59.8 percent that couldn't be accounted for. The authors found that the use of financial technology, such as mobile banking and internet banking, increased financial performance as measured by ROA. The findings from this study constitute the basis for the aforementioned conclusions. This suggests that between 2018 and 2022, microfinance banks significantly improved their efficiency thanks to the use of cutting-edge financial technologies.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The existing theoretical framework presents a novel monetary paradigm that leverages technology as a means to provide a diverse array of financial services, including settlement, financial management, and financing. The achievement of this objective is facilitated via the use of emerging technologies, including cloud computing, mobile payment systems, and social media platforms (Schueffel, 2016). In this emerging paradigm, technology assumes a pivotal role in the delivery of these services. Due to the paradigm shift noted above, there has been a noticeable rise in the public's acceptance and use of FinTech services. These services include several areas such as online banking and mobile payments, among other fields. As a result, traditional banking encounters a significant peril as individuals undergo a paradigm shift in their account management practices (Hassan and Misrina, 2021). As per the analysis conducted by experts at Standard and Poor's, the potential ramifications of FinTech on the worldwide financial sector are poised to be of significant magnitude, thereby instigating a substantial metamorphosis of conventional financial offerings and provisions.

FinTech has indisputably acquired a vital position within the complicated architecture of the financial services industry, particularly in respect to its symbiotic connection with conventional banking institutions. This is especially the case in light of the fact that traditional banking institutions are able to benefit from the presence of fintech. The availability of financial goods and services is rising, particularly for those who live in rural areas that are devoid of any established financial infrastructure. Not only can financial technology enhance the accessibility of these commodities, but it also has the potential to render them more cost-effective by reducing transaction costs for the banking sector, thereby enabling the transfer of these savings to consumers. When one considers the convergence of affordable mobile telecommunication devices and ubiquitous cellular networks, coupled with the aspiration of achieving a global economy that encompasses all individuals, the realization of such a scenario may not be as remote as one might initially surmise (Bames, 2014).

To date, the discourse has encompassed two conjectures, namely the concept of disruptive innovation and the influence of consumer demand. The banking sector is positioned to be profoundly impacted by the rapid development of FinTech, which is now expanding at an exponential rate. The idea behind this theory is that the emergence of FinTech would displace the establishment of new financial institutions because of its capacity to satisfactorily meet the demands of customers. In contrast, the hypothesis of disruptive innovation claims that market players would adhere to and apply pioneering technologies in order to provide services that are both accessible and inexpensive, hence engendering a high degree of competition within the market (Nguyen, 2022). According to Yударuddin (2022), the theoretical framework of customer theory elucidates the phenomenon in which FinTech startups undertake the displacement of antiquated facilities across the financial services sector, thereby effectively catering to the discernible exigencies articulated by the customer base. The theoretical framework of disruptive innovation posits that FinTech startups accrue advantages from pioneering technological advancements that aim to furnish cost-effective and convenient service accessibility to clientele, thereby engendering substantial competition vis-à-vis conventional banking institutions.

The study that was carried out by Buchak and colleagues (2018) is regarded as a groundbreaking venture in the field of academic inquiry. This is because it is the very first attempt to take into account the impact of regulatory considerations on an investigation into the effects that FinTech credit has on the efficiency of banks. The inherent capacity of FinTech to improve the realm of financial services through the amelioration of service quality, the facilitation of cost-effective transactions, and the fortification of business frameworks has been the subject of multiple scholarly investigations, including the seminal works of Nguyen (2022) and Chen et al. (2019). Moreover, the scholarly work conducted by Yao and Song (2021) has highlighted the potential of FinTech to facilitate the implementation of diversification strategies within the realm of commercial banking. According to the results of Li et al. (2017), there is a clear link that can be seen between the stock returns of financial institutions and the growth of the FinTech industry.

1.1.1 Financial Technology Adoption

Within the current banking milieu, the utilization of technology can be delineated into three discrete classifications. Primarily, we encounter the phenomenon of customer-independent

technology, a paradigm characterized by the autonomous execution and consummation of transactions by customers, devoid of any direct human engagement with the banking establishment. Prominent instances of this phenomenon encompass the utilization of ATMs, telephonic banking services, and the advent of Internet banking. Furthermore, we are confronted with the phenomenon of customer-assisted technology, whereby bank personnel employ technological resources to expedite the execution of various transactions. In the context of call centers, it is observed that customer service officers make use of CRM Systems as a means to gain a comprehensive understanding of a customer's profile, thereby enabling them to promptly address inquiries pertaining to banking transactions and real-time billings (Guttek & Welsh, 1999)

The concept of smartcard banking can be characterized as a financial framework whereby transactions are facilitated through the employment of electronic cards, specifically ATM cards, debit cards, and credit cards. The current system offers customers a notable level of convenience by equipping them with the necessary tools to access funds, carry out transfers, and acquire information related to their accounts, all without requiring a physical visit to the banking institution. Strategically situated within urban agglomerations, a diverse array of establishments, encompassing supermarkets, transportation hubs, and hotels, house facilities that are specifically designed to accommodate and facilitate the utilization of smart card technology. Mobile banking, colloquially referred to as M-banking, entails the implementation of financial transactions via the utilization of portable electronic devices or stationary wireless devices. The dissemination of instructions transpires via auditory modalities or the employment of Short Messaging Service (SMS) as a conduit for transmitting the information to the computational framework.

1.1.2 Financial Performance

The evaluation of fiscal performance holds significant importance as a metric for appraising the financial well-being of corporations within a specific sector or across divergent sectors, thereby enabling purposeful comparisons. As per the scholarly exposition put forth by Al-Matari, Al-Swidi, and Fadzil (2014), the notion of financial performance can be explicated as the organizational aptitude to proficiently accomplish a range of pre-established financial goals, encompassing, albeit not restricted to, the attainment of profitability. The idea of a company's

"financial performance" may be seen as an evaluation measure that evaluates the degree to which a company has achieved or exceeded certain financial standards that were set before the company was founded. This empirical observation is useful for elucidating the degree to which financial goals are being effectively reached, as its primary purpose.

There is a large selection of different financial ratios that may be used to express how well an organization is doing financially. The metrics described above include a number of other financial ratios, such as activity ratios, liquidity ratios, debt ratios, and profitability ratios. These ratios have been the subject of substantial elaboration by Bouba (2011) in their academic work, which can be found here. The scholarly elucidation of diverse viewpoints, encompassing but not limited to liquidity, profitability, and solvency, has been undertaken by Mwangi and Angima (2016). The evaluation of a corporation's performance can be executed through the utilization of accounting-based indicators that are derived from the entity's financial statements. These metrics encompass Return on Assets (ROA), Return on Equity (ROE), and Gross Profit Margin (Mwangi & Murigu, 2015).

1.1.3 Microfinance Banks

According to KPMG's definition provided in the year 2017, Fintech companies can be characterized as entities that effectively harness technology to optimize their operations and instigate transformative changes within the realm of financial services. These corporations exhibit a steadfast dedication to achieving the highest standards of performance, providing unparalleled satisfaction to their clientele, and showcasing a proven aptitude for outperforming their competitors in a specific domain within the market. The progress made by financial technology companies, commonly known as fintechs, in leveraging digital technology has hitherto been observed primarily within the domains of lending, financial advisory services, insurance, and payment systems.

In the Kenyan context, a multitude of financial technology (fintech) enterprises have emerged, proffering a diverse array of services that have successfully permeated the market. According to the authoritative report published by the Communications Authority of Kenya in 2018, a comprehensive enumeration of the entities that have duly registered with said authority to engage

in the provision of mobile money services reveals the following prominent companies: Airtel Networks Ltd, Safaricom Plc, Finserve Africa Ltd, Telkom Kenya Ltd, Mobile Pay Ltd, and Sema Mobile Services. In addition to the aforementioned entities, it is worth noting that there exist several other companies that engage in the provision of payment services, albeit without being formally registered with regulatory bodies. Notable examples include Cellulant, Jambopay, and Pesapal, among others. In the contemporary financial landscape, a multitude of enterprises, including but not limited to Branch, Tala, and Micromobile, have emerged as purveyors of mobile lending services, catering to the needs of individual borrowers. Conversely, entities such as Musoni, Saidia, and Umati Capital have positioned themselves as providers of loans specifically tailored to the exigencies of entrepreneurial ventures. In contemporary financial landscapes, entities such as Odyssey Capital and PesaZetu have emerged as providers of peer-to-peer (P2P) lending services.

1.2 Research Problem

FinTech, a groundbreaking and disruptive innovation designed to disrupt conventional economic mechanisms in the delivery of financial services, encompasses not only the inherent benefits of cost reduction but also assumes a pivotal role in facilitating the expansion of client access beyond the boundaries of established networks. Consequently, it engenders opportunities for seamless and effective cross-functional interactions, thereby fostering an environment conducive to enhanced efficiency and collaboration (San-Jose, Ituralde, & Maseda, 2009). The emergence of Financial Technology (Fintech), as explicated by Demertzis, Merler, and Wolff (2017), has precipitated a substantial tumult within the domain of commercial banking, thereby inciting a profound perturbation. The aforementioned disruption, distinguished by its abrupt and far-reaching characteristics, can be ascribed to the ingress of prominent digital internet enterprises into the domain. It is imperative to duly acknowledge that enterprises such as Google, Branch, Amazon, and Apple have garnered commendation within the domain of financial technology, commonly referred to as fintech. Nevertheless, it is of utmost importance to emphasize that these entities have not yet attained comprehensive market saturation. With their extensive access to substantial volumes of customer data and their adeptness in actively engaging with customers in the realm of financial services, they exhibit a heightened potentiality. The realm of financial technology (fintech) granting has demonstrated a persistent trajectory of expansion, whereby it is

currently being utilized by social media platforms as a mechanism to efficiently engage in reciprocal promotion of their financial products and augment their understanding of customer behavior.

Upon the culmination of the temporal unit denoted as the calendar year 2017, the sovereign entity known as the Republic of Kenya exhibited a noteworthy manifestation, namely the presence of an estimated aggregate of forty distinct entities engaged in the realm of financial technology (commonly referred to as fintech) within the geographical confines of its jurisdiction. The entities mentioned above provide a wide array of services that encompass payment facilitation, remittance processing, financing provision, financial banking, platforms for crowdfunding, and other similar offerings that were historically limited to financial institutions. In accordance with an exhaustive inquiry conducted by PricewaterhouseCoopers (2017), entities operating within the financial technology sector, colloquially known as fintechs, have emerged as formidable competitors to conventional banking establishments, thereby posing a threat to their market hegemony and subsequently encroaching upon their profitability. This phenomenon can be ascribed to the reality that these entities are inclined towards serving individuals who have historically been neglected by conventional banking establishments, specifically those who are economically disadvantaged and the younger demographic that lacks financial stability. Furthermore, these entities proffer their services to burgeoning business enterprises distinguished by subpar credit scores or a scarcity of financial histories. Fintech enterprises have bestowed upon individuals an unprecedented opportunity to proficiently administer their financial affairs, as they exhibit the inherent capacity to scrupulously monitor and meticulously document their expenditures.

A plethora of scholarly inquiries have been embarked upon with the aim of scrutinizing the multifaceted implications of financial technology (fintech) on the banking sector at a global level. In congruence with the scholarly contributions of Navaretti et al. (2017), it becomes apparent that China assumes a preeminent position within the global economic milieu, specifically with regards to its conspicuous adoption of financial technology (fintech). Telecommunication enterprises play a pivotal role in facilitating the provision of deposit services to individuals, thereby affording them the opportunity to amass augmented interest rates vis-à-vis

conventional banking institutions, which are constrained by regulatory limitations on interest rates. The dearth of expansive branch networks within the banking sector in China has engendered an environment conducive to the infiltration of financial technology companies (fintechs). In accordance with the scholarly research conducted by Vives (2017), it has been postulated that within the geographical boundaries of the United States, loans provided by financial technology (fintech) enterprises encompass a substantial proportion, precisely one-third, of the aggregate loans disbursed. As per the scholarly work conducted by Buchak et al. (2017), the implementation of rigorous regulatory measures concerning the enhancement of capital requisites and legal supervision within the domain of banking has resulted in a notable escalation in the proliferation of fintech enterprises and other entities engaged in activities within the purview of shadow banking.

Ngigi's (2012) empirical analysis has given a persuasive result, which postulates that the rise of financial innovation within the banking sector has had a noticeable and considerable influence on the total profitability of these aforementioned institutions. Ngigi's (2012) empirical investigation of the Kenyan social and economic context supports this conclusion. Financial institutions are continually contributing to the process of generating new commodities, as found by the academic research conducted by Kinuthia (2008). Banks have a well-deserved reputation for being forward-thinking, but the pace of innovation depends on several variables, including the size of the bank, its ownership structure, and how long it has been in business. The empirical evidence has unequivocally substantiated the proposition that the implementation of innovative financial instruments and practices possesses the inherent potential to engender economic expansion and enhance the financial efficiency of commercial banking institutions. (CBK,2011). As of present, a dearth of empirical inquiry has been observed within the Kenyan milieu with regards to the pursuit of ascertaining the plausible ramifications of the burgeoning financial technology (fintech) sector on the financial performance of indigenous enterprises operating within said sector. The current inquiry thus endeavors to explicate this gap in the extant body of scholarly work.

1.3 Research Objectives

The study will seek to establish the effect of financial technology adoption on the financial performance of microfinance banks in Kenya

1.4 Value of the Study

The discoveries derived from this investigation shall serve as a scholarly point of reference for individuals of erudition, students, and researchers alike, who may harbor aspirations to embark upon inquiries within the same domain. The investigation will additionally facilitate the discernment of a lacuna in research within this domain for both researchers and scholars, thereby inciting and directing subsequent scholarly inquiries.

The inherent value of this study lies in its capacity to elucidate the multifaceted benefits that accrue to diverse stakeholders when leveraging FinTech as a means of augmenting operational efficacy and mitigating costs. Findings like this may help regulators improve the operational efficiency and overall performance of financial institutions by encouraging the widespread deployment of financial technology across the industry. This will serve as a catalyst for institutions that continue to harbor apprehensions regarding the adoption of said technology, even subsequent to their discovery of its manifold advantages.

The present study aims to incorporate the theoretical frameworks and practical implications into the existing corpus of knowledge. Researchers who possess an inclination towards conducting investigations within this particular domain may effectively leverage the findings of this research as a valuable reference point for the purpose of informing and guiding subsequent scholarly inquiries.

In addition, the results of this research will help to enlighten and support a wide variety of regulatory bodies in their efforts to develop laws and build regulatory frameworks, which will be facilitated by the findings of this study. This research will thus be taken into consideration by the authorities as they participate in the process of formulating rules that would create an environment that is favorable for investors.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This section undertakes a comprehensive review of extant scholarly literature pertaining to the domains of economic technology and banking profitability. The present inquiry is underpinned by a hypothetical foundation, which serves as the guiding framework for this study. A variety of empirical studies on the impact of technology on the bottom line of financial organizations like banks are also summarized in this chapter. The goal of this discourse is to provide a more thorough explanation of a conceptual model that correctly describes the intricate interplay between independent and dependent variables. Following this, a complete synthesis of the existing literature is presented, which ultimately results in a condensed statement of the whole argument.

2.1 Theoretical Review

In this particular section, we shall embark upon a thorough and exhaustive analysis of the fundamental assumptions that serve as the foundation for the intricate and multifaceted interaction between financial technology and the achievement of financial prosperity. The claims that were made before are pertinent to the acceptance model as well as the idea of the spread of innovation.

2.1.1 Technology Acceptance Model

The Technology Acceptance Model, originally proposed by Davis (1989), presents a theoretical framework that expounds upon the complex dynamics between the user's acceptance of emerging technological innovations and their subjective evaluation of the technology's convenience and utility. The Technology Acceptance Theory postulates that the determination of technology utilization is contingent upon a myriad of factors that encompass diverse dimensions. The considerations that were brought up before relate to the apparent efficacy and the perceived user-friendliness that are associated with a certain technology progress (Davis, 1989).

Legris, Ingham, and Collette (2003) have proposed that they have conducted empirical research to support the claim that the TAM serves as a theoretical framework that can effectively explain and predict customer behaviors related to IT. According to Sabi (2014), the Theory of TAM has been established as the dominant and extensively used theoretical framework in academic discussions. The aforementioned claim is supported by an analysis of a sample of one hundred and eighty-eight scholarly articles, of which thirty-one articles, comprising roughly sixteen percent of the entire dataset, were identified as explicitly incorporating the TAM theory. Within the context of this investigation, it is of the greatest relevance to underline the significance of theory as a major factor in understanding the underlying logic behind the incorporation of FinTech within the operational framework of commercial banks. This is of the highest importance. When it comes to the process of integrating and melding newly developed technologies into a particular setting, the way in which humans interact with and respond to newly introduced technical breakthroughs plays an essential role. In this scholarly inquiry, we aim to undertake a comprehensive investigation to determine the relative distribution of customers who have engaged in the utilization of online banking services within the geographical boundaries of the Republic of Kenya. The present investigation endeavored to establish the relationship between the efficacy of FinTech and the subjective assessments rendered by its users.

2.1.2 Innovation Diffusion Theory

Diffusion, within the domain of social sciences, pertains to the intricately nuanced process by which a novel conceptual framework is propagated among the constituents of a particular system over a temporal trajectory, culminating in its assimilation and subsequent validation. The dynamic progression of ideation, diffusion, and subsequent assimilation or dismissal of innovative concepts gives rise to significant ramifications and instigates profound paradigmatic shifts within a specified milieu (Gongera et al., 2013). Theoretical underpinnings establish a conceptual framework that elucidates the interdependent nature of four fundamental factors that are inherently associated with the dissemination of a novel concept. The factors mentioned above encompass the core essence of innovation, the various methods employed to distribute information regarding its advancement, and the temporal and contextual dimensions of the

societal framework in which the inventive ideas are introduced (Rogers, 1995). With respect to the subject of innovation under consideration, Dillon and Morris (1996) along with Rogers (1983 & 2003) have undertaken comprehensive investigations pertaining to this domain. The researchers have effectively discovered a multiplicity of essential components that have a major impact on the process of innovation. It has been shown that the relative benefit of the innovation, its compatibility with existing social norms and standards among users, its degree of complexity, its trialability, and its observability all play key roles in determining the course and consequences of innovation efforts. The aforementioned factors exert a pivotal influence in shaping the process of adoption and diffusion of innovations within a particular contextual framework. In its most elementary form, the theory of diffusion postulates a crucial analysis of the intricate interplay among these dominant factors and supplementary variables, with the aim of discerning the facilitating or inhibiting dynamics that underlie the dissemination of a particular product or practice within a discrete cohort of adopters.

The aforementioned stipulation was initially introduced in the year 1962 and subsequently revised by Rogers (1995). The principal aim of this study is to thoroughly examine the complex dynamics pertaining to the proliferation of novel concepts and technologies within a collective entity, as elucidated by Rogers (1962). As per the scholarly work of Fichman (2000), the notion of diffusion encompasses the intricate mechanism by which knowledge is disseminated within a given industry. The phenomenon of innovation diffusion frequently pertains to the dissemination of ideas, typically transpiring between discrete communities or from a public entity to diverse regions within said community (Rogers, 1962).

In accordance with the extant theoretical framework, the decision to embrace innovations is contingent upon five pivotal factors that pertain to the intrinsic characteristics of said innovations. The factors mentioned above encompass the perceived utility, congruence with requirements, complexity, verifiability, and observability within the sociotechnical framework of technology adoption. The proposed theoretical framework postulates that consumers can be classified into discrete clusters, namely inventors, early adopters, early majority, late majority, and laggards. Theoretical underpinnings suggest that customers, when situated within the framework of innovation adoption phases, manifest notable variations in their individual

characteristics. In congruence with the scholarly discourse presented by Fichman (2000), it becomes apparent that the focal area under scrutiny possesses a paramount significance and thus necessitates a thorough examination.

2.1.3 Resource Based Theory

A competitive edge over competitors may be achieved by a company if it acquires and effectively employs a strategic resource. These highly regarded institutions possess the capacity to achieve significant economic benefits through the strategic utilization of their unique competitive advantages, as elucidated by the seminal research conducted by Barney (1991). In his seminal treatise, Wernerfelt (1984) explicated the notion of tactical resource, delineating its essence as an asset endowed with a distinctive amalgamation of scarcity, value, inimitability, and dearth of viable alternatives. The application of strategic frameworks facilitates the formulation and execution of efficacious methodologies intended to harness favorable conditions. Strategic resources bestow upon organizations a discernible competitive edge by astutely harmonizing the multifarious assortment of resources, proficiencies, and knowledge encompassed within their fundamental capabilities. In the contemporary context, it is of utmost importance to recognize that core competence assumes a central role in bestowing a competitive advantage upon an organization in relation to its competitors, as elucidated by Chi (1994).

Strategy, at its core, can be delineated as a meticulously formulated and orchestrated framework, encompassing a sequence of purposeful endeavors, intricately harmonized with the overarching goals, policies, and diverse undertakings of an enterprise, all with the ultimate objective of propelling the organization towards the actualization of its visionary aspirations (Barney & Clark, 2009). A cogently formulated strategy that is intricately synchronized with the organizational goals and objectives assumes a pivotal role in the methodical aggregation and allocation of the company's financial resources, thereby establishing a pragmatic framework predicated upon the firm's inherent capabilities, the prevailing external environmental conditions, and the dynamic alterations influenced by their competitors. In accordance with the seminal contribution of Mintzberg (1994), the conceptualization of strategy encompasses the process of formulating a meticulously constructed blueprint of sequential actions, which are carefully devised with the explicit intention of achieving predetermined goals and objectives. The

resource-based theory, in its capacity as a valuable adjunct to strategic analysis and decision-making processes within the domain of organizational management, assumes a position of significance.

2.2 Determinants of Financial Performance

The assessment of the economic performance of the banking system is predicated upon six factors that have been derived from the revised Capital Adequacy, Asset Quality, Management, Earnings, Liquidity, and Sensitivity to Market Risk (CAMEL) framework. The aforementioned factors encompass a comprehensive evaluation of the financial institution's performance, namely Capital Adequacy, Asset quality, Management quality/Assessment, Earning ability, and Liquidity.

2.3 Financial technology

The emergence of technological advancements has given rise to improved methods of conducting business in the modern era (Stiroh, 2001). Ongori and Migiro (2010) propose that the advent of ICT has led to a sea change in the factors that determine the efficacy with which financial institutions operate and the quality with which they provide services to their customers. Financial institutions have made significant capital investments in technology and have embraced financial technology networks as a widely prevalent mechanism for dispensing a wide array of value-added products. These developments have been motivated by the goals of global expansion, improved customer service, and decreased transaction costs. According to Brynjolfsson and Hitt (1996), financial technology, often known as fintech in a more colloquial sense, acts as a powerful catalyst for enhancing production capacities and accelerating monetary advances inside the organizational realm. The emergence of financial technology has brought about a significant transformation in the accessibility and cost-efficiency of goods and services, mostly due to the decreased transaction costs experienced by banking institutions (Bames, 2014).

2.3.1 Size of the firm

Schmalensee (2001) presents a seminal contribution to the field of organizational analysis by offering an all-encompassing elucidation of the concept of size. The conceptualization of size,

in this context, pertains to the quantification of an entity's total assets, thereby encompassing the comprehensive extent and breadth of its resource foundation. Moreover, Schmalensee (2001) conducts a comprehensive analysis of diverse accounting performance metrics, encompassing but not restricted to return on assets and profit margin, with the aim of elucidating the intricate facets of firm size and its ramifications for organizational effectiveness. The assessment of a firm's magnitude can be quantified through a multitude of metrics, encompassing but not restricted to the quantification of its workforce, sales performance, asset valuation, and value augmentation. The aforementioned measures have been widely employed in the realm of scholarly discourse, as evidenced by the work of Pandy (2005).

2.3.2 Capital Adequacy

The concept of resource sufficiency encompasses the financial resources that are anticipated to be in a state of equilibrium with the inherent risks encountered by banking institutions. The risks involved in this context include market, operational, and credit risks. The fundamental purpose of maintaining this balance is to enhance the absorption of any deficiencies and protect the bank's debt controller (Karlyn, 1984). The Capital Adequacy Ratio, sometimes referred to as the capital-to-risk weighted assets ratio, plays a crucial role in protecting shareholders and maintaining the resilience and efficiency of worldwide economic systems. The assessment of capital encompasses two discrete classifications: tier one capital, which possesses the capacity to absorb deficits without mandating the cessation of a financial institution within the market, and tier two capital, which is capable of absorbing deficits in the event of business termination and thereby conferring a relatively diminished level of protection for shareholders (Karlyn, 1984).

2.3.3 Assets Quality

The adverse ramifications of asset quality on the financial soundness of banking institutions have been duly recognized by Grier (2007). The procedure of loan selection represents an essential constituent within the domain of asset classification, specifically within the purview of financial institutions. In accordance with the prevailing discourse within the field, it is of utmost importance to duly recognize that banks are confronted with a paramount peril, namely the occurrence of loan losses that arise as a result of providing suboptimal loans. In accordance with Frost's (2004) postulation, the prominence of asset metrics becomes discernible by employing

non-performing loan ratios as a proxy for asset excellence, alongside the establishment of provisions or allowances for loan losses reserves.

The existing framework for categorization postulates that loans can be delineated into five discrete cohorts, specifically denominated as the standard, sub-standard, special mention, doubtful, and bad losses categories. Non-performing loans (NPLs) refer to financial liabilities that fall within the lower echelons of the credit quality spectrum, specifically encompassing those that have exceeded their due dates or have not had their interest payments waived for a continuous duration of ninety days, in accordance with the predetermined criteria. Within specific legal jurisdictions, it is customary for regulatory entities to bestow a duration of one hundred and eighty days for the authorization of particular actions, as elucidated by Parven (2011).

2.3.4 Management Efficiency

The effectiveness of managerial practices is a fundamental element of the primary internal factors that form the foundation of the overall performance of a financial institution. The aforementioned indicators serve as representative manifestations of a wide array of financial ratios, encompassing the velocity at which earnings proliferate, the augmentation of aggregate assets, and the pace at which loans experience expansion. The quantification of management's ability to efficiently allocate its financial resources, optimize productivity, and minimize operational costs can be achieved through the utilization of financial ratios. One of the aforementioned ratios possesses the capability to evaluate the extent of managerial acumen in relation to the ratio between operating profits and income (Sangmi & Nazir, 2010). The presence of a significant proportion of operating profit in relation to total income serves as a reliable metric for assessing the organizational competence in terms of functional efficiency and revenue generation.

2.3.5 Earning quality

The notion of income quality encompasses the collective economic benefits obtained from outstanding sales or below-average expenditures, as opposed to spurious revenues resulting from accounting irregularities or occurrences such as stock price fluctuations, variable depreciation, or

modifications in stock valuation methodologies. The examination of patterns in earnings also presents financial institutions with the prospect of maintaining a competitive edge by procuring the requisite capital to efficiently execute the strategic initiatives and tactical maneuvers formulated by the management of the organization (Dang, 2011). The assessment of profitability hinges upon the rate of expansion of aggregate assets, as ascertained through the mean of past asset growth ratios. Furthermore, the consideration of the loan increase ratio, which is obtained by averaging the historical loan increase ratios, and the earnings increase ratio, which is determined by averaging the historical earning increase ratios, is incorporated into the analysis (Jaffar & Manarvi, 2011)

2.3.6 Liquidity management

Liquidity may be defined as the inherent ability of a financial organization to fulfill its fiduciary responsibilities, particularly in relation to its stakeholders. Lenders, investors, and directors all have a vested interest in thoroughly scrutinizing a company's financial records, using liquidity measurement measures as a tool to evaluate the underlying risk linked to its liquidity. The explication of this particular phenomenon commonly entails the juxtaposition of the notion of liquid assets with that of short-term obligations. It is of utmost importance for enterprises characterized by an excessive degree of leverage to undertake strategic initiatives aimed at mitigating the discrepancy between their accessible cash reserves and their outstanding liabilities. According to Dang (2011), the financial ratios that relate to the percentage of client deposits to total assets and the proportion of total credit to client deposits are generally accepted as major indications of a bank's liquidity condition.

2.4 Empirical Review

In this section, the researcher shall undertake a comprehensive evaluation of both international and local studies in order to discern and delineate the existing lacunae within the realm of research.

2.4.1 International Evidence

The research endeavor undertaken by Kagan et al. (2005) aimed to evaluate the ramifications of internet banking on the operational intricacies of community banks situated within the

geographical boundaries of the United States of America. A meticulously selected sample of the 60 most eminent banking conglomerates within the European Union was subjected to a comprehensive sampling procedure that encompassed the temporal domain from 1995 to 2005. The current inquiry utilized a descriptive research design. The present study included the collection of data from the financial statements of the specified financial organizations. The empirical data was subjected to inferential analysis in order to identify noteworthy patterns and correlations. The empirical inquiry has unveiled a positive association between the provision of a heterogeneous range of online banking services and enhanced performance within the realm of financial institutions, particularly those of a banking nature. The researchers have further determined that the adoption of internet-based banking platforms has enabled community-based banks to enhance their earnings potential, as demonstrated by a significant rise in their return on equity. Moreover, the amelioration of their asset quality was attained by means of a diminution in the ratio of unresolved assets that were not exhibiting optimal performance.

In their seminal opus, De Young et al. (2015) undertook an exhaustive inquiry into the profound ramifications of the internet on the productivity and operational efficacy of community banks located in the dynamic urban center of Oslo, Norway. The current inquiry utilized a descriptive research design to conduct an all-encompassing survey involving a total of 29 financial institutions over the period from 2006 to 2010. The variables encompassed within the purview of this investigation pertain to the utilization of online accounts, as well as the deployment of debit and credit services. The study utilized digital questionnaires as a modality for data acquisition. The extra data came from the yearly financial reports of the several banking institutions that were accessed. The empirical research revealed that conventional community banks, in contrast to their internet banking counterparts, experienced a drop in profitability. This decline was attributed to decreasing levels of commercial activities, as seen by decreased figures of deposits and non-interest revenue. The internet banking counterparts of traditional community banks exhibited a rise in profitability. Moreover, it is worth noting that these community banks experienced an escalation in labor expenditures, thereby intensifying their preexisting financial predicaments. Nevertheless, the author expeditiously elucidates that the prevailing economic disparities are expeditiously rectified over the course of time as a direct consequence of the profound impacts engendered by the phenomenon of economies of scale.

In a seminal scholarly investigation, Nader (2011) conducted an exhaustive assessment of the implications arising from the introduction of novel banking practices on the operational intricacies of corporate financial establishments within the geographical boundaries of the Kingdom of Saudi Arabia, encompassing the temporal span from 1998 to 2007. This study used a descriptive research method to analyze in depth the primary effects that emerged as a consequence of the implementation of innovative financial practices in the Riyadh banking industry between 2005 and 2009. The use of questionnaires enabled the acquisition of primary data, which in turn facilitated the direct gathering of first-hand information from respondents, which in turn facilitated the acquisition of primary data. On the other hand, the secondary data that were used in this investigation came from the annual and financial reports of the financial institutions, which supplied additional information that had previously been compiled and documented. The scholar effectively determined that the incorporation of mobile phone technology in the domain of banking, in conjunction with the presence of automated teller machine (ATM) networks and the establishment of physical branch networks, exerted a beneficial impact on the financial profits and operational efficiency of banks operating within the Kingdom of Saudi Arabia. However, the previously quoted research found that firms' profitability did not improve much as a consequence of the widespread use of point-of-sale terminals, personal computer banking, and mobile banking.

In a seminal scholarly endeavor, Kijjambi (2014) embarked upon an exhaustive inquiry into the intricate determinants that serve as the foundation for the economic efficiency of business financial institutions operating within the specific milieu of Uganda. The research endeavor was primarily directed towards comprehensively examining the licensed commercial banking sector operating within the geographical confines of the Republic of Uganda. The empirical data employed in this investigation was obtained from the publicly accessible annual financial statements of diverse financial institutions. The temporal epoch encompassing the years 2000 to 2011 bore witness to the utilization of linear multiple regression analysis. The current investigation has effectively determined that the operational efficiency of domestic commercial

financial institutions in Uganda during the examined period is influenced by a myriad of factors, specifically organizational competence, interest income, asset quality, inflation, and capital adequacy.

2.4.2 Local Evidences

The present investigation, conducted by Githakwa (2011), aimed to undertake an assessment in order to ascertain the degree of implementation pertaining to automated teller machine (ATM) banking services within the commercial banking institutions that are operational in the country of Kenya. The academician used a descriptive study strategy with the intention of carrying out an exhaustive survey that covers each and every one of the 44 commercial banks that were in existence throughout the country between the years 2005 and 2010. The inquiry utilized a composite of secondary data, encompassing both qualitative and quantitative data. The current investigation utilized regression and correlation analyses as methodological instruments for the purpose of data analysis. The researcher's discernment of the ramifications of mobile phone technology and agency banking on the banking industry constitutes a noteworthy observation of considerable import. The empirical evidence reveals a discernible trend wherein financial institutions have progressively directed their resources towards the advancement and execution of these platforms, thereby diminishing their dependence on automated teller machines (ATMs). The strategic realignment being undertaken is predicated upon the objective of augmenting financial inclusivity and broadening the reach of banking services to encompass a wider spectrum of their clientele.

In order to explicate the implications that mobile banking services have on the operational efficiency of SMEs situated within the metropolitan areas of Kenya, Nyaga (2013) undertook an in-depth investigation. The empirical observations were methodically obtained within the spatial boundaries of the Naivasha municipality. The selection of the urban center as a representative specimen was conducted using a purposive sampling technique, motivated primarily by the imperative of optimizing efficiency. This selection was made from a larger pool consisting of 31 municipalities and 24 towns within the nation.

Muthoni (2011) undertook an empirical inquiry with a focal point on the Kenyan Commercial Bank, wherein she employed the Data Envelopment Analysis (DEA) technique to evaluate the

operational efficiency of said institution. The research endeavor entailed an examination of a cohort comprising 168 branches of financial institutions, carefully selected to be indicative of the wider array of branches operating within the nation during the temporal confines of the year 2010. The inquiry utilized extant secondary data procured from the databases of financial institutions. The application of the CCR model was utilized to ascertain the relative efficiency of operational processes within each distinct branch. The empirical inquiry has unveiled that the average operational efficiency throughout the entire banking establishment has been ascertained to be 65%. Within the comprehensive scope of analysis encompassing a total of 168 branches, it is noteworthy to highlight a discernible subset comprising 25 branches that have demonstrated a commendable degree of operational efficacy.

Gitau (2011), explores the complex interplay between economic progress and the fiscal efficacy of commercial banking institutions in the specific context of Kenya, encompassing a substantial temporal span of five years. The current study utilized a quasi-experimental design to scrutinize the research inquiries under consideration. The current investigation centered its attention on a cohort of 44 commercial banks located within the geographical boundaries of Kenya. The data collection process entailed the utilization of primary data, which was acquired through the systematic administration of questionnaires. Furthermore, the procurement of secondary data was undertaken through the acquisition of financial reports and publications emanating from the banks subject to investigation. The empirical evidence derived from the study elucidates that a substantial proportion of institutions, precisely 70%, have wholeheartedly embraced process innovations.

2.5 Conceptual Framework

The conceptual framework, in its most basic form, operates as a graphical portrayal that elucidates the complex dynamic that exists between the variables that are independent and those that are dependent. Within the confines of the predetermined study structure, the variable of interest, which is more frequently referred to as ROA, plays the role of an indicator. The current investigation will encompass the inclusion of firm size and capital adequacy as control variables. The visual representation in Figure 2.1 elucidates the profound influence exerted by financial technology on the various dimensions of financial performance variables.

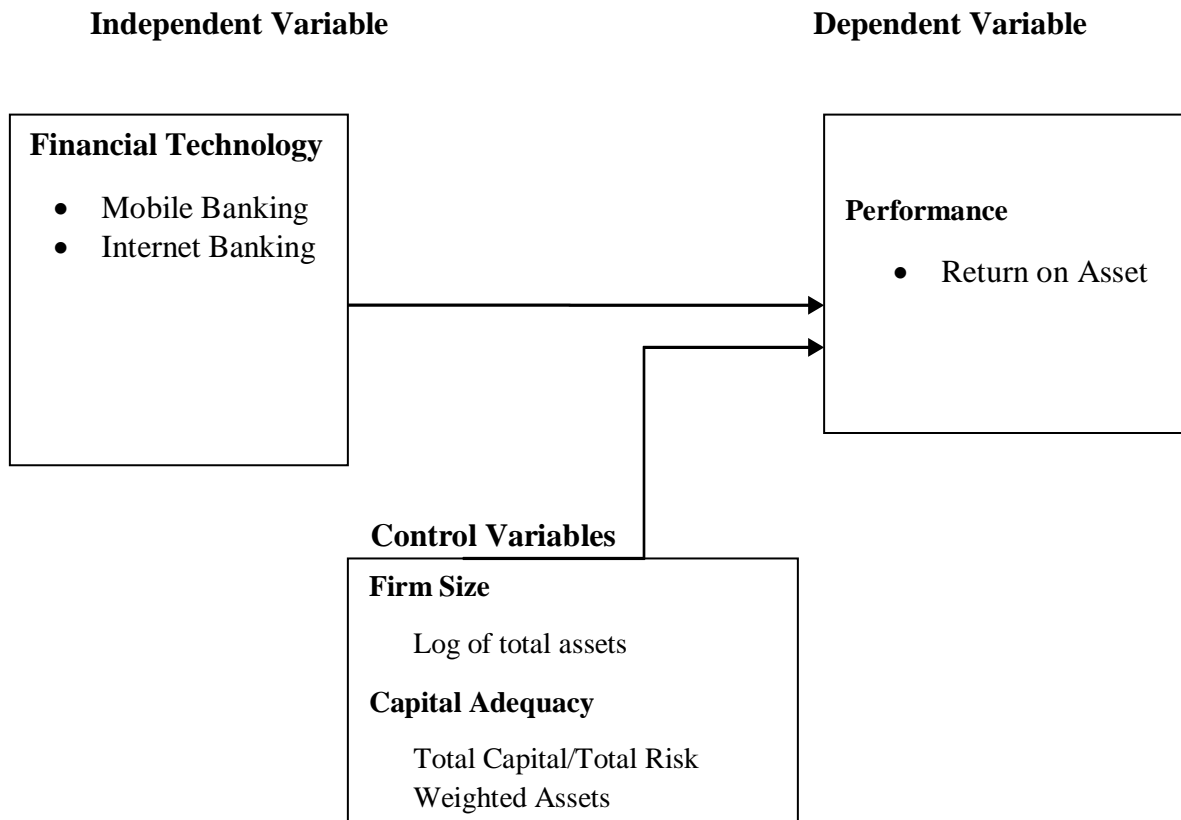


Figure 1: Conceptual Framework

2.6 Summary of Literature Review and Research Gaps

Kagan et al. (2005) investigated the effects of online banking on the internal dynamics of small, local banks in the United States. The study found that online banks that offered more services to their customers performed better than their counterparts who did not provide banking services to their customers over the internet. This was the conclusion that could be drawn from the data. Moreover, the application of this technological platform has been observed to result in an elevated return on equity.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

The next chapter will include a thorough explanation of the methodological framework used in the implementation of this academic investigation. The objective of this chapter is to provide a comprehensive explanation of the research design used, the particular demographic that was chosen as the target group for the study, the procedures implemented for data collecting, and the following analysis performed on the obtained data.

3.1 Research design

According to what Creswell (2009) has suggested, the concept of study purpose can be understood as a methodical framework that outlines the methodologies employed for the acquisition and examination of data, with the ultimate goal of attaining precise and all-encompassing responses to the research inquiries that are currently being taken into consideration. The present investigation made use of a descriptive study design since its objective was to explain the emergence of a particular behavioral trait as a response to the influence imposed by an independent variable (Kothari, 2005). The present publication demonstrates a commendable talent for understanding the complicated dynamics at play between the rapidly developing field of financial technology (FinTech) and the performance metrics of financial institutions operating within the geographical confines of Kenya. This is an accomplishment that deserves appreciation.

The present investigation will make use of a research strategy known as cross-sectional research, with the intention of collecting data at a particular instant in time for a total of five consecutive years. According to Kothari (2005), a cross-sectional study is a research approach that is used to reveal the qualities or features that appear within a selected cohort of people. This may be accomplished by comparing the individuals in the cohort at many points in time. Nevertheless, it is imperative to acknowledge that the present methodology is not explicitly tailored to ascertain any potential causal associations that may underlie the aforementioned traits or characteristics. The present methodology is employed solely for the purpose of acquiring empirical data. The empirical data shall be subsequently employed to further elaborate upon alternative

methodologies with the aim of scrutinizing the experimental relationship.

3.2 Population

As elucidated by Kothari (2004), the notion of population pertains to a comprehensive aggregation of constituent elements that exhibit discernible attributes, thereby enabling the extraction of meaningful inferences through effective utilization. Drawing upon the comprehensive analysis presented in the report issued by the esteemed Central Bank of Kenya (CBK) pertaining to the fiscal year culminating on the 30th of June, 2023, it becomes evident that the sovereign territory of Kenya served as the domicile for a collective assemblage of 14 microfinance banks. The forthcoming inquiry was conducted through an all-encompassing census survey, with the objective of encompassing the entirety of financial institutions operating within the geographical confines of the nation of Kenya. Prior scholarly inquiries, as demonstrated by the seminal study conducted by Ongore (2008), have utilized a comparable methodological framework to explore diverse aspects of board efficacy, alongside other relevant domains of investigation. Furthermore, as posited by Dennis (1989), in situations where the sample size is constrained, it becomes paramount to encompass the entirety of the population in order to ascertain the requisites of an organization.

3.3 Data Collection Methods

Due to the quantitative nature of the data that will be gathered in the following study, secondary data sources will be used. Financial institution financial statements spanning a five-year time period were combed through for a large quantity of secondary data to help this investigation achieve its aims. The data acquisition process specifically targeted variables that hold relevance to the specific research undertaking at hand. The employment of a temporal framework encompassing a quinquennial duration confers an elevated and nuanced modality for discerning and appraising diverse patterns and fluctuations in phenomena (Kieso, et al., 2007). Furthermore, it is imperative to acknowledge that antecedent empirical inquiries have utilized a temporal span of five years for the purpose of executing financial analyses.

To attain a thorough and satisfactory depiction, the current inquiry embarked upon a scrupulous analysis of secondary data sources encompassing duration of five successive years, precisely from 2018 to 2022. The selection of the temporal parameter was undertaken with meticulous deliberation, taking into account the conspicuous pattern of escalating adoption of Financial Technology (FinTech) among the various actors within the financial sector throughout the preceding five-year period. This remarkable transformation has observed a multitude of enterprises undergoing a transition from conventional modes of operation to digitalized business models, predominantly propelled by the imperatives imposed by the prevailing global pandemic. The dataset currently under examination pertains to the comprehensive aggregation of data concerning the measurable value of transactions conducted via internet banking and mobile banking platforms.

3.4 Data analysis

The empirical data acquired shall undergo meticulous examination employing the statistical software package known as SPSS (Version 22.0) in conjunction with the Microsoft Excel application. The forthcoming research's results will be laid out in a comprehensive manner, utilizing both tabular and graphical formats to effectively convey the data. The utilization of percentages, mean values, and standard deviations will be applied as statistical measures to ascertain the underlying trend amidst the parameters under investigation. The present study will employ the method of Regression analysis in order to ascertain the intricate relationship that exists among the parameters that are currently under examination.

3.4.1 Diagnostic tests

The current inquiry shall employ diagnostic assessments to ascertain the dependability of the ensuing discoveries. The fundamental objective underlying the execution of dependence and multicollinearity tests is to effectively diagnose potential complications inherent in a statistical model. The autocorrelation test functions as a quantitative evaluation of the extent of similarity between a provided time series and its associated lagged value across successive temporal intervals. The utilization of the Durbin-Watson test shall be employed with the intention of conducting the assessment. The current assessment introduces a statistical metric spanning from

0 to 4, where a score of 2 denotes the lack of autocorrelation. According to Khan (2008), values below 2 signify the manifestation of positive autocorrelation, whereas values surpassing 2 indicate the manifestation of negative autocorrelation. The application of a Multicollinearity Test will serve to ascertain the lack of bias in the gathered data, as well as to establish the absence of any statistically significant associations among the variables under scrutiny. Accordingly, the present investigation shall proceed to execute an exhaustive assessment of multicollinearity. The phenomenon under consideration becomes apparent when a state of near-optimal or optimal linearity is observed among two or more variables that are independent of one another.

One methodological technique that may be used in the process of determining whether or not multicollinearity is present is the utilization of the variance of inflation. It is possible to draw the conclusion that there is no multicollinearity present when the VIF displays values that are contained within the range of 1 to 10 under the given conditions. On the other hand, it can be shown that the manifestation of multicollinearity becomes obvious when the VIF adopts values below 1 or above the threshold of 10 in either direction. This may be noticed. In the event that the test is unsuccessful, it is of the highest significance to begin the process of normalizing continuous variables by meticulously choosing an appropriate standardization technique from inside the regression dialog box. One plausible technique that could be employed is the implementation of a variable centering approach, as posited by Cohen, West, and Aiken (2013). The primary objective of the current investigation is to evaluate the existence of heteroscedasticity through the utilization of the Breusch-Pagan test. This statistical method serves as a mechanism to determine the degree of uniformity, or lack thereof, in the variability across the observed data points. Heteroscedasticity is a phenomenon that becomes apparent when there is a presence of unequal variability among the observations. The potential ramifications of this particular scenario may manifest in the form of an estimation that is imbued with a bias towards a specific perspective or desired outcome.

3.4.2 Analytical Model

Based on the work of Hair et al. (2006), this study aims to apply a regression model to examine whether or not financial institutions in Kenya exhibit higher levels of performance after

adopting FinTech. The present document encapsulates the model specification in question:

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

Y Financial performance (ROA= net income/ average total assets).

X₁ Mobile banking (Aggregate volume of transactions executed through mobile banking platforms)

X₂ Internet banking (measured by the log of amount of transactions performed via Internet banking)

X₃ is Firm size (control variable) which is measured by log of total assets

X₄ Capital Adequacy (control variable) which is measured by Total Capital/Total Risk Weighted Assets

β_0 = gradient of the regression gauging the sum of the vary in Y linked with a unit vary in X

ε = Error term within a confidence interval of 5%

3.4.3 Test of Significance

One of the key foci of this work is going to be the use of regression analysis as a tool for investigating the ways in which statisticians probe and assess causal associations between variables. Within the context of regression analysis, the use of the ANOVA test is applied to determine whether or not an independent variable has a causal impact on a variable that is being analyzed (the dependent variable). In addition, this evaluation is used to investigate disparities in average scores, and then the T-statistic test is carried out to determine how likely it is that there is a link between performance and technology, which are the independent and dependent variables, respectively. The implementation of a significance level of 5% is utilized.

CHAPTER FOUR: DATA ANALYSIS RESULTS AND FINDINGS

4.1 Introduction

This chapter gives a summary of the study's analysis and findings, detailing how they relate to the study's stated aims and methods. Many statistical tests, such as for normality, Multicollinearity, heteroskedasticity, autocorrelation, and stationarity, are summarized and explained here. The results of the research on how digitization would affect the financial success of Kenya's microfinance institutions are presented here. The data collection process relied primarily on two sources: the records housed at the CBK and the public reports published by microfinance institutions. All other data included in the study were derived from secondary sources.

4.2 Descriptive Statistics

This section presents descriptive results derived from the data. For each variable in the research, descriptive data provide mean values and standard deviations. There are a total of 65 observations (13 * 5), thanks to the 13 microfinance organizations who contributed data covering a duration of 5 years. Table 4.1 provides a summary of the results.

Table 4.1: Summary statistics

Descriptive Statistics							
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
MOB	65	.33	8.10	4.7945	2.13694	-.304	.297
INB	65	8.47	16.38	14.1052	1.90072	-1.621	.297
CAA	65	.02	1.96	.2879	.31845	4.355	.297
SIZ	65	7.20	8.73	8.0507	.41386	-.397	.297
ROA	65	.00	.30	.1067	.07574	.723	.297
Valid N (listwise)	65						

According to the findings in Table 4.1, Kenya's microfinance banks' average level of performance (ROA) between 2018 and 2022 was 0.1067, which is a favorable indication of the average level of performance in the country.

In addition, between 2018 and 2022, microfinance institutions in Kenya had an average capital adequacy of 28.79%, as shown by the mean capital adequacy ratio of 0.2879. According to the data, the average asset quality of Kenya's microfinance institutions is positive between 2018 and 2022, with a mean size of total asset quality of 8.0507. The results show that the average mobile banking usage by the microfinance banks was 4.7945 indicating, this indicates poor mobile banking usage. The average internet banking as determined by the results is 14.1052, which suggests that from 2018 to 2022, Kenya's microfinance banks on average has a high internet banking usage.

4.2.1 Return on Assets

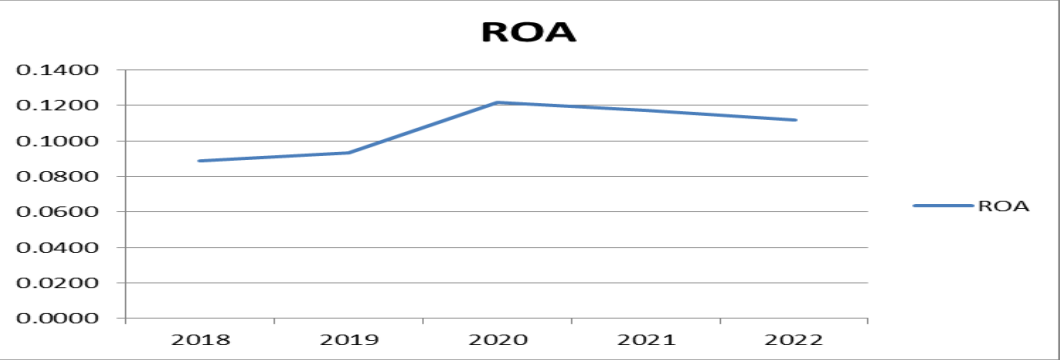


Figure 4.1: Return on Assets

Figure 4.1 indicates an upward trend of level of ROA from 2018 to 2020 then s decline from 2020, 2021 and 2022. This can be explained because of the impact of Covid 19.

4.2.2 Mobile Banking

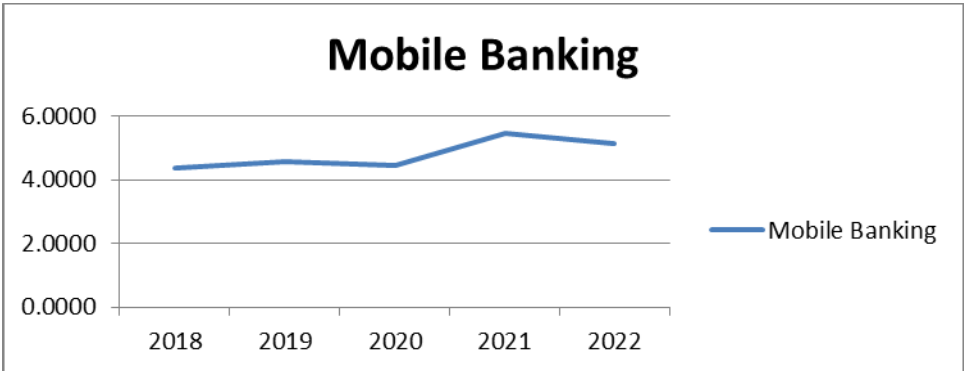


Figure 4.2: Mobile Banking

Figure 4.2 shows mobile banking trend, which is characterized by upward and downward fluctuations. The trend line shows a general slight increase of mobile banking from 2018 to 2019 then a small decline in from 2019 to 2020. There was a sharp increase from 2020 to 2021, then a steady decline from 2021 to 2022.

4.2.3 Internet Banking

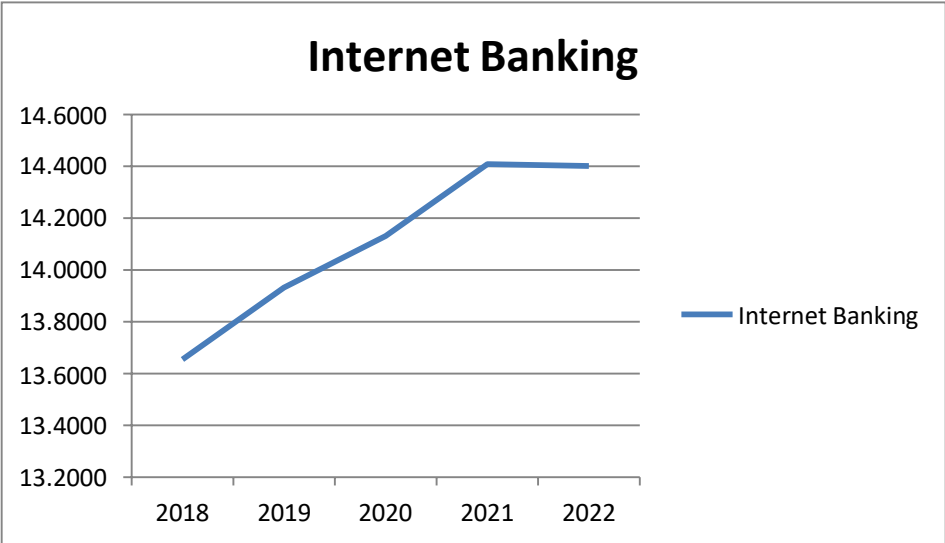


Figure 4.3: Internet Banking

Figure 4.3 shows Internet banking trend, which is characterized by an upward movement from 2018 to 2021. From 2021 to 2022 the trend was a flat movement. It indicates that the microfinance banks have been adopting the usage of internet banking.

4.2.4 Capital Adequacy

From figure 4.4 below there is an indication that capital adequacy was stable from 2018 to 2019. Then from 2019 to 2020 there was a sharp decline on capital adequacy. 2020 to 2022 there was a decline but stable.

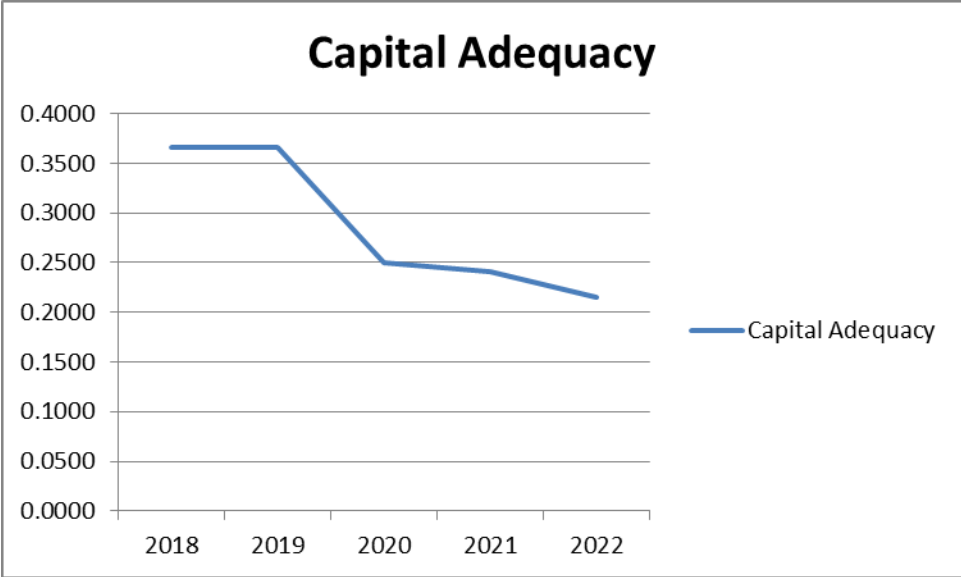


Figure 4.4: Capital Adequacy

4.2.5 Banks Size

Over the last 5 years, there have been a continued growth in the microfinance industry as of end of December 2022 had total assets of approximately KES 250 billion. The growth has been at a steady rate an average of 2% driven by the economic recovery and the easing of lending measures by microfinance institutions. Additionally, competition has remained a major force in the growth of the industry and microfinance institutions must develop a set of externally oriented competencies in the areas of market research, competitive advantage analysis, digitization and innovative product offerings to thrive in the face of increasing local and foreign competition.

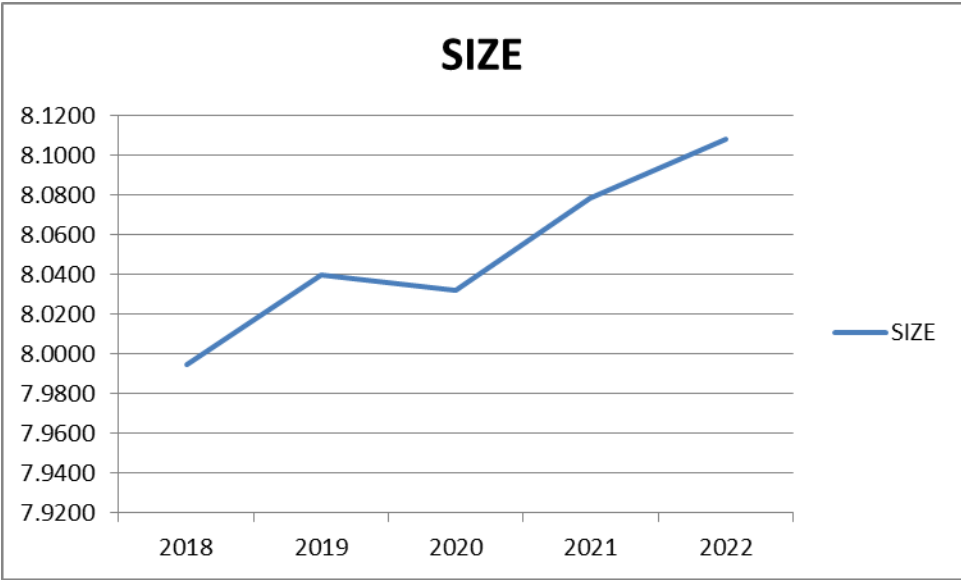


Figure 4.5: Bank Size

4.3 Diagnostic Tests

Diagnostics were performed to check that the assumptions of the regression model were not broken and to locate interesting research directions. Before actually implementing the regression model, however, preliminary research was conducted to assess the approximation and post-approximation stages. Preliminary experiments were performed in such cases to evaluate the model's viability. Multicollinearity and unit root testing were among those performed. The study used these analyses in order to prevent spurious regression results.

4.3.1 Normality Test

There are several options for determining whether data follows a normal distribution. Shapiro-Wilk and Kolmogorov-Smirnov tests, measurements of skewness and kurtosis, histogram analysis, P-P Plot, box plot, Q-Q Plot, and the computation of mean and standard deviation are all common tools in statistical analysis. Normality tests like the Kolmogorov-Smirnov and the Shapiro-Wilk tests are often used. Although the Shapiro-Wilk test was developed for use with samples with sizes less than 50, it may be used to much larger data sets as well. On the other hand, the Kolmogorov-Smirnov test is more appropriate for sample sizes above 50 ($n > 50$). Consequently, the research used the Kolmogorov-Smirnov test as the quantitative approach for assessing the normalcy.

Table 4.2: Normality test

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
Mobile Banking	-.304	.297	-1.213	.586
Internet Banking	-1.621	.297	2.661	.586
Capital Adequacy	4.355	.297	20.769	.586
Bank Size	-.397	.297	-.849	.586
ROA	.723	.297	-.173	.586

From the table 4.2 the skewness value for mobile banking was -0.304 and the kurtosis value was -1.213. Both of the values fell within the normal range for a normal distribution. The skewness value for internet banking was -1.621 and the kurtosis value was 2.661. Both of skewness value and the kurtosis values were in the acceptable range for a normal distribution. The skewness and kurtosis for capital adequacy and bank size were 4.355, -0.397 and 20.769, -0.849 respectively.

4.3.2 Multicollinearity Test

A regression model with multicollinearity has independent variables that are significantly correlated with one another. The presence of multicollinearity was assessed through the utilization of two statistical measures, namely the VIF and the tolerance index. In cases where the VIF exceeds a value of 10 and the tolerance index falls below 0.2, it can be inferred that multicollinearity exists, thereby violating the underlying assumption. However, as the VIF values in this study were found to be less than 10, it can be concluded that there is no evidence to support the presence of multicollinearity.

Table 4.3: Multicollinearity Test

	Kolmogorov-Smirnov	P-value
Mobile banking	.906	1.104
Internet banking	.900	1.111
Capital adequacy	.890	1.124
Bank Size	.911	1.097

According to the findings in Table 4.4, all of the research variables had a p value that was more than 0.05, indicating that they followed a normal distribution.

4.3.3 Homoscedasticity

Homoscedasticity was tested via histogram. The test results were presented on figure 4.6.

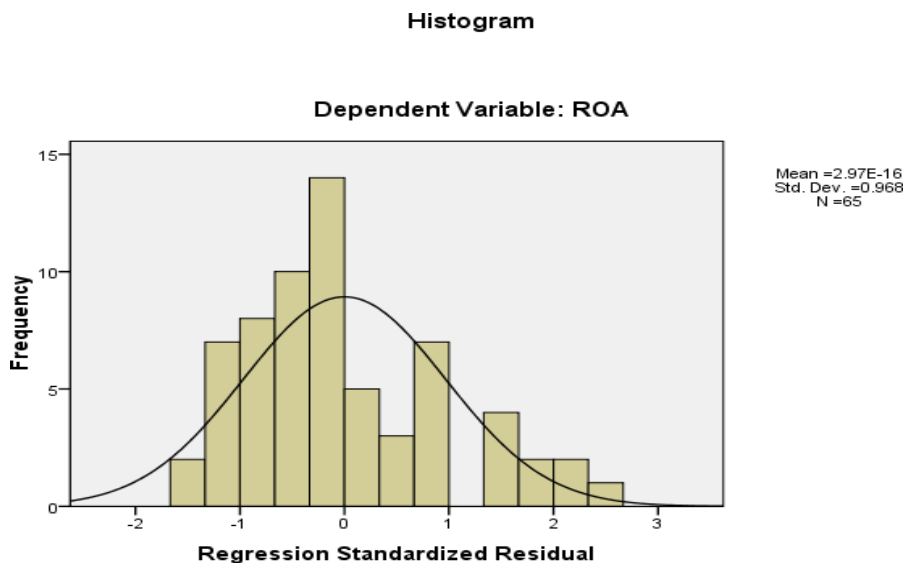


Figure 4.6 Homoscedasticity

From figure 4.6 it was evident that a relationship did exist between the regression standardized residual and frequency of the dependent variable ROA. There was no evidence that the data set lacked homoscedasticity. The Durbin-Watson statistic is a numerical value between 0 and 4 that may be used to compare two groups. Positive autocorrelation is indicated by numbers between 0 and 2, and negative autocorrelation by values above 2 but below 4. Values that are near to or equal to 2 indicate the lack of autocorrelation within the dataset. Multicollinearity examines the degree of intercorrelation among variables. The presence of multicollinearity in the research was assessed by using the Variance Inflation Factor. When the $VIF=1$, it indicates the absence of correlation. A $1 < VIF < 5$ suggests a moderate level of correlation, but a $VIF > 5$ a high level of correlation.

Table 4.4: Autocorrelation

Autocorrelation	
Durbin-Watson Statistic	1.298

The Durbin-Watson Statistic was found to be 1.298 based on the autocorrelation table. The numerical approximation of this number is around 2. Therefore, it was deduced that there was no presence of autocorrelation in the variables being examined.

4.4 Correlation Analysis

To measure how closely two variables are related, statisticians utilize the Pearson correlation coefficient. To evaluate the linear connection between variables, the correlation matrix is a common tool. The matrix also serves as a tool for assessing the stability of the model's internal variables, in this case to ascertain which factor best clarifies the connection between technological innovation uptake and economic success. To begin answering this question, one may ask the following: To what extent can the association between technological innovation uptake and economic success be explained by the following variable? The variable correlation matrix is shown in Table 4.5.

There is a substantial and positive linkage between mobile banking and the financial success of microfinance banks, as shown by the outcomes of a correlation study that are shown in table 4.5. ($r = 0.523$, $p < 0.5$) This was determined by testing the hypothesis that there is no link between the two. This suggested that mobile banking was connected with an enhanced degree of financial performance among microfinance banks in Kenya.

Table 4.5: Correlation Analysis

		MOB	INB	CAA	SIZ	ROA
MOB	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	65				
INB	Pearson Correlation	0.029	1			
	Sig. (2-tailed)	0.000				
	N	65	65			
CAA	Pearson Correlation	0.205	0.249	1		
	Sig. (2-tailed)	0.000	0.045			
	N	65	65	65		
SIZ	Pearson Correlation	0.238	0.175	0.062	1	
	Sig. (2-tailed)	0.05	0.001	0.000		
	N	65	65	65	65	
ROA	Pearson Correlation	0.523	0.434	0.612	0.382	1
	Sig. (2-tailed)	0	0.002	0.003	0.005	
	N	65	65	65	65	65
*. Correlation is significant at the 0.05 level (2-tailed).						

The results also show a positive substantial correlation between internet banking ($r = 0.434$, p value < 0.05); capital adequacy ($r = 0.612$, p value < 0.05); bank size ($r = 0.382$, p value < 0.05), and financial performance. This suggested that among Kenyan microfinance banks, a higher level of financial performing is related to mobile banking, internet banking, capital adequacy and bank size.

4.5 Regression Analysis

The primary objective of doing a regression analysis is to ascertain the linearity of the association between the dependent and independent variables. The methodology may also be used to quantify the magnitude of the impact that each independent variable has on the dependent variable under analysis. In order to evaluate how a movement in interest rates impacts loan profitability, the researchers ran a regression analysis for their study. The model summary, ANOVA table, and Coefficients table all provide concise summaries of the study's findings.

The model's explanation for the dependent variable's variability may be estimated by looking at the model's abstract. ANOVA tables are used to evaluate the model's ability to predict the dependent variable, while the coefficients table is used to determine the relative importance of the independent variables in producing a reliable prediction. The findings reported here are the product of an analysis of data obtained specifically for the research.

Table 4.6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.634 ^a	.402	.363	.08415	1.289

a. Predictors: (Constant), SIZ, MOB, CAA, INB

b. Dependent Variable: ROA

The model description made it very clear that the R Squared value was 0.402. As a result, the usage of financial technology, sufficient capital levels, and the size of the bank accounted for 40.2% of the variation in ROA. The model did not account for the 59.8% of the variation that was not directly related to the dependent variable.

Table 4.7: Analysis of Variance

		ANOVA(b)				
Model		Sum of Squares	df	Mean Square	F	.000a
1	Regression	.286	4	.072	10.102	
	Residual	.425	60	.007		

a. Predictors: (Constant), SIZ, MOB, CAA, INB

From the ANOVA table it was deduced that the F values was 10.102 at a significance level of 0.000. The study thus determined that the model was statistically significant to predict financial performance based on financial technology adoption, capital adequacy and bank size

Table 4.8 Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	0.817	.226		2.12	.000
Mobile Banking	0.348	.081	0.599	4.367	.000
Internet Banking	0.167	.273	0.174	1.372	.000
Capital Adequacy	0.335	.126	0.058	0.562	.000
Bank Size	0.055	.244	0.339	0.271	.000

a. Dependent Variable: ROA

Findings from the regression coefficients table show that the model fit for predicting financial performance based on mobile banking, internet banking, capital adequacy and bank size is;

$$Y = 0.817 + 0.348X_1 + 0.167 X_2 + 0.335 X_3 + 0.055 X_4$$

Where; Y= ROA: X₁= Mobile Banking, X₂= Internet Banking, X₃ =Capital Adequacy X₄=Bank Size

It was determined via the use of the regression equation that the ROA would equal 0.817 in a scenario in which factors such as mobile banking, internet banking, capital sufficiency, and bank size had no impact whatsoever on financial performance. The beta coefficients of 0.348, 0.167, 0.335, and 0.055 accordingly show that mobile banking, internet banking, capital sufficiency, and bank size each had a favorable influence on financial performance. This indicates that the ROA will grow by 0.348, 0.167, 0.335, and 0.055 accordingly for each unit increase in mobile banking, online banking, capital adequacy, and bank size.

4.6 Discussions of the Findings

From the findings on the descriptive statistics, there was an indication that the Kenya's microfinance banks' average level of performance (ROA) between 2018 and 2022 was 0.1067, which is a favorable indication of the average level of performance in the country. The statistical data also reveals that the mean capital adequacy ratio for microfinance banks is at 0.2879, implying that from 2018 to 2022, the average capital adequacy ratio for microfinance banks in Kenya was 28.79%. The findings also indicate that the average overall asset quality (size) is 8.0507, which suggests that the asset quality of microfinance institutions in Kenya from 2018 to 2022 is generally satisfactory on average. The results show that the average mobile banking usage by the microfinance banks was 4.7945 indicating, this indicates poor mobile banking usage. The average internet banking as determined by the results is 14.1052, which suggests that from 2018 to 2022, Kenya's microfinance banks on average has a high internet banking usage. Microfinance banks in the country are increasingly developing technical banking products, which may explain why there has been an uptick in the volume of banking transactions as well as the number of people using mobile phones and the internet. There's also the possibility that more individuals having access to the internet has a role. This coincides with the findings of Koivu (2022), who found that the dependence on mobile devices to carry out monetary transactions had progressively gained pace across a wide variety of economic sectors. This finding is consistent with the findings of Koivu (2022).

According to the findings of the research, there is a favorable connection between mobile and internet banking and the financial success of Kenya's microfinance institutions. The findings of a research on mobile banking and the effects of mobile technology on customers' actions and the financial institutions' bottom lines are consistent with this (Tiwari, Buse, & Herstatt, 2016). Mobile banking and the effects of mobile technology on customer behavior were the subjects of study by Tiwari, Buse, and Herstatt (2016). The research also discovered a favorable association between adequate bank capital and the size of the institution in terms of its financial performance. These findings are consistent with those of Furst et al. (2002), who found that e-banking institutions often earned more money and relied less on traditional banking operations than their counterparts. Traditional banks were found to depend more primarily on traditional banking activities. This is consistent with the findings of Hasan et al. (2002), who compared the performance of traditional banks against that of online banks and found the latter to be much more successful. DeYoung et al.'s (2006) study of the American banking market between 1999

and 2001 indicated that, thanks to increased income from deposit fees, electronic adoption increased the profitability of community banks.

The coefficient of determination, as measured by R Square, was determined to be 0.402 in this study, supporting the results of the regression analysis. Conclusion: Adequate capital levels, bank size, and the usage of financial technology accounted for 40.2% of the variance in ROA-measured financial performance. The remaining 59.8%, at a 95% level of confidence, may be attributed to factors beyond the scope of the present model. The analysis of variance showed a statistically significant outcome ($p < 0.005$). This indicates that the regression model has a likelihood of delivering an incorrect prediction that is less than 0.005 percent.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the results of the research and draws conclusions on the effect of financial technology on the bottom lines of Kenya's microfinance firms. Recommendations, a discussion of the study's shortcomings, and ideas for further research are all included in this section.

5.2 Summary of Findings

The study's results suggest that microfinance banks in Kenya are increasingly adopting digital financial services including mobile and internet banking, and that this trend is positively correlated with the financial success of these institutions. The data came from a normal distribution, as established by the normality test. This was indicated by the skewness value for mobile banking was -0.304 and the kurtosis value of -1.213. Both of the values fell within the normal range for a normal distribution. The skewness value for internet banking was -1.621 and the kurtosis value was 2.661. Both of skewness value and the kurtosis values were in the acceptable range for a normal distribution. The skewness and kurtosis for capital adequacy and bank size were 4.355, -0.397 and 20.769, -0.849 respectively. Results from the multi collinearity statistics showed that financial technology adoption had a VIF factor of 1 implying that it was correlated with any other factor since it was the only predictor in the study.

From the descriptive statistics, Kenya's microfinance banks' average level of performance (ROA) between 2018 and 2022 was 0.1067, which is a favorable indication of the average level of performance in the country. The statistical data further reveals that the mean capital adequacy ratio for microfinance banks is at 0.2879, implying that from 2018 to 2022, the average capital adequacy ratio for microfinance banks in Kenya was 28.79%. Furthermore, the results reveal that the mean total asset quality (magnitude) is 8.0507, suggesting that the overall asset quality of microfinance institutions in Kenya between 2018 and 2022 may be deemed adequate. The results show that the average mobile banking usage by the microfinance banks was 4.7945 indicating, this indicates poor mobile banking usage.

The correlation study revealed that there was a positive considerable link between internet banking ($r= 0.434$, p value <0.05), capital adequacy ($r= 0.612$, p value <0.05), bank size ($r= 0.382$, p value <0.05), and financial performance. This was shown to be the case when comparing internet banking to capital adequacy, bank size, and financial performance. Researchers drew the inference that a higher level of financial performance among Kenya's microfinance institutions is associated with the presence of mobile banking, internet banking, sufficient capital, and a larger bank size.

According to the results of the analysis, the three independent variables of financial technology use, capital adequacy, and bank size accounted for 40.2% of the variance in ROA. While 59.8% stemmed from unaccounted-for variables. The F-value of 10.102 was calculated using the ANOVA table, and it was found to be statistically significant at the 0.000 level. The study thus determined that the model was statistically significant to predict financial performance based on financial technology adoption, capital adequacy and bank size. The regression equation predicted that ROA would be 0.817 if there were no relationship between financial performance and mobile banking, internet banking, capital sufficiency, or bank size. The beta coefficients for mobile banking, online banking, capital sufficiency, and bank size all point to a favorable effect on financial performance. ROA increases by a factor of 0.348, 0.167, 0.335, and 0.055 for every one unit increase in mobile banking, internet banking, capital adequacy, and bank size, respectively.

5.3 Conclusion

The study's findings indicate that the use of financial adopting technology, namely mobile banking and internet banking, has a generally favorable influence on financial success, as assessed by the ROA. This implies that during the years 2018-2022 the financial technological adoption by microfinance banks contributed greatly to the increase in their performance. This was probably due to the low cost burden that comes with the use of mobile and internet banking.

The analysis revealed a significant rise in revenue generated by internet and mobile banking between the years 2018 and 2022. For example, the revenue generated from mobile banking had a significant growth, rising from a modest amount of KShs. 0.16 billion in January 2018 to KShs. 118.08 billion at the conclusion of the year 2022. Similarly, the income generated from internet

banking also witnessed substantial growth, increasing from KShs. 0.21 billion in January 2018 to KShs. 19.19 billion in December 2022. Nevertheless, the microfinance banks saw fluctuations in their financial performance during the specified time. However, it is noteworthy that at the conclusion of the year 202, they managed to sustain an overall upward trajectory. The rise in revenue from mobile banking may be attributed to the growing volume of mobile banking transactions, which is a direct consequence of the expanded range of mobile banking products offered by microfinance banks. Additionally, the increasing prevalence of mobile phone use among the population has contributed to this trend.

5.4 Recommendations for Policy and Practice

According to the results, microfinance banks in Kenya saw an improvement in their bottom line after using financial technology. As a result, it is suggested that Kenyan microfinance banks prioritize increasing customer use of mobile and internet banking to better drive the growth of ROA. Based on the findings, the Kenyan government, namely the Central Bank of Kenya, is urged to enact regulatory measures that are suitable and beneficial for banks to participate in a wide range of financial technology adoption and usage endeavors.

Capital adequacy was shown to positively affect microfinance organizations' ROA, according to the study's findings. Consequently, it is recommended that banks maintain sufficient levels of capital in order to fulfill their financial commitments in a timely manner, while also taking advantage of any short-term investment opportunities that may occur. It is recommended that policy makers establish a specific threshold for the capital adequacy level that banks should maintain. Excessive capital adequacy, although beneficial in certain respects, nevertheless has inherent opportunity costs.

It was also shown that the larger the bank, the greater the positive impact the bank's size had on ROA. Therefore, the research advises the management of Kenyan microfinance banks to be cautious when making loans above their capacity, since doing so might lead to a fall in ROA. It is essential for microfinance institutions to develop and implement efficient asset management techniques.

5.5 Limitations of the Study

The impact of financial technology adoption on return on investment for Kenyan microfinance banks was the primary research interest. The studies analyzed two specific examples of financial technology adoption: mobile and online banking. In reality, there exist multiple indicators of both technological and non-technological factors that exert influence on the return on assets (ROA) of banking firms. These factors encompass corporate governance attributes and management efficiency, among others. Additionally, certain factors, such as interest rates and political stability, are external to the control of the firm.

For the purposes of this investigation, a time frame spanning five years, namely from 2018 to 2022, was chosen. The absence of empirical evidence suggests that the consistency of similar outcomes over an extended duration cannot be guaranteed. Furthermore, it is not feasible to anticipate if the aforementioned results would last till the year 2022. Considering the presence of significant economic shifts such as recessions and booms, extra time might be seen as a more reliable factor.

The primary limitation of this research was the data quality. It is challenging to definitively ascertain if the study's conclusions provide an accurate representation of the present state of affairs. The assumption has been made that the data used in the research are precise. The present circumstances have resulted in a significant amount of inconsistency in the measurement of data. Secondary data were analyzed instead of original data. Because of information scarcity, analysis of potential development drivers has been hampered. In addition, regression models were used for the data analysis. The researchers would have challenges in generalizing their results accurately due to the restrictions inherent in the model, such as the potential for imprecise or erroneous findings coming from variations in variable values. Performing a regression model using the previous model becomes infeasible as more data is included into it.

5.6 Suggestions for Further Research

The primary emphasis of this research was directed at examining microfinance banks operating within the context of Kenya. Subsequent research endeavors may adopt a comprehensive approach by including more financial institutions within the Kenyan context, so providing a basis for corroborating or challenging the findings of the present study. Moreover, the present research

specifically examined two indicators of financial technology adoption, namely mobile banking and online banking. Further research should prioritize the exploration of other electronic banking strategies that were not taken into account in the present study.

The present study was limited in its temporal scope to a period of five years. Further investigation beyond this timeframe is needed to ascertain the potential persistence of the observed outcomes. Therefore, future studies with a broader time frame may be used to either corroborate or challenge the existing study findings. The study's scope was further limited in terms of the specific setting in which microfinance institutions were analyzed. Additional research might be conducted on additional financial institutions to see if they align with or diverge from the results of the present study. Researchers in the East African region, as well as other parts of Africa and many worldwide jurisdictions, have the capacity to conduct study within their respective areas to validate the enduring validity of the present research findings.

Secondary data were analyzed instead of original data. Because of information scarcity, analysis of potential development drivers has been hampered. In addition, regression models were used for the data analysis. Primary data sources, such as in-depth surveys and structured interviews with professionals and stakeholders, might be used in future research but were not available for this study. This means that the results of the current research might be supported or contested by these findings. In this investigation, we mostly used statistical methods such multiple linear regression and correlation analysis. Although component analysis, cluster analysis, granger causality, discriminant analysis, and descriptive statistics have proven useful in the past, it is important to note that these techniques may not be the only ones used in future research projects.

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APPENDICES

APPENDIX I: DATA COLLECTION FORM

YEAR	Mobile Banking	Internet Banking	Total Assets	Total Capital	Total Risk Weighted Assets
2018					
2019					
2020					
2021					
2022					

APPENDIX II: LIST OF MICROFINANCE BANKS IN KENYA

- 1) Caritas Microfinance Bank Limited.
- 2) Century Microfinance Bank Limited.
- 3) Choice Microfinance Bank Limited.
- 4) Daraja Microfinance Bank Limited.
- 5) Faulu Microfinance Bank Limited.
- 6) Kenya Women Microfinance Bank Plc.
- 7) Maisha Microfinance Bank Limited.
- 8) Muungano Microfinance Bank Limited.
- 9) Rafiki Microfinance Bank Limited.
- 10) Key Microfinance Bank Limited.
- 11) SMEP Microfinance Bank Limited.
- 12) Sumac Microfinance Bank Limited.
- 13) U&I Microfinance Bank Limited.
- 14) Uwezo Microfinance Bank Limited.

APPENDIX III: DATA SUMMARY

MFI	Year	ROA	Mobile banking	Internet banking	Capital adequacy	Bank size
1	2018	0.2410	2.7423	14.6052	0.1592	8.3379
1	2019	0.1590	3.2537	15.9889	0.1639	8.4239
1	2020	0.0644	2.8869	15.9219	0.1616	8.4141
1	2021	0.0604	2.9535	15.8584	0.1578	8.4557
1	2022	0.0310	2.7541	15.7852	0.1602	8.4859
2	2018	0.0279	6.4279	13.7599	1.8796	8.2067
2	2019	0.0248	6.6621	14.5768	1.9617	8.2879
2	2020	0.0139	6.6387	14.9398	0.3053	8.3768
2	2021	0.0019	6.5259	14.7218	0.3229	8.4253
2	2022	0.1050	6.3715	15.1152	0.3466	8.4516
3	2018	0.0840	1.1578	15.3316	0.1596	7.5576
3	2019	0.1331	1.3225	13.5734	0.1840	7.6198
3	2020	0.1709	1.6563	14.2855	0.1786	7.5878
3	2021	0.0574	1.4725	14.4647	0.1803	7.5652
3	2022	0.1230	1.2701	14.9982	0.1638	7.5406
4	2018	0.0887	7.0066	11.1449	0.3941	8.0577
4	2019	0.0937	6.9122	12.7982	0.4230	8.1238
4	2020	0.0986	7.0197	12.5000	0.4574	8.1659
4	2021	0.0999	6.5030	12.9661	0.5397	8.2286
4	2022	0.1514	5.3769	14.0891	0.4392	8.3287
5	2018	0.0609	7.3306	13.2541	0.2730	8.5767
5	2019	0.2966	6.6133	14.2506	0.2832	8.6278
5	2020	0.2323	5.9541	13.1748	0.2637	8.6514
5	2021	0.2298	6.0810	14.1294	0.2555	8.6986
5	2022	0.1657	5.4965	12.9685	0.2764	8.7303
6	2018	0.0105	3.8258	15.6607	0.1791	8.0019
6	2019	0.0572	3.5541	16.2099	0.1792	8.0506
6	2020	0.0125	4.0251	15.9346	0.1845	8.0485
6	2021	0.0912	5.7342	16.0608	0.1732	8.1428
6	2022	0.0185	5.6053	16.0866	0.1573	8.1599
7	2018	0.1863	2.8898	13.9119	0.1099	7.9815
7	2019	0.0950	5.5063	13.1426	0.0939	8.0263
7	2020	0.1526	4.3085	13.8898	0.0790	8.0767
7	2021	0.1072	7.6511	14.0673	0.0509	8.1894
7	2022	0.0096	5.8032	14.0719	0.0280	8.2824
8	2018	0.0175	2.4783	13.0293	0.1883	8.0201
8	2019	0.0041	2.4053	13.0224	0.1551	8.0438
8	2020	0.1415	3.5773	13.2537	0.2285	7.9725
8	2021	0.1548	2.2843	13.5020	0.1477	7.9744
8	2022	0.1681	2.2110	13.7576	0.1451	7.9950
9	2018	0.0296	5.1441	15.0340	0.2165	8.1877
9	2019	0.0382	5.2963	15.0109	0.2126	8.2356
9	2020	0.0419	5.8661	15.5781	0.2277	8.2709

9	2021	0.0275	6.9341	16.1124	0.0227	8.3291
9	2022	0.0570	6.0711	16.1330	0.1618	8.3508
10	2018	0.0402	5.3464	14.3210	0.2345	8.3898
10	2019	0.0415	5.9238	14.3780	0.2442	8.4802
10	2020	0.2296	5.0765	14.6360	0.2508	8.5279
10	2021	0.2144	6.9348	14.4732	0.2355	8.5719
10	2022	0.1606	7.6295	14.2760	0.2456	8.6261
11	2018	0.1440	7.9523	14.2875	0.2291	7.2060
11	2019	0.1219	7.8483	15.2683	0.1463	7.1988
11	2020	0.0957	6.9704	15.6160	0.1850	7.2236
11	2021	0.2794	6.6765	16.3843	0.1901	7.3186
11	2022	0.2788	6.8287	16.3125	0.2111	7.3549
12	2018	0.1096	3.0733	8.6540	0.4230	7.7230
12	2019	0.0593	2.2910	8.4730	0.4574	7.6766
12	2020	0.2438	0.3275	8.7650	0.5397	7.5374
12	2021	0.1236	8.1011	8.9370	0.7005	7.4993
12	2022	0.1261	7.4564	8.9819	0.2990	7.4789
13	2018	0.1169	1.5561	14.5097	0.3184	7.6874
13	2019	0.0870	1.7376	14.4261	0.2496	7.7237
13	2020	0.0850	3.3564	15.1980	0.1944	7.5611
13	2021	0.0769	3.2217	15.6354	0.1599	7.6254
13	2022	0.0621	3.7710	14.6307	0.1659	7.6188