EFFECT OF ELECTRONIC BANKING ON FINANCIAL PERFORMANCE OF MICROFINANCE INSTITUTIONS IN KENYA

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A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN FINANCE, FACULTY OF BUSINESS AND MANAGEMENT SCIENCES, UNIVERSITY OF NAIROBI

OCTOBER, 2022

DECLARATION

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

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

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ACKNOWLEDGMENT

I am grateful to God for His mercies and provisions during the period of preparing this project. My sincere gratitude goes out to my supervisor, Prof. Josiah Aduda, for the patience he has exercised in guiding me through this project. My special thanks to my beloved husband, Brown Kiburu and sons Ethan Karomba and Theo Kimere for their moral support. I also thank the library staff for giving me access to the resources I needed to complete this project. Under their mentorship I have acquired a love for research and the discipline to submit work on time.

DEDICATION

This research project is heartily and proudly dedicated to the people who served as an inspiration. My Beloved husband and sons (Brown, Ethan and Theo), Dad (Simon Kimere), mum (Lucy Wangui), sisters (Lydia, Caroline, Ann and Winnie) and brother (Victor) without whose constant emotional support this thesis paper was not possible.

Above all to the Almighty God, thank you for the strength, protection and for giving me a healthy life and guidance in realization of this work.

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LIST OF ABBREVIATIONS

AMFI	Association of Micro Finance Institutions
ANOVA	Analysis of Variance
ATM	Automated Teller Machine
CBK	Central Bank of Kenya
DTMs	Deposit Taking Micro Finance Institutions
MFI	Micro Finance Institution
NPL	Non- Performing Loans
ROA	Return on Assets
SPSS	Statistical Package for Social Sciences
TAM	Technology Acceptance Model
VIF	Variance Inflation Factors

ABSTRACT

MFIs in Kenya play a role in financial intermediation which has included 2.9% Kenyans. The last decade has seen MFIs in Kenya embrace electronic banking. This innovation of electronic banking has revolutionized the convenient means of accessing financial services. Electronic banking platforms are perceived as enablers for formal financial services through remote transactions. The current study sought to investigate how this influences the financial performance among MFIs in Kenya as they play a key role in financial intermediation and inclusion. The independent variables for the research were mobile banking, internet banking and ATMs. Credit risk, liquidity risk, capital adequacy and MFI size were the control variables while the dependent variable was financial performance measured as ROA. The study was guided by financial intermediation theory, diffusion of innovation theory and technology acceptance model. Descriptive research design was utilized in this research. The 47 MFIs in Kenya as at December 2021 served as target population. The study collected secondary data for five years (2017-2021) on an annual basis from CBK and individual MFIs annual reports. Descriptive, correlation as well as regression analysis were undertaken and outcomes offered in tables followed by pertinent interpretation and discussion. The research conclusions yielded a 0.530 R square value implying that 53% of changes in MFIs ROA can be described by the seven variables chosen for this research. The multivariate regression analysis further revealed that individually, mobile banking has a positive and significant effect on ROA of MFIs (β=0.162, p=0.001). Internet banking and ATMs exhibited a positive but not statistically significant influence on ROA. Both credit risk and liquidity risk have a negative effect on ROA of MFIs as shown by (β=-0.157, p=0.000) and (β=-0.160, p=0.000) respectively. Capital adequacy and firm size exhibited a positive and significant ROA influence as shown by (β=0.739, p=0.000) and (β=0.293, p=0.000) respectively. The study recommends the need for policy makers to provide a conducive environment for MFIs to undertake mobile banking as this enhances their financial performance. The study further recommends that MFIs should work at reducing their liquidity risk and credit risk as these two adversely affects ROA. Future research ought to focus on other financial institutions in Kenya to corroborate or refute the conclusions of this research.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Electronic banking has significantly affected the operation of financial firms and created the foundation for the financial institutions to differentiate between their products and their competitors. Abdulkarim and Ali (2019) argue that electronic banking is essential for directing money to efficient purposes and allocation of risk to people who can utilize them, and this boosts financial performance. Electronic banking is anticipated to improve financial inclusion, resulting in improved efficiency of the intermediaries (Rasheed, Law, Chin & Habibullah, 2016). Neaime and Gaysset (2018) asserted that in general, electronic banking has a substantial influence in increasing performance of financial firms.

This study drew support from diffusion of innovation theory, the technology adoption model as well as the financial intermediation theory. Financial intermediation theory by Diamond (1984) was the anchor theory as it states that via intermediation, financial institutions can develop and offer tailored financial solutions that are tailored to the needs of each client. The financial intermediaries expand their credit reach and increase their effectiveness by doing this. According to Rogers (1995), the mechanism whereby a new invention spreads through a particular social system depends on the use of a particular preference channel. The Technology Acceptance Model (TAM) clarifies how consumers use and benefit from a cutting-edge idea (Davis, 1989). TAM was employed in this research to establish the adoption of new technologies by Microfinance Institutions (MFIs) in Kenya.

The study focused on MFIs in Kenya; this is because the last decade has seen MFIs in Kenya embrace electronic banking. Electronic banking is available in Kenya in a

number of forms, inclusive of mobile phone apps, mobile money wallets, as well as payroll borrowing. Electronic banking has revolutionized the convenient means of accessing financial services (Mohamed, 2018). Electronic banking platforms are perceived as enablers for formal financial services through remote transactions (CBK, 2019). The current study sought to investigate how this influences the financial performance among MFIs in Kenya as they play a key role in financial intermediation and inclusion.

1.1.1 Electronic Banking

According to Sheleg and Kohali (2011), any technical advancement affecting the financial industry and its operations is referred to as electronic banking. Electronic banking can also refer to businesses that combine financial services with modern technology to provide user-friendly, automated, transparent, and efficient internet-based and application-oriented services (Triki & Faye, 2013). Electronic banking, according to Freytag and Fricke (2017), is innovative technology that enables financial services. Financial institutions are expected to offer social network platforms in the future, allowing clients to utilize their mobile phones to access investment options made possible by electronic banking (World Bank, 2017).

Electronic banking provides a range of technological options for comfort, faster reaction time and operating efficiencies (Klapper, 2016). Electronic banking has affected many financial industry players. As a result, services of asset management have improved by providing retailers wealth management services via streamlined systems, algorithm proposals to assist decision-making and managed portfolios artificially through robots. The financial sector has also been affected by monitoring tax labiality, spending, credit, saving, bank service provision besides traditional

banking, distribution leading technology allows for quicker transaction, mobile transfer, the usage of cryptocurrencies, and data analytics allows for cellular lending to individuals and small businesses (Yang & Liu, 2016).

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

1.1.2 Financial Performance

Financial performance refers to ability of a firm to achieve a set of financial goals (Abernathy & Utterback, 2015). FP stands for the extent firm financial goals have been met. It shows how successfully financial objectives have been attained (Nzuve, 2016). The health of the economy as a whole, as well as shareholders and investors, depends on financial performance. Investors receive a total return on their investment, and a solid company can increase investors' earnings over the long run (Fatihudin & Mochklas, 2018). The financial performance of a firm is crucial to both its survival and prosperity. When a business performs well, it shows that it manages its assets effectively and efficiently for operations, investments, as well as financial transactions (Karajeh & Ibrahim, 2017).

The focus on financial performance is of importance as it majorly touches on items that directly change financial statements or the company's reports (Omondi & Muturi, 2013). The company's FP is the primary evaluation tool used by external stakeholders (Bonn, 2000). Consequently, the company's FP is used as a metric. How successfully the company meets its financial objectives determines its financial performance. The performance of a company is the outcome of accomplishing both internal and external goals (Nyamita, 2014).

Several ratios are utilized in measuring financial performance. In relation to Mwangi and Murigu, (2015), the often used metrics for evaluating financial performance are ROA and ROE. In contrast to the ROE, which looks at how a firm is using shareholders' equity, the ROA measures a company's profitability using all of its assets. Market-based indicators including market capitalization, dividend yield, market to equity par value, and earnings per share can also be used to measure financial performance (Baba & Nasieku, 2016). Because ROA has a larger range of applications in prior literature, the current study employed it as an indicator of financial performance.

1.1.3 Electronic Banking and Financial Performance

The diffusion of innovation hypothesis says that every economically impactful change centers on entrepreneurship, market power and innovation. From this reasoning come theories about the electronic banking revolution. Rogers (1995) believes that invention briefly establishes a monopoly, wherein imitators compete and remove monopolies. Therefore, if financial institutions utilize electronic banking and secure hedging other institutions using new goods and services, they will certainly have an effect on performance.

With the number of electronic banking transactions rise, households, credit as well as savings offerings for everyone is simplified (Mehotra & Yetman, 2015). Long-term financial institutions efficiency is one of the projected benefits of electronic banking (Rasheed, Law, Chin & Habibullah, 2016). According to Zins and Weill (2016), ensuring that individuals can easily access and make use of these services is essential for promoting social growth and sustainable economic development, reducing poverty, and aiding in the stabilization of the financial sector.

Improved financial access, as per Lenka and Sharma (2017), encourages the creation of jobs in rural regions since inhabitants there will have more disposable income and be able to save and expand their deposits, that boosts economic growth generally because of the multiplier effect. The difficulty to obtain funding due to suboptimal electronic banking adoption has a negative impact on a financial institution's effectiveness. This is because it's assumed that the poor's incapacity to invest in and save for sources of income stems from a lack of money. On the other side, electronic banking's simplified access to finance stimulates companies to make more investments and take on more risk, increasing the financial institution's efficiency (Neaime & Gaysset, 2018).

1.1.4 Microfinance Institutions in Kenya

Deposit-taking and non-deposit-taking microfinance institutions are the two basic categories into which the CBK classifies the microfinance institutions. The CBK issues licenses and regulates deposit-taking microfinance institutions (DTMs), which are authorized to collect, process, or lend public deposits. The DTMs opened branches in numerous areas of Kenya and the region, which helped to further financial inclusion (CBK, 2020). Additionally, they have created brand-new financial solutions

that are responsive to customer demands and driven by demand. Examples include KWFT, SMEP, and Faulu Kenya. The National Treasury, which oversees the Ministry of Finance, forbids the non-deposit accepting microfinance institutions from using public funding (Association of Microfinance Institutions, 2022).

Kenyan microfinance is governed by a number of legislations, notably the Microfinance Act, that was passed in 2006 and revised in 2013. Therefore, the Microfinance sector is principally regulated by the Microfinance Act 2006 and the Central Bank of Kenya Act (Muganga, 2010). The primary goal of the Microfinance Act is to provide a framework for legal, regulatory, and oversight of deposit-taking microfinance institutions (DTMs).

Low-income groups and micro and small businesses can get financial services from microfinance organizations because they typically do not have access to the nation's main financial institutions. The microfinance sector is crucial in developing financial markets and improving the majority of Kenyans' access to financial services and goods. The microfinance institutions are essential since they lend to 45% of Kenya informal sector (Association of Microfinance Institutions, 2022).

Electronic banking continues to change and shape the microfinance sub-sector in Kenya. The Kenyan microfinance sub-sector has focused increasingly on electronic banking as a strategic instrument to achieve organization goal of reducing costs and maximizing revenues. Almost all MFIs have some aspect of electronic banking through their digital platforms (CBK, 2020). The big question is whether financial performance has improved as a result of mobile banking.

1.2 Research Problem

The use of electronic banking by the financial sector has increased drastically around the world. Financial processes including trading stocks, offering financial products, handling electronic payments, and making payments have all benefited from the enhancement. As a result, the quality of services provided by financial institutions around the world has improved (Babajide et al., 2015). In the growth process, finances are just as essential as creativity (Kim, Yu & Hassan, 2018). According to evidence, innovation experts are consistently convinced that the electronic banking promotion will result in increased efficiency for financial institutions. On the other hand, financial institutions are likely to miss out on the benefits of enhanced performance if access to electronic banking is restricted (Neaime & Gaysset, 2018).

MFIs in Kenya play a role in financial intermediation which has included 2.9% Kenyans (FinAccess, 2019). The last decade has seen MFIs in Kenya embrace electronic banking. This innovation of electronic banking has revolutionized the convenient means of accessing financial services (Mohamed, 2018). Electronic banking platforms are perceived as enablers for formal financial services through remote transactions (CBK, 2020). The current study sought to investigate how this influences the financial performance among MFIs in Kenya as they play a key role in financial intermediation and inclusion.

Although there have been international studies in this field, they have mostly focused on certain elements of electronic banking and how they correlate to financial performance. Stoica, Mehdian, and Sargu (2015) investigated how internet banking affects Romanian bank performance and E-banking, according to the study, provides affordable and efficient services that help banks operate better. Wadhe and Saluja

(2015) investigated how E-banking impacted the profitability of Indian banks from 2006 to 2014. The results showed that e-banking had a favorable relationship with profitability in both private and public sector banks. Hujud and Hashem (2017) examined the connection between Lebanon's financial innovations and profit statuses of commercial banks and found that electronic banking have a positive and significant relation to profitability. All these investigations were conducted in a distinct setting thus, their results cannot be applied to the current situation.

Locally, Mutinda's (2018) study on effect of technology advancements upon the profitability of commercial banks and found that mobile banking has a significant negative link to Kenya's profitability of commercial banks. In contrast, Kariu (2017) studied the financial technology and profitable business banking in Kenya and concluded financial technology has a statistically substantial connection with commercial bank profitability. Kamande (2018) showed the statistically meaningful excellent outcomes of only agency banking with statistically irrelevant, positive financial performance connections among ATM, internet and mobile banking. These studied were conducted among commercial banks in Kenya whose operations are different from MFIs.

The current study was motivated by the fact that despite the increased adoption among MFIs, some of them are still experiencing financial performance challenges. MFIs play a key role in financial intermediation and therefore need to ensure their objectives are achieved. Despite the existence of prior studies there exist contextual, conceptual and methodological gaps that need to be filled. Conceptually, prior studies have operationalized electronic banking differently hence findings depend on the operationalized method. Contextually, prior studies have mostly focused on

commercial banks which operate differently compared to MFIs. Methodologically, the research methodologies adopted have not been uniform hence explaining variance in results. The current research was based on these gaps and attempted to answering the research question; how does electronic banking influence financial performance of MFIs in Kenya?

1.3 Research Objective

The objective of this study was to determine the effect of electronic banking on financial performance of MFIs in Kenya.

1.4 Value of the Study

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

The conclusions of the research may be helpful to the government and the regulator in creating regulations for the population under investigation. Investors who are interested in the population under research will gain from the research findings because they will be able to learn more about the performance impact of these institutions' electronic banking and return tradeoffs.

The conclusions will aid investors as well as practitioners comprehend the link between the two variables, that is important for ensuring strong management team with diverse viewpoints and competences streamlining operations as well as managing electronic banking, as well as for building confidence among corporate stakeholders, which will ultimately optimize performance.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The theories that underpin electronic banking and financial performance are explained in this chapter. It also reviews the prior empirical research, identifies knowledge gaps, and summarizing with a conceptual framework and hypotheses illustrating the anticipated link between the variables under research.

2.2 Theoretical Framework

This segment examines the theories that underpin the study of electronic banking and performance. The study reviewed the financial intermediation theory, diffusion of innovation theory and technological acceptance model.

2.2.1 Financial Intermediation Theory

This theory was proposed by Diamond (1984) and it serves as the anchor theory. The theory plays a central role in the financial intermediation process predominantly among banks to mitigate information asymmetry that lies between borrowers and lenders, hence their constant interaction assists lenders in producing credit worthy information to borrowers. Information that is provided gives creditors and loan officers a strong incentive in assessing and appraising credit to those that require it. Modern theories state that the business of financial intermediation is pegged on economic imperfections from 1970s with limited contributions (Jappelli & Pagano, 2006). The presence of the intermediaries is based on their capability to lower transaction and information costs from asymmetries (Tripe, 2003).

The biggest criticism of the financial intermediation theory is its inability to give recognition to the role of lenders in the process of risk management (Levine et al.,

2000). Scholtens and Van Wensveen (2000) stated that they do not recognize credit risk management as an important factor in the financial industry and emphasizing the participation costs concept. They suggested future developments in the financial intermediation theory to understand challenges in the financial sector.

The theory is pertinent to the research because MFIs FP can be increased by using electronic banking solutions that make it simple as well as suitable for clients to conduct banking transactions. Financial intermediaries utilize mobile apps and other digital lending mechanisms that are useful in lowering transactional costs brought about by information asymmetry. They hence play a central role in effective functioning of financial markets. The theory is useful in understanding how electronic banking and FP relate.

2.2.2 Diffusion of Innovation Theory

The pioneer of this idea was Rogers (1962). An innovation is any newly introduced ideas, practices or item into a social structure whereas, on the contrary, innovation dissemination is the way the new concept is transmitted over a period of time to the social system via a default route. In this regard, this theory attempts to outline how new innovations are accepted and utilized in a social system such as mobile banking and online banking (Clarke, 1995). Rogers (1995) broadened the idea by saying that the study on technological diffusion was insufficient, further explaining that the technology cluster had additional distinctive characteristics that were thought to be fully linked. That is why the advantages and repercussions of embracing or refusing to embrace innovation should be notified to people and societies at large. Rogers (2003) says plainly that interpersonal connections are necessary because dissemination includes a social process.

Robinson (2009) criticizes the theory for taking a dramatically different view of other change theories. It is not about attempting to persuade people to change, though about making progress or re-inventing goods and character, so that they can better suit what the person wants or needs. In this idea, people do not change, but innovations have to adapt to the demands of the people. The invention process takes time, as per Sevcik (2004), and it does not happen immediately. He also believes that the spread of innovation and the opposition to changes has the greatest impact on the process of innovation because it delays it down.

Rogers (2003) argues that the perception of these characteristics by an organization affects the degree of breakthrough technology adoption. If an organization realizes the benefits arising from electronic banking, these innovations will be taken into account when additional technologies are available. Innovation is quicker adopted in companies having internet access as well as information technology than in those lacking. The hypothesis is based on the present research, which shows how innovations like electronic banking are taken up by financial institutions. This theory is relevant study as it helps in understanding how electronic banking is taken up by MFIs and how this influences performance.

2.2.3 Technology Acceptance Model

Davis (1989) founded technology acceptance model and is sometimes referred to as the Davis model. The model takes into account how users embrace new technologies, which is used to choose a system that is both practical and advantageous to them. Moon and Kim (2015) examined the fundamentals of TAM validity and discovered that user acceptance is influenced by the usage of technology and other usability factors rather than the fundamental design of TAMs. The assumption that a

technology or computer system will greatly enhance work performance once it is implemented defines its anticipated usefulness (Davis, 1989).

The ease with which a system can be utilized is still valued; it is a sign that the user has mastered its use and the new technology. The model emphasizes ease of use as a way to forecast system utility (Gefen, Karahanna & Straub, 2013). In relation to Potaloglu and Ekin, (2015 people are more likely to adopt electronic banking when they believe it is efficient. Features such as perceived usability simplicity and perceived utility are seen as essential to the promotion of e-banking.

Research methodology has changed as a result of the theory of technology acceptance. The current study mainly aims to establish the advantages and disadvantages of electronic banking into MFIs in Kenya and to look at how easy or difficult it is for electronic banking to be used within the MFI sector in Kenya. This theory is relevant study as it helps in understanding how electronic banking is accepted among MFIs and how this influences performance.

2.3 Determinants of Financial Performance

There are numerous determinants affecting a firm's FP that can be discovered inside or outside the company. Firm-specific internal variables that can be changed internally and they include electronic banking, credit risk, liquidity risk, interest rate risk, operating risk, asset base and capital adequacy. External factors such as inflation, GDP, political stability, and interest rates might affect a company efficiency (Athanasoglou et al., 2005).

2.3.1 Electronic Banking

Electronic banking entails making investment utilizing cutting-edge technology in order to boost income and increase the system's efficiency and efficacy (Sheleg &

Kohali, 2011). According to John, Fredrick and Jagongo (2014), electronic banking refers to new technologies that enable money transfer services and financial transactions that are regulated and carried out by financial institutions through digital platforms rather than conventional over-the-counter trades.

World Bank (2016) has identified that digital platforms and electronic banking have had a positive effect on financial inclusion levels. Nevertheless, increase in financial inclusion did not always translate to superior performance for financial institutions. The correlation between electronic banking and performance was found to be insignificant. The current study seeks to contribute in this area.

2.3.2 Credit Risk

This indicates an MFI's asset risk and stability. It estimates the asset quality magnitude among the characteristics that impact banks' health. The value of assets under the control of a MFI is heavily dependent on credit risk, and the quality of the assets owned by the MFI heavily relies on specific risks, level of NPLs, and debtors cost to the MFI. This ratio should be at the lowest level. If lending is susceptible to risk in a well-functioning bank, the indicator in this case would be the applied interest margins. A low ratio shows an insufficient risk cover by the margins (Athanasoglou et al., 2009).

A Sacco's assets primarily consist of a loan portfolio, current as well as fixed assets, and other investments. The quality of assets mostly improves with the age and bank size (Athanasoglou et al., 2005). The primary assets that generate income for MFIs' are loans. The loan portfolio quality hence determines bank performance. Good quality assets reduce losses arising from NPLs, and this subsequently impacts performance (Dang, 2011).

2.3.3 Liquidity Risk

Liquidity refers to a company's ability, in this case, an MFI, to pay its debts that are accrued in a year by using cash and quickly convertible short-lived assets into cash. Therefore, it happens in the event of the capacity to satisfy debt obligations to creditors without liquidating their other assets (Adam & Buckle, 2013).

Insufficient liquid assets, as per Liargovas and Skandalis (2008), make it difficult for businesses to finance their operations and make investments. Companies having this level of liquidity are able to cover unforeseen liabilities and commitments that must be paid. According to Almajali et al. (2012), a bank's liquidity has a significant impact on the loan amounts it can afford to make to customers; as a result, MFIs should maintain more liquid assets and less short-term liabilities. A rise in MFI liquidity, according to Jovanovic (1982), may be detrimental to the companies.

2.3.4 Firm Size

A company's earnings from economies of scale are inversely correlated with its size. Due to significant economies of scale, a firm's operational processes have a higher efficiency the larger it is. As per Amato and Burson (2007) large organizations, irrespective of its size, run the risk of losing control over both their strategic and operational activities, which would reduce managerial effectiveness.

Big businesses have more power in the market. They can also further diversify their investment portfolios. If the company grows rapidly, they are also more prone to encounter organizational waste. The amount of cash flow which can be reinvested greatly depends on the size of the firm. When determining a company's size, it's crucial to take its workforce, property holdings, and sales volume into account (Njoroge, 2014).

2.3.5 Capital Adequacy

Also called the capitalization ratio, the adequacy ratio shows how equity and total assets are related. It shows the ability of a bank to remain solvent by regulating risks. Berger and DeYoung (1997) in an investigation showed a negative relation between capital adequacy and performance. In imperfect capital markets, institutions with sufficient capital ought to reduce borrowing to back a specific asset class, hence lowering the predicted bankruptcy costs hence incur less financing costs.

A financial institution with sufficient capital signals the market that a superior performance is to be expected. The results of Magweva and Marime (2016) revealed that capital holdings are positively related to bank profitability, indicating that Greek banks are in a stable financial position. Also, Amato and Burson (2007) showed a positive causality between capital contributions and profitability.

2.4 Empirical Review

Local as well as global researches have determined the link between electronic banking and performance, the objectives, methodology and findings of these studies are discussed.

2.4.1 Global Studies

Wadhe and Saluja's (2015) study focused on electronic banking impact on bank profitability in India from 2006 to 2014. The research made use of data relating to Indian commercial banks. The relationship between banking services and profitability was examined using multiple regression analysis. E-banking has been linked to higher profitability for both private and public sector banks, according to research. According to this study, profitability rises as the number of ATMs rises. There were

some links, however weak, between the financial institutions' profits and the number of branches.

Khamis (2016) has investigated impact of agent banking techniques on customer services of commercial bank in Ghana. Services provided to clients have a significant impact on such elements as decreased banking hall waits times, reduced service costs and personally tailored banking services, leading to the conclusion that the development of excellent financial services and customer service is closely related. In addition, the research showed that bank representatives substantially enhance the overall efficiency and quality of customer service in banks. As a consequence, the research deemed it essential for financial institutions to develop methods to guarantee their employees are properly motivated and to propose the usage of performance based incentives.

King'ang'ai et al. (2016) examined financial outcome of banks' performance via agents in the Rwandan country of East Africa utilizing four Rwandan commercial bank currently functional by 31 December 2015. The results from the research showed that the regulation of bank agencies, low transaction cost via banking agencies, access to banking-related services through bank agents and general development in the market had a favorable effect on performances in terms of financial position of commercial bank. Findings of linear regression model have created a favorable connection among agency banking effect and performances in terms of financial position of commercial bank.

Le, Ho, and Mai (2019) focused on how financial industry innovation affect income disparity in developing nations. Financial innovations impact on income inequality is examined in 22 developing economies between 2005 and 2015 using the two-stage

least squares model and two financial innovations indices. The study's findings indicate that the GINI coefficient and the financial innovations index have a negative relationship. One of the proposals made is that policy recommendations are necessary to reduce income disparity through the creation of financial innovations

In order to pinpoint the important concerns and gaps in their research, Kim et al. (2019) looked at 54 academic works on the connection between development, integration, and mobile services. Conclusions show that the majority of the literature under review focused on the environment, delivery, and mobile services. In the early stages of the research, the regions looked at demonstrated a bias to individual and institutional situations in the implementation of mobile banking services, contrasted to the supply and demand of actual users and their social impact. Furthermore, the study methodologies chosen showed little depth and variety. With regard to inclusivity among emerging regions, this research broadens the knowledge of recent publications on mobile financial services and emphasizes the need for additional research.

2.4.2 Local Studies

Aduda and Kingoo (2012) investigated the relationship between e-banking and performance of Kenya banking system. Specifically, the study established whether there is relationship between the dependent variable i.e., performance measured by return on assets and the independent variables: investments in e-banking, number of ATMS and number of debits cards issued to customers as proxy for e-banking. The study used secondary data. The data was collected from annual report of target banks and Central Bank of Kenya. The study used both descriptive and inferential statistics in analyzing the data. In general the study revealed that e-banking has strong and

significance marginal effects on returns on asset in the Kenyan banking industry. Thus, there exists positive relationship between e-banking and bank performance.

Aduda and Kalunda (2012) conducted a review of literature on the effect of financial inclusion on financial stability with respect to Kenya. Numerous studies have revealed levels of financial inclusion with limited studies performed on the impact of financial inclusion initiatives on financial stability. This paper concludes that enhanced measures of financial inclusion which include both access and usage should be applied, since access and usage are not the same but supplementary. Informal financial services should also be included as they play a big role in developing countries.

Using secondary data gathered between 2013 and 2017, Muli (2018) investigated how commercial banks efficiency is influenced by electronic banking. All 42 banks operating in Kenya were sampled. The variable predictor has been chosen as electronic banking based on the value of transactions performed by using ATMs, mobile banking, internet, and agency banking. Performance was utilized as a study response variable. The findings showed that the good and important effects of bank size, liquidity, capital adequacy, ATMs and mobile banking were achieved. Internet banking and agency banking have been identified as statistically negligible factors for efficiency in commercial banks.

Wanalo (2018) evaluated the financial position of commercial banks and their performance in establishing if the employment of technical financial technology has a substantial influence on financial performance. This research was completed using the descriptive research methodology. All commercial banks were taken into consideration for this research. In total, 15 people were sampled for this study drawn

from commercial and non-commercial sectors. In addition to data acquired from the CBK and the bank's website, supplementary data was sourced via annual reports delivered by commercial banks between 2012 and 2016. The study made use of panel data analysis. The Prais Winstein regression model was used to generate the results. Despite being more widely used, agency banking and ATMs have little effect on a bank's overall financial stability.

Sindani, Muturi, and Ngumi (2019) looked at the effects of the evolution of financial distribution channels on financial inclusion in Kenya over a six-year period starting in 2012 and ending in 2017.Secondary data was acquired. Frequency tables, percentages, and mean were utilized in analyzing the data and show how the study's findings were reached. In this research, descriptive statistics were used to show the category sets that were generated by the research. The function of the variance, mean, and standard deviation on the dependent and independent variables was to characterize the study's variables. This study's result being internet banking fosters productivity and efficiency, it has a positive impact on Kenya's financial sector. Additionally, the use of ATMs has increased financial inclusion in Kenya.

Ogweno (2019) looked at the impact of financial innovations on the Kenyan regulated DT-SACCO market's financial performance. The population comprised 13 registered microfinance institutions (DT-SACCOs). Every year over the first five years of the project's existence, data were collected. The results show that a descriptive cross-sectional design was utilized in the study methodology, and a multiple linear regression model was used to assess the connection between variables. The study's conclusions showed that deposit, mortgage, and bank size all had a significant impact

on the growth and balances of savings accounts. The number of ATMs, agency banking, and bank financial performance were not significantly correlated.

Abdulkadir (2019) undertook in-depth research on digital payments impact on the operations of commercial banks. The quantity of transactions made via mobile and internet banking was a factor in the adoption of digital internet banking. In this instance, all of the data originates from commercial banks. The study made use of financial institution and capital adequacy ratio variables to assess the size of the bank. A descriptive research strategy was used to collect information on all of Kenya's commercial banks. Using Pearson correlation, the straightforward linear link was produced. Regression analysis was used to reveal the dynamics of the connection. The study found that financial innovations influenced financial performance.

2.5 Summary of the Literature Review and Research Gaps

The theoretical reviews exhibited the anticipated link between electronic banking and the FP of financial institutions. Major factors that affect effectiveness have been examined. There is a knowledge gap that has to be filled based on the research that have been examined. From the studies analyzed, there are differing inferences regarding the association between electronic banking and performance. The variations between the studies can be attributed to the various operationalization’s of electronic banking by the researchers, showing that the operationalization model affects the conclusions.

Moreover, numerous studies used various designs, some of which depended on empirical analysis to draw conclusions and others of which relied on existing literature to gauge the relationships between the variables. Researchers produced a variety of conflicting results and failed to pinpoint the precise connection between

electronic banking and the performance of firms. This highlights the need for additional study in future research to bridge the gap through conceptualizing the impact of electronic banking on FP.

2.6 Conceptual Framework

Displayed in figure 2.1 is the predicted relation between the variables. The predictor variable is electronic banking given by the volume of transactions via mobile apps, internet banking and ATMs. The control variables are credit risk given as NPL to total loans, liquid risk given by total assets to liquid assets, firm size given by total assets natural log and capital adequacy by core capital to risk weighted assets. The response variable is performance given by ROA.

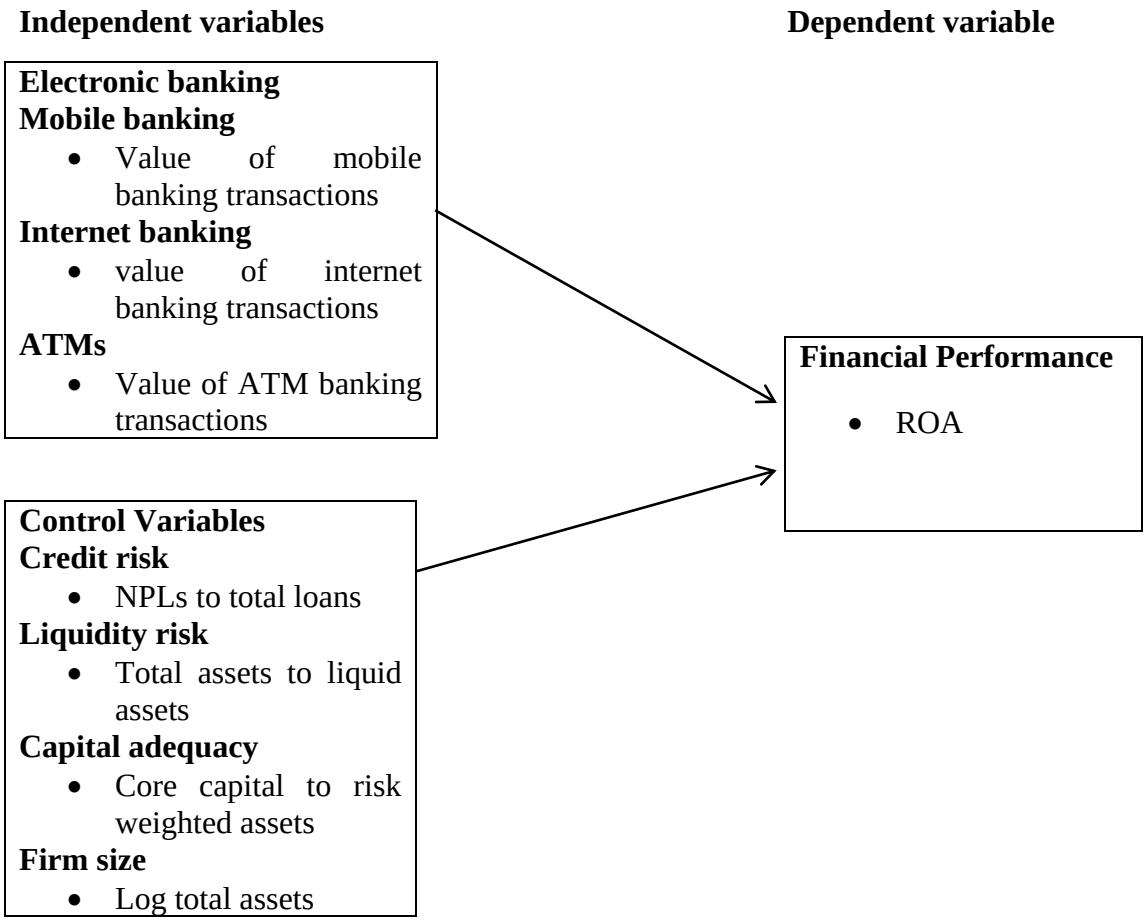

Figure 2.1: The Conceptual Model

Source: Researcher (2022)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter details the procedures that were followed to reach the study's overarching goal: learning if and how electronic banking influence MFIs' performance. The research emphasizes the design, data collection, as well as analysis specifically.

3.2 Research Design

To ascertain the relationship between electronic banking and MFIs' performance, a descriptive approach was used. This design was suitable since the researcher was particularly interested in the phenomenon nature (Khan, 2008). Additionally, it was adequate for describing how the occurrences are related to one another. Additionally, this design authentically and precisely represented the variables, providing satisfactory responses to the research questions (Cooper & Schindler, 2008).

3.3 Population and Sample

The study population was the 47 MFIs in Kenya that are members of the AMFI as at December 2021 (see appendix I). Since the population was relatively small, the study adopted a census technique where all the 47 MFIs in Kenya were taken into account.

3.4 Data Collection

Secondary data was relied on in this investigation which was extracted from annual published financials of the MFIs from 2017 to 2021 and captured in data collection forms. The reports were extracted from the CBK financial publications of the specific MFIs and AMFI reports. The specific data collected included net income, total assets, mobile banking transactions, internet banking transactions, ATM transactions, total loans, total assets, net operating income, total debt, liquid assets, core capital, risk

weighted assets.

3.5 Data Analysis

To evaluate the data, SPSS software version 24 was employed. The results were presented quantitatively in tables and graphs. Measures of central tendency and dispersion were calculated using descriptive statistics, and standard deviation provided for each variable. Correlation and regression were used in inferential statistics. The size of the relationship between the research variables was determined by correlation, and cause and effect relationships between the variables were determined via regression. The link between the dependent and independent variables was established linearly via a multivariate regression.

3.5.1 Diagnostic Tests

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

Table 3.1: Diagnostic Tests

Test	Meaning	Statistical method	Interpretation	Diagnosis
Autocorrelation	Occurs when the residuals lack independence from each other.	Durbin-Watson statistic	When the test outcomes fall within critical values (1.5<d<2.5) there is no autocorrelation	Correlogram (Auto Correlation Function-ACF plot) Review model specifications
Multicollinearity	How closely related are the independent variables of the study	Variance Inflation Factors (VIF)	VIF less than 10 implies that there is no multicollnearity	Data that was causing Multicollinearity was adjusted using log transformation
Heteroscedasticity	When data lacks similar	Breusch Pagan	Data split into high and low	Non-linear transformation

	variance as assumed by standard linear regression model	Test Levene Test Normal P-P plots	value. If data differ significantly, there is an element of heteroscedasticity	
Normality Test	When linear regression analysis for all variables is multivariate normal	Goodness of fit test Shapiro-Wilk test	Kolmogorov-Smirnov test prob.> 0.05. If the test is not substantial, the distribution is possibly normal.	Data that was not normally distributed was adjusted for using log transformation and non-linear log transformation.
Stationarity	a unit-root test to establish if the data was stationary	Levin-Lin Chu unit root test	A p value less than 0.05 implies that the data is stationary	Robust standard errors were used where data failed the test.

3.5.2 Analytical Model

The following equation was applicable:

$$Y= \beta_0 + \beta_1X_1+ \beta_2X_2+ \beta_3X_3 + \beta_4X_4+ \beta_5X_5 + \beta_6X_6+ \beta_7X_7 +\varepsilon$$

Where: Y = financial performance given by net income to total assets

β_0 =y intercept of the regression equation.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$=are the regression coefficients

X_1 = mobile banking given by log total value of mobile banking transactions

X_2 = internet banking given by log total value of internet banking transactions

X_3 = ATM banking given by log total value of ATM banking transactions

X_4 = Credit risk as measured by the ratio of NPLs to total loans on an annual basis

X_5 = liquidity risk as measured by the ratio of total assets to liquid assets

X_6 = Capital adequacy as given by the ratio of total core capital to risk weighted assets

X_7 = firm size as measured by the natural logarithm of total assets

ε =error term

3.5.3 Tests of Significance

Parametric tests established significance of the general model and variables. ANOVA was used to do the F-test, which established the model significance, and a t-test, which established every variable significance.

CHAPTER FOUR: DATA ANALYSIS RESULTS AND FINDINGS

4.1 Introduction

This chapter presents descriptive statistics and the results and interpretations of various tests namely; test of normality, Multicollinearity, heteroskedasticity tests, autocorrelation and stationarity test. The chapter also presents the results of Pearson correlation and regression analysis.

4.2 Descriptive Statistics

This section presents the descriptive findings from the collected data. The descriptive results include mean and standard deviation for each of the study variables. The analyzed data was obtained from CBK and individual MFIs annual reports for a period of 5 years (2017 to 2021). The number of observations is 210 (42*5) as 42 MFIs provided complete data for the 5 year period. The results are as shown in Table 4.1

Table 4.1: Descriptive Results

	N	Minimum	Maximum	Mean	Std. Deviation
ROA	210	.0015	.3650	.111186	.0861992
Mobile banking	210	.2463	11.3884	4.579899	2.1673997
Internet banking	210	8.4730	17.2928	14.335374	1.5558073
ATMs	210	8.4730	17.2928	14.265655	1.6104882
Credit risk	210	.0000	.5700	.091332	.0901119
Liquidity risk	210	1.0237	10.0893	2.357211	1.4603364
Capital adequacy	210	.0227	1.9617	.261818	.2545613
MFI size	210	6.0724	8.7303	7.773748	.5705492
Valid N (listwise)	210				

Source: Field Data (2022)

4.3 Diagnostic Tests

As rationalised in chapter three, the researcher conducted diagnostic tests to ensure that the assumptions of Classic Linear Regression Model (CLRM) are not violated and to obtain the suitable models for examining in the consequence that the CLRM hypotheses are infringed. Accordingly, before processing regression model pre-approximation and post approximation analyses were carried out. The pre-approximation tests carried out in such cases existed in the multicollinearity test and unit root tests while the post estimation tests are normality test, test for heteroskedasticity and test for autocorrelation. The research obtained these analyses to refrain from factitious regression outcomes.

4.3.1 Normality Test

The normality of data can be tested using a variety of methods. The most commonly used methods include the Shapiro–Wilk test, Kolmogorov–Smirnov test, skewness, kurtosis, histogram, P–P Plot, box plot, Q–Q Plot, mean and standard deviation. The most extensively used normality tests are the Kolmogorov–Smirnov test and the Shapiro–Wilk test. The Shapiro–Wilk test is better for small sample sizes ($n < 50$ samples), while it can also be used on more extensive samples selections, whereas the Kolmogorov–Smirnov test is better for $n > 50$ samples. As a result, the study used the Kolmogorov–Smirnov test as the numerical method of determining normality. For both of the above tests, the null hypothesis says that the data are obtained from a normally distributed population. The null hypothesis is rejected when P-value is less than 0.05, and the data are said to be not normally distributed. If any violation of the assumption of normality was detected, necessary correction measures were applied.

Table 4.2: Test for Normality

	Kolmogorov-Smirnov	P-value
ROA	0.823	0.171
Mobile banking	0.869	0.178
Internet banking	0.918	0.202
ATMs	0.881	0.194
Credit risk	0.874	0.191
Liquidity risk	0.892	0.201
Capital adequacy	0.923	0.220
MFI size	0.874	0.194

Source: Research Findings (2022)

From Table 4.2 results, all the study variables have a p value more than 0.05 and therefore were normally distributed.

4.3.2 Multicollinearity Test

Multicollinearity occurs when the independent variables in a regression model are significantly linked. Multicollinearity was assessed using the VIF and tolerance indices. When the VIF value is higher than ten and the tolerance score is less than 0.2, multicollinearity is present, and the assumption is broken. The VIF values are less than 10, indicating no problem with multicollinearity.

Table 4.3: Multicollinearity

	Collinearity Statistics	
Variable	**Tolerance**	**VIF**
Mobile banking	0.523	1.912
Internet banking	0.564	1.773
ATMs	0.619	1.616
Credit risk	0.528	1.894
Liquidity risk	0.672	1.488
Capital adequacy	0.598	1.672
MFI size	0.671	1.490

Source: Research Findings (2022)

4.3.3 Heteroskedasticity Test

The residual variance from the model must be constant and unrelated to the independent variable in linear regression models calculated using the Ordinary Least Squares (OLS) method(s). Homoskedasticity refers to constant variance, whereas heteroscedasticity refers to non-constant variance (Field, 2009). The study used the Breusch-Pagan/Cook-Weisberg test to check if the variation was heteroskedastic. The null hypothesis implies constant variance, indicating that the data is homoscedastic. The results are as shown in Table 4.4.

Table 4.4: Heteroskedasticity Results

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity		
chi2(1)	=	0.8352
Prob > chi2	=	0.6182

Source: Research Findings (2022)

Table 4.4 reveals that the null hypothesis was not rejected since the p-value was 0.6182, which was statistically significant (p>0.05). As a result, the dataset had homoskedastic variances. Since the P-values of Breusch-Pagan's test for homogeneity of variances were greater than 0.05. The test therefore confirmed homogeneity of variance. The data can therefore be used to conduct panel regression analysis.

4.3.4 Autocorrelation Test

Serial correlation, also known as autocorrelation, makes the standard errors of coefficients appear to be less than in linear panel data models, resulting in higher R-squared and erroneous hypothesis testing Autocorrelation was tested using Durbin-Watson test. Error terms of regression variables are uncorrelated if Durbin-Watson test is equivalent to 2 (i.e. between 1 and 3). The closer the value to 2 is; the better. The results are as shown in Table 4.5.

Table 4.5: Test of Autocorrelation

Durbin Watson Statistic
2.136

Source: Research Findings (2022)

The results in Table 4.7 show that the Durbin-Watson statistic was 2.136. This shows that the error terms of regression variables are uncorrelated as the Durbin-Watson statistic was close to 2.

4.3.5 Stationarity Test

The research variables were subjected to a panel data unit-root test to establish if the data was stationary. The unit root test was Levin-Lin Chu unit root test. At a standard statistical significance level of 5%, the test was compared to their corresponding p-values. In this test, the null hypothesis is that every panel has a unit root, and the alternative hypothesis is that at least one panel is stationary. Table 4.6 shows Levin-Lin Chu unit root test results.

Table 4.6: Levin-Lin Chu unit-root test

Levin-Lin Chu unit-root test			
Variable	**Hypothesis**	**p value**	**Verdict**
ROA	Ho: Panels contain unit roots	0.0000	Reject Ho
Mobile banking	Ho: Panels contain unit roots	0.0000	Reject Ho
Internet banking	Ho: Panels contain unit roots	0.0000	Reject Ho
ATMs	Ho: Panels contain unit roots	0.0000	Reject Ho
Credit risk	Ho: Panels contain unit roots	0.0000	Reject Ho
Liquidity risk	Ho: Panels contain unit roots	0.0000	Reject Ho
Capital adequacy	Ho: Panels contain unit roots	0.0000	Reject Ho
MFI size	Ho: Panels contain unit roots	0.0000	Reject Ho

Source: Research Findings (2022)

As demonstrated in Table 4.6, this test concludes that the data is stationary at a 5% level of statistical significance since the p-values all fall below 0.05.

4.4 Correlation Results

To determine the degree and direction of link between each predictor variable and the response variable, correlation analysis was carried out. The correlation findings in Table 4.7 display correlation nature between the research variables in relation to magnitude and direction.

Table 4.7: Correlation Results

		ROA	Mobile banking	Internet banking	ATMs	Credit risk	Liquidity risk	Capital adequacy	MFI size
ROA	Pearson Correlation	1							
	Sig. (2-tailed)								
Mobile banking	Pearson Correlation	.141**	1						
	Sig. (2-tailed)	.015							
Internet banking	Pearson Correlation	.075	-.059	1					
	Sig. (2-tailed)	.279	.398						
ATMs	Pearson Correlation	.034	-.006	-.068	1				
	Sig. (2-tailed)	.621	.933	.328					
Credit risk	Pearson Correlation	-.567**	-.072	-.025	-.172*	1			
	Sig. (2-tailed)	.000	.300	.724	.013				
Liquidity risk	Pearson Correlation	-.575**	-.034	.177**	-.070	.115	1		
	Sig. (2-tailed)	-.567**	.620	.010	.312	.096			
Capital adequacy	Pearson Correlation	.467**	.035	-.242**	.151*	-.166*	.060	1	
	Sig. (2-tailed)	.000	.618	.000	.029	.016	.387		
MFI size	Pearson Correlation	.585**	.095	.180**	.011	-.131	.225**	.023	1
	Sig. (2-tailed)	.000	.171	.009	.873	.059	.001	.743	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
c. Listwise N=210

Source: Research Findings (2022)

The correlation results disclose that mobile banking has a weak positive as well as significant link with ROA of MFIs in Kenya (r=0.141) at 5 percent significance level while internet banking and ATMs have a positive but not significant relationship with ROA. The results also disclose that credit risk and ROA have a negative as well as significant correlation (r=-0.5677) at 5 % significance level. The relationship between

liquidity risk and ROA was also negative and significant (r=-0.5755) at 5 % significance level. Both capital adequacy and size had positive as well as significant relation with ROA as depicted by p values below 0.05.

4.5 Regression Results

To determine the extent to which ROA is described by the chosen variables, regression analysis was used. In Table 4.8, the regression's findings are displayed.

Table 4.8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.728[a]	.530	.502	.008115

a. Predictors: (Constant), MFI size, ATMs, Mobile banking, Capital adequacy, Liquidity risk, Credit risk, Internet banking

Source: Research Findings (2022)

From the conclusions as epitomized by the R^2, the studied independent variables explained variations of 0.530 in ROA among MFIs in Kenya. This suggests that other factors not incorporated in this study account for 47% of the variability in ROA among MFIs in Kenya, while the seven variables account for 53% of those variations.

Table 4.9: ANOVA Analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.035	6	.172	62.900	.000[b]
	Residual	.570	203	.003		
	Total	1.605	209			

a. Dependent Variable: ROA

b. Predictors: (Constant), MFI size, ATMs, Mobile banking, Capital adequacy, Liquidity risk, Credit risk, Internet banking

Source: Research Findings (2022)

The data had a 0.000 significance level, according to Table 4.9's ANOVA results, which suggests that the model is the best choice for drawing conclusions about the variables.

Table 4.9: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.472	.052		7.038	.000
	Mobile banking	.162	.013	.114	3.219	.001
	Internet banking	.003	.007	.021	.480	.632
	ATM	.010	.017	.026	.610	.542
	Credit risk	-.157	.042	-.150	-3.376	.000
	Liquidity risk	-.160	.003	-.162	-3.587	.000
	Capital adequacy	.739	.014	.695	16.630	.000
	MFI size	.293	.006	.286	6.723	.000
a. Dependent Variable: ROA						

Source: Research Findings (2022)

The coefficient of regression model was as below;

$$\mathbf{Y = 0.472+0.162X_1 - 0.157X_2 - 0.160X_3 + 0.739X_4 + 0.293X_5}$$

Where:

Y = ROA; X_1 = Mobile banking; X_2 = Credit risk; X_3=Liquidity risk X_4= Capital adequacy; X_5 = MFI size

4.6 Discussion of Research Findings

The objective of this research was to establish the effect of electronic banking on ROA of MFIs in Kenya. The study utilized a descriptive design while population was the 47 MFIs in Kenya. Complete data was obtained from 42 MFIs in Kenya and which were considered adequate for regression analysis. The research utilized secondary data which was gotten from CBK and individual MFI annual reports. The specific attributes of electronic banking considered were; mobile banking, internet

banking and ATMs. The control variables were credit risk, liquidity risk, firm size and capital adequacy. Both descriptive as well as inferential statistics were used to analyze the data. The results are discussed in this section.

Multivariate regression results revealed that the R square was 0.530 implying 53% of changes in ROA of MFIs are due to five variables alterations selected for this study. This means that variables not considered explain 47% of changes in ROA. The overall model was also statistically significant as the p value was 0.000 which is less than the significance level of 0.05. This implies that the overall model had the required goodness of fit.

The multivariate regression analysis further revealed that individually, mobile banking has a positive and significant effect on ROA of MFIs (β=0.162, p=0.001). Internet banking and ATMs exhibited a positive but not statistically significant influence on ROA. Both credit risk and liquidity risk have a negative effect on ROA of MFIs as shown by (β=-0.157, p=0.000) and (β=-0.160, p=0.000) respectively. Capital adequacy and firm size exhibited a positive and significant ROA influence as shown by (β=0.739, p=0.000) and (β=0.293, p=0.000) respectively.

These conclusions concur with those of Muli (2018) who investigated how commercial banks efficiency is influenced by electronic banking. A sample was taken from each of Kenya's 42 banks. The variable predictor has been chosen as electronic banking based on the value of transactions performed by using ATMs, mobile banking, internet, and agency banking. Performance was utilized as a study response variable. The findings showed that the good and important effects of bank size, liquidity, capital adequacy, ATMs and mobile banking were achieved. Internet

banking and agency banking have been identified as statistically negligible factors for efficiency in commercial banks.

The research findings also concur with Ogweno (2019) who looked at the impact of financial innovations on the Kenyan regulated MFI market's financial performance. The population comprised 13 registered microfinance institutions (MFIs). Every year over the first five years of the project's existence, data were collected. The results show that a descriptive cross-sectional design was utilized in the study methodology, and a multiple linear regression model was used to assess the connection between variables. The study's conclusions showed that deposit, mortgage, and bank size all had a significant impact on the growth and balances of savings accounts. The number of ATMs, agency banking, mobile banking and bank financial performance were not significantly correlated.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The key aim of the research was determining how electronic banking influences the performance of MFIs in Kenya. This section includes a summary of the findings from the previous chapter as well as the conclusions and limitations of the study. Additionally, it makes recommendations for potential policy measures. The chapter provides recommendations for further research

5.2 Summary

The objective of this research was to establish the effect of electronic banking on ROA of MFIs in Kenya. The study utilized a descriptive design while population was the 47 MFIs in Kenya. Complete data was obtained from 42 MFIs in Kenya and which were considered adequate for regression analysis. The research utilized secondary data which was gotten from CBK and individual MFI annual reports. The specific attributes of electronic banking considered were; mobile banking, internet banking and ATMs. The control variables were credit risk, liquidity risk, firm size and capital adequacy. Both descriptive as well as inferential statistics were used to analyze the data. The results are discussed in this section.

The correlation results disclose that mobile banking has a weak positive as well as significant link with ROA of MFIs in Kenya while internet banking and ATMs have a positive but not significant relationship with ROA. The results also disclose that credit risk and ROA have a negative as well as significant correlation. The relationship between liquidity risk and ROA was also negative and significant. Both capital adequacy and size had positive as well as significant relation with ROA.

Multivariate regression results revealed that the R square was 0.530 implying 53% of changes in ROA of MFIs are due to five variables alterations selected for this study. This means that variables not considered explain 47% of changes in ROA. The overall model was also statistically significant as the p value was 0.000 which is less than the significance level of 0.05. This implies that the overall model had the required goodness of fit.

The multivariate regression analysis further revealed that individually, mobile banking has a positive and significant effect on ROA of MFIs. Internet banking and ATMs exhibited a positive but not statistically significant influence on ROA. Both credit risk and liquidity risk have a negative effect on ROA of MFIs. Capital adequacy and firm size exhibited a positive and significant influence on ROA among MFIs in Kenya.

5.3 Conclusions

The study purpose of the research was to find out the association between electronic banking and ROA among MFIs in Kenya. The study results indicated that mobile banking had a positive as well as significant effect on ROA. This may imply that MFIs which have adopted mobile banking in a large scale are likely to record a high level of ROA compared with MFIs with less mobile banking adoption.

The findings indicated that credit risk had a negative as well as significant impact on ROA. This may imply that MFIs with high credit risk have low levels of ROA. Credit risk management is therefore necessarily to achieve the targeted performance. The study concludes that credit risk affects ROA among MFIs in Kenya in a negative manner.

Additionally, the outcomes revealed that liquidity risk has a significant negative effect on ROA. This implies that firms with low levels of liquid assets compared to their assets end up having a lower ROA. This can be explained by the inability of illiquid firms to take advantage of investment opportunities when they arise.

The study conclusions revealed that capital adequacy had a positive as well as significant effect on ROA. This may mean that the MFIs that have adequate capital are able to meet their obligations when they fall due and are also able to take advantage of investment opportunities that might arise in the course of doing business and therefore high levels of ROA compared with firms that has less capital adequacy.

The research outcomes further depicted that MFI size possessed a positive as well as significant effect on ROA which might mean that an increase in asset base of an MFI leads to enhanced ROA. This can be explained by the fact that bigger MFIs are likely to have developed structures to monitor the internal operations of a firm leading to better ROA. Bigger MFIs are also likely to have better governance structure which can also explain the high ROA associated with firm size.

5.4 Recommendations for Policy and Practice

The study findings reveal that mobile banking had a positive and significant effect on ROA. The study therefore recommends that the management of MFIs in Kenya should work on increasing their scale of mobile banking as this will contribute to enhancement of ROA. The policy makers such as the CBK should create a conducive environment for MFIs to conduct mobile banking activities.

The research findings reveal that credit risk had a negative as well as significant impact on ROA. The research therefore commends that the administrators of MFIs should work on reducing the level of non-performing loans. This can be achieved by

coming with effective credit risk management methods that will enable the MFI distinguish between good and bad borrowers.

Further, liquidity risk was discovered to possess a significant and positive impact on ROA. The research therefore commends that management of MFIs in Kenya should ensure that they do not over commit their assets by giving excess loans as this will likely lead to reduced ROA. The MFIs should come up with effective liquidity risk management strategies. Regulators should ensure that the MFIs do not led beyond a certain set limit of their asset base.

From the study findings, capital adequacy was found to enhance ROA of MFIs, this study recommends that MFIs should keep adequate capital levels to sustain their obligations when they fall due whereas simultaneously time enjoying short term investment chances which may arise. The policy makers should set a limit of the capital adequacy level that MFIs should have as too much capital adequacy is also disadvantageous as it comes with opportunity costs.

5.5 Limitations of the Study

The focus was on various factors which are thought to influence ROA of Kenyan MFIs. The research focused on seven explanatory variables in particular. However, in certainty, there is presence of other variables probable to influence ROA of firms including internal like corporate governance attributes and management efficiency whereas others are beyond the control of the firm like interest rates as well as political stability.

In this study, a five-year period from 2017 to 2021 was selected. There is no proof that comparable results will remain the same across a longer time frame. Moreover, it is impossible to predict if the same outcomes would persist until 2021. Given that

additional time contains instances of big economic transitions like recessions and booms, it is more dependable.

The quality of the data was the main restriction for this study. It is impossible to conclusively conclude that the study's findings accurately reflect the current reality. It has been presumed that the data utilized in the study are accurate. Due to the current conditions, there has also been a great deal of incoherence in the data measurement. The study made use of secondary data rather than primary data. Due to the limited availability of data, only some of the growth drivers have been considered.

The data analysis was performed using regression models. Because of the limitations associated with using the model, like inaccurate or erroneous findings resulting from a change in the variable value, the researchers would not be able to generalize the conclusions precisely. A regression model cannot be performed using the prior model after data is added to it.

5.6 Suggestions for Further Research

This study focused on MFIs in Kenya. Further studies can focus on a wide scope by covering other financial institutions in Kenya to back or criticize the results of the current study. Further, this study focused on three measures namely; mobile banking, internet banking and ATMs. Future studies should focus on other electronic banking measures that were not considered in this study.

The current research scope was restricted to five years; more research can be done past five years to determine whether the results might persist. Thus, inherent future studies may use a wider time span, that can either support or criticize the current research conclusions. The scope of the study was additionally constrained in terms of context where MFIs were examined. Further studies can be extended to other

financial firms to establish if they complement or contradict the current study findings. Researchers in the East African region, the rest of Africa, and other global jurisdictions can too perform the research in these jurisdictions to ascertain if the current research conclusions would persist.

The research only used secondary data; alternate research may use primary data sources such in-depth questionnaires and structured interviews given to practitioners and stakeholders. These can then affirm or criticize the results of the current research. This study used multiple linear regression and correlation analysis; future research could use other analytic techniques such factor analysis, cluster analysis, granger causality, discriminant analysis, and descriptive statistics, among others.

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APPENDICES

Appendix I: Microfinance Institutions in Kenya

1. ASA International MFI Limited
2. BIMAS MFI Limited
3. Caritas MFI Limited
4. Century MFI Limited
5. Choice MFI Limited
6. Daraja MFI Limited
7. Diversity MFI Limited
8. Eclof Kenya MFI Limited
9. Faulu MFI Limited
10. Fincredit MFI Limited
11. Greenland Fedha MFI Limited
12. Habitat for Humanity MFI Limited
13. Hand in Hand Eastern Africa MFI Limited
14. Hazina Development Trust MFI Limited
15. Jitegemea MFI Limited
16. Jiweze MFI Limited
17. Juhudi Kilimo MFI Limited
18. Kenya Women MFI Limited
19. Kipepeo MFI Limited
20. Letshego MFI Limited
21. Liberty Afrika Technologies MFI Limited
22. Longitude Finance MFI Limited
23. Maisha MFI Limited
24. Momentum MFI Limited
25. Money Worth Investment MFI Limited
26. Musoni MFI Limited
27. My Credit MFI Limited
28. NEEMA- HEEP MFI Limited
29. Nyali capital MFI Limited
30. PAWDEP MFI Limited
31. Platinum Credit MFI Limited
32. Premier Credit MFI Limited
33. Progressive Capital MFI Limited
34. Rafiki MFI Limited
35. Real people MFI Limited
36. Remu MFI Limited
37. Select MFI Limited
38. SMEP MFI Limited
39. SpringBoard Capital MFI Limited
40. Sumac MFI Limited
41. U & I MFI Limited
42. Ushind Bora MFI Limited
43. Uwezo MFI Ltd
44. Vision Fund MFI Limited
45. Weighbridge Ventures MFI Limited

46. Yehu MFI Limited
47. ZENKA MFI Limited

Source: CBK (2021)

Appendix II: Research Data

MFI	Year	ROA	Mobile banking	Internet banking	ATMs	Credit risk	Liquidity risk	Capital adequacy	MFI size
1	2017	0.0826	5.1251	13.4492	9.6530	0.1600	3.9703	0.1723	8.2162
1	2018	0.1139	4.5563	14.5950	11.2650	0.0600	3.9512	0.1645	8.2177
1	2019	0.1465	6.7565	14.6453	10.3690	0.1500	3.9318	0.1528	8.2509
1	2020	0.1945	7.4478	14.8834	9.6263	0.0400	3.9120	0.1560	8.2695
1	2021	0.1736	7.2316	15.0790	13.4537	0.0500	3.8918	0.1844	8.3168
2	2017	0.2410	2.7423	14.6052	13.4492	0.1400	3.9120	0.1592	8.3379
2	2018	0.1590	3.2537	15.9889	14.5950	0.1500	3.8918	0.1639	8.4239
2	2019	0.0644	2.8869	15.9219	14.6453	0.1200	3.8712	0.1616	8.4141
2	2020	0.0604	2.9535	15.8584	14.8834	0.0900	3.8501	0.1578	8.4557
2	2021	0.0310	2.7541	15.7852	15.0790	0.1100	3.8286	0.1602	8.4859
3	2017	0.0279	6.4279	13.7599	14.6052	0.0100	4.3944	1.8796	8.2067
3	2018	0.0248	6.6621	14.5768	15.9889	0.0200	4.3820	1.9617	8.2879
3	2019	0.0139	6.6387	14.9398	15.9219	0.0200	4.3694	0.3053	8.3768
3	2020	0.0019	6.5259	14.7218	15.8584	0.0400	4.3567	0.3229	8.4253
3	2021	0.1050	6.3715	15.1152	15.7852	0.0600	4.3438	0.3466	8.4516
4	2017	0.0840	1.1578	15.3316	13.7599	0.1300	3.1781	0.1596	7.5576
4	2018	0.1331	1.3225	13.5734	14.5768	0.1200	3.1355	0.1840	7.6198
4	2019	0.1709	1.6563	14.2855	14.9398	0.1300	3.0910	0.1786	7.5878
4	2020	0.0574	1.4725	14.4647	14.7218	0.1700	3.0445	0.1803	7.5652
4	2021	0.1230	1.2701	14.9982	15.1152	0.2200	2.9957	0.1638	7.5406
5	2017	0.0887	7.0066	11.1449	15.3316	0.0400	2.0794	0.3941	8.0577
5	2018	0.0937	6.9122	12.7982	13.5734	0.0500	1.9459	0.4230	8.1238

MFI	Year	ROA	Mobile banking	Internet banking	ATMs	Credit risk	Liquidity risk	Capital adequacy	MFI size
5	2019	0.0986	7.0197	12.5000	14.2855	0.0100	1.7918	0.4574	8.1659
5	2020	0.0999	6.5030	12.9661	14.4647	0.0100	1.6094	0.5397	8.2286
5	2021	0.1514	5.3769	14.0891	14.9982	0.0700	1.3863	0.4392	8.3287
6	2017	0.0609	7.3306	13.2541	11.1449	0.1000	3.5835	0.2730	8.5767
6	2018	0.2966	6.6133	14.2506	12.7982	0.0800	3.5553	0.2832	8.6278
6	2019	0.2323	5.9541	13.1748	12.5000	0.0200	3.5264	0.2637	8.6514
6	2020	0.2298	6.0810	14.1294	12.9661	0.3900	3.4965	0.2555	8.6986
6	2021	0.1657	5.4965	12.9685	14.0891	0.0600	3.4657	0.2764	8.7303
7	2017	0.0105	3.8258	15.6607	13.2541	0.0400	3.9703	0.1791	8.0019
7	2018	0.0572	3.5541	16.2099	14.2506	0.1500	3.9512	0.1792	8.0506
7	2019	0.0125	4.0251	15.9346	13.1748	0.3100	3.9318	0.1845	8.0485
7	2020	0.0912	5.7342	16.0608	14.1294	0.0200	3.9120	0.1732	8.1428
7	2021	0.0185	5.6053	16.0866	12.9685	0.1100	3.8918	0.1573	8.1599
8	2017	0.1863	2.8898	13.9119	15.6607	0.3500	3.9120	0.1099	7.9815
8	2018	0.0950	5.5063	13.1426	16.2099	0.1800	3.8918	0.0939	8.0263
8	2019	0.1526	4.3085	13.8898	15.9346	0.3900	3.8712	0.0790	8.0767
8	2020	0.1072	7.6511	14.0673	16.0608	0.1900	3.8501	0.0509	8.1894
8	2021	0.0096	5.8032	14.0719	16.0866	0.0500	3.8286	0.0280	8.2824
9	2017	0.0175	2.4783	13.0293	13.9119	0.1000	4.3944	0.1883	8.0201
9	2018	0.0041	2.4053	13.0224	13.1426	0.1100	4.3820	0.1551	8.0438
9	2019	0.1415	3.5773	13.2537	13.8898	0.1200	4.3694	0.2285	7.9725
9	2020	0.1548	2.2843	13.5020	14.0673	0.0400	4.3567	0.1477	7.9744
9	2021	0.1681	2.2110	13.7576	14.0719	0.0500	4.3438	0.1451	7.9950

MFI	Year	ROA	Mobile banking	Internet banking	ATMs	Credit risk	Liquidity risk	Capital adequacy	MFI size
10	2017	0.0296	5.1441	15.0340	13.0293	0.0200	3.1781	0.2165	8.1877
10	2018	0.0382	5.2963	15.0109	13.0224	0.0200	3.1355	0.2126	8.2356
10	2019	0.0419	5.8661	15.5781	13.2537	0.1900	3.0910	0.2277	8.2709
10	2020	0.0275	6.9341	16.1124	13.5020	0.0200	3.0445	0.0227	8.3291
10	2021	0.0570	6.0711	16.1330	13.7576	0.0300	2.9957	0.1618	8.3508
11	2017	0.0402	5.3464	14.3210	15.0340	0.0900	2.0794	0.2345	8.3898
11	2018	0.0415	5.9238	14.3780	15.0109	0.0900	1.9459	0.2442	8.4802
11	2019	0.2296	5.0765	14.6360	15.5781	0.1000	1.7918	0.2508	8.5279
11	2020	0.2144	6.9348	14.4732	16.1124	0.0400	1.6094	0.2355	8.5719
11	2021	0.1606	7.6295	14.2760	16.1330	0.0200	1.3863	0.2456	8.6261
12	2017	0.1440	7.9523	14.2875	14.3210	0.0200	2.3571	0.2291	7.2060
12	2018	0.1219	7.8483	15.2683	14.3780	0.0200	2.2968	0.1463	7.1988
12	2019	0.0957	6.9704	15.6160	14.6360	0.0300	2.6813	0.1850	7.2236
12	2020	0.2794	6.6765	16.3843	14.4732	0.0400	2.3480	0.1901	7.3186
12	2021	0.2788	6.8287	16.3125	14.2760	0.0300	2.6204	0.2111	7.3549
13	2017	0.1096	3.0733	8.6540	14.2875	0.0600	1.3164	0.4230	7.7230
13	2018	0.0593	2.2910	8.4730	15.2683	0.1900	1.1960	0.4574	7.6766
13	2019	0.2438	0.3275	8.7650	15.6160	0.1900	1.1739	0.5397	7.5374
13	2020	0.1236	8.1011	8.9370	16.3843	0.0200	1.2056	0.7005	7.4993
13	2021	0.1261	7.4564	8.9819	16.3125	0.0400	1.2276	0.2990	7.4789
14	2017	0.1169	1.5561	14.5097	8.6540	0.3000	1.0562	0.3184	7.6874
14	2018	0.0870	1.7376	14.4261	8.4730	0.2400	1.0962	0.2496	7.7237
14	2019	0.0850	3.3564	15.1980	8.7650	0.2000	1.1120	0.1944	7.5611

MFI	Year	ROA	Mobile banking	Internet banking	ATMs	Credit risk	Liquidity risk	Capital adequacy	MFI size
14	2020	0.0769	3.2217	15.6354	8.9370	0.1700	1.1601	0.1599	7.6254
14	2021	0.0621	3.7710	14.6307	8.9819	0.1400	1.1233	0.1659	7.6188
15	2017	0.0665	3.9301	15.8102	14.5097	0.0000	4.5106	0.2120	8.2162
15	2018	0.0515	4.4434	15.8072	14.4261	0.2000	6.2963	0.2018	8.2177
15	2019	0.0227	3.8448	16.6319	15.1980	0.0100	10.0893	0.1966	8.2509
15	2020	0.0227	3.2752	16.5526	15.6354	0.0200	4.2579	0.2041	8.2695
15	2021	0.2837	2.6956	16.4875	14.6307	0.1200	8.8431	0.2041	8.3168
16	2017	0.0015	1.4248	13.9028	15.8102	0.0200	1.1065	0.2691	7.3921
16	2018	0.0337	1.0373	14.1470	15.8072	0.0300	1.1464	0.1441	7.3912
16	2019	0.1402	0.9045	15.6077	16.6319	0.1300	1.3815	0.2078	7.4269
16	2020	0.0819	1.8812	15.9390	16.5526	0.3800	1.5359	0.1986	7.4953
16	2021	0.3061	2.9505	15.7806	16.4875	0.0100	1.4639	0.1952	7.6089
17	2017	0.1685	5.8197	14.2011	13.9028	0.0500	1.2832	0.1125	7.7088
17	2018	0.2919	5.2869	14.7579	14.1470	0.0500	1.1679	0.1145	7.7925
17	2019	0.2136	5.6893	15.0670	15.6077	0.0700	1.3048	0.1399	7.7958
17	2020	0.0041	4.6180	15.1934	15.9390	0.0500	1.1971	0.1534	7.8087
17	2021	0.0041	5.0652	15.2987	15.7806	0.0500	1.1606	0.0911	7.7387
18	2017	0.1179	4.3657	14.7349	14.2011	0.0700	1.5853	0.2335	8.1416
18	2018	0.2618	4.6527	14.4013	14.7579	0.0600	1.9464	0.2649	8.2161
18	2019	0.1030	4.8576	14.5828	15.0670	0.0500	1.0851	0.2547	8.2482
18	2020	0.1341	4.9525	14.6201	15.1934	0.0400	1.0237	0.2387	8.2873
18	2021	0.0918	6.1537	14.8757	15.2987	0.0300	1.4691	0.2597	8.2934
19	2017	0.0045	10.0598	11.6827	14.7349	0.2100	1.9836	0.1712	7.0270

MFI	Year	ROA	Mobile banking	Internet banking	ATMs	Credit risk	Liquidity risk	Capital adequacy	MFI size
19	2018	0.0527	7.9749	12.5462	14.4013	0.0500	1.3339	0.1763	6.9998
19	2019	0.0538	9.6619	11.9296	14.5828	0.0500	1.5404	0.1904	6.9773
19	2020	0.0737	3.6584	12.9837	14.6201	0.0800	1.2591	0.2022	6.9368
19	2021	0.0201	4.4554	13.0078	14.8757	0.0300	1.1154	0.2275	6.9339
20	2017	0.0475	4.1929	13.7061	11.6827	0.5700	4.1442	0.1351	6.8581
20	2018	0.0879	8.6744	14.0772	12.5462	0.5300	7.9538	0.1577	6.8614
20	2019	0.1244	5.2021	14.2170	11.9296	0.0800	8.4745	0.1872	6.9607
20	2020	0.0180	4.7512	14.4033	12.9837	0.0600	3.3451	0.1620	7.0390
20	2021	0.0180	4.6638	13.6780	13.0078	0.0000	1.9506	0.1866	7.1179
21	2017	0.1605	3.8078	12.4380	13.7061	0.0600	1.0966	0.2022	8.3379
21	2018	0.1071	3.8256	12.6520	14.0772	0.0700	1.4218	0.3213	8.4239
21	2019	0.0045	3.9366	13.4776	14.2170	0.0600	1.4858	0.3911	8.4141
21	2020	0.0225	4.7076	12.3870	14.4033	0.0400	1.7358	0.1700	8.4557
21	2021	0.0400	2.7861	13.4740	13.6780	0.1200	1.2374	0.1534	8.4859
22	2017	0.0397	2.8513	14.8357	12.4380	0.1300	1.9502	0.3909	8.3379
22	2018	0.0421	2.9480	14.6567	12.6520	0.1600	1.9346	0.1813	8.4239
22	2019	0.1185	2.6592	15.1431	13.4776	0.2000	1.9684	0.1769	6.7611
22	2020	0.0468	2.7969	15.4955	12.3870	0.2300	1.2242	0.1700	6.7943
22	2021	0.0662	2.7711	16.1981	13.4740	0.0200	1.6434	0.1534	8.2879
23	2017	0.1105	2.4030	13.9230	14.8357	0.0600	1.0320	0.1885	8.2067
23	2018	0.0800	2.6147	14.9697	14.6567	0.0600	1.9226	0.2020	8.2879
23	2019	0.0468	2.4046	15.1743	15.1431	0.1000	1.8973	0.1815	8.3768
23	2020	0.0759	2.1650	16.4039	15.4955	0.0800	1.1574	0.1858	8.4253

MFI	Year	ROA	Mobile banking	Internet banking	ATMs	Credit risk	Liquidity risk	Capital adequacy	MFI size
23	2021	0.2283	8.2018	16.3720	16.1981	0.1200	1.5021	0.1793	8.4516
24	2017	0.2214	8.8776	13.1488	13.9230	0.1600	1.4648	0.2610	8.4859
24	2018	0.3650	8.0052	13.1722	14.9697	0.1400	1.5627	0.1625	8.3379
24	2019	0.0561	8.5523	14.2912	15.1743	0.1100	1.4005	0.2008	8.4239
24	2020	0.0168	8.6836	13.9164	16.4039	0.1100	1.0634	0.1933	6.0724
24	2021	0.1243	0.7826	13.7920	16.3720	0.1700	1.6245	0.1915	6.5049
25	2017	0.1145	0.9095	15.9989	13.1488	0.0500	1.7402	0.2101	7.5107
25	2018	0.1364	1.4783	16.5515	13.1722	0.0100	4.3944	0.1536	7.5376
25	2019	0.0400	1.9144	17.1188	14.2912	0.0900	4.3820	0.1801	7.5084
25	2020	0.0199	2.3880	17.2928	13.9164	0.1000	4.3694	0.1663	7.6403
25	2021	0.0111	2.6507	17.1680	13.7920	0.0300	2.2050	0.1955	7.6508
26	2017	0.2872	2.2119	13.1120	15.9989	0.0500	2.5238	0.1945	8.3898
26	2018	0.0267	2.2886	13.4730	16.5515	0.0100	3.3740	0.4270	8.4802
26	2019	0.0035	2.5349	13.2621	17.1188	0.0900	2.8332	0.3933	8.5279
26	2020	0.1599	3.0281	13.1230	17.2928	0.0300	3.0200	0.5708	8.5719
26	2021	0.1599	2.9394	13.7946	17.1680	0.0500	4.4016	0.4494	8.6261
27	2017	0.1966	2.8013	13.1780	13.1120	0.0100	2.3280	0.4576	7.6734
27	2018	0.2632	2.8432	13.2730	13.4730	0.0700	1.7710	0.3498	7.7973
27	2019	0.0323	3.8223	13.2089	13.2621	0.0900	1.8952	0.3869	7.6170
27	2020	0.0706	2.8331	13.1657	13.1230	0.0700	2.1309	0.3316	7.6754
27	2021	0.1038	2.7102	13.4661	13.7946	0.0800	1.9554	0.3093	7.6856
28	2017	0.1004	2.6740	15.8709	13.1780	0.0100	1.2192	0.1393	7.1251
28	2018	0.0773	2.3577	15.8396	13.2730	0.0000	1.1561	0.1399	7.0917

MFI	Year	ROA	Mobile banking	Internet banking	ATMs	Credit risk	Liquidity risk	Capital adequacy	MFI size
28	2019	0.0718	2.4099	16.0799	13.2089	0.0800	1.1158	0.0715	7.1023
28	2020	0.0745	11.3884	16.5700	13.1657	0.0700	1.0780	0.0542	7.1695
28	2021	0.0365	9.3893	16.7438	13.4661	0.2500	1.5236	0.0370	7.1649
29	2017	0.0635	7.2817	14.1168	15.8709	0.1400	1.4882	0.2104	7.4691
29	2018	0.0277	6.7329	16.1623	15.8396	0.1600	1.2774	0.2059	7.4211
29	2019	0.0882	5.8688	16.3715	16.0799	0.0000	1.2997	0.2304	7.4344
29	2020	0.0327	4.7591	16.3834	16.5700	0.0100	1.1003	0.2227	7.4408
29	2021	0.0327	4.3676	16.4759	16.7438	0.0000	1.6298	0.1869	7.4577
30	2017	0.2284	3.8762	12.5908	14.1168	0.0300	1.5950	0.2545	7.1018
30	2018	0.3270	3.4674	12.6277	16.1623	0.0100	1.4871	0.2412	7.0967
30	2019	0.2227	3.4581	13.0815	16.3715	0.0300	1.2846	0.2741	7.0904
30	2020	0.2210	3.4841	13.3428	16.3834	0.0400	1.4099	0.2946	7.1179
30	2021	0.2283	3.4685	13.5197	16.4759	0.0300	1.0780	0.2853	7.1249
31	2017	0.2175	3.0992	13.0425	12.5908	0.0200	1.5236	0.1676	7.1984
31	2018	0.2715	3.5693	13.4555	12.6277	0.0400	1.4882	0.1729	7.2791
31	2019	0.2842	3.6862	14.1686	13.0815	0.0600	1.0983	0.2216	7.3376
31	2020	0.2461	6.8343	14.4548	13.3428	0.2300	1.0861	0.2248	7.4162
31	2021	0.2692	6.7928	14.6174	13.5197	0.0300	2.3685	0.3729	7.4263
32	2017	0.3188	5.9359	13.5625	13.0425	0.0300	2.2713	0.2056	6.5049
32	2018	0.3282	7.6256	14.2903	13.4555	0.1000	1.8378	0.2468	7.5107
32	2019	0.3134	7.5373	14.9790	14.1686	0.0300	2.3583	0.2325	7.5376
32	2020	0.0600	3.6862	14.9697	14.4548	0.0400	2.5221	0.1646	7.5084
32	2021	0.0642	6.8343	14.7987	14.6174	0.0400	1.3097	0.1440	7.6403

MFI	Year	ROA	Mobile banking	Internet banking	ATMs	Credit risk	Liquidity risk	Capital adequacy	MFI size
33	2017	0.0383	6.7928	14.3780	13.5625	0.1000	1.1747	0.1723	7.6508
33	2018	0.0409	9.0631	14.7036	14.2903	0.0000	1.1699	0.1870	8.3898
33	2019	0.1052	8.8924	14.9574	14.9790	0.0300	1.1666	0.1812	8.4802
33	2020	0.1249	5.3014	14.8312	14.9697	0.0800	1.1380	0.1684	8.5279
33	2021	0.1203	5.2639	14.5404	14.7987	0.0300	2.5641	0.1723	8.5719
34	2017	0.2358	5.3700	16.0002	14.3780	0.0000	1.0423	0.1982	8.6261
34	2018	0.1874	4.5236	16.2735	14.7036	0.0000	1.0590	0.2116	7.6734
34	2019	0.1596	4.0286	16.1346	14.9574	0.1100	1.1121	0.2091	7.7973
34	2020	0.1253	0.4569	16.2419	14.8312	0.1000	1.1251	0.1852	7.6170
34	2021	0.1372	0.7479	16.4453	14.5404	0.0900	1.0611	0.1947	7.6754
35	2017	0.0661	0.7480	14.7419	16.0002	0.1600	1.1587	0.1071	7.6856
35	2018	0.0758	0.8429	14.8352	16.2735	0.1900	1.1441	0.1745	7.1251
35	2019	0.0722	3.6403	14.0358	16.1346	0.2300	1.1447	0.1627	7.0917
35	2020	0.0795	5.5968	14.6208	16.2419	0.1900	1.0939	0.1265	7.1023
35	2021	0.0795	5.2449	14.7272	16.4453	0.2600	1.0332	0.2201	7.1695
36	2017	0.0868	5.2609	13.1792	14.7419	0.2700	1.2705	0.2773	7.1649
36	2018	0.0940	5.5477	13.5055	14.8352	0.2300	1.2776	0.2164	7.4691
36	2019	0.0215	0.2463	13.5092	14.0358	0.2200	1.1715	0.2230	7.4211
36	2020	0.0961	7.1792	14.2825	14.6208	0.0600	1.1658	0.2908	7.4344
36	2021	0.0562	7.0968	14.3957	14.7272	0.2300	1.5334	0.2111	7.4408
37	2017	0.0812	6.3610	10.7413	13.1792	0.1200	1.6234	0.5862	7.4577
37	2018	0.0910	5.6699	10.8024	13.5055	0.0500	1.6385	0.2379	7.1018
37	2019	0.0507	4.9121	10.9464	13.5092	0.0600	1.6048	0.3868	7.0967

MFI	Year	ROA	Mobile banking	Internet banking	ATMs	Credit risk	Liquidity risk	Capital adequacy	MFI size
37	2020	0.0743	4.9245	11.8670	14.2825	0.0500	1.5050	0.3878	7.0904
37	2021	0.0581	4.4818	12.9946	14.3957	0.0900	1.2653	0.3316	7.1179
38	2017	0.0650	4.2288	13.2541	11.1449	0.1300	1.2875	0.2908	7.1249
38	2018	0.0540	4.3671	14.2506	12.7982	0.1700	1.2781	0.1723	7.1984
38	2019	0.0468	4.8607	13.1748	12.5000	0.1200	1.2225	0.2545	7.2791
38	2020	0.0138	3.9169	14.1294	12.9661	0.0400	1.1691	0.2274	7.3376
38	2021	0.0138	2.8042	12.9685	14.0891	0.0300	1.1254	0.2109	7.4162
39	2017	0.3482	5.2970	15.6607	13.2541	0.0400	1.0996	0.1592	7.4263
39	2018	0.2536	4.6800	16.2099	14.2506	0.0498	1.0417	0.1639	8.2161
39	2019	0.0833	4.5000	15.9346	13.1748	0.0389	1.2396	0.1616	8.2482
39	2020	0.0851	4.4200	16.0608	14.1294	0.0387	2.2624	0.1578	8.2873
39	2021	0.0991	3.4100	16.0866	12.9685	0.0360	2.9326	0.1602	8.2934
40	2017	0.2214	2.8300	13.9119	15.6607	0.0284	3.5336	1.8796	7.0270
40	2018	0.3650	4.0000	13.1426	16.2099	0.0498	2.5000	1.9617	6.9998
40	2019	0.0561	3.1800	13.8898	15.9346	0.0389	3.1447	0.3053	6.9773
40	2020	0.0168	3.9900	14.0673	16.0608	0.0387	2.5063	0.3229	6.9368
40	2021	0.1243	4.0000	14.0719	16.0866	0.0360	2.5000	0.3466	6.9339
41	2017	0.0912	3.3500	13.0293	13.9119	0.0284	2.9851	0.1596	6.8581
41	2018	0.1378	3.2600	13.0224	13.1426	0.0449	3.0675	0.1840	6.8614
41	2019	0.1111	3.3800	13.2537	13.8898	0.0446	2.9586	0.1786	6.9607
41	2020	0.0781	3.7600	13.5020	14.0673	0.0471	2.6596	0.1803	7.0390
41	2021	0.0672	3.3700	13.7576	14.0719	0.0278	2.9674	0.1638	7.1179
42	2017	0.0664	4.6000	15.0340	13.0293	0.0374	2.1739	0.3941	8.3379

MFI	Year	ROA	Mobile banking	Internet banking	ATMs	Credit risk	Liquidity risk	Capital adequacy	MFI size
42	2018	0.0664	6.7900	15.0109	13.0224	0.0417	1.4728	0.4230	8.4239
42	2019	0.0673	4.1400	15.5781	13.2537	0.0414	2.4155	0.4574	8.4141
42	2020	0.0547	7.3700	16.1124	13.5020	0.0427	1.3569	0.5397	8.4557
42	2021	0.0547	5.4600	14.2825	14.6208	0.0386	1.8315	0.4392	8.4859