

**FINANCIAL INNOVATIONS AND FINANCIAL PERFORMANCE OF
MICROFINANCE BANKS IN KENYA**

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university or for any other award. No part of this thesis may be produced without prior authority of the author and/ or Kenyatta University.

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DEDICATION

I Dedicate this thesis to my wife Carolyne Aswani, my daughters Winnie Hope, Favour Famous, Whitney Wise, and my parents Lewnida Odongo and the late John Odongo Ochuodho - for their love, patience, encouragement, prayers, and support.

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OPERATIONAL DEFINITION OF TERMS

- Artificial intelligence:** Software application that microfinance banks use to understand and simulate their clients' behaviours, predict future outcomes, trends, secure return on assets (ROA), lowers costs, as well as ensure quick and accurate processing to generate net revenue.
- Competitiveness:** The size of the market share controlled by a single MFB in relation to other MFBs within the microfinance banking sector.
- Crowd funding:** The use of internet by microfinance banks to raise net revenue from a large pool of people who contribute some relatively small sum of money.
- Digital Field Applications:** Differentiated financial services that microfinance banks provide to their clients' doorstep, from digital account opening, digital savings, digital loan application, and other digitised transactions and consequently generate net revenue.
- Financial innovations:** Introduction of new, improved or modified banking products, processes and institutions to enable MFBs generates net revenue.
- Financial performance:** A microfinance banks to utilize assets to generate revenue. It is indicated by Return on Assets (ROA).
- Group lending:** A lending mechanism that microfinance banks use to enable groups of clients to provide a loan guarantee or collateral through the use of a group repayment pledge, and generate revenue.

Institutional innovation:	Implementing new methods which results in changes in the organisation of the workplace, business practices or external business relations and to enable MFBs generate revenue.
Microfinance bank:	A firm licensed by the central bank to carry the business of accepting deposits from low- and middle-income earners.
Micro-credit:	Very small loans advanced microfinance banks lend their clients.
Micro-insurance:	Insurance package that microfinance banks provide to their clients to generate revenue.
Micro-savings:	Small deposit accounts that microfinance banks provide to their clients.
Mobile banking apps:	A service provided by microfinance banks that allow their customers to transact remotely using their tablets or smartphones and to help these banks generate revenue.
PesaLink:	Interbank money transfer solution that enables customers of microfinance banks to receive money into their accounts using their mobile phone numbers.
Process innovation:	Introduction of new or substantial improvement in production or service delivery methods. It includes changes in equipment or techniques.
Product innovation:	The development and introduction of new, improved or modified products or services to meet the changing needs of clients and business environment to assist.

Regulatory framework: A capital adequacy ratio and liquidity ratio requirement of MFB by its regulatory authority to comply with.

ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
ATM	Automated Teller Machine
CBK	Central Bank of Kenya
CRB	Credit Reference Bureaus
DFAs	Digital Field Applications
FI	Financial Innovations
FP	Financial Performance
FSD	Financial Sector Deepening
GDP	Gross Domestic Product
IN	Institutional Innovations
ICT	Information Communication Technology
MENA	Middle East and North Africa
MFI s	Microfinance Institutions
MFB s	Microfinance Banks
PD	Product Innovations
PC	Process Innovations
ROA	Return on Assets
ROI	Return on Investment
SACCOS	Savings and Credit Cooperative Societies
SME	Small and Medium Enterprises
VIF	Variance Inflation Factor

ABSTRACT

The microfinance banks in Kenya have experienced a fluctuating and mixed performance between 2014 and 2020. For example, the financial performance measured in terms of pre-tax profits and return on assets was 1,002 million shillings and two percent in 2014 respectively. Further in 2020, the banks recorded a pre-tax loss of 2,240 million shillings and a return on assets of negative three percent. This presented a threat to their financial soundness, efficiency, stability, and sustainability, which has raised concern among financial scholars, regulators, and practitioners. Firms' financial performance has long been associated with financial innovations. Nonetheless, the available empirical literature failed to provide a consensus on the effects of financial innovations such as product innovations, process innovations, and institutional innovations on financial performance. In view of this, the current study assessed the effect of financial innovations on the financial performance of Kenyan microfinance banks for the period 2014-2020. The specific objectives were to examine the effect of product innovations, process innovations, and institutional innovations on the financial performance of microfinance banks in Kenya. In addition, the study determined the moderating effect of the regulatory framework and the mediating effect of competitiveness on the relationship between financial innovations and financial performance. The study was guided by financial intermediation, constraint-induced innovation, transaction cost innovation, regulation innovation theories, and Merton's Market theories of innovation. The positivism research paradigm was employed. The assessment was guided by a descriptive research design. The assessment targeted all the 14 microfinance banks registered by the Central Bank of Kenya. A census was carried out and a document review guide was used to collect secondary data from the financial records of these banks. Means, standard deviations, median, maximum, minimum, skewness, and kurtosis were used for purposes of descriptive analysis while panel multiple regression and correlation were used for inferential analysis. The study found and concluded that financial innovations positively and significantly affect the financial performance of microfinance banks. Specifically, product innovations and process innovations have significant statistically positive effects while institutional innovations have no statistically significant effect on the financial performance of microfinance banks in Kenya. The study further established that the regulatory framework moderated the relationship between financial innovations and financial performance. The research also established that competitiveness mediated the relationship between financial innovations and the financial performance of microfinance banks. The study concluded that financial innovations enhance the financial performance of microfinance banks. Consequently, the study recommended that the Central bank of Kenya reward innovative banks through tax reliefs and strengthen its regulation and oversight while the management should focus on product differentiation strategy, aggressive advertising, and research and development to foresee new and innovative ideas. The study also recommends that microfinance banks should enhance their competitiveness by increasing their market shares to improve their financial performance.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The financial performance of microfinance banks (MFBs) in any country is important for the maintenance of a stable microfinance banking sub-sector and the economy at large (IMF, 2020). The reason for this is that the benefits of MFBs across the globe depend heavily on net operating activities and related operating costs. Kamau and Ngari (2015) observed that firms enhance their financial performance by growing their revenue and adopting better approaches to doing business. Aysel and Fatma (2017) opine that financial innovations are a major competitive tool that a firm can use to gain a competitive advantage and cut costs. In addition, financial innovations enhance the efficiency of firms, improve the quality of their services, and gain corporate intelligence which is significant determinants of a firm's financial performance (Norden, Buston & Wagner, 2014).

While the global trend of financial performance based on return on assets (ROA) of microfinance banks is positive at 2 percent, regional variations have been observed (Mix Market Financial Performance Report, 2019). Return on assets of Africa's MFBs stands at 1.5 percent, East Asia and the Pacific (EAP) at 1.8 percent, Eastern Europe and Central Asia (ECA) at 0.3 percent, Latin America (LAC) at 2.1 percent, Middle East and North Africa (MENA) at 4.4 percent, and South Asia at 2.8 percent (FinDev Gateway, 2019). It is evident that Africa, which incorporates Kenya, has a performance of 1.5 percent, which is below the world benchmark of 2 percent. The variations are attributed to several factors

emanating from a difficult regulatory, economic, and political environment (Microfinance Barometer, 2019).

The main role of microfinance banks (MFBs) globally is to financially empower the poorest members of society as well as to enhance sustainable development (SD) through employment creation and poverty eradication (Mix Market Financial Performance Report, 2019). MFBs provide maintainable revenue to low-income earners through low-cost loans. MFBs play a central role in transforming economies by providing several of financial services to the economically underprivileged, including credit to micro and small enterprises, insurance, savings facilities, as well as transfer and payment facilities to achieve SD goals (AfDB, 2018).

Globally, the embrace of financial innovations into the banking industry is fast increasing since financial institutions are presently motivated to adopt financial innovations to improve financial inclusion, financial deepening, increase deposits, reduce costs, enhance efficiency and improve the general financial performance (FSD, 2019). Innovation results in an assortment of competitive industries where firms have to transform for them to survive (Mbugua & Omagwa, 2017). Many service sectors, including microfinance banks, are compelled to embrace financial innovations to meet or surpass their business rivals (World Bank, 2018). The reason for adopting innovations is to enable MFBs to compete effectively in the flexible and fast-changing business environment. Further, this enables them to attain competence at every operational level by utilising the most effective innovations for profitability, sustainability as well as growth.

Competitiveness enables microfinance banks to receive richer clientele groups in urban areas (Mugane, 2015). As a result, microfinance banks, whose goal is financial inclusion of the poor, risk losing their wealthier clients to competitors that offer more flexible innovations with larger loan portfolios and better conditions (Norden, Buston & Wagner, 2014). Level of competitiveness determines consumers' wealth, productive efficiency and soundness of the MFBs, quality, and the number of products offered to clients (Svirina, Zabbarova & Oganisjana, 2016). MFBs invest heavily in three categories of financial innovations such as product innovations, process innovations, and institutional innovations to achieve competitive advantage (Brancati, 2015). Intense competition positively affects poor clients and small and medium enterprises (Mohan, 2016). Attaining a competitive advantage enables MFBs to gain market share and increase revenue and financial performance.

The regulatory framework demands that MFBs must generate a minimum threshold of revenue to be able to meet their costs (Yenesew, 2015). According to the CBK report (2018), all microfinance banks must maintain adequate liquidity ratio requirements, capital adequacy ratio requirements, operating requirements, and financial reporting requirements. The effect of any regulatory requirement is multifaceted depending on how it is implemented (Kambua, 2015). A firm that actively deals with regulations can innovate more and increase its financial resources, which are a prerequisite for further innovation (AfDB, 2018). Regulatory framework requirement influences profitability and hence financial performance.

1.1.1 Financial Performance

A company's financial performance is its revenue strength, based on the way it uses its assets to make money as it pays its expenses. Katusabe (2013) observed that firms use financial performance to make key economic decisions like capital budgeting, working capital, dividend decisions, and capital structure decisions. Profitability, solvency, liquidity, and efficiency ratios are commonly used to analyse the financial performance of various firms (Kojien, Tomas & Uhlig, 2016). The financial performance of a firm reflects its efficiency and ability to achieve its goals. Muigai and Gitau (2018) pointed out that good financial performance enables firms to meet the different needs of their stakeholders and achieve financial objectives.

Some scholars including Palmer (2015), Mtsitsi, Dzanja, Gondwe, and Kamwana (2016) among others posit that financial performance is synonymous with financial health, financial stability, financial solvency, or financial strength of a firm. Fotoki, Olweny and Nasiku (2018) contend that financial performance is a measure of the extent to which an entity can accomplish its financial goals. This involves using monetary parameters to measure the results of operations and organisational policies. Accounting ratios like earnings per share, market-to-book value, return on assets, and return on capital employed are the commonly used parameters to measure financial performance (Monyi, Namusonge & Sakwa, 2016). Financial performance is important because it signifies a firm's ability to meet the goals of various stakeholders.

Otieno, Nyagol, and Onditi (2016) indicate that financial performance measures a firm's ability to achieve its operations, objectives and policies. It depicts the financial well-being

of the firm, which can be compared across firms, industries, and regions. Assefa, Hermes, and Meesters (2013) observed that financial performance determines its competitiveness, ability of the management to effectively manage the business and efficiently utilise resources, generate revenue, and the ability of the firm to pay its debts. Ngari (2014) also asserts that financial performance is the ability of an entity to continue with operations in a profitable manner and remain solvent without necessarily requiring bailing out by the government or donor. MFBs should aim to operate profitably to maintain stability, grow, and improve sustainability.

Financial performance indicates a firm's success over a specified time frame. It is calculated by using financial ratios of liquidity, activity, leverage, profitability, and market ratios. Preference is made for profitability ratios because they evaluate a company's ability to generate revenue as well as overall profit (Canh *et al.*, 2019). Yenesew (2015) proposes that a good measure of financial performance should not cover less than one additional performance indicator besides profitability. Apart from showing a firm's profitability, ROA is a more suitable measure because it also shows the ability of a firm's management to efficiently utilise resources available to generate profits (Rosli & Sidek, 2013). In addition, ROA is consistent with the profit-maximization goal of firms and is a widely accepted measure in the banking industry (Muigai & Gitau, 2018). The financial performance of microfinance banks is shown by pre-tax profits, loan portfolio, return on equity, customer deposits, and total capital to total risk-weighted assets, and the number of branches (CBK, 2019).

The MFBs need to record a strong financial performance for the banks to remain stable, vibrant, sound, and sustainable (CBK, 2019). Yenesew (2014) posits that strong financial performance enhances the ability of MFBs to absorb shocks and remain solvent. A solvent MFB can meet its financial obligations, grow and raise additional capital (Monyi, Namusonge & Sakwa, 2016). It indicates strong financial health, which is a prerequisite for sustainability (Assefa, Hermes & Meesters, 2013). Such firms can remain sustainable and avoid over-reliance on government subsidies and donor funding to escape possible financial distress.

Table 1.1 shows the financial performance of microfinance banks in Kenya, measured in terms of pre-tax profits and return on assets:

Table 1.1: Financial Performance of Microfinance Banks in Kenya

	2014	2015	2016	2017	2018	2019	2020
Return on assets (%)	2	1	-0.5	-0.9	-2	0.4	-3
Profit before tax (Million Shs.)	1,002	592	-377	-622	-1,437	-399	-2,240

Source: CBK report (2020)

Table 1.1 shows that the microfinance banks in Kenya have continued to post a declining and mixed performance over the study period. The results showed that the combined return on assets and profit before tax has been fluctuating for the period 2014 - 2020. For instance, the MFBs last reported a pre-tax profit and a positive ROA in 2015. Since then, the MFBs have suffered increasing pre-tax losses except in 2019 when they recorded decreasing but negative pre-tax losses. The return on assets has also been decreasing and

negative, except in 2019 when they recorded improved performance followed by a decline in 2020.

Financial innovations and financial performance have been subjects of study by various scholars, with many conceptualising financial innovations differently. The innovations improve cost reduction, increase revenues, or both (Ngumi, 2014). External changes in technology create room for cost reduction that induces innovation within the microfinance banking sector (Mwawasaa & Ali, 2020). For example, information technology advancement has fundamentally reduced the cost of accounting-intensive products like mutual funds (Muigai & Gitau, 2018). Other product innovations such as mobile banking applications reduce MFB operating costs by efficiently executing faster transactions.

1.1.2 Financial Innovations

Financial innovations are recognized as one of the significant factors that drive financial inclusion, competitiveness, economic growth as well as financial soundness of the financial sector and the economy at large (World Bank, 2019). With increased global, regional, industry, and firm competition, individual firms must engage in innovation to create, gain or sustain a competitive edge (Canh, Liem, Thu & Khuong, 2019). Quickly changing business environments as well as constant unexpected variations make it compulsory for firms to innovate (Dongol, 2021). The adoption of financial innovations creates the impetus for firms to optimise returns and enhance financial performance (Crowley & McCann, 2018). Non-innovative firms fail to meet the demands of the changing business and technological environments. Dunde and Kaskende (2018) observe

that financial innovations enhance customer convenience and promote the efficiency with which financial services are offered. Kunttu and Torkkeli (2015) point out that the adoption of financial innovations does not affect the main function of financial intermediation of the financial sector players but instead enhances financial intermediation roles.

Arisa and Nyangena (2015) posit that financial innovations involve the introduction of new or modified financial products, processes, or institutions. Closed innovations are where the innovations originate from the firm whereas open innovations occur when firms collaborate (Forrer & Forrer, 2015). Most innovations adopted by banks do not originate from the banking sector. Financial innovations first originate from other sectors before banks adopt them by adding financial components to the innovations (Arnaboldi & Rossignoli, 2014). Osei, Yun-fei, Appienti, and Forkuoh (2016) observed that financial innovations have enabled banks to gain a competitive advantage, cut costs and become cost-efficient, improve the quality of their services, gain corporate intelligence, and improve their financial performance.

For the MFBs to be innovative, many physical, human, financial and organisational resources must be invested (Akhiser, Tunay & Tunay, 2015). The reasons and aims for financial innovations within the MFBs include expanding access to bank services, improving efficiency, and to remain competitive to enhance banking sector stability (Dunde & Kasekende, 2018). Fostel and Geanakoplos (2016) opine that financial innovations take three forms namely product innovations, institutional innovations, and

process innovations. The financial innovations take various features that are unique to the MFBs only (Kunttu & Torkkeli, 2015).

Product innovations involve the adoption and use of financial products or services that are either new, enhanced or modified to meet the ever-changing needs of clients, and the business environment (Aysel & Fatma, 2017). Determinants of product innovations, including micro-savings, digital credit, and micro-insurance have been widely applied as new ways of solving a problem that faces a greater number of clients. Firms innovate their products for various reasons, including continuous upgrades of technologies, increased competition, changing clients' expectations, and fast-shortening product life cycles (Canh *et al.*, 2019). Product innovations are usually market-driven to attract clients' focus and differentiate a firm's products from those of others. Muigai and Gitau (2018) posit that product innovations result in a competitive advantage. However, early adopters of the financial innovations may also suffer retaliation, which may adversely counter its products. The benefits of product innovations outweigh the limitations. MFBs must take the lead in innovating especially given that the banking sector is highly competitive (Forrer & Forrer, 2015).

Process innovations involve the introduction of new features in a firm's service operations. The innovations also involve the introduction of new or substantial improvements in production or service delivery methods (Kiveu, Namusonge & Muathe, 2017). Parameters of process innovations such as mobile banking applications, pesa-link, and digital field applications lead to better financial performance through the reduction of cost per unit of financial service delivery. The innovations may take the form of

changes in equipment, techniques or changes in service or production organisation (Sidek & Rosli, 2013). Process innovations seek to build new capacity and competency of the firm. Adoption of process innovations does not affect the products but instead reduces the cost of providing banking services. Successful implementation of process innovations also reduces the prices and costs of products (Kaloki, 2018). It exerts pressure on the profit levels thereby causing product innovations to be more attractive to the customers.

Institutional or organisational innovations involve implementing new methods within an organisation, which results in changes in the organisation of the workplace, business practices, or external business relations (Rajapathirana & Hui, 2018). Institutional innovations, including group lending, artificial intelligence, and crowd funding are also vital in maintaining competitive advantage and overall firm performance. Mairesse and Mohnen (2010) argue that institutional innovation enables firms to handle work procedures more differently and uniquely. As such, this type of innovation improves productivity and customers' perception of the product (Rosli & Sidek, 2013). Institutional innovations in the banking sector involve changes in the financial system's structure, the introduction of new types of financial institutions, and changes in the financial system's structure in the legal or regulatory framework of the bank (Schueffel & Vadana, 2015).

1.1.3 Regulatory Framework (Moderating Variable)

The regulatory framework can be defined in terms of the liquidity ratio requirement, capital adequacy ratio requirements, operating requirements, and financial reporting requirements (Microfinance regulations, 2008). Regulations safeguard microfinance banks from unscrupulous business activities, reduce risk exposure to creditors, ensure

MFBs' confidentiality, lower systematic risks, and ensure financial sustainability (Spescha & Woerter, 2018). The regulatory framework also ensure the maintenance of orderliness in the market or industry, licensing of providers and products of financial institutions, enforcing relevant laws, and handling cases of misconduct (Agborndakaw, 2010).

Microfinance banks are regulated by the Central bank of Kenya Act, the Microfinance Act of 2006, the banking Act, and the Companies Act. The primary objective of the regulations is to offer a regulatory, legal, and supervisory framework for microfinance banks (FSD Kenya, 2019). The Act creates provisions for MFBs license issuance, restriction, and revocation, as well as provides entry for MFBs into more regulated status (KBA, 2020). Microfinance Act (2006) provides minimum core capital requirement, credit limits, defines ownership and management structure, states the terms of periodic reporting to the Central Bank of Kenya, and provides the CBK regulation. The new Microfinance Act of 2006 mandated registration and on-going regulation for microfinance firms in Kenya. The legislation itself was approved in 2006, but its rules did not take effect until 2008. For an MFB to be completely registered, it must be registered separately under the Microfinance Act and either the Companies Act or the Banking Act. Based on their market shares and minimum capital requirements, the MFBs are categorised into three tiers to provide an opportunity for regulatory arbitrage.

The regulatory framework and operating costs of banks are positively and significantly related (Akims & Akims, 2019). A rise in the operating costs causes a reduction in the profitability of a firm leading to poor financial performance. Lyman, Pickens, and

Porteous (2018) pointed out that compliance with regulatory requirements results in financial stability and improved financial performance of banks. According to the World Economic Forum (2016), the presence or lack of regulations on microfinance banks affects their financial performance to some extent. Wang and Dai (2020) confirm that changes in the regulatory framework requirements greatly affect the financial performance of banks.

More regulations are required with the adoption of various innovations and technology in banks (CBK, 2018). The rationale for increasing regulations is to ensure the safety of deposits, ensure the stability of the banks, promote fair competition, and enhance the overall efficiency and sustainability of the MFBs (Iyade, 2006). Arnaboldi and Rossignoli (2015) contend that changes in the regulatory framework in it can also be classified as institutional innovation. Depending on the type of regulations implemented, it may either facilitate or hinder financial innovations (Debapratim, Trilochan & Biswajit, 2014). Some regulations open opportunities for innovation while others restrict the adoption of financial innovations (Ndede, Mbewa & Jagongo, 2016). Therefore, it is worth determining how the regulatory framework affects the relationship between financial innovations and the financial performance of microfinance banks in Kenya.

1.1.4 Competitiveness (mediating variable)

A company's competitiveness is determined by its ability to innovate and upgrade. Companies acquire an edge over the greatest rivals in the world as a result of pressure and challenge (Porter, 2011). They gain from having formidable domestic competitors, tough domestic suppliers, and demanding local clients. Competitiveness is a measure of

the size of the market share controlled by a single firm in relation to other firms within a given industry (Competition Act, 2010). The MFBs competitiveness is computed by using a weighted composite index, capital, loan accounts, as well as deposit account numbers (CBK, 2015). Based on the weighted composite indices, MFBs are classified into three broad categories. MFBs with a market share of above 5% are considered large. If the market share is between one percent and five percent, it is considered medium or small if the market share is less than 1% (World Bank, 2018). The microfinance banking sector's market is highly concentrated with the large tier MFBs owning over 89% of the total market share (IMF, 2020). The sector remained highly competitive and profitable. The number of MFBs and their combined market share under the three categories have increased during the study period as a result of shifts in the market shares as well as fluctuating over the study period (World Economic Forum, 2016). Due to new entrants, products, processes, institutions, as well as new practises, competitiveness among MFBs has been rapidly evolving over the study period.

Celik and Kizil (2008) observe that an industry's competitiveness is contributed by its underlying structure, technical characteristics, and fundamental economy. It encompasses the ability to attain allocative efficiency, to ensure continued financial growth in the present global, regional, or industry environments. Muli, Goko, Kitheka, Ngunjiri, and Mulwa (2013) suggest that a firm can gain competitiveness through cost leadership, product or service differentiation, and market strategy. The three dimensions of competitiveness reflect the limitations that financial innovations have sought to address over time (Tahir *et al.*, 2018). For instance, process innovations reduce the transaction cost of providing financial services, which further creates a competitive edge that is vital

for improved financial performance (Arnaboldi & Rossignoli, 2015). Dash *et al.*, (2014) point out that firms should continue to innovate their products to conquer competitors, gain a competitive edge against other firms, and finally increase their profit margins.

Microfinance banks' competitiveness concerns how they manage their competencies to realise stability as well as profitability by making use of existing structures, regulatory, and policy frameworks (Buyuksalvarci & Abdioglu, 2011). Competitiveness is an important and fundamental determinant within the microfinance banking sub-sector, particularly during this period of escalating financial innovations agenda advanced by policymakers (Mwai, 2017). The level of MFBs competitiveness greatly affects its financial performance. Similarly, the competitive level is a fundamental instrument for strengthening banking innovation. Higher market competition lures microfinance banks to ascertain innovative lending methods resulting in the growing availability of credit (Borji, 2010). MFBs are compelled to lower loan rates helping borrowers to make loan repayments because of competition, thus leading to reduced default risk. Assefa, Hermes, and Meesters (2013) also assert that increased competitiveness resulting from the adoption of financial innovations positively affects the financial performance of banks. The current study sought to establish the mediating role of competitiveness on the link between financial innovations and the financial performance of microfinance banks in Kenya.

1.1.5 Financial Innovations and Financial Performance

Microfinance banks are expected to perform financially without necessarily compromising their social objectives. The financial performance of these firms is

significant for the enhancement of their financial soundness, stability, sustainability, and growth (CBK, 2019). Financial performance can be measured in terms of operational efficiency, levels of capital, liquidity, and credit risks as well as their market shares. Beck *et al.*, (2014) argued that MFBs pursue financial performance to enable them to remain sustainable to continue expanding operations and meet the social goals. Mohan (2016) opined that a strong financial performance enhances the wealth of the shareholders. Yenesew (2014) notes that a strong financial performance increases the ability of firms to absorb shocks and remain solvent. According to Ibekwe (2021), the adoption of relevant financial innovations enhanced the return on assets of the deposit money banks (MFBs).

Various scholars have investigated the determinants of the financial performance of microfinance banks. According to Ngari (2014), these factors can be firms specific or market-specific and includes financial innovations, competition, inflation rates, money supply, levels of income, and regulatory framework. According to Dongol (2021), financial innovations place some pressure required for banks' financial stability required to play their role of financial intermediation. Further, financial innovations enable MFBs to improve services to their clients by meeting the changing customers' expectations. Kaloki (2018) opined that banks require more regulations with the increase in the number of financial innovations. Chava *et al.*, (2013) argued that bank regulations enhanced financial innovations, fostered competition, and ensure stability and financial health of the firms.

1.1.6 Microfinance Banks in Kenya

Microfinance banks specialise in the provision of financial services to low-income individuals and households who were financially excluded by conventional banks (Monyi, Namusonge & Sakwa, 2018). Microfinance banks also offer non-financial services such as insurance, business, investment, and health education as well as training (Kaloki, 2018). They exist to eliminate poverty, reduce unemployment levels, and stimulate economic growth (Wieneke, 2016). Microfinance banks are regulated in Kenya under the Microfinance Act (2006), Microfinance Regulation 2008, and the CBK. The MFBs are not fully registered as banks though they are subject to many of the similar conditions given by CBK because such institutions use deposits of the customers to raise capital for independent loans (CBK Report, 2018).

With the changing business environment, the financial system has continued to be more innovative in its processes, products, and markets (CBK, 2016). Due to rising information technology, this has led to innovations for new, improved or modified product designs in the financial institutions' industry as well as services to customers and their contentment (CBK, 2017). Innovation and dynamism within the microfinance industry have increased and the industry has experienced growth in terms of the number of customers as well as in its multiplicity in the variety of services and products provided (CBK Report, 2019).

In Kenya, MFBs' financial performance has fluctuated since 2014 and the situation has worsened since then (CBK, 2019). This can be attributed to decreasing net income because of an increase in operating expenses (Okiro & Ndungu, 2013). The poor financial performance saw three MFBs such as Daraja, Maisha, and Choice MFBs breach the

minimum core capital requirement to run a microfinance bank (KBA, 2020). Choice MFB also failed to meet the required minimum liquidity ratio of 20 percent (CBK, 2018). It has also led to the closure of marketing offices and branches (CBK, 2020).

1.2 Statement of the Problem

MFBs play a key role in enhancing financial inclusion, financial deepening and sustainable development, stimulating economic growth, wealth creation, and job creation in Kenya (CBK, 2019; AfDB, 2018). To attain these roles, MFBs need to achieve their financial objectives and remain financially healthy. A strong financial performance is vital for the maintenance of stable, vibrant, sound, and sustainable MFBs in Kenya (CBK, 2019). According to KBA (2020), the Kenyan banking sector particularly the MFBs is renowned as leader in the adoption of financial innovations. However, it remains difficult to ascertain the returns associated with the innovations adopted by various MFBs.

CBK's (2020) report shows that MFBs in Kenya have continued to experience fluctuating financial performance. The CBK reports (2014, 2015, 2016, 2017, 2018, 2019, and 2020) show a trend of ROA as 2%, 1%, -0.5%, -0.9%, -2%, 0.4% and -3% for 2014 – 2020 respectively. Such declines in financial performance imply a decreasing inability of the MFBs to efficiently/effectively generate income from assets. As of 2018, ten out of the thirteen licensed MFBs suffered losses, leaving only three in profits (CBK, 2018) which led to the subsequent closure of some branches and marketing offices. Consequently, fluctuating financial performance leads to weak financial inclusion, limited financial deepening and sustainable development, as well as a limited stimulated economic growth. It might render the MFBs a non-viable investment opportunity to meet goals.

The significance of financial innovations in enhancing financial performance is undebatable, leading to many empirical studies on the subject matter. The literature reviewed revealed various research gaps that present some unresolved issues. Even though various studies have been conducted on financial innovations in Kenya, there remain knowledge gaps, conceptual gaps, contextual gaps, geographical gaps, and methodological gaps that required additional investigation. Previous studies ignored the mediating role of competitiveness and the moderating role of regulatory framework on the relationship between financial innovations and financial performance (Chava *et al.*, (2013); Setyawati *et al.*, (2017; Ibekwe, 2021; Rajapathira & Hui, 2018; Tahir *et al.*, 2018; Mbama & Edepue, 2018). In addition, variables such as the new PesaLink have not been thoroughly explored and researched. In addition, digital field applications and crowd funding are new financial innovations influencing the Kenyan microfinance banking industry, thus the necessity for this study. This presented knowledge gaps that the present study sought to investigate.

Most of the previous studies have also focused on other study contexts such as commercial banks, Saccos, and manufacturing firms rather than microfinance banks (Muthinja, 2016; Muigai & Gitau, 2018; Canh *et al.*, 2019) respectively which presented contextual gaps. Other studies have focused on financial innovations in other countries, which are subjected to different regulatory frameworks from the Kenya context (Avotri & Wereko, 2016; Tuan, Nhan, Giang, & Ngoc, 2016; Mbama & Edepue, 2018). Some of the countries where previous studies were conducted are more developed than Kenya. This presented geographical gaps as the study findings cannot be generalised.

The studies have also looked at elements of financial innovations in isolation such as Ampah *et al.*, (2017); Chikalipah (2018); Abdirashid and Jagongo (2019). Greco, Grimald and Cricelli (2017) used the input approach of research and development expenditure to define institutional innovations whereas Katusabe (2013) used loan portfolios to define institutional innovations. Financial innovations have been defined in different ways by various authors, which presented a conceptual gap.

Abdirashid and jagongo (2019) only carried out a study on Kenya Women Finance Trust while Osei *et al.*, (2016) and Canh *et al.*, (2019) sampled firms in the manufacturing sector. Other studies such as Rajapathira and Hui (2018) used a pooled OLS model to analyse data which can be challenged due to the likelihood of self-selection. The current study addressed methodological gaps by using the census approach to increase the validity of research findings. Previous studies also used either pure cross-sectional data or time-series data while the present study used panel data which provides more information and increases the variability and efficiency.

In response to the documented gaps identified in the preceding paragraphs as well as the role of MFBs in Kenya, there are some unresolved issues on how financial innovations are connected to financial performance in the context of MFBs in Kenya. The current study sought to fill the existing gaps and to determine the moderating effect of the regulatory framework and the mediating role of competitiveness on the relationship between financial innovations and the financial performance of Kenyan microfinance institutions.

1.3 Research Objectives

The study sought to achieve a general objective and specific objectives.

1.3.1 General Objective

The general objective of the study was to investigate the effect of financial innovations on financial performance of microfinance banks in Kenya.

1.3.2 Specific Objectives

The study pursued the following specific objectives:

- i. To determine the effect of product innovations on the financial performance of microfinance banks in Kenya.
- ii. To establish the effect of process innovations on the financial performance of microfinance banks in Kenya.
- iii. To find out the effect of institutional innovations on the financial performance of microfinance banks in Kenya
- iv. To determine the moderating effect of regulatory framework on the relationship between financial innovations and the financial performance of microfinance banks in Kenya.
- v. To ascertain the effect of competitiveness in mediating the relationship between financial innovations and the financial performance of microfinance banks in Kenya.

1.4 Research Hypotheses

The study sought to test the following null hypotheses:

H₀₁: Product innovations do not have a significant effect on the financial performance of microfinance banks in Kenya

H₀₂: Process innovations do not have a significant effect on the financial performance of microfinance banks in Kenya.

H₀₃: Institutional innovations do not have a significant effect on the financial performance of microfinance banks in Kenya.

H₀₄: Regulatory framework does not significantly moderate the relationship between financial innovations and the financial performance of microfinance banks in Kenya.

H₀₅: Competitiveness does not significantly mediate the relationship between financial innovations and the financial performance of microfinance banks in Kenya.

1.5 Significance of the Study

The study findings shed light on the issues regarding the relationship between financial innovations and financial performance. The study provided a ground for understanding the effect of regulatory framework and competitiveness on the relationship between financial innovations and financial performance. The study is useful in informing and contributing to theory, industry, and policy in varied ways.

Firstly, this study will help managers of MFBs and the entire banking sector to understand and create new or modify appropriate products, processes, and institutions to improve their financial performances. Understanding financial innovations enable the

management of MFBs to innovate more products and services, which are important in mobilising more savings. This enhances the financial intermediation role by expanding credit and ensuring that funds are allocated efficiently.

Secondly, researchers and scholars benefit from the current findings of this study as it builds on the existing body of knowledge by evaluating the connection between financial innovations and financial performance. Further, the study contributes to finance theory by testing the mediating role of competitiveness and the moderating effect of the regulatory framework on the relationship between financial innovations and a firm's financial performance. The study also established how financial intermediation theory, constraint-induced financial innovation theory, transaction-cost innovative theory, regulation innovation theory, and Merton's market theory of innovation are applicable in the process of financial innovations and financial performance. The findings also provide empirical evidence to base future studies.

Understanding the link between financial innovations, competitiveness, regulatory framework, and financial performance is vital for policymakers in coming up with policies to regulate MFBs. The findings will be also significant to the Association of Microfinance Institutions (AMFI), Central Bank of Kenya (CBK), and the treasury among others. The findings of the study act as a reference point during the formulation of relevant policies, laws, or guidelines to guide the MFBs in designing and implementing new or improved products, processes, and institutions to ensure improved financial performance of the MFBs. The findings facilitate the achievement of sustainable development goal number nine through innovation, financial inclusion, increasing

financial access required for investment, and the overall development of the financial industry.

1.6 Scope of the Study

The study was limited to all microfinance banks in Kenya (Appendix II) which have been in operation for at least one year. The research targeted the heads of the finance department who are privy to the required information. The study sought to establish the effect of financial innovations on financial performance of microfinance banks in Kenya. Microfinance banks were chosen because they have been experiencing a fluctuating financial performance despite the increasing adoption of financial innovations. Financial intermediation theory, constraint-induced innovation theory, transaction cost innovative theory, regulation innovation theory, and Merton's Market theory of innovation were used to guide the study.

The study was conducted in all the 14 licensed MFBs in Kenya, between 2014 and 2020. During this period, microfinance banks in Kenya experienced increasing fluctuation in their financial performance and a rise in the adoption of different financial innovations. At the same time, the microfinance banking sub-sector recorded mixed fortunes in terms of financial performance despite the banking sector recording overall improvement in their financial performance. The period was also marked by major reviews of legislative and regulatory framework to support the rapid growth of the MFBs amid a weakening financial performance despite the advancement in financial innovations. The banking sector relies on unique innovations as an input for better performance. Product innovations, process innovations and institutional innovations formed the independent

variables while financial performance formed the dependent variable. Conceptualization of the assessment model encompassed the integration of the regulatory framework and MFB's competitiveness as the moderating and mediating variables respectively.

1.7 Limitations of the Study

Microfinance banks were licensed at different times and at the same time adopted financial innovations at different times. This could mean that some data for the entire study period could be missing or not available. The use of panel data helped solve this limitation of unbalanced data where data is only available for some periods and/or dropping microfinance banks whose data for the entire study period is missing. Random Effect Model analysis is suitable in cases of balanced or unbalanced data and still yields significant results. Another limitation is that MFB's reports are not published and can only be provided upon request and authorization. A research permit from the National Commission for Science, Technology, and Innovation (NACOSTI) and a letter of research authorization from Kenyatta University helped overcome this limitation.

1.8 Organisation of the Study

The thesis was organised into five chapters. Chapter one discussed the background of the study, research problems, objectives, hypothesis, significance, scope, limitations, and organisation of the study. Chapter two included a review of theories underpinning the study, an empirical literature review, a summary of the reviewed studies, and the conceptual framework. Chapter three discussed research methodology that encompassed the research philosophy adopted, research design, empirical model, operationalization and measurement of study variables, data collection, sampling frame and technique, and

data analysis and presentation. Chapter four presented the study findings and the interpretations. Finally, chapter five summarised the study findings, concludes, and made recommendations and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter reviewed theories that guided the study. It also presented an empirical review of studies on study variables such as product innovations, process innovations, institutional innovations, regulatory framework, and competitiveness. Further, it gave a conceptual framework that demonstrates how the study variables were conceptualised. Finally, it provided a summary of the studies reviewed and presented the identified research gaps.

2.2 Theoretical Review

The study concentrated on the review of theories linked to innovations, comprising financial intermediation, constraint-induced innovation, transaction cost innovation, regulation innovation theories, and Merton's Market theory of innovation. The study was guided by these theories. They informed the research on the source of variables and investigated the linkage between the study variables.

2.2.1 Financial Intermediation Theory

Gurley and Shaw put the theory forward in 1960 based on agency and information asymmetric theories. The theory states that banks exist to provide a link (intermediation) between entities that have money (lenders) and those that want the money (borrowers). The theory postulates that firms obtain external funds from banks and other financial intermediaries. According to this theory, lenders are risk-averse people who are not sure of how to utilise their excess cash while borrowers are sure of their financial needs and

are willing to take up risks. This presents a gap that financial intermediaries exist to fill by providing unique financial services and products to both lenders and borrowers. Financial intermediaries exist to minimise the costs of transactions and reduce information asymmetries (Diamond & Douglas, 1984). However, despite the reduction in the costs of transactions and asymmetric information, the demand for intermediation roles has increased.

Rodgers (1995) supported this theory that banks and other financial institutions form financial intermediaries which are the main sources of external funding for firms. Financial intermediaries aim at reducing the costs of running businesses as well as creating efficient markets through the reduction of information asymmetries (Ferrer & Ferrer, 2015). Asymmetric information is a major cause of market imperfections which in turn puts upward pressure on the costs of transactions (Hull, 2016). The presence of market imperfections creates the need for intermediaries.

Financial intermediaries such as banks are alliances that protect individuals and households from such risks as idiosyncratic shocks that are likely to reduce their liquidity (Diamond & Dybvig, 1982). Such alliances help in the achievement of economies of scale. Diamond (1984) further argued that financial institutions perform delegated monitoring roles on behalf of the savers. Savers may eventually rely on the financial intermediary in making investment decisions (Hart, 1995). Financial institutions also perform the role of product innovations since the traditional way of doing banking is fast-changing (Brighan & Gapenski, 1997). With the subsiding performance of financial

institutions, such institutions need to come up with new or modified products in a bid to mobilise savings and remain afloat (Kojien, Tomas & Uhlig, 2016).

The study is deeply based on the financial intermediation theory since microfinance banks exist to perform intermediation roles between borrowers and lenders. Product innovations have played a significant role in enabling microfinance banks and other financial institutions to create new products that could attract clients and generate more sales revenue. In this study, the theory informed the dependent variable of financial performance and the independent variable of product innovations.

2.2.2 Constraint-Induced Financial Innovation Theory

Silber (1983) first proposed the constraint-induced financial innovation theory. The theory postulates that firms mainly exist among other reasons to maximize profits in a bid to improve their financial performance. The theory also assumes that firms also adopt process innovations to gain a competitive edge. However, a number of restraints face firms in pursuit of profit maximisation objectives such as organisational management and policy. The constraints limit the ability of firms to operate efficiently towards improved performance (Morawczynski & Mark, 2019). As such, firms strive toward casting off such constraints through innovative processes aimed at increasing efficiency in operations (Norden, Buston & Wagner, 2014). Silber (2004) opines that firms such as microfinance banks embrace process innovations to get rid of the constraints to enhance financial performance. Therefore, firms that face imperfections have a high propensity to innovate their processes in a bid to improve their financial performance.

Financial firms can innovate in three ways. These include a new financial instrument; endogenize a balance sheet item or a combination of the two in the form of modified financial instrument (Silver, 1983). Mohamad and Kassim (2017) contend that poor performance among financial firms is attributable to the failure of such firms to embrace innovative processes. Financial firms operating in markets with relatively more constraints tend to adopt more processes, as suggested by Lerner (2006). As recommended by Dash, Tech, and Samal (2014), the adoption of financial innovations enhances financial performance through reductions in the costs of operations. Ndwiga and Maina (2018) suggested that banks that have embraced process innovations tend to succeed contrary to those that have not embraced the innovations. The theory informs the independent variable of process innovations.

2.2.3 Transaction Cost Innovative Theory

The theory was advanced by Hicks and Niehans (1983). According to this theory, the most essential trait of institutional innovation is the ability to minimise transaction costs that respond to technological advancements. The theory posits that optimal firms aim to achieve economic efficiency through transaction costs reduction. As Bamoriya and Singh (2012) recommend, reduction in cost is a key driver of institutional innovations. According to Domeher, Frimpong, and Appiah (2015), the capability to reduce the transaction results of institutional innovations as well as improve financial services. Money linked to innovations also lowers the costs of making transactions.

Rahman (2016) postulates that the essence of transaction costs innovation theory in building internet-linked information technology (IT) substantially lowers a firm's

exchange costs because it offers effective administration, coordination, and usage of data. Mobile phones that utilise internet-based IT reduces exchange costs since it provides off-site access to MFBs' internal database as well as substantial information sources (Beck, Chen, Lin, & Song, 2014). According to Lyman, Pickens, and Porteous (2018), the financial innovations further lowers operational costs through the use of mobile and agency banking which positively impacts the profitability of MFBs. Transaction cost innovative theory guided this study on the effect of institutional innovations on the financial performance of microfinance banks.

2.2.4 Regulation Innovation Theory

Scylla *et al.*, (1982) developed the theory. The theory views financial innovations from the point of view of the history of economic development. It states that financial innovations are directly linked to social regulation. Coupled with economic regulation, the transformation of social regulations leads to financial innovations. According to Scylla *et al.*, (1982), financial innovations cannot thrive in pure free or command economic systems. Instead, financial innovations thrive in a mixed economic system where there is freedom accompanied by regulations (Argamo, 2015). Microfinance banks and the entire financial system resort to financial innovations when government regulations hinder financial activities (Borg & Gall, 2009). This is possible as microfinance banks strive to circumvent the controls put by the government to hinder the banks' intermediation role.

A regulation innovation is one of the major components of financial innovations (Scylla *et al.*, 1982). Governments exercise control over microfinance banks through regulations.

Such regulations can both facilitate and obstruct financial innovations through reforms to respond to the changing regulations. Meijer *et al.*, (2007) opined that regulations aligned to technologies limit the ability of firms to introduce new technologies. It results in uncertainties about the resultant technology that will be adopted (Fostel & Geanakoplos, 2016). Financial firms should therefore not align regulations to technologies to encourage the adoption of various financial innovations that impacts the financial performance of microfinance banks (Yenesew, 2015). This theory is used to support this study by exploring the moderating effect of the CBK regulatory framework on the link between financial innovations and MFB financial performance in Kenya.

2.2.5 Merton's Market Theory of Innovation

Merton postulated the theory in 1990. According to the theory, markets are viewed to be imperfect instead of perfect. Imperfect markets are not efficient (Domeher, Frimpong & Appiah, 2015). Therefore, banks and other financial institutions need to innovate to increase market efficiency. The driving force toward attaining improved social welfare and market efficiency is the introduction of innovations (Baker, 2011). Markets are said to be efficient when the state of that market reflects the past, present, and future information and resources are efficiently allocated.

There are three reasons for financial innovations (Yin & Zhengzheng, 2012). The first reason is to develop new financial structures which facilitate sharing, pooling, and hedging of risks. Secondly, it is to improve liquidity and efficiency. Finally, it is to reduce the costs of the agency. On the contrary, innovations can also result in market instability and crashes. According to Muthinja and Chipeta (2016), financial innovations within the

banking sector are very instrumental to the banks, especially in correcting the inefficiencies in the market such as asymmetric information. Perfect markets ensure that the customers have the correct information that is necessary to make economic decisions. This guided the study by looking at competitiveness and its mediating role in the link between financial innovations and financial performance.

2.3 Empirical Review

2.3.1 Product Innovations and Financial Performance

Ampah *et al.*, (2017) sought to establish the relationship between product innovations and poverty reduction in the central Ghana region using an explanatory research design. The study used cluster sampling to sample 370 entrepreneurs running small and medium enterprises. The dependent variable was poverty reduction indicated by the acquisition of assets. The product innovation was operationalized into micro-saving. The predictor variable of micro-savings was measured in terms of interest rates, rate of savings, and type of savings. Primary data was collected using questionnaires and analysed using cross-tabulations and multiple regression analysis. The study found that product innovations result in an increase in the incomes and acquisition of business assets. However, the study focused on SMEs and poverty reduction, and relied only on two-month data to do the analysis. Further, the assessment result indicated that micro-savings and a rise in consumer spending have a slight positive link ($R = 0.393$ and $P = 0.000$). The current study investigated the effect of micro-savings on the financial performance of microfinance banks in Kenya. Additionally, the study adopted the panel data regression technique to analyse data collected from the MFBs between the periods 2014 -2020. The study conceptualised product innovations to be inclusive of the rate of savings, types of

savings, and interest rates, while leaving out the product innovations element of new micro-credit accounts, thus presenting a conceptual gap.

Osei *et al.*, (2016) used a structural equation model to investigate the link between product innovations and the performance of SMEs in Ghana. Product innovations were conceptualized in terms of new product development, new product introduction, and existing product improvement. Performance was measured in terms of the growth of employees and sales levels. The study results indicated that product innovations positively affect the performance of SMEs in the Ghana manufacturing sector. Further, the results showed that 26.3 percent of the impact on firm performance is related to the adoption of innovation principles in new product development (AIP), while 16% is attributable to the improvement of current products (IEP) and 28.3% is attributable to the launch of new products (INP) among SMEs. The study did not specify the specific product innovations while the current study specified micro-savings, microcredit, and micro-insurance products as elements of product innovations. The study was conducted in the context of Small and Medium-Sized Enterprises in the manufacturing sector rendering it difficult to infer the findings of the microfinance banking sector.

Ngure, Kimani, and Kariuki (2017) studied the effect of product innovations on the financial performance of SACCOs in Kenya. Cross-sectional descriptive survey design was used. Fifty-two out of sixty SACCOs were selected using stratified simple random sampling. Primary data on product innovations was collected using questionnaires while secondary data on financial performance was collected from the audited financial statements. The analysis of variance (ANOVA) results indicated an F-statistic value of

7.863 and a P-value of 0.000. The resultant P-value was smaller than the standard P-value of 0.05, indicating that the regression model accurately predicted the association between financial innovation and SACCO performance. The study focused on new deposit accounts, electronic fund transfer, credit cards, and debit cards to be some of the product innovations while the present study focused on micro-savings, micro-insurance products, and digital credit as elements of product innovations. The results showed that product innovations positively impacted the financial performance of SACCOs. Product innovations were conceptualised in terms of new deposit accounts, electronic fund transfer, credit cards, and debit cards, while ignoring product innovation elements of new micro-credit accounts and new insurance products, thus presenting a conceptual gap.

Odneyo and Simiyu (2014) using a survey research design sought to investigate product innovation strategies and how the innovations affect their growth, using a survey research design. The study targeted branch managers and employees of 25 banks located within Eldoret municipality in Kenya. A sample of 191 respondents out of the possible 578 respondents was selected using the purposive sampling technique. Data was collected using questionnaires and analysed using both descriptive and inferential statistics. The study concluded that product innovations increase in the number of customers. The study was based on commercial banks, making it difficult to infer the findings from the microfinance banking sector. The current study investigated the relationship between financial innovations and financial performance.

Muigai and Gitau (2018) using a descriptive research design analysed the effect of innovation strategies on the financial performance of the Kenyan banking industry, using

a cross-sectional descriptive survey design. The study specifically focused on product innovations and institutional innovations among 51 financial institutions based in Nairobi County, Kenya. A structured questionnaire was used to collect both primary and secondary data. Both descriptive and inferential statistics were used to analyse the data. The study found that product innovations positively affect the financial performance of the financial institutions that form the banking sector in Kenya. As demonstrated by a Pearson coefficient of 0.342 and a significance level of 0.000, the study found that product innovation had a positive and statistically significant relationship with the financial success of enterprises in the Kenyan banking industry. The study recommends that the banking industry should adopt new products and services or improve the existing ones to increase their financial performance. The study was based in Nairobi County, making it difficult to infer the results from the current scenario. The current study also focused on all three components of financial innovations within the microfinance banking sub-sector.

Avotri and Wereko (2016) investigated the effect of product innovations on the financial performance of microfinance institutions in Ghana whose financial information was reported to the Microfinance Information Exchange Market seven years. Sixteen out of thirty-two microfinance banks were sampled to collect unbalanced secondary data. The data was analysed using pooled Prais-Winsten regression with correlated panels and corrected standard errors. Product innovations were operationalized in terms of micro-savings. Micro savings were measured in terms of the natural logarithm of total deposits as a proxy indicator. Operational self-sufficiency and portfolio at risk, which is greater than thirty days, were used to measure dependent variables of sustainability and financial

performance of the microfinance institutions. The empirical results of the study indicated that product innovations negatively affect the operational self-sufficiency of microfinance institutions. Considering the effects of product innovations on firm performance, the above study applied pooled OLS model, which can be challenged due to the likelihood of self-selection, while the current study used panel multiple regression. The interaction between credit and savings has negligible and statistically insignificant impacts on the OSS of MFIs (0.0076086; $p = 0.2780.05$; $r = -0.028$). The study did not specify the sampling method used to select the 16 firms, making it difficult to generalise the findings to the current scenario, and this presents a methodological gap. The current study carried out a census of the microfinance banks in Kenya.

Chikalipah (2018) investigated whether empirical relationships existed between micro-savings product innovations and the financial performance of microfinance institutions in Sub-Saharan Africa. Panel data was collected from the Microfinance Exchange market. Financial performance was measured in terms of Return on assets. Micro-savings was the independent variable and was measured in terms of the loan sizes. A sample of 360 microfinance institutions was sampled from 36 sub-Saharan countries for the period 1998-2012. The study only investigated one element of product innovations in microfinance institutions. The study found that product innovations and financial performance are negatively related. The study was conducted in entire Sub-Saharan Africa, making it difficult to generalise the results to the current study context. The current study focused on products, processes, and institutional innovations. Additionally, it focused on microfinance banks in Kenya.

Mtsitsi *et al.*, (2016) used qualitative and quantitative data from three case studies to examine the effect of product innovations on financial performance. The DuPont model with financial ratios was used for detailed analysis. Product innovations were operationalized in terms of micro-credit. Micro-credit portrayed mixed effects on financial performance. It improved the amount of capital for the venture translating into better competitiveness, production efficiency, as well as market share acquisition thus positively resulting in improved financial performance. Microcredit also improved the level of debt-equity ratio thus raising the firm's risk of default. The DuPont model mainly relied on accounting data from the firm's income statements and balance sheets, some of which can be manipulated by businesses, and so they may be inaccurate. The study lacked an empirical foundation, thus the motivation to conduct an empirical analysis on the study variables.

2.3.2 Process Innovations and Financial Performance

Canh *et al.*, (2019) studied the effect of process innovations on firm performance in Vietnam. Panel data was collected from a sample of manufacturing firms for the three years between 2011 and 2013. Random effects panel data regression model was used to analyse data and firm performance was measured using ROA. The study observed that process innovations are valuable to firm performance in terms of market share but not return on assets (ROA). The analysis concluded that investment in innovative activities needs time to have positive changes in profitability; however, it may enhance the winning loyalty of customers. The study was based in Vietnam; hence the results may not apply to the current assessment.

Akhiser, Tunay, and Tunay (2015) using descriptive statistics sought to determine the effect of process innovations on bank performance. Bank performance was measured by return on assets and return on equity while process innovations were indicated by electronic banking. Secondary data for the period 2005 – 2013 was collected from World Bank, IMF, and BIS for twenty-three developing and developed countries. Data was analysed using a dynamic panel data model to establish the link between study variables. The study results showed that process innovations and bank performance are positively related when the results are collectively evaluated. The study did not specify the target population and sampling method used, hence rendering it difficult to generalise the results to the current analysis.

Ibekwe (2021) sought to investigate the effect of process innovations on the performance of deposit-taking microfinance banks in Nigeria. Process innovations included automated teller machines and mobile banking. The study employed ex-post facto research design and secondary data was collected from the statistical bulletin of the central bank of Nigeria. Multiple regression models were used to investigate the relationship between the study variables. The study results showed that process innovations and performance are positively and significantly related. However, the study did not indicate whether a direct or indirect relationship was found.

Mbama and Edepue (2018) investigated the relationship between process innovations indicated by digital banking services on the financial performance of UK banks. The bank customers were surveyed and data analysed using multivariate factor analysis, structural equation modelling, and ANOVA tests. The results showed that process innovations and

financial performance of the UK banks are positively related. The study recommended that to improve their financial performance, banks should adopt digital financial innovations. The study was conducted among the banks in the UK and the findings may not apply to the current context.

Tahir *et al.*, (2018) sought to establish whether process innovations affect financial performance in Pakistan. Process innovations were categorised into online banking, mobile banking, and Automated Teller Machines (ATMs) are all forms of banking and were measured in terms of the values of the transactions. Financial performance was operationalized into a measure of efficiency ratio (ER). Panel data from the state bank of Pakistan for the period 2009 – 2016 was collected and analysed using the fixed-effects regression model. Data was analysed using descriptive statistics and presented in tables with the help of Eviews version 8.0. The results show a significant positive association between transactions on the internet and the efficiency ratio (ER). Granger impact appraisal showed process innovation had a significant impact on the value of transactions. The study concluded that process innovations enhance payment systems utilised in borrowing as well as lending funds, which eventually opens up a quick method of handling customers. The study examined the direct relationship between process innovations and financial performance in the entire banking sector. The study did not provide the population as well as sampling design, hence may not apply to the current scenario.

Tuan *et al.*, (2016) analysed the effect of process innovations on the firm performance of Vietnam's supporting industries in mechanics, electronics, motorbikes, and automobiles.

The study hypothesised that the higher the level of process innovations, the greater the improvement in the level of financial performance. Primary data on process innovations was collected from 150 firms by use of questionnaires. Exploratory factor analysis and linear regression models were used to analyse data. The study found that process innovations had a significant positive effect on a firm's financial performance. Nonetheless, the assessment was based on cross-sectional data that focuses only on analysing observable characteristics. The survey also used data that were gathered retrospectively, which raises concern regarding the likelihood of data measurement errors.

Mwawasaa and Ali (2020) sought to establish the effect of financial process innovation on financial performance in commercial banks in Kenya. A descriptive survey design was employed. Primary data on financial innovations were collected using questionnaires. Financial process innovations were conceptualised in terms of real-time gross settlements (RTGS), credit scoring, and asset securitization while the dependent variable was conceptualised in terms of profitability, market share, cost reduction, and competitiveness. Respondents in different levels of management were selected using stratified random sampling. Data was analysed using descriptive statistics, multiple regression, and Pearson correlation. The results of the study rejected the null hypothesis and concluded that financial process innovations significantly affected the financial performance of commercial banks. The study recommended that management should adopt process innovations to improve financial performance. The study established the direct link between the study variables while the current study incorporated the mediated link of competitiveness and the moderated effect of regulatory framework on the

relationship between financial innovations and the financial performance of Kenyan microfinance institutions. The study was based on the commercial banking sector and the results may not be generalizable to the current context while the current study is based on the microfinance banks in Kenya.

2.3.3 Institutional Innovations and Financial Performance

Abdirashid and Jagongo (2019) used primary data gathered from credit/loan officers and credit managers to study the relationship between group lending and loan performance of microfinance institutions. Loan performance was the dependent variable, which was operationalized into three measures which include timely payments, default rates, and irrecoverable group loans. Regression analysis was used and the investigation indicated a strong correlation coefficient between group self-internal regulations, credit risk control measures, credit policy, as well as credit appraisal process, and loan performance. The study failed to specify the population as well as the sampling design, rendering generalisation difficult.

Rajapathirana and Hui (2018) studied the link between organizational (institutional) innovations and firm performance among insurance firms in Sri Lanka. Data was collected using questionnaires from a sample of 274. Data was analysed using confirmatory factor analysis, correlation analysis, and regression equation. The results show that institutional innovations bring financial value to companies, which in turn improves their performance. Nevertheless, such a significant and positive effect is not always observed. Firms increasingly factor in the problem of larger budgetary oversights regarding the development of innovative processes as well as innovative product

marketing. Much of this is because of the escalation in the costs linked with the innovations. The study was based on insurance companies in Sri Lanka and not the microfinance banks in Kenya. Therefore, the findings may not be relevant to the current assessment. The current study focused on microfinance banks in Kenya.

Owolabi (2015) used primary and secondary data gathered from 62 questionnaires and 35 interviews to study institutional innovations and microfinance intervention. The dependent variable was microfinance intervention, operationalized as loans, interest rates, savings, and non-financial services. Qualitative, cross-tabulation, frequency distributions, Logit as well as OLS regression analysis were done to establish the link between group lending and microfinance intervention and the results showed that the application of savings as group loan guarantee is negatively correlated to MFI intervention. However, the study did specify the relationship between group lending and financial performance. The current study focused on three components of institutional innovations instead of one.

Katusabe (2013) studied the effect of institutional innovations on the performance of microfinance companies in Uganda using Hofokam Ltd and incorporated loan portfolio as the measure of funding. Performance of microfinance institutions was the dependent variable, operationalized as operational self-sustainability (OSS). The correlation results established that the loan portfolio has no direct influence on the performance of microfinance banks. Institutional innovation activities can have varying effects on a firm's financial performance, depending on the time duration. The study was more inclined to

loan performance as opposed to other parameters of financial performance like return on assets, making it inapplicable to the current scenario.

2.3.4 Financial innovations, Regulatory Framework, and Financial Performance

Chava *et al.*, (2013) observed that bank regulations are key determinants of financial innovations and financial performance. Effective regulations are important for enhancing financial innovations, fostering competition, ensuring the stability of the financial markets, and ensuring healthy and ethical conduct of businesses that uphold the rights of the customers. Şimşek (2013) posits that regulations are important in promoting fair playing for every firm. The microfinance banking sector is regulated to work within the stipulated structures and to protect clients, specifically the poor who mostly bank with microfinance banks (Mugane, 2015). However, these were theoretical reviews that lack empirical testing of the reported results.

Kaloki (2018) studied the relationship between the CBK regulations and the financial performance of microfinance banks in Kenya. A census of all the 13 MFBs was carried out and a descriptive research design was utilised. Both primary and secondary data were collected. CBK regulations were measured in terms of capital adequacy, total capital to total risk-weighted assets, statutory requirements, operational requirements, financial reporting requirements, and liquidity ratio. The empirical findings indicated that CBK regulations affect the financial performance of MFBs. Statutory requirements greatly affected financial performance, followed by capital adequacy, then operational requirements while financial reporting requirements least affected the financial performance of MFBs. The study recommended that the capital requirements should be

set after considering the ability of each MFB to take risks. However, the regulatory framework was used as the independent variable in the study while the present study considered the regulatory framework as a moderator variable.

Otieno, Nyagol, and Onditi (2016) used the longitudinal research design to investigate the effect of capital adequacy regulations on the financial performance of microfinance banks in Kenya. A sample of 6 MFBs was selected using the purposive sampling technique. Secondary data was collected using a document review guide. Panel data was analysed using multiple regression models and Pearson's correlation coefficient. The study found that both the CBK regulatory framework of capital adequacy ratio and liquidity ratio requirement had a moderate significant and positive correlation with the financial performance of the MFBs in Kenya. The study recommended that MFBs should maintain an adequate prudential capital adequacy ratio to enhance their financial performance. A small sample size of only 6 microfinance banks was used; hence making generalizability of findings difficult.

Knut, Sören, and Cesare (2017) conducted an empirical review to investigate the impact of standards and regulatory frameworks on the efficiency of innovations in some markets. The empirical analysis was based on the German Innovations Survey and argued that the nature of market uncertainty affects the regulations imposed by the regulating authority. The study results indicated that formal regulations positively impact innovation efficiency. The study recommended that the regulations on financial innovation should be heavily dependent on the market environment. The study focused on innovations

efficiency and ignored financial performance, which rendered it difficult to infer the results to financial performance in the current context.

Muthinja (2016) identified regulation as one of the major macro-level factors that drive financial innovations and performance within the banking sector. The study sought to investigate macro level factors that influence financial innovations in Kenya. Panel data for 10 years on four financial innovations were collected from 42 commercial banks. Koyck distributed lag model using the dynamic panel regression with the System generalised method of moments was used to analyse data. According to the study, the relationship between financial innovations and regulations is determined by the ability of the regulations to support or hinder innovations. The empirical findings posit that in the Kenyan context, CBK regulations enhance the financial innovations in the banking industry. The study was based on the commercial banking sector, which rendered the results inapplicable to the current scenario.

Debate on the role of regulations on financial innovations seems inconclusive in the sense that certain literature suggests a positive link between the two (Moussa, 2013) while some suggest a negative relationship (Calomiris, 2009). This implies that regulations may or may fail to prevent innovations. The divergent views on the effect of the regulatory framework provide an opportunity for examining the moderating effect of regulatory framework between financial innovations and financial performance. In addition, most of the reviewed studies focused on either the effect of regulatory framework on financial innovations or financial performance.

2.3.5 Financial innovations, Competitiveness, and Financial Performance

Musau, Muathe, and Mwangi (2018) used descriptive statistics and panel regression analysis to study bank competitiveness, financial inclusion, and bank stability. The mediating variable of bank competitiveness was conceptualised to include measures of the market share of each bank. Secondary data on market share for each bank was collected using document review guides from the published bank supervision reports from CBK and KNBS. The study observed that the relationship between bank stability and financial inclusion is partially mediated by bank competitiveness. The results of the study were based on the commercial banking sector, which may not apply to the current assessment.

Monyi, Namusonge, and Sakwa (2018) studied the association between competitiveness and performance of deposit-taking microfinance institutions in Kenya. Census Data was collected using a questionnaire and secondary document review sheet. Sixty portfolio managers were randomly selected as respondents. Data was analysed using descriptive statistics, inferential statistics, and correlation analysis. Results of the study indicated that competitiveness and financial performance are positively correlated. The findings were based on a sample of portfolio managers while leaving out other key players in the industry from the study.

Setyawati, Rosiana, and Shariff (2017) investigated the mediating effect of competitive advantage on the relationship between innovation and SME performance of the businesses in Indonesia. The study hypothesised that competitive advantage has a mediating effect on the relationship. Structural equation modelling was used to test the

empirical model. One hundred and twenty-five owner-managers of the SMEs were sampled. The results of the study showed that competitive advantage has no mediating effect on the relationship between innovations and business performance. The study was based on the SMEs in Indonesia, whose findings may not apply to the current context.

Wanjiru, Muathe, and Kinyua (2019) investigated the mediating effect of competitiveness on the relationship between corporate strategies and the performance of manufacturing firms in Nairobi County, Kenya. Descriptive and explanatory research designs were adopted in the study. One hundred and eighty-nine firms were sampled from a population of 373 firms using multi-stage sampling techniques. In addition, stratified and simple random sampling was also used. Descriptive and inferential statistics were used to analyse data. Competitive advantage was found to have a mediating effect between corporate strategies and the performance of manufacturing firms. The study also showed that innovations significantly influence competitive advantage. The study was based on manufacturing companies, whose results may apply to the current analysis. Further, it was based in Nairobi County, implying the results may not be relevant to other areas outside Nairobi County.

2.4 Summary of Empirical Gaps

The elements of financial innovations include product innovation, process innovations, and institutional innovations. The financing decisions of microfinance banks are based on how these components can be integrated in their products, processes, and institutional operations to generate more income as they efficiently cut down their costs. Empirical literature reviewed concerning financial innovations variables and how they influence

financial performance has concentrated on only individual elements of financial innovations on financial performance at a time. Further, the studies reviewed have only focused on individual measures of financial performance while ignoring other measures such as profit margin, return on investment, as well as return on equity among others. It implies that most of the studies reviewed had inadequate variables or limited scope.

Other studies adopting various elements of financial innovations have analysed different time periods and examined different sectors. The assessments ignored the current microfinance banking sector and the time when the global economic slowdown affected most parts of the world. Most of the studies reviewed were based in the commercial banking sector as opposed to the microfinance banking sector. The literature reviewed further showed that the methodology applied was not adequate in some studies. It is evidenced that some of the samples chosen were too small comprising only one banking institution. The identified gaps in the empirical investigations provide the basis for this current study that intends to address the identified gaps as well as contradictions. Table 2.1 provides the summary of literature reviewed, findings, and identified gaps.

Table 2.1 Summary of Empirical Gaps

Author (s)	Objectives	Key Findings	Research gaps	How the current study will fill the existing study gaps
Ibekwe (2021) -Nigeria	Financial innovations and performance	-Financial innovations positively affect profitability of deposit money banks	-Only focused on one form of innovations - Used primary data on innovations	-Study focused on process, product and institutional innovations -Study used multiple indicators for each form of financial innovations -Study used secondary data to investigate financial innovations
Canh <i>et al.</i> , (2019) -Vietnam	Impact of innovation on firm performance	-Product and process innovations are beneficial increasing a firm's market share -Investment in innovations require time to affect profitability	-Overlooked the institutional form of innovations -Focused only on the manufacturing firms - Focused on direct relationship	- The study incorporated institutional innovations as an additional independent variable -Study focused on financial innovation in the microfinance banking sector - The study focused on the direct, mediated and moderated relationships between financial innovations and financial performance

Rajapathirana and Hui (2018) -Sri Lanka	Innovation capability, type and firm performance	-Innovations positively affect financial performance	-Direct relationship was investigated -Insurance sector was studied - Used a pooled OLS model, which can be challenged due to the likelihood of self-selection	-The study investigated the mediated and moderated relationship. -Study focused on MFBs -Study analysed whether there is a direct or indirect relationship between the variables.
Tahir <i>et al.</i> , (2018) -Pakistan	Analysis of process innovation and financial performance of the banking sector	Process innovations enhances bank efficiency	-The study investigated the direct relationship between the variables -Failed to show the direction of the relationship - The banking sector was studied as a whole - Financial performance was operationalized in terms of efficiency ratio	-The study focused on direct, mediated and moderated relationships. -The study sought to give the direction of the relationship -The study specifically focused on the MFBs - ROA, a profitability ratio is used as a measure of financial performance
Mbama and Edepue (2018) -United Kingdom	Digital banking services and financial performance of UK banks	Process innovations positively affects financial performance	-Investigated direct relationship -Studied the entire banking sector -Only focused on one form of financial innovations	-The study investigated the direct, mediated and moderated relationships -Study was specific to MFBs only. -The study emphasised all the three forms of

				financial innovations
Tuan <i>et al.</i> , (2016) -Vietnam	Effect of innovation on firm performance in supporting firms	Process and institutional innovations positively affect financial performance	-Used primary data only -Did not specify specific firms in an industry -Focused on direct relationship -Used cross sectional data only which might be upward biased	-Study was specific to MFBs only -Study used secondary data -The interactions effect of mediator and moderator were also analysed -Panel data was used
OECD (2016) -Germany	Measuring output in process innovation	-Process innovation and performance are negatively related	-Used binary measure for process innovation -Studied the direct relationships	-Study used secondary data to measure financial innovations -The study included direct, mediated and moderated relationships
Avotri and Wereko, (2016) -Ghana	Effect of microfinance innovations and efficiency	The study found that micro-savings is statistically and significantly negatively correlated to operational self sufficiency	-Micro-savings was measured in terms of the natural logarithm of total deposits -The study focused on only one variable for product innovations -Used efficiency as dependent variable	-The current study measured in terms of the annual average revenue generated from micro savings products. -The study used other measures of innovations such as digital credit -Study used financial performance as dependent variable

Abdirashid and Jagongo (2019) -Kenya	Relationship between group lending innovation and financial performance	-A strong correlation between group lending innovation and loan performance	- The study only focused on the Kenya Women Finance Trust only -Only one form of institutional innovation will be used.	- The current study focused on all the MFBs in Kenya -Additional elements of institutional innovations such as artificial intelligence and crowd funding were also studied
Osei <i>et al.</i> , (2016) -Ghana	Product innovations and SMEs Performance in the manufacturing sector	Product innovations positively affect performance	-Focused on SMEs in manufacturing sector -Only focused on product innovations	-Study focused on all MFBs in Kenya -Current study focused on product, process and institutional innovations
Akhiser, Tunay and Tunay (2015) -Across countries	Innovations and bank performance	Innovations and bank performance are positively related	-Only used electronic banking to indicate process innovations -Only one independent variable was studied -Direct relationship was studied	-Process innovations indicated by digital field application, pesalink and mobile applications -Current study used three independent variables - Study focused on direct, mediated and moderated link

Source: Various studies reviewed (2021)

2.5 Conceptual Framework

The study looked at the effect of financial innovations on financial performance. The independent variables comprised product innovations, process innovations, and institutional innovations. The moderating variable in this study is the regulatory framework while the mediating variable is the microfinance bank's competitiveness. The dependent variable is financial performance. Figure 2.1 is the conceptual framework, showing the link between the variables of financial innovations, financial performance, regulatory framework, and competitiveness.

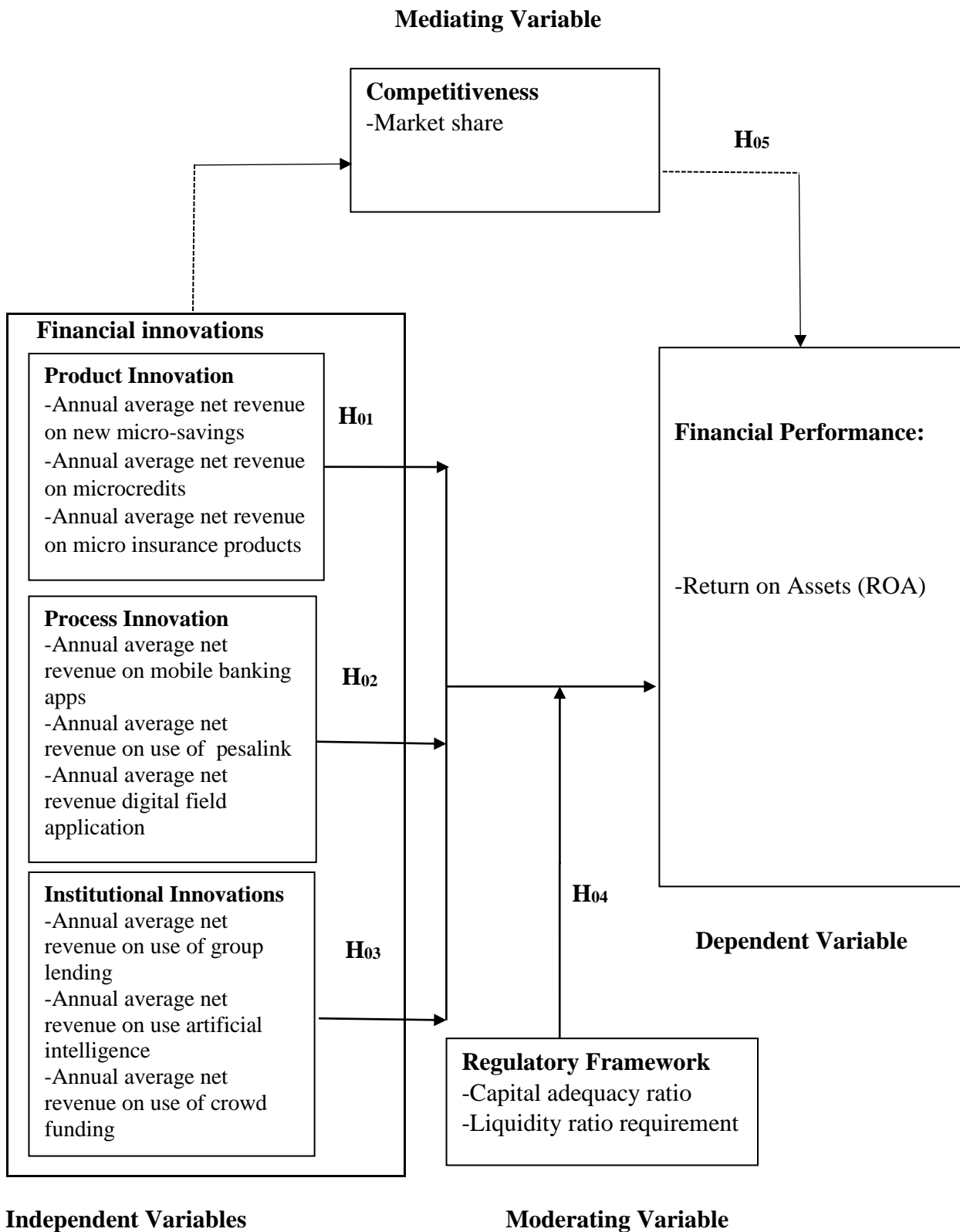


Figure 2.1: Conceptual Framework
 Source: *Author (2021)*

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter presented procedures as well as methods that were used for data collection and analysis on how financial innovations affected the financial performance of microfinance banks operating in Kenya. Further, research philosophy and design, target population, and method of data collection are discussed. Other aspects described comprise sampling design, data collection instruments, the procedure for collecting data, data analysis, presentation, as well as diagnostic tests.

3.2 Research Philosophy

The philosophy adopted by a researcher is based on the nature, development, and sources of knowledge being developed. Research epistemology can be based on two extreme philosophies; positivism and phenomenology. This study was anchored on the positivism philosophy to help achieve the study objectives. Saunders *et al.*, (2009) posit that positivism is grounded on the belief that the observer is not dependent on what is being observed and measurement should be through objective criteria rather than being inferred subjectively.

Different researchers arrive at the same conclusion if the same instrument is used (Bell, Bryman & Harley, 2018). Positivism is quantitative and is derived from natural sciences. Kothari (2011) opined that positivism is characterised by the existence of facts as well as hypothesis testing derived from prevailing theories by measuring observable social

reality. It is also characterised by the neutrality of the researcher where their opinion is excluded. Positivism presumes the social world exists objectively and externally. According to Zikmund (2010), in positivism, knowledge is valid on the condition that it is based on observations of this external reality. It posits that theoretical models that are generalizable can be developed and can also explain cause-effect relationships that can lead to the prediction of results. Using this positivist philosophy, the current study tested hypotheses that were derived from an objective review of the empirical literature. Testing was conducted using data that was collected using scientific methods thus ensuring objectivity. Data analysis formed the basis for either rejecting or accepting the null hypotheses.

3.3 Research Design

The strategy a researcher uses to respond to the research questions is explained by the research design. It provides a blueprint for data collection, measurement, analysis, and interpretation (Creswell, Klassen, Plano & Smith, 2011). According to Saunders, Lewis, and Thornhill (2009), explanatory, descriptive, and exploratory designs are the three types of research designs. The design adopted by any researcher is dependent upon the purpose of carrying out any particular research. Saunders *et al.*, (2009) posit that the adoption of two or more research designs in a study increases the validity of research findings.

The current study adopted both descriptive and explanatory research designs. Cooper and Schindler (2014) assert that explanatory design is suitable for the study because it helps to establish a causal association between variables of financial innovations and MFBs’

financial performance to explain the existing relationship that exists between the variables. According to Mugenda and Mugenda (2012), the explanatory research design identifies the reasons for the occurrence of a phenomenon to aid prediction or explanation. As such, explanatory and descriptive designs were useful in describing population characteristics as well as hypothesis testing.

3.4 Empirical Model

The general empirical equation that was used for panel data regression is expressed as follows:

$$Y_{it} = \alpha_1 + \beta_i X_{it} + \varepsilon_{it} \dots\dots\dots 3.1$$

Where:

Y_{it} denotes the dependent variable MFBs' financial performance i at time t , and it is measured by ROA.

i denotes various MFBs in Kenya ($i = 1, 2, 3 \dots 14$) while t refers to the time period under study ($t = 2014, 2015, 2016, 2017, 2018, 2019, \text{ and } 2020$).

β_i denotes the coefficients that are being estimated.

X_{it} denotes the vector of the predictor variables (financial innovations) of each MFB over time (t)

α_1 is the constant term

ε_{it} refers to the error term

Equation 3.1 was then expanded to provide the estimated association between financial innovations and MFBs' financial performance as follows:

$$ROA_{it} = \alpha_1 + \beta_1 PD_{it} + \beta_2 PC_{it} + \beta_3 IN_{it} + \varepsilon_{it} \dots \dots \dots (3.2)$$

Where;

ROA_{it} = Return on Assets, of MFB i , at time t ,

PD_{it} = Composite score for Product Innovations, of MFB i at time t ,

PC_{it} = Composite score for Process Innovations, of MFB i at time t ,

IN_{it} = Composite score for Institutional Innovations, i at time t .

3.4.1 Testing Moderating Effect of Regulatory Framework

The study tested the moderating effect by applying Baron and Kenny (1986). This involved two steps to test the moderating effect of the regulatory framework on the existing association of financial innovations with MFBs' financial performance. The first step involved running the moderator variable (regulatory framework) as an independent variable as shown in equation 3.3:

$$ROA_{it} = \alpha_1 + \beta_1 PD_{it} + \beta_2 PC_{it} + \beta_3 IN_{it} + \beta_4 Rf_t + \varepsilon_{it} \dots \dots \dots (3.3)$$

The second step involved testing the significance level of the p-value for the regulatory framework. If the p-value is significant, then the regulatory framework becomes the independent variable in this test. However, for an insignificant p-value, the interaction effect is run as follows:

$$ROA_{it} = \alpha_1 + \beta_1 PD_{it} + \beta_2 PC_{it} + \beta_3 IN_{it} + \beta_4 PD_{it} * Rf_t + \beta_5 PC_{it} * Rf_t + \beta_6 IN_{it} * Rf_t + \epsilon_{it} \dots \dots \dots (3.4)$$

Where:

Rf = Regulatory Framework

ROA = Return on Assets

3.4.2 Decision Criteria for Moderation

Table 3.1 illustrates the decision criteria that were used to analyse the moderating variable. The analysis was based on the F-statistics at 5% significance level. In the analysis, the regulatory framework was first run as an independent variable, and it was run as a moderator variable in the second step upon which the decisions were made as shown:

Table 3.1: Decision Criteria for Moderation

Analysis	Outcome	Conclusion
First step: Equation 3.3	The regulatory framework has a significant coefficient	Regulatory framework is an explanatory variable
Running regulatory framework as an independent variable	The regulatory framework has an insignificant coefficient	Regulatory framework moderates the link between financial innovations and financial performance
Second step: Equation 3.4 Regulatory framework as a moderator variable	The regulatory framework has a significant coefficient	Regulatory framework moderates the link between financial innovations and financial performance
	The regulatory framework has an insignificant coefficient	Regulatory framework does not moderate the link between financial innovations and financial performance
	Interaction terms have a significant coefficient	Significant interaction
	Interaction terms do not have a significant coefficient	Insignificant interaction

Source: Researcher (2022)

3.4.2 Testing Mediating Effect of Microfinance Banks' Competitiveness

The model proposed by Baron and Kenny (1986) was applied to test the mediating role MFBs competitiveness. This model used an approach that involved four steps in which several regressions analysis were conducted and the significance of the coefficients was examined. According to this model, there are two paths to the dependent variable. Accordingly, financial innovations (independent variables) must predict financial performance (dependent variable), and financial innovations must predict MFBs' competitiveness (mediating variable). This was predicted through a four-step process:

Step 1: conducting regression analysis with financial innovations predicting financial performance for microfinance banks

$$ROA_{it} = \alpha_1 + \beta_1 PD_{it} + \beta_2 PC_{it} + \beta_3 IN_{it} + \varepsilon_{it} \dots \dots \dots 3.5$$

Step 2: Performing a regression analysis where financial innovations predict MFBs competitiveness

$$Competitiveness (MC)_{it} = \alpha_1 + \beta_1 PD_{it} + \beta_2 PC_{it} + \beta_3 IN_{it} + \varepsilon_{it} \dots \dots \dots 3.6$$

Step 3: Performing regression analysis where competitiveness predicts financial performance

$$ROA_{it} = \alpha_1 + \beta_1 MC_{it} + \varepsilon_{it} \dots \dots \dots 3.7$$

Step 4: Conducting multiple regression analysis with financial innovations, MFBs competitiveness predicting financial performance

$$ROA_{it} = \alpha_1 + \beta_1 PD_{it} + \beta_2 PC_{it} + \beta_3 IN_{it} + \beta_4 MC_{it} + \varepsilon_{it} \dots \dots \dots 3.8$$

Steps one to three examined the existing zero-order association with variables for this study. Insignificant relationships between one and more of the study variables depict lack of mediation. However, if there is a relationship between the first three steps, the researcher would proceed to step four (Baron & Kenny, 1986). In the fourth step, total mediation exists if financial innovations no longer influence financial performance after MFBs' competitiveness has been controlled. However, partial mediation occurs when financial innovations' influence on financial performance is reduced after removing MFBs' competitiveness. The decision criteria for mediation are illustrated in Table 3.2 below.

Table 3.2: Decision Criteria for Mediation

Model 3.5	Model 3.6	Model 3.7	Model 3.8	Test	Conclusion
B51 ; (p > 0.05)	-	-	-	-	There is no overall relationship for Mediation
B51 ; (p ≤ 0.05)	-	-	-	-	There exist an overall relationship to mediate
B51 ; (p ≤ 0.05)	B61 ; (p ≤ 0.05)	B71 ; (p ≤ 0.05)	B81 and B82 ; (p ≤ 0.05)	B51- β81= B71*β82	Partial mediation
B21 ; (p ≤ 0.05)	B31 ; (p ≤ 0.05)	B41 ; (p ≤ 0.05)	B51 ; (p > 0.05) B52 ; (p ≤ 0.05)	B51- β81= B51*β82	Perfect mediation

Source: Baron and Kenny (1986)

3.5 Test of Hypotheses

The study adopted the empirical models shown in table 3.3 to test the hypotheses, following the assessment objectives.

Table 3.3: Test of Hypotheses

Study Objectives	Hypotheses	Statistical Model	Threshold of Results' Interpretation (5 % Significance Level)
To determine the effect of product innovations on financial performance of MFBs in Kenya	Product innovations do not have a significant effect on financial performance of microfinance banks in Kenya	$ROA_{it} = \alpha_1 + \beta_1 MS_{it} + \beta_2 MC_{it} + \beta_3 MI_{it} + \varepsilon_{it}$	P-Value < 0.05 (Accept H _A) P-Value > 0.05 (Accept H ₀)
To establish the effect of process innovations on financial performance of MFBs in Kenya	Process innovations do not have a significant effect on financial performance of microfinance banks in Kenya	$ROA_{it} = \alpha_1 + \beta_1 MA_{it} + \beta_2 PL_{it} + \beta_3 DA_{it} + \varepsilon_{it}$	P-Value < 0.05 (Accept H _A) P-Value > 0.05 (Accept H ₀)
To find out the effect of institutional innovations on financial performance of MFBs in Kenya	Institutional innovations do not have a significant effect on financial performance of MFBs in Kenya	$ROA_{it} = \alpha_1 + \beta_1 GL_{it} + \beta_2 AI_{it} + \beta_3 CF_{it} + \varepsilon_{it}$	P-Value < 0.05 (Accept H _A) P-Value > 0.05 (Accept H ₀)
To determine the moderating effect of regulatory framework on the relationship between financial innovations and financial performance of MFBs in Kenya	Regulatory framework does not significantly moderate the relationship between financial innovations and financial performance of microfinance banks in Kenya	$ROA_{it} = \alpha_1 + \beta_1 CAR_{it} + \beta_2 LRR_{it} + \varepsilon_{it}$	P-Value < 0.05 (Accept H _A) P-Value > 0.05 (Accept H ₀)
To ascertain the mediating effect of competitiveness on the relationship between financial innovations and financial performance of MFBs in Kenya	MFBs Competitiveness does not significantly mediate the relationship between financial innovations and financial performance of microfinance banks in Kenya	$ROA_{it} = \alpha_1 + \beta_1 MS_{it} + \varepsilon_{it}$	P-Value < 0.05 (Accept H _A) P-Value > 0.05 (Accept H ₀)

Source: Author (2021)

3.6 Operationalization and Measurement of Variables

Different variables, their operational definition as well as the measurements applied in their estimations are presented under this section. The measures adopted have been used and validated by other researchers. They are further documented in most finance as well as econometric literature.

Table 3.4: Operationalization and Measurement of Variables

Category	Variable	Operationalization	Measurement	Type of scale
Dependent Variable	Financial Performance	Actual outcome of microfinance banks in terms of their return on assets.	Return on Assets = Net income ÷ Total assets	Ratio
Independent Variable	Product Innovations	Revenue generated from product innovations	Average annual revenue = Total revenue ÷ 12 months	Ratio
	Process Innovations	Revenue generated from process innovations	Average annual revenue = Total revenue ÷ 12 months	Ratio
	Institutional Innovations	Revenue generated from institutional innovations	Average annual revenue = Total revenue ÷ 12 months	Ratio
Moderating Variable	Regulatory Framework	Composite index of capital adequacy ratio and liquidity ratio requirement	CBK rates	Ratio
Mediating Variable	Competitiveness	Market share that a particular microfinance bank controls in relation to other microfinance banks.	Market share (MS)	Ratio

Source: Author (2021)

3.7 Target Population

The target population refers to the particular members of a real or hypothetical set of people, events or objects that a researcher wishes to generalise the results of their research. Sekaran (2006) mentions population as the whole group of events, people, or set of items of interest upon which a researcher intends to obtain information. Borg and Gall (2009) specify two types of population, target and accessible population. Hence, the target population of the study was all 14 microfinance banks in Kenya, as per the CBK (2020) report (Appendix II).

3.8 Sampling Design

Based on the size of the sampling frame, the study applied the census approach. The sampling frame for this study consisted of all the 14 microfinance banks in Kenya. A census involves the study of all the firms within the population (Cooper & Schindler, 2014). According to Kothari (2011), the validity of the data collected is enhanced since all the required information is obtained from all the study units. The approach also helps in the elimination of potential bias resulting from sampling errors. However, one microfinance bank was not analysed since data was not available because it lacked a complete set of financial reports having been licensed in November, 2019 (CBK, 2020).

3.9 Data Collection Instrument

Secondary data was utilised because it is readily available, cost-effective, provides a baseline for comparison, and makes it possible to use panel data analysis (Hakim, 2012). Panel data consisted of data from a cross-section of 14 MFBs and time-series data for the period 2014 – 2020. Document review guide (Appendix I) was used to collect the

secondary data from the MFBs annual financial reports and the bank supervision reports by the Central Bank of Kenya covering 2014 to 2020. The required secondary data were extracted and compiled by the use of a document review guide to aid analysis.

3.10 Data Analysis

Data analysis was done using descriptive statistics, including means, percentages, standard deviations (SD), and inferential statistics using correlation and panel regression. In view of Leyla (2001), descriptive statistics was used to provide meaningful interpretation and description of the data collected. The standard deviation indicates the variations of results obtained from the data. As recommended by Burke and Onwuegbuzie (2014) inferential statistics was used to infer results, make generalised conditions, as well as ensure that a reliable conclusion is made regarding the relationships of the study variables. As suggested by Creswell *et al.*, (2011), the analysis used the Pearson correlation coefficient, which provided the nature and strength of correlation variables. The Pearson method is preferred because the variables in this study were quantitative variables.

According to Creswell (2014), panel data regression analysis is considered suitable for predicting the existing relationship between study variables. Marshall and Rossman (2006) further advise that panel data regression analysis is premised on the fact that it is suitable for both balanced and unbalanced data and can be used for such complex behavioural characteristics as financial innovations. In this study, the MFBs were licensed at different times thereby resulting in unbalanced data.

A composite index for each variable in each MFB was calculated from the quantitative data gathered. The composite index was calculated using the weighted harmonic mean as recommended by Creswell, Klassen, Plano, and Smith (2011). The harmonic mean was adjusted to give the relative weight of each variable as demonstrated by the following formula.

$$H = \frac{\sum_{i=1}^n w_i}{\sum_{i=1}^n \frac{w_i}{x_i}} = \left(\frac{\sum_{i=1}^n w_i x_i^{-1}}{\sum_{i=1}^n w_i} \right)^{-1} .$$

Source: Gupta (2008)

Where;

H = composite index for each variable. The variables whose indices were computed included product innovations, process innovations, institutional innovations, and regulatory framework.

n = number of MFIs that returned filled document review forms

X_i = Percentage Mean Score for each component for each MFB, which is computed as a ratio of the actual score to the maximum possible score on the statements for each variable.

W_i = The weight of the mean score for each variable for each MFB calculated as the ratio of the mean scores for each variable to the sum of all the mean scores.

The F-test statistic was used for hypothesis testing to predict how variables relate. This is because the F- test is usually suitable for testing hypotheses for continuous data obtained

from smaller samples, and it allows the researchers to test the existence of a relationship between the variables, direction or size of the relationship as suggested by Cooper and Schindler (2014). The hypothesis was tested within the 95 percent level of confidence interval. According to Burke and Onwuegbuzie (2004) the 95% confidence level is often used in statistical analysis and is a generally acceptable standard to test whether the hypothesis test is statistically significant.

3.11 Diagnostic Tests

The study carried out diagnostic tests to ensure compliance with the assumptions of the classical linear regression model (CLRM). Creswell *et al.*, (2011) pointed out that when regression analysis is carried out without first complying with the assumptions of CLRM, then the results of the regression would be biased, inefficient, and inconsistent. Therefore, the study conducted multicollinearity, heteroscedasticity, normality, stationarity, and autocorrelation tests.

3.11.1 Multicollinearity Test

As advised by Cooper and Schindler (2015), Variance Inflation Factors (VIF) and tolerance levels were used to test multicollinearity. Multicollinearity is evidenced in situations with a high correlation of explanatory variables. According to Kothari (2011), multicollinearity means that one independent variable can linearly be predicted by the other with a certain level of accuracy. High variances can occur because of multicollinearity, which may invalidate hypothesis testing and thus impact the prediction power of a model. A VIF value greater than 10 is considered indicative of the presence

of multicollinearity as recommended by Creswell *et al.*, (2011). Multicollinearity was to be corrected by non-linear transformation.

3.11.2 Normality Test

The study employed the Shapiro-Wilk test to test for the normality of variables. According to Razali and Wah (2011), the Shapiro-Wilk test is preferred since it has good properties for power. Similarly, it is based on the correlation between given and associated normal scores. While a p-value less than 0.5 represents a violation of normality, a p-value greater than 0.5 implies the existence of normality as suggested by Brace (2018). The remedy for violation of the normality test is the use of non-parametric statistics. Normality tests are important in regression methods as it ensures that statistical analysis does not result in inflated or under-estimated standard errors (Kothari, 2011). The presence of normality affects the interpretation, validity, and reliability when making inferences. The study Shapiro-Wilk test hypothesises that the data is normally distributed. The alternative hypothesis is that the data is not normally distributed.

3.11.3 Heteroscedasticity Test

The presence of heteroscedasticity may result in the estimates being inefficient due to the reduced statistical power of the regression coefficient (Kothari, 2011). This may lead to overestimates or underestimates of the standard error thus yielding too wide or too narrow confidence intervals. Regression analysis assumes that the error term should have constant variance. This study used the Breusch-pagan test as proposed by Breusch and Pagan (1979) to test for heteroscedasticity. The null hypothesis assumed that the error term has a constant variance (homoscedastic) while the alternative hypothesis assumed

heteroscedasticity. Null hypothesis would be accepted when the p-value > 0.05 indicates homoscedasticity. When the p-value is less than 0.05, the null hypothesis is rejected indicating the presence of heteroscedasticity. Hakim (2012) pointed out that the presence of heteroscedasticity during regression analysis leads to wrong parameter estimates. The study was to remedy for violation of homoscedasticity by carrying out logarithmic transformation.

3.11.4 Autocorrelation

Serial correlation within the panel data renders the standard error bias. According to Verbeek (2012) autocorrelation exists when the current observations in time “t” are affected by the observations in the previous time “(t-1)”. This might cause the results to be less efficient. In addition, the presence of first order serial correlation results in unbiased coefficients and overestimated R^2 . As advised by Mugenda and Mugenda (2012), this study sought to identify serial correlation in the idiosyncratic error term by conducting the Box-Ljung test for serial correlation’s first-order. According to Brace (2018), the Box-Ljung test requires very few assumptions. It is also used under general conditions and can be used for both balanced and unbalanced data. The test was guided by the null hypothesis that there is no serial correlation’s first order in the data. The p-value of less than 0.5 is insignificant at 5 percent significant level leading to the null hypothesis’ acceptance that autocorrelation does not exist. Feasible General Least Squares would be performed as a remedy in the case of the presence of autocorrelation.

3.11.5 Stationarity/Unit Root Test

The time series component of panel data requires that stationarity test to test whether its statistical properties are not varied over time. Running regression on non-stationary data would result in spurious results. Therefore, it was important to ensure the absence of unit roots. As recommended by Creswell (2014), this study tested unit roots by using the Augmented Dickey-Fuller (ADF) and Philip Peron (PP) tests. The reason for the use of this technique was that it takes into account possible gaps as well as unbalanced panels. As recommended by Kromtit and Tsenkwo (2014), the test was based on the null hypothesis that there were no unit roots within the time series of the data is non-stationary. According to Saunders *et al.*, (2009), if the p-value is below 5 percent, the null hypothesis is rejected. The alternative hypothesis was that all panels do not have unit roots implying that the data is stationary. In the event of a violation of stationarity of time series, the data would be differentiated.

3.11.6 Model Specification Test

Green (2008) suggests that panel data regression requires the determination of whether to use the fixed-effect model or the random effect model. According to Kromtit and Tsenkwo (2014), this required the use of the Hausman specification test. According to this test, the correlation between the uniqueness of errors with the independent variables is determined (Greene, 2008). The null hypothesis was that the preferred model was random effects, that is, independent variables have no correlation in the model and the unique errors. The alternative hypothesis assumed that the fixed effect is preferred and the independent variables and the unique errors are correlated. Therefore, if the p-value is statistically significant, then the fixed effect used is used.

3.12 Ethical Consideration

According to Saunders *et al.*, (2009) ethics are behaviour standards and norms guiding moral choices regarding behaviour and the way individuals relate. It emphasizes on the methods of gathering the information and how such information is conveyed to the target audience. The ethical standards and norms are important in the promotion of roles of research which include avoidance of errors, pursuing truth, and knowledge acquisition. Ethics is useful in various ways including in the creation of trust between the researcher and the target audience. It can be attained by ensuring confidentiality, free consent, and privacy. A research permit was obtained from NACOSTI to allow for the collection of data from MFBs and CBK. In addition, a research authorization letter was obtained from Kenyatta University before proceeding with data collection. This is useful in addressing ethical concerns in data collection. The findings were shared with NACOSTI and the different stakeholders and were also published with a reputable firm.

CHAPTER FOUR

RESEARCH FINDINGS, INTERPRETATIONS AND DISCUSSIONS

4.1 Introduction

The chapter indicated the response rates, descriptive analysis, trend analysis, inferential statistics, and diagnostic tests results. Some of the diagnostic tests carried out included multicollinearity, normality, heteroscedasticity, autocorrelation, stationarity, Hausman specification test. Based on the inferential statistics, this chapter derived meaning by documenting results as per each of the assessment objectives as well as hypotheses. Interpretations of results was made according to the specific objectives and linking them to relevant study literature.

4.2 Response Rate

The study sought responses from 14 MFBs in Kenya. Table 4.1 shows the response results.

Table 4.1: Responses Rate

Response	Frequency	Percentage (100%)
Responded	10	71.4
Not responded	4	28.6
Total	14	100

Source: Survey data (2021)

From Table 4.1 above, 14 document review guides were distributed to the 14 registered microfinance banks in Kenya. Responses were received from 10 MFBs while 4 did not

respond. The ten responses received during the study period represented a 71.4% response rate. The data for the remaining three microfinance banks were incomplete as no response was obtained. Further, data from Muungano microfinance bank was not available because it lacked a complete set of financial reports having been licensed in November 2019. A response rate of over 50% is considered adequate (Mugenda & Mugenda, 2003). This meant that the response rate of 71.4% obtained in this study was adequate and sufficient to aid data analysis and drawing of conclusions in line with the research objectives. Churchill (2010) posits that higher response rates enhance generalisation of research findings.

4.3 Descriptive Analysis

The section presented descriptive statistics of variables used in the study, including product innovations, process innovations, institutional innovations, regulatory framework, competitiveness, and financial performance. The descriptive statistics presented the summarised characteristics of the variables used. Hakim (2012) observed that descriptive statistics helps in understanding the distribution of data compared to the normal distribution. Means, median, standard deviations, maximums, minimums, skewness, and kurtosis were determined to establish the nature of data gathered for the study. The mean was preferred since it is a robust statistic that is more representative, uses all values and can closely be associated with standard deviations and variance. Standard deviations are stable to compare other measures of dispersion, as suggested by Bell, Bryman, and Harley (2018). Table 4.2 shows the results of the descriptive statistics.

Table 4.2: Descriptive Statistics

	Product innovations	Process innovations	Institutional innovations	Regulatory framework	Competitiveness	ROA
Mean	8.6159E6	5.8528E6	7.1538E7	36.8067	6.2766	-1.67
Median	7.3600E6	4.8850E6	5.4000E6	28.4000	1.7500	0.12
Maximum	28500000.00	17380000.00	8.34E8	217.00	42.50	6.0
Minimum	704788.00	45000.00	33949.00	1.48	-.20	-20
Std. deviation	7.03917E6	5.37817E6	1.96194E8	30.87293	11.79888	4.308
Skewness	1.112	.722	2.839	3.239	2.458	-1.396
Kurtosis	.777	-.731	6.730	16.215	4.662	4.197
Sum	5.34E8	3.63E8	4.72E9	2576.47	426.81	-97
Obs	62	62	66	70	68	58

Source: Study data (2021)

Table 4.2 indicated that the total mean of ROA for the period 2014 – 2020 was -1.67% with a standard deviation of 4.308% showing a large variability in ROA over time. This implied that some MFBs had a positive return on assets whereas others experienced negative returns on their assets. The implication was that some MFBs were able to generate income from their assets while others did not. The minimum ROA during the period was -20% while the maximum was 6.0%.

Product innovations showed a mean of Ksh 8.6159E6 with a standard deviation of Ksh 7.03917E6 for the period 2014 – 2020. The positive mean implied that product innovations existed in the microfinance banks in Kenya during the period 2014-2020 at the highest level. The standard deviation of 7.03917E6 showed the greatest variation in product innovations as shown by a maximum and minimum of amounts of 28,500,000.00

and 704,788.00 respectively. In comparison to other variables used in the assessment, product innovations had the largest dispersion from the mean, implying that in some years the MFBs received high amounts of annual average income from product innovations while in certain years they received less. The average amount of process innovations in terms of mean was 5.8528E6 while the maximum and minimum amounts were 17,380,000.00 and 45,000.00 respectively. The mean amount of institutional innovations was 7.1538E7 while the maximum and minimum were 8.34E8 and 33,949.00 respectively.

The regulatory framework had a mean of 36.8067 while the maximum and minimum amounts received were 217.00 and 1.48 respectively. The regulatory framework showed a standard deviation of 30.87293. The results also indicated that competitiveness had a mean of 6.2766% while a maximum and minimum 42.50% and -0.20% respectively. Competitiveness had a standard deviation of 11.79888 indicating a small variability over time and a median of 1.7500.

4.4 Trends Analysis

The assessment analysed trends to ascertain the movement of variables over the study period. Trend analysis shows the blueprint movement in the study variables. The study analysed trends for financial performance, financial innovations, regulatory framework, and competitiveness to investigate whether significant changes occurred during the period of the study.

4.3.1 Trend analysis for financial performance

Figure 4.1 shows the trend of financial performance for the ten MFBs from the year 2014 to 2020. Financial performance was measured in terms of return on assets. The trend line showed that the ROA was on the decline during the entire study period. The ROA was positive for three years only (2014 -2015). Thereafter, the return on assets remained negative between 2016 and 2020. According to Yenesew (2015), financial performance is a measure of a firm's success and can be measured in terms of such ratios as return on assets. Muigai and Gitau (2018) pointed out that firms can meet the needs of their stakeholders only if they post positive financial performance.

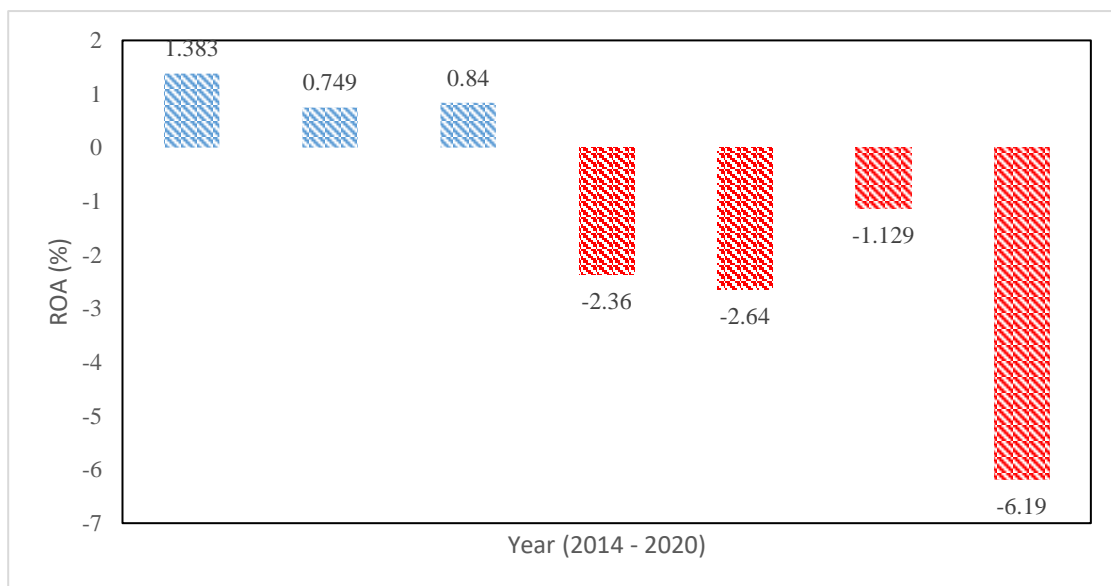


Figure 4.1: Trend analysis for financial performance for 2014 – 2020

Source: Study data (2021)

4.3.2 Trend analysis for product innovations

Figure 4.2 shows product innovation trends for microfinance banks for the period 2014 – 2020.

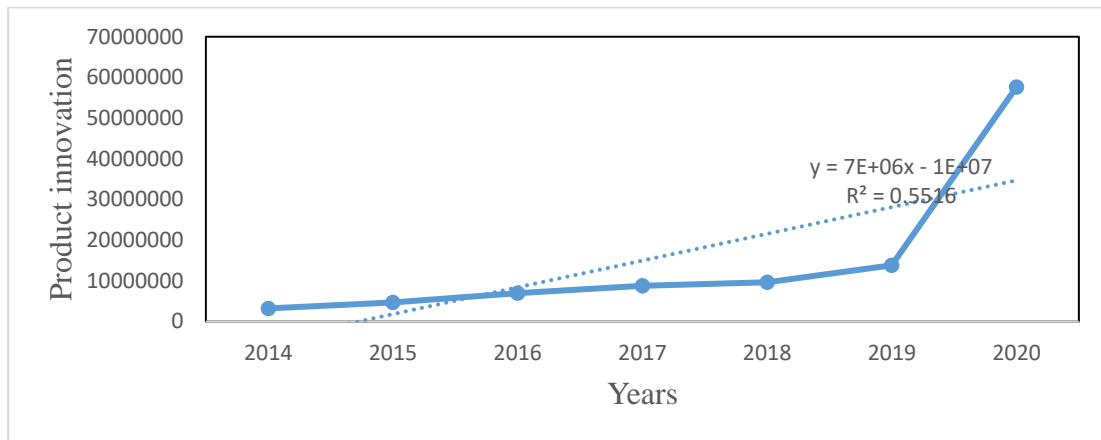


Figure 4.2: Product innovation trend for 2014 – 2020

Source: Study data (2021)

Figure 4.2 above shows the trend of product innovations over the study period. Product innovations were computed by the average annual revenue generated from various forms of product innovations. The trend analysis results indicated that the revenue generated from product innovations steadily increased between 2014 and 2019. A sharp increase was realised between 2019 and 2020. This increase could be attributed to an increase in the amounts invested by MFBs in product innovations. According to Aysel and Fatma (2017), firms innovate their products from time to time to meet the ever-changing needs of clients and businesses.

4.3.3 Trend analysis for process innovations

Figure 4.3 shows the trend for process innovations for 10 microfinance banks for the period 2014 – 2020. According to the trend line, process innovations have been increasing between 2014 and 2019, with a fall in 2020. This signifies an increase in the annual average revenue generated from various elements of process innovations. Dunde and Kaskende (2018) point out those process innovations enhance the experience of

customers and promote the efficiency with which financial services are offered. Similar results were also found by Mwawasaa and Ali (2020).

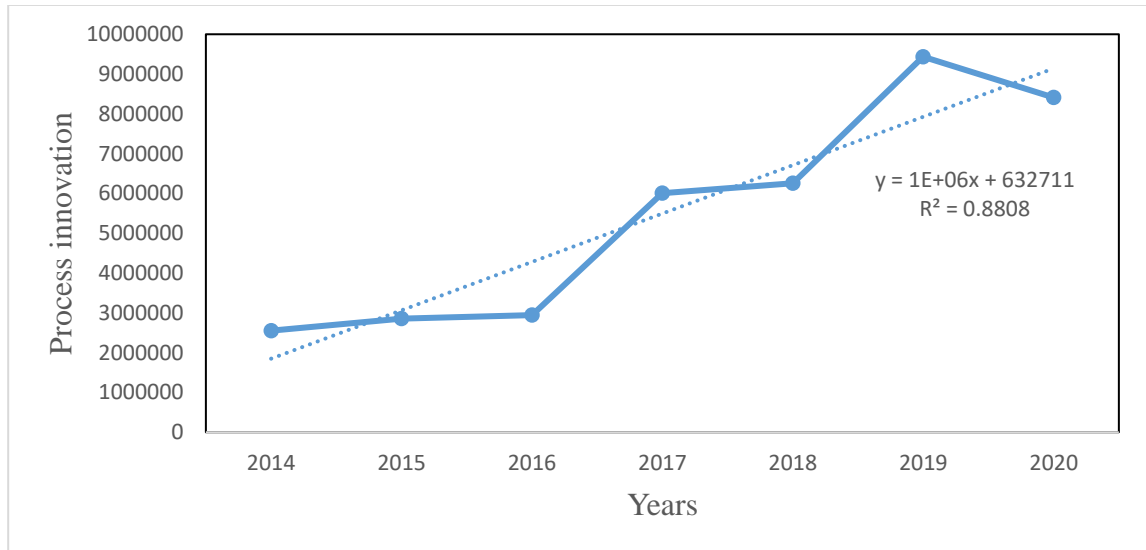


Figure 4.3: Process innovation trend in 2014 – 2020

Source: Study data (2021)

4.3.4 Trend analysis for institutional innovations

Figure 4.4 indicates the trends for institutional innovations for the 10 microfinance banks between 2014 and 2020. Institutional innovations were measured by the annual average revenue generated from various indicators of institutional innovations. The trend results indicate that the annual average revenue generated from institutional innovations increased between 2014 and 2019, and thereafter decreased. However, between 2014 and 2016, the annual average revenue was below the mean of 7.1538E7. The increase can be attributed to increased investments and adoption of institutional innovations by the microfinance banks under consideration. Rosli and Sidek (2013) pointed out those institutional innovations help to improve productivity and customers' perception of

products. According to Mairesse and Mohnen (2010), firms adopt institutional innovations to help them offer improved and unique services to their clients.

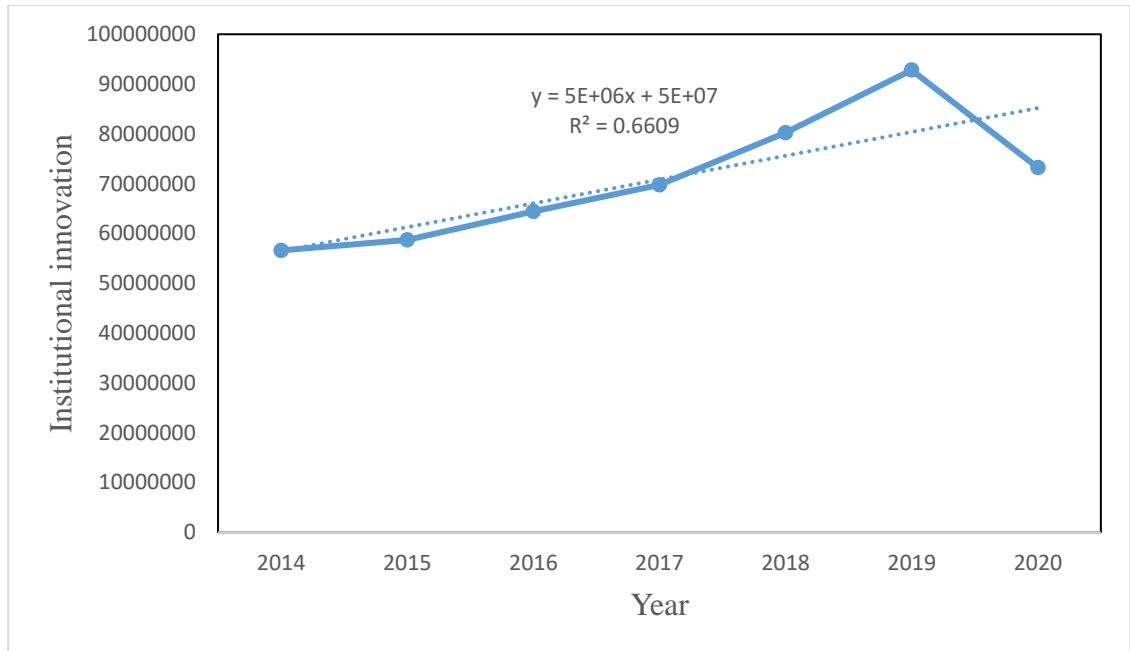


Figure 4.4: Institutional innovation trend for 2014 – 2020

4.3.5 Trend analysis for Regulatory framework

The study sought to analyse the trend of regulatory framework during the study period. The trend of the regulatory framework of the 10 microfinance banks analysed for the period 2014 – 2020 is shown in figure 4.5. The regulatory framework was computed by computing the composite indices for capital adequacy ratio and liquidity ratio requirement. The trend results indicate that there was a decline in the ratios throughout the study period of 2014 – 2020. The trend was above the mean of 36.8067 between 2014 and 2018 and thereafter fell below the mean. According to Debapratim, Trilochan, and Biswajit (2014) regulations either hinder or facilitate financial innovations. Arnaboldi and Rossignoli argued that the bank regulator increases regulations to achieve various goals including ensuring the safety of deposits and stability of banks, promoting fair

competition, and enhancing the overall efficiency and sustainability of banks. Porteous (2018) noted that firms that do not comply with regulatory frameworks never achieve financial stability nor perform better.

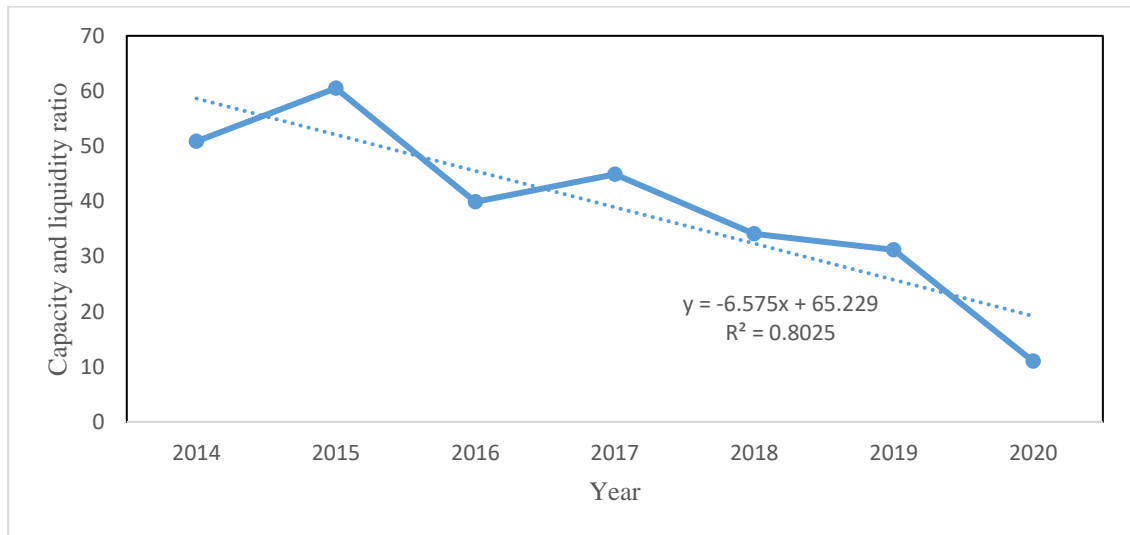


Figure 4.5: Regulatory framework trend for 2014 – 2020

4.3.6 Trend analysis for Competitiveness

Competitiveness measures the market share controlled by the microfinance banks under consideration. The trend for competitiveness was analysed between 2014 and 2020 as shown in figure 4.6. The trend analysis results show a marginal decline in competitiveness between 2014 and 2016 followed by a small steady increase between 2016 and 2019 and finally, it tends to flatten from 2019 to 2020. The trend presents a fairly stable competitive environment among the MFBs in Kenya. According to Celik and Kizil (2008), competitiveness depends on an industry's structure, its technical characteristics, and the fundamental economy. Tahir *et al.*, (2018) argue that cost leadership, product differentiation, and market strategy are important ingredients to achieving competitive advantage and financial innovations.

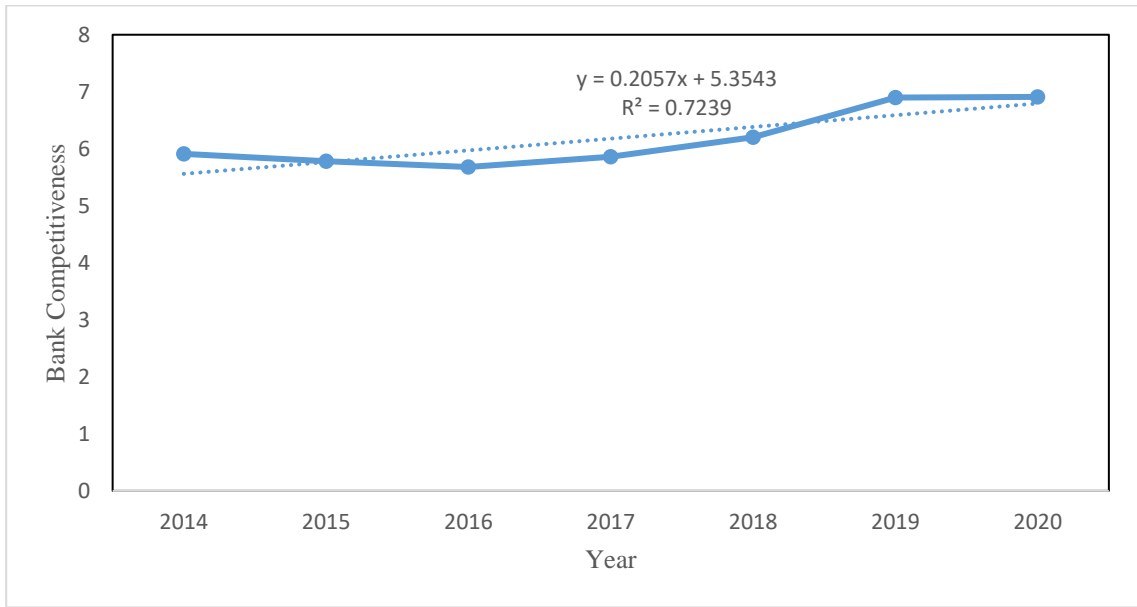


Figure 4.6: Trend of MFBS competitiveness in the period 2014 - 2020

4.5 Diagnostic Test Results

Before conducting regression analysis, different diagnostic tests were conducted to avoid violating the postulations of the Classical Linear Regression Model (CLRM). This was done to ensure that the regression estimates are efficient and not biased. Some of the tests carried out included tests for normality, multicollinearity, heteroscedasticity, normality, autocorrelations, stationarity, and Hausman’s specification tests. The diagnostic test results were presented and discussed in the sections that follow.

4.5.1 Multicollinearity Test Results

The study tested multicollinearity using the variance inflation factor (VIF) and tolerance levels. Multicollinearity test results were presented in table 4.3 below.

Table 4.3: Test for Multicollinearity result

Variable	VIF	Tolerance
Product innovations	1.82	0.549
Process innovations	1.73	0.578
Institutional innovations	1.54	0.649
Mean	1.697	

Source: Survey data (2021)

From Table 4.3, multicollinearity was tested using variance inflation factor. The findings presented in the table show a VIF of 1.82, 1.72, and 1.52 for the product, process, and institutional innovations respectively. The mean value for VIF is 1.697 which is less than 10. According to Field (2009), a VIF value of less than 10 indicates the absence of multicollinearity. Therefore, the mean VIF of 1.697 represented no evidence of multicollinearity, and thus the model was declared fit for regression analysis. According to William (2015), multicollinearity inflates standard errors and confidence intervals, resulting in unstable estimations of individual predictor coefficients. Large standard errors influence the accuracy of rejecting the null hypothesis or failing to do so. It is not the presence of multicollinearity that poses a challenge, but its intensity.

Tolerance is related to each independent variable and varies between 0 and 1. Allison (1999) states that there is no strict tolerance threshold, but offers a threshold of 0.40 as an alarming number. Weisburd and Britt (2013) claim that a model's multicollinearity is severe if it is less than 0.20. From table 4.3 above, the results show that the tolerance

values exceed 0.50 which is significantly above 0.20 or 0.40. This led to the conclusion that multicollinearity does not exist between product innovations, process innovations, and institutional innovations.

4.5.2 Normality Test Results

Shapiro-Wilk test was used to test whether the data was normally distributed. Violation of normal distributions affects the validity, interpretations, and reliability when making interpretations. Table 4.4 presented the normality test results.

Table 4.4: Normality test for Process, product, institutional, moderating and mediating variables

Shapiro-Wilk Test for Normal Data

Variable	Obs	W	V	Z	Prob>Z
Process	62	0.87567	6.938	4.183	0.42317
Product	63	0.17312	46.742	8.310	0.52901
Institutional	66	0.39529	35.489	7.736	0.32754
Moderating	70	0.87050	7.971	4.514	0.16749
Mediating	69	0.53570	28.247	7.259	0.28563

Source: Survey data (2021)

Table 4.4 presents that the residuals for the variables were normally distributed, as seen above. The null hypothesis for the Shapiro-Wilk test was that the data was normally distributed while the alternative hypothesis was that the data was not normally distributed. Where the p-value is extremely small, typically equal to or less than a threshold value of 0.05, referred to as the significance level, it indicates that the observed

data are incompatible with the null hypothesis's premise of truth (Kothari, 2011). The test results show that the p-value for product innovations, process innovations, institutional innovations, regulatory framework, and competitiveness were more than 0.05. Therefore, the study failed to reject the null hypothesis and concluded that the data was normally distributed and fit for panel multiple regression analysis.

4.5.3 Heteroscedasticity Results

The study used the Breusch-Pagan (1979) test to determine whether the error term between different values of financial innovations had constant variances. The test results were summarised in Table 4.5 below.

Table 4.5: Breusch –Pagan test for heteroscedasticity

Variable	Chi-sq	df	P-value
Product	3.41	1	0.0649
Process	0.01	1	0.9266
Institutional	0.29	1	0.5878
Moderating	0.00	1	0.9501
Mediating	0.11	1	0.7374
Simultaneous	4.23	5	0.5171

Source: Survey data (2021)

The null hypothesis for the test was homoscedasticity while heteroscedasticity was the alternative hypothesis. Baum and Schaffer (2013) observed that heteroscedasticity results in overestimating or underestimating the standard errors. Where the p-value is smaller than the criterion for statistical significance at 0.05, then the null hypothesis should be rejected. The null hypothesis would be accepted if the p-value is greater than 0.05 indicative of the presence of homoscedasticity (Hakim, 2012). The test result showed a

p-value of 0.5171 which was more than 0.05 hence the null hypothesis was accepted indicating the absence of heteroscedasticity. Homoscedastic data suggests that there is no error term associated with the various values of financial innovations that have non-constant variances, and hence the regression model would produce efficient results.

4.5.4 Autocorrelation Test Results

The study used the Box-Ljung Statistical test to test for serial correlation. The test was preferred because it is capable of detecting various forms of residual autocorrelation in balanced and unbalanced panel data, which other tests fail. The study was guided by the null hypothesis that there is no first-order serial correlation in the data and the alternative hypothesis was that there is serial first-order correlation. The findings were presented in Table 4.6 below.

Table 4.6: Results for Autocorrelations on financial innovations

Lag	Autocorrelation	Std. Error ^a	Box-Ljung Statistic		
			Value	Df	Sig. ^b
1	.184	.125	2.190	1	.139
2	.148	.121	3.685	2	.158
3	-.005	.119	3.686	3	.297
4	-.091	.116	4.301	4	.367
5	-.005	.114	4.302	5	.507
6	-.013	.111	4.317	6	.634
7	.234	.111	8.753	7	.271
8	-.049	.110	8.952	8	.346
9	-.105	.110	9.860	9	.362
10	-.153	.109	11.834	10	.296
11	-.256	.107	17.550	11	.093
12	-.148	.106	19.495	12	.077
13	-.104	.104	20.494	13	.084
14	.205	.103	24.449	14	.040
15	.024	.100	24.504	15	.057
16	.025	.100	24.565	16	.078
Overall	/aggregate value	p			.2379

a. The underlying process assumed is independence (white noise).

b. Based on the asymptotic chi-square approximation.

Source: Study data (2021)

Table 4.6 shows the test results for autocorrelations on the return on assets. The overall p-value (significance value) was 0.2379 which is greater than 0.05. This is insignificant at 5 percent level, implying the acceptance of the null hypothesis that there is no serial first-order correlation.

4.5.5 Stationarity Test Results

Panel data required that a stationarity test be performed to determine whether there were or there were no unit roots. The null hypothesis was that the variables contained a unit while the alternative hypothesis was that there were no unit roots. Augmented Dickey-Fuller (ADF) and Philip Peron (PP) tests were conducted to test for the stationarity of the study variables. Table 4.7 presents the findings.

Table 4.7: Stationarity Test results

Test	Statistic	Probability
ADF-Fisher Chi-Square	13.2002	0.4367
PP-Fisher Chi-Square	13.7429	0.4492

Source: Study data (2021)

Table 4.7 results indicated that the p-value was less than 0.05 which led to the non-acceptance of the null hypothesis. Since the study failed to accept the null hypothesis, it concluded that product innovations, process innovations, institutional innovations, regulatory framework, and competitiveness did not contain unit-roots. Therefore, the data was fit for panel multiple regression as spurious results would not be obtained.

4.5.6 Hausman Specification Test Results

Panel data analysis required that a model specification test be carried out to determine whether to use the fixed effects model or the random-effects model. The null hypothesis was that the random effects were preferred while the alternative hypothesis was that the fixed effects were preferred (Greene, 2008). Table 4.8 presented the results as follows.

Table 4.8: Hausman Test results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.77563	0.349738	6.653895	0.001
Product	0.017296	0.121872	0.176237	0.659
Process	4.258427	1.844372	5.122171	0.000
Institutional	-12.65246	3.158729	5.127842	0.020
Regulatory framework	1.458621	0.146742	4.886742	0.000
Competitiveness	1.623419	0.116427	7.762452	0.001
Weighted Statistics				
R-squared	0.322804	Mean dependent var	1.65213	
Adjusted R-squared	0.21785	S.D. dependent var	3.88021	
S.E. of regression	2.99241	Sum squared resid	3856.718	
F-statistic	21.66813	Durbin-Watson stat	1.22147	
Prob (F-statistic)	0.1437			

Source: Study data (2021)

At 5% level of significance, the test result indicated a p-value of 0.1437. Therefore, the study failed to reject the null hypothesis and concluded that the random-effects model was preferred to the fixed-effects model.

4.6 Correlation Analysis Results

The assessment applied Spearman's rank correlation matrix to explain the strength of the relationship between the study variables. The results are presented in Table 4.9 below.

Table 4.9: Correlation matrix showing the relationship between Return on Assets and Process, Product, Institutional, mediating, and moderating factors

	ROA	Product	Process	Institutional	Regulatory framework	Competitiveness
ROA	1.0000					
Product	0.1019 0.0481	1.0000				
Process	-0.3030 0.0307	0.3939 0.0020	1.0000			
Institutional	0.3891 0.3250	-0.3048 0.0211	-0.0220 0.8700	1.0000		
Regulatory framework	0.0347 0.0258	-0.1584 0.2226	-0.4077 0.0010	-0.2303 0.0650	1.0000	
Competitiveness	0.3180 0.0150	-0.1597 0.2228	-0.0539 0.6800	0.9664 0.0000	-0.2547 0.0347	1.0000

Source: Survey data (2014-2020)

Table 4.9 results revealed that financial performance based on return on assets (ROA) was significantly positively influenced by product innovations ($r = 0.1019$, $P = 0.0481$). The results support that of Osei *et al.*, (2016) who established that product innovations positively affect performance. Ngure, Kimani, and Kariuki (2017) also found that product innovations positively impact financial performance. A similar finding was found by Muigai and Gitau (2018) that product innovations positively affected the financial performance of the financial institutions that form the banking sector in Kenya. However, a contradictory finding was obtained by Avotri and Wereko (2016) that product innovations negatively affect the operational self-sufficiency of microfinance banks.

Similarly, Chikalipah (2018) found that product innovations and financial performance are negatively related.

The results further indicate that the relationship between banks' process innovations and the return on assets (ROA) when subjected to Spearman's rank correlation analysis, revealed that process innovations significantly reduced Banks' return on assets ($r = -0.3030$, $P = 0.0307$). Canh *et al.*, (2019) also found that process innovations are valuable to firm performance in terms of market share but not return on assets (ROA). The analysis concluded that investment in innovative processes requires time to have positive changes in return on assets.

However, a contradictory finding was established by Akhiser, Tunay, and Tunay (2015) that process innovations and bank performance are positively related when the results are collectively evaluated. Ibekwe (2021) also found that process innovation and performance are positively and significantly related. Further, the findings by Mbama and Edepue (2018) showed that process innovations positively affect the financial performance of banks. This was also supported by the findings of Tuan *et al.*, (2016) that process innovations had a significant positive effect on a firm's financial performance.

Institutional innovations insignificantly but positively influenced return on assets ($r = 0.3891$ $p = 0.3250$). The findings are contradicted by those of Rajapathirana and Hui (2018) that institutional innovations bring financial value to companies, which in turn improve their performance, but such significant and positive effects are not always observed.

The moderating variable of the regulatory framework was found to have a positive but insignificant effect on financial performance ($r=0.347$; 0.7958). The results confirm the findings by Kaloki (2018) that CBK regulations affect the financial performance of the MFBs. Based on the level of significance, the findings are partly disputed by Otieno, Nyagol, and Onditi (2016) that the CBK regulatory framework of capital adequacy ratio and liquidity ratio requirement had a moderate significant and positive correlation with the financial performance of MFBs in Kenya. The effect of the mediator variable of MFBs competitiveness was also found to have a significant and positive effect on the relationship between financial innovations and financial performance.

4.7 Regression Analysis

The assessment was based on the premise of a link between financial innovations and financial performance of microfinance banks but the relationship was moderated by regulatory framework and mediated by competitiveness. Further, product innovations, process innovations, and institutional innovations directly influenced MFBs' financial performance. To determine the statistical significance of the given hypotheses, regression analysis was carried out at 95 percent confidence level.

The results based on the regression model were used to test the hypotheses. The discussion formed the basis of interpreting the empirical findings by comparing the results with the theoretical foundation and reviewing literature findings of previous studies on financial innovations and MFBs' financial performance. It centres on key findings of the analysis and is structured as per the objectives of the assessment.

4.7.1 Test for Direct Effects

The first three objectives of the analysis were to determine the direct effect of product innovations, process innovations, and institutional innovations on MFBs' financial performance. Product innovations were measured by micro-saving (MS), micro-credit (MC), and micro-insurance (MI) while process innovations were indicated by mobile bank applications (MA), Pesa Link (PL), and digital field application (DA). Institutional innovations measure group lending (GL), artificial intelligence (AI), and crowd funding (CF). Financial performance (ROA) was regressed against product innovations, process innovations, institutional innovations, regulatory framework, and microfinance banks competitiveness.

4.7.1.1 Effect of Product Innovations on MFBs Financial Performance

The first hypothesis was that product innovations do not have a statistically significant effect on financial performance of microfinance banks in Kenya. The results of the regression are presented in Table 4.10 below.

Table 4.10: Regression table showing effect of product innovations on Micro Finance banks' financial performance

ROA	Coefficient	Standard error	T	P> t
Micro savings	1.79e-07	2.06e-07	0.87	0.000
Microcredit	-4.00e-08	2.34e-07	0.17	0.029
Micro insurance	2.27e-08	6.00e-07	0.04	0.001
Constant	-3.277296	1.345452	2.44	0.010

R-squared=0.234
F-statistics=0.33,
p=0.020

Source: Study Data (2021)

Results in Table 4.10 indicated that micro-savings (MS) has a statistically significant positive effect on financial performance (ROA) as ($P = 0.000 < 0.05$). The findings show that microcredit (MC) has a negative but statistically significant effect on ROA as ($P=0.029<0.05$). Further, the results indicate that micro-insurance (MI) has a positive and a statistically significant effect on MFBS financial performance ($P=0.001<0.05$).

Overall, the p-value of product innovations was 0.020 which is less than 0.05. This led to the rejection of the null hypothesis which signified that product innovations have a statistically significant effect on the financial performance of microfinance banks in Kenya. The finding is in agreement with those of Osei *et al.*, (2016) who obtained a direct positive link between product innovations and firm performance. Ngure, Kimani, and Kariuki (2017) also found that product innovations and financial performance are positively related.

Using multiple regression model of $ROA_{it} = \alpha_1 + \beta_1MS_{it} + \beta_2MC_{it} + \beta_3MI_{it} + \epsilon_{it}$

Therefore,

$$\text{Return on assets (ROA)} = -3.277296 + 1.79e-07MS - 4.00e-08MC + 2.27e-08MI + \epsilon_{it}$$

Where;

MS = micro saving

MC = microcredit

MI = micro insurance)

Return on assets was influenced by an R square value of 23.4% and positively increased by micro saving and micro insurance but reduced by microcredit.

4.7.1.2 Effect of Process Innovations on MFBs Financial Performance

The second hypothesis that was formulated by the study was that process innovations did not have a statistically significant effect on the financial performance of microfinance banks in Kenya. Table 4.11 shows the regression results for the direct effect of process innovations.

Table 4.11: Regression table showing effect of process innovation on Micro Finance banks' performance

ROA	Coefficient	Standard error	T	P> t
Mobile bank apps	4.69e-07	2.84e-07	1.65	0.011
Pesa Link	-2.95e-07	1.63e-07	-1.81	0.008
Digital Field applications	-2.38e-08	1.96e-07	-0.12	0.004
Constant	-3.862383	1.351021	-2.86	0.008
R-squared=0.2370				
F-statistics=2.59, p=0.006				

Source: Study Data (2021)

Based on the results presented in Table 4.11 above the p-value for process innovations was 0.06 which is less than 0.05. The results led to the rejection of the null hypothesis that process innovations have no statistical effect on the financial performance of microfinance banks. This indicated that process innovations have a statistically significant but negative effect on the financial performance of microfinance banks in Kenya. R-squared of 0.2370 implies that process innovations explain a 23.7% variation of the dependent variable (financial performance).

The regression results also indicated that the coefficient of interaction between mobile bank applications and financial performance is positive and statistically significant

($P=0.011<0.05$). It implies that the effect of mobile bank applications on ROA increases with an increase in process innovations. The results further show that the coefficient of the interaction between pesa-link and ROA is negative but significant as shown by ($P=0.008<0.05$). Similarly, the coefficient of interaction between digital field application (DA) and ROA is negative and statistically significant at 5 percent significant level as indicated by ($P = 0.004 < 0.05$). Overall, the results show that process innovations have significant but negative effects on return on assets ($P=0.006<0.05$).

The findings of this study are consistent with Canh *et al.*, (2019) whose study findings indicated that process innovations are valuable to firm performance in terms of market share but not return on assets (ROA). This implies that process innovations negatively but significantly affected financial performance. However, studies by Ibekwe (2012), Akhiser, Tunay, and Tunay (2015), Tahir *et al.*, (2018), Mbama and Edepue (2018), and Tuan *et al.*, (2016) found a significant but positive relationship between process innovations and financial performance of firms.

By using multiple regression model of $ROA_{it} = \alpha_1 + \beta_1 MA_{it} + \beta_2 PL_{it} + \beta_3 DA_{it} + \varepsilon_{it}$

The findings, therefore, adopted the model;

$$ROA = -3.862383 + 4.69e-07MA - 2.95e-07PL - 2.38e-08DA + \varepsilon_{it}$$

Where:

MA = Mobile banking

PL = Pesa link

DA = Digital field application.

4.5.1.3 Effect of Institutional Innovations on MFBs Financial Performance

The third hypothesis was that institutional innovations do not statistically and significantly affect financial performance of microfinance banks in Kenya. Table 4.12 presents the regression results on the direct effect of institutional innovations.

Table 4.12: Regression table showing effect of Institutional innovation on Micro Finance banks' performance

ROA	Coefficient	Standard error	T	P> t
Group lending	1.06e-07	6.91e-07	0.15	0.886
Artificial intelligence	-1.16e-07	7.63e-07	-0.15	0.886
Crowd funding	2.92e-07	6.03e-07	0.48	0.654
Constant	-5.900795	2.933087	-2.01	0.115

R-squared=0.1783

F-statistics=0.29,
p=0.8319

Source: Study Data (2021)

The regression results presented in Table 4.12 show that group lending (GL) and crowd funding (CF) positively influence the association between institutional innovations and Return on assets (ROA). The link between artificial intelligence (AI) and ROA is negative and statistically insignificant at a 5 percent confidence interval. The results indicate that the effect of AI on the ROA of MFBs does not change in the presence of institutional innovations. However, the overall p-value of institutional innovations was 0.8319 which is greater than 0.05 which led to the acceptance of the null hypothesis. Therefore, the study found that institutional innovations do not have a statistically significant effect on financial performance.

The findings of this study did not agree with the findings of previous studies. For example, Rajapathirana and Hui (2018) found that institutional innovations bring financial value to the firm which in turn improves the financial performance. On the other hand Owolabi (2015) found a negative effect of institutional innovations on financial performance. Katusabe (2013) found that institutional innovations affect financial performance in varied ways, either positively or negatively.

When using multiple regression model of $ROA_{it} = \alpha_1 + \beta_1 GL_{it} + \beta_2 AI_{it} + \beta_3 CF_{it} + \varepsilon_{it}$

The result of this study therefore by adopting this model;

Return on assets (ROA) = $-5.90795 + 1.06e-07GL - 1.16e-07AI + 2.92e-07CF + \varepsilon_{it}$

Where:

GL = group lending

AI = artificial intelligence

CF = crowd funding.

4.7.2 Test for Moderating Effect

The fourth objective of the analysis was to determine the moderating effect of the regulatory framework on the relationship between financial innovations and the financial performance of MFBs in Kenya. The study hypothesised that the regulatory framework does not have a statistically significant moderating effect on the relationship between financial innovations and the financial performance of microfinance banks in Kenya. The achievement of the research objective was aided by the use of Baron and Kenny's (1986) approach for testing moderation. The regulatory framework was initially run as an

independent variable with the help of equation 3.3 and the results were presented in table 4.13 below.

Table 4.13: Regression Results for the Moderating Effects

Equation	Obs	Parns	RMSE	R-sq	F	P
ROA	47	5	3.280725	0.2353	3.231144	0.0212
ROA	Coef.	Std. Error	t	p > t 	95% Conf.	Interval
Mediating	.0039003	.0101832	0.38	0.704	.0166502	.0244508
Product	6.96e-07	7.67e-08	0.91	0.369	.851e-08	2.24e-08
Process	-2.53e-07	1.12e-07	-2.26	0.029	-4.79e-07	-2.68e-08
Institutional	3.45e-09	2.86e-09	1.21	0.235	-2.32e-09	9.22e-09
Cons	-1.317424	1.512619	-0.87	0.389	-4.370013	1.735165

Source: Study data (2021)

Table 4.13 shows that the regulatory framework was first run as an independent variable. Equation 3.3 was formed from the various coefficients obtained from the table. The value for R^2 was 0.2353 indicating the changes 23.53% of changes in financial performance could be explained by regulatory framework and product, process, and institutional innovations. The p-value of the regulatory framework is 0.704 which was greater than 0.05. This shows that there is no overall effect for moderating, as suggested by Baron and Kenny (1986). Since the p-value is insignificant, the model's interaction component was run and the results were presented in table 4.13 based on equations 3.4.

Table 4.14: Regression Results for the Moderating Effects

	Obs	Parns	RMSE	R-sq	F	P
Moderating	53	4	48.59154	0.2620	5.797186	0.0018
Mediating	Coef.	Std. Error	t	p > t 	95% Conf.	Interval
Product	1.79e-06	1.05e-06	1.71	0.094	-3.16e07	3.89e-06
Process	-4.89e-06	1.40e-06	-3.50	0.001	-7.69e-06	-2.08e-06
Institutional	-1.23e07	3.77e-08	-3.26	0.002	-1.99e-07	-4.71e-08
Cons	103.2063	13.02528	7.92	0.000	77.3098	129.3815

Source: Study data (2021)

In the second step model 3.4, the moderator variable of the regulatory framework shows a moderating effect as the p-value of 0.0018 is less than 0.05 ($p \leq 0.05$) as per the criteria recommended by Baron and Kenny (1986). This led to the acceptance of alternative hypotheses that regulatory framework has a statistically significant moderating effect on the relationship between financial innovations and financial performance. The results conform to the findings by Chava's *et al.*, (2013), Otieno, Nyagol, and Onditi (2016), Muthinja (2016), and Kaloki (2018) that bank regulations moderates the link between financial innovations and financial performance. Therefore, the moderating effect of the regulatory framework is similar in different study contexts.

4.7.3 Test for Mediating Effect

The fifth hypothesis was that competitiveness does not have a statistically significant mediating role in the relationship between financial innovations and the financial performance of microfinance banks in Kenya. Baron and Kenny's (1986) approach for testing mediation was used. In step one, model 3.5 was estimated to establish whether the independent variables of product innovations, process innovations, and institutional innovations had a statistically significant effect on the dependent variable of financial performance (ROA). In step two, model 3.6 was estimated to establish whether the independent variables of product innovations, process innovations, and institutional innovations have a statistically significant effect on the mediator variable of competitiveness. In step three, model 3.7 was estimated to determine whether the mediator variable of competitiveness predicted financial performance (ROA). Step four, model 3.8 was estimated to determine the effect of independent variables of product innovations, process innovations, and institutional innovations including the mediating

variable of competitiveness as one explanatory variable on the dependent variable of ROA. The mediating variable was included in the models presented in equations 3.5 to 3.8.

Step 1: involved conducting regression analysis with financial innovations predicting financial performance for microfinance banks. The results are presented in Table 4.15 using equation 3.5.

$$ROA_{it} = \alpha_1 + \beta_1 PD_{it} + \beta_2 PC_{it} + \beta_3 IN_{it} + \varepsilon_{it} \dots \dots \dots 3.5$$

Table 4.15: Regression Results for the Mediating Effects

Equation	Obs	Parns	RMSE	R-sq	F	P
ROA	47	4	3.24801	0.2326	4.345526	0.0092
ROA	Coef.	Std. Error	t	p > t	95% Conf.	Interval
Product	7.70e-08	7.35e-08	1.05	0.301	-7.13e-08	2.25e-07
Process	-2.71e-07	1.00e-07	-2.71	0.010	-4.73e-07	-6.93e-08
Institutional	2.98e-09	2.55e-09	1.16	0.250	-2.18e-09	8.13e-09
Cons	-.9253447	1.1025	-0.84	0.406	-3.148748	1.298059

Source: Study data (2021)

Table 4.15 shows a significant p-value of 0.0092, which indicated that there was an overall relationship to mediate as ($p \leq 0.05$), according to the decision criteria by Baron and Kenny (1986).

Step two involved performing a regression analysis where financial innovations predict MFBs competitiveness according to equation 3.6. The results of the regression were presented in table 4.15

$$Competitiveness (MC)_{it} = \alpha_1 + \beta_1 PD_{it} + \beta_2 PC_{it} + \beta_3 IN_{it} + \varepsilon_{it} \dots \dots \dots 3.6$$

Table 4.16 Regression Results for the Mediating Effects

Equation	Obs	Parns	RMSE	R-sq	F	P
CP	52	4	1.998635	0.9677	479.1866	0.0000
CP	Coef.	Std. Error	t	p > t 	95% Conf.	Interval
Product	2.31e-07	4.33e-08	-5.33	0.000	-3.18e-07	-1.44e-07
Process	3.82e-07	5.78e-08	6.61	0.000	2.66e-07	4.98e-07
Institutional	5.80e-08	1.55e-09	37.37	0.000	5.49e-08	6.12e-08
Cons	2.066586	.5522985	3.74	0.000	.956115	3.177056

Source: Study data (2021)

The results in table 4.16 show R^2 of 0.9677 indicating that 96.77% variation in competitiveness can be explained by financial innovations. P-value was 0.0000 which is less than 0.05 resulting to the rejection of the null hypothesis that financial innovations do not have a statistically significant effect on competitiveness. Therefore, changes in MFBS' competitiveness can be explained by financial innovations. This is evidence of the existence of an overall relationship for competitiveness to mediate.

Step three involved performing regression analysis where competitiveness predicts financial performance based on equation 3.7. The regression results are presented in Table 4.17 below.

Table 4.17 Regression Results for the Mediating Effects

Equation	Obs	Parns	RMSE	R-sq	F	P
ROA	58	2	4.120349	0.1011	6.298448	0.0150
ROA	Coef.	Std. Error	t	p > t 	95% Conf.	Interval
CP	.1095008	.0436315	2.51	0.015	.0220963	.1969052
Cons	-2.468598	.6277036	-3.93	0.000	-3.726039	-1.211157

Results in table 4.17 show R^2 of 0.1011 that indicates 10.11% of changes in financial performance can be explained by competitiveness. The null hypothesis was that competitiveness does not affect financial performance. The results indicated a p-value of

0.015 which is less than 0.05 indicating the rejection of the null hypothesis. Therefore, competitiveness can predict the financial performance of microfinance banks in Kenya.

The final and fourth step was conducted because the first three steps depicted relationship between the variables. It involved conducting multiple regression analysis with financial innovations and MFBs competitiveness predicting financial performance based on equation 3.8. The results were presented in table 4.18 below.

Table 4.18 Regression Results for the Mediating Effects

Equation	Obs	Parns	RMSE	R-sq	F	P
ROA	47	5	3.285892	0.2329	3.187992	0.0225
ROA	Coef.	Std. Error	t	p > t 	95% Conf.	Interval
CP	-.029847	.2500714	-0.12	0.906	-.5345115	.4748175
Product	6.92e-08	9.87e-08	0.70	0.487	-1.30e-07	2.68e-07
Process	-2.61e-07	1.32e-07	-1.99	0.054	-5.27e-07	4.24e-09
Institutional	4.69e-09	1.46e-08	0.32	0.750	-2.48e-08	3.42e-08
Cons	-.8380378	1.333833	-0.63	0.533	-3.529823	1.853747

From table 4.18, the results show R^2 of 0.2329. This implied that 23.29% of the variation in financial performance can be explained by both financial innovations and competitiveness. The results showed a p-value 0.0225, which is less than 0.05 ($p \leq 0.05$). The null hypothesis was rejected showing that MFBs competitiveness and financial innovations are statistically significant in explaining the financial performance of microfinance banks in Kenya. This indicates the presence of total mediation of competitiveness on the relationship between financial innovations and financial performance. This conforms to Monyi, Namusonge, and Sakwa (2018) who also found that competitiveness and financial performance are positively correlated. Competitiveness was also found to have a mediating effect by Setyawati, Rosiana, and Shariff (2017) and Wanjiru, Muathe, and Kinyua (2019).

4.5.4 Hypothesis Testing

The assessment tested hypotheses with the aid of multiple regression analysis. Test for the set Hypothesis were carried out and table 4.19 showed a summary of the results of the hypothesis tested above.

Table 4.19: Summary of Hypothesis Tests

	Hypotheses	Reject H_0 / Fail to reject H_0
H01	Product innovations do not have statistically significant effect on financial performance of microfinance banks in Kenya.	Reject H_0
H02	Process innovations do not have a statistically significant effect on the financial performance of microfinance banks in Kenya.	Reject H_0
H03	Institutional innovations do not have statistically significant effect on financial performance of microfinance banks in Kenya.	Fail to reject H_0
H04	Regulatory framework does not have statistically significant moderating effect on the link between financial innovations and financial performance of microfinance banks in Kenya.	Reject H_0
H05	Competitiveness does not have a statistically significant mediating effect on the relationship between financial innovations and financial performance of microfinance banks in Kenya.	Reject H_0

Source: Study data (2021)

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter presents the summary of the study, conclusions, recommendations, and suggestions for further research. Recommendations were made from the conclusions derived from the data analysis. Suggestions for further research were made based on the weaknesses and the findings of the study. Further, the author compared the findings to previous studies as outlined in the literature review. This was done in line with the research objectives of the study.

5.2 Summary of the Study

Financial innovations play a very vital role in the general and financial performance of a company. The financial performance of a firm determines its ability to meet its goal of maximising the wealth of its shareholders and remaining solvent. Between 2014 and 2020, microfinance banks in Kenya posted fluctuating financial performance. This can be attributed to several factors which include financial innovations. There is no consensus among finance scholars based on the available empirical literature on the effects of financial innovations on the financial performance of firms. Similarly, most of the studies have been carried out outside Kenya and cannot be generalized in the Kenyan context. Therefore, the current study sought to fill these gaps by assessing the effects of financial innovations on the financial performance of microfinance banks in Kenya.

The study sought to investigate the effects of financial innovations on financial performance of microfinance banks in Kenya. Specifically, the study sought to investigate

the effect of product innovations, process innovations, and institutional innovations on the financial performance of microfinance banks in Kenya. In addition, the study sought to determine the moderating and mediating effects of regulatory framework and competitiveness respectively on the relationship between financial innovations and the financial performance of MFBs in Kenya. Descriptive research design and positivism philosophy guided the study. The study targeted all the MFBs licensed to operate in Kenya. Secondary data on product innovations, process innovations, institutional innovations, regulatory framework, competitiveness, and financial performance was collected from these MFBs. Data analysis was done with the help of descriptive and inferential statistics. Research findings were presented, interpreted, and discussed. Based on the findings, the summary of the study was presented as per the study objectives below.

5.2.1: Effect of product innovations on the financial performance of microfinance banks in Kenya

The study sought to establish the effect of product innovations on the financial performance of Microfinance banks in Kenya. The formulated hypothesis was that product innovations have no statistically significant effect on the financial performance of microfinance banks in Kenya. Product innovations were indicated by micro-savings, micro-credit, and micro-insurance products measured in terms of the composite index for annual average revenues generated. Trend analysis of product innovations showed that the average annual revenues generated increased between 2014 and 2020. The increase could be attributed to the increase in the number of microcredit, micro savings, and micro-insurance products adopted by the microfinance banks. The descriptive results showed that microfinance banks received varying amounts in terms of annual average revenues

earned from product innovations, as depicted by fluctuation levels of mean aggregates. Further, the inferential analysis showed that product innovation carried out in microfinance banks has a positive and significant statistical effect on their financial performance. The result implies that firms can improve their financial performance by adopting varied types of product innovations.

5.2.2: Effect of process innovations on financial performance

The study sought to determine the effect of process innovations on the financial performance of Microfinance banks in Kenya. The formulated hypothesis was that process innovations have no statistically significant effect on the financial performance of microfinance banks in Kenya. Process innovation was indicated by mobile banking applications, pesalink, and digital field applications, measured in terms of the composite index of the annual average revenues generated from these indicators. Between 2014 and 2019, the annual average revenues increased while this revenue decreased in 2020. The descriptive results showed that microfinance banks received varied amounts in terms of revenues earned from process innovations, as depicted by fluctuating levels of mean aggregates. Further, the inferential analysis showed that process innovation carried out in these microfinance banks have a negative but significant statistical effect on their financial performance. This implies that the annual average revenue generated from process innovations declined as the overall financial performance improved and vice versa. This can be attributed to the higher costs than revenue associated with process innovations.

5.2.3: Effect of institutional innovations on financial performance

The study sought to establish the effect of institutional innovations on the financial performance of Microfinance banks in Kenya. The study hypothesised that institutional innovations have no statistically significant effect on the financial performance of microfinance banks in Kenya. Institutional innovations were measured using the composite index of the annual average revenues generated from group lending, artificial intelligence, and crowd funding. Based on the descriptive results, microfinance banks received varying revenues from institutional innovations, as depicted by fluctuating levels of mean aggregates. The inferential analysis also showed that institutional innovations carried out in these banks had insignificant positive statistical effects on their financial performance. The implication is that it does not matter whether a firm adopts institutional innovations because it is not beneficial or the benefit is marginal.

5.2.4: Moderating effect of regulatory framework on the relationship between financial innovations and financial performance of microfinance banks in Kenya

The fourth objective was to establish the moderating effect of the regulatory framework on the financial performance of microfinance banks in Kenya. The formulated hypothesis was that the regulatory framework has no statistically significant moderating effect on the relationship between financial innovations and financial performance of microfinance banks in Kenya. To achieve this objective, various indicators of financial innovations including product innovations, process innovations and institutional innovations and their corresponding interaction effects were run against the financial performance. The study found a statistically significant moderating effect of regulatory framework on the

relationship between the various indicators of financial innovations and financial performance.

5.2.5: Mediating effect of competitiveness on the relationship between financial innovations and financial performance of microfinance banks in Kenya

The final objective was to establish the mediating effect of competitiveness on the relationship between financial innovations and the financial performance of microfinance banks in Kenya. The study hypothesised that competitiveness does not have a statistically significant mediating effect on the relationship between financial innovations and financial performance. Competitiveness was measured in terms of market share controlled by each MFB. Trend analysis shows an increase in competitiveness over the study period 2014 - 2020. The inferential findings did not support the null hypothesis that competitiveness does not have a statistically significant mediating effect on the link between financial innovations and financial performance. Therefore, competitiveness was found to have a significant statistical effect on the relationship between financial innovations and financial performance. MFBs have to be competitive as they regularly innovate to scale up their revenue earnings and overall financial performance.

5.3 Conclusions

Conclusions were made according to the study findings in line with the study objectives and hypothesis. Based on findings from the assessment, the study concluded that financial innovations have a positive and statistically significant effect on the financial performance of microfinance banks in Kenya. Accordingly, the financial performance depends on the financial innovations adopted by a company. This denotes that the

constraint-induced financial innovation theory which suggests that firms exist mainly to maximise profits in a bid to increase financial performance is applicable among the microfinance banks in Kenya. Further, the transactions costs innovation theory proved useful and applicable in reducing costs of transactions and achieving economic efficiency which is critical in enhancing the financial performance of firms.

Product innovations recorded the greatest effect on financial performance, followed by process innovations and finally institutional innovations. Both product and institutional innovations affect financial performance in the same direction (positively) whereas process innovations affect financial performance in the opposite direction (negatively). However, the magnitude of the effects varies across all the three forms of financial innovations. Similar results were found for combined effects of all the three forms of financial innovations. The study also established that different dimensions of financial innovations affect financial performance in different ways.

Firstly, the study concluded that product innovations positively and significantly affect the financial performance of microfinance banks in Kenya. The findings are consistent with several empirical studies across countries. This implies an increase in the adoption of product innovations results in an increase in the annual average revenue generated from the innovations which translate to better financial performance. As a result, financial managers need to consider product innovation dimensions in terms of improved products, new products and quality products as they pursue the goals of their firms. This is in line with the financial intermediation theory that posits that banks exist to play the role of an intermediary by offering diverse and innovative products to their customers.

Process innovations indicated a negative but significant statistical effect on the financial performance of microfinance banks in Kenya. This implies that as the annual average revenue generated from process innovations, the financial performance measured in terms of ROA declined. It can be concluded that increased process innovations in terms of mobile bank applications, pesa link, and digital field applications enhances speed and quality, which result in more revenues generated. This contravenes the transaction cost innovation and constraint induced theories which postulate that innovations are meant to lower the costs of transactions and improve financial performance.

Thirdly, institutional innovations were found to have a positive but insignificant effect on the financial performance of microfinance banks in Kenya. This implies that as more and more revenue is generated from institutional innovations, the financial performance remains the same or if it changes, then the change is positive but not significant. The study concludes that the costs and revenues generated from institutional innovations are barely the same or the costs are marginally less than the revenues. Therefore, it does not matter whether or not a firm invests in institutional innovations.

Fourthly, the analysis found out that the regulatory framework of MFBs has a positive and significant moderating effect on the link between financial innovations and the financial performance. The implication is that the relationship between financial innovations and financial performance is not direct, but it is also affected by the regulatory framework. The study concluded that the regulatory framework enhances such a relationship with a total effect of increasing the financial performance while a reduction of regulations results in a decrease in the financial performance.

Finally, the test results for the fifth hypothesis point out that competitiveness has a positive and significant statistical mediating effect on the relationship between financial innovations and MFBs financial performance. Therefore, the study concludes that competitiveness mediates the relationship between financial innovations and financial performance. Microfinance Banks with large market share are more financially strong compared to those with small market share because of economies of scale to tap on large revenue and evenly spread operational costs. This supports the Merton's market theory of innovations which postulates that firms innovate to increase market efficiency which is necessary for improved financial performance.

The study makes significant contributions to scholars, researchers, and finance theory. In the first place, the study builds on the existing body of knowledge by evaluating the direction and magnitude of the connection between financial innovations and financial performance. The mediating role of competitiveness and the moderating role of regulatory framework on that connection is also an important contribution to finance theory. The study validates the financial intermediation theory, constraint-induced theory, regulation innovations theory, and Merton's market theory of innovations. However, the findings contradict the transaction cost innovation theory as more revenue generated from process innovations results in higher costs. Lastly, academicians will benefit based on the gaps highlighted in this study upon which further research can be conducted.

5.4 Contribution to Knowledge

The study contributes to finance theory, policy, and practice in a number of ways. The analysis contributes to finance theory and how financial innovations affect the financial performance of microfinance banks. The magnitude and direction of each financial innovation variable is explained in the analysis. Financial scholars will have the basis for conducting future studies as per the knowledge gaps ascertained to fill the gaps. Further, the study will contribute to similar topics in finance such as retail structured products, updated technology, credit generation, regulatory framework, competitiveness, and financial innovation theories which strive to explain the determinants of financial performance.

5.5 Recommendations

Based on the findings of the study, the current study draws a number of recommendations for policy and practice. Further, the study also makes recommendations and suggestions for further studies as presented in sections 5.5.1 and 5.5.2.

5.5.1 Recommendations for policy

The regulations of microfinance banks in Kenya are still at lower levels compared to the mainstream banking sector. Despite being licensed by the central bank of Kenya, the MFBs are subjected to prudential and non-prudential guidelines. While prudential guidelines help guarantee the stability of the financial sector, the non-prudential guidelines are dependent on the nature and the core mandates of the MFBs' formation. The CBK should ensure harmony between these two forms of regulations to ensure unified guidelines on the MFBs operations. Secondly, CBK should use its fiscal and

monetary policies to reward innovative MFBs through tax reliefs on product and process innovations to help them increase their incomes and improve their overall financial performance and achieve their goals.

According to CBK (2020), MFBs are classified either as nationwide or community-based. Most of the MFBs are based in urban regions which limit their ability to reach all parts of the country to meet the needs of the targeted clientele and enhance financial deepening. Therefore, the study recommends that parliament should enact legislation to ensure that microfinance services are available to low-income populations across the entire country. Product and process innovations were found to have positive and significant effects on a firm's financial performance. For example, micro savings products were found to have the highest effect, followed by micro-credit products and finally micro insurance products. The study recommends that MFBs should develop unique micro-savings, micro-credit, and micro-insurance in order to meet the rising demands of the poor and the marginalised who cannot afford the current packages offered by other financial institutions. It is also important that in order to enhance profitability MFBs should also focus more on micro-credit product innovation, pesa-link process innovation to improve their financial performance. The study also recommends that the study findings be used as a reference point for CBK, AMFI, and the treasury during policy formulations.

5.5.2 Recommendations for practice

The study results showed that product and process innovations have significant effects while institutional innovations have insignificant effects on the relationship between financial innovations and financial performance. The study recommends that finance

managers should use the study findings to modify or create products and process innovations to improve their financial performance. In addition, finance managers should not focus on institutional innovations because its overall effect does not impact the firm's financial performance.

The study results showed that product and process innovations have significant effects while institutional innovations have insignificant effects on the relationship between financial innovations and financial performance. The study recommends that MFBs management should embrace research and development. Research and development play a key role in providing in-depth knowledge and understanding of strategic themes of financial innovations that are significant in boosting financial performance.

Secondly, the study found that competitiveness mediates the relationship between financial innovations and the financial performance of MFBs in Kenya. Management of the MFBs should engage in aggressive advertising campaigns for the various innovative products such as micro-insurance whose uptake is still very low. This would enable the MFBs to expand their market shares and increase competitiveness which in turn increases their financial performance. On the other hand, MFBs suffer from duplication of financial innovations that reduce their significance. Therefore, MFBs should engage in product differentiation strategy to enhance their competitiveness and in turn their financial performance.

5.5.3 Suggestions for Further studies

The study investigated the effects of financial innovations on the financial performance of microfinance banks in Kenya. The concentration was on the microfinance banks only

while there are many categories of financial institutions that could be investigated. On the other hand, financial innovations are numerous and fast-changing. There is a need to carry out further studies on additional financial innovations as well as on additional innovations that have recently been adopted by various financial players.

Kenya is one of the pioneer countries in the adoption of financial innovations in Africa. Therefore, the financial innovations under consideration are yet to be adopted or studied by other African countries. It is important to carry out the same study in these other countries where the unique elements of financial innovations are still new. As innovations are spread to these countries, further studies should be carried out to fill the geographical and conceptual gaps.

The regulatory framework was used as a moderating variable while competitiveness was used as a mediating variable between financial innovations and financial performance. The results showed that both regulatory framework and competitiveness have significant moderating and mediating effects respectively on the relationship. This study recommends further research by using other variables such as money supply and other external environmental factors to moderate and mediate the relationship between financial innovations and financial performance. In addition, further studies is recommended to determine whether there is a relationship between financial innovations, credit uptake, non-performing credits, cost of deposits, and the cost of loans.

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APPENDICES

Appendix I: Document Review Guide

	Element/Year	2014	2015	2016	2017	2018	2019	2020
	Return on Assets (ROA)							
1.	Average annual revenue on new micro-savings products							
2.	Average annual revenue on new micro-credits							
3.	Average annual revenue on micro-insurance products							
4.	Average annual revenue on mobile banking applications							
5.	Average annual revenue on use of PesaLink							
6.	Average annual revenue on digital applications							
7.	Average annual revenue from group lending							
8.	Average annual revenue from use of artificial intelligence							
9.	Average annual revenue from crowd funding							
10.	Capital adequacy ratio (CAR)							
11.	Liquidity ratio requirement (LRR)							
12.	Competitiveness (CP)/Market share							

Source: Researcher (2021)

Appendix II: List of Microfinance Banks (MFBs) in Kenya

S/NO	MICROFINANCE BANK	DATE LICENCED
1	Caritas Microfinance Bank Ltd	02.06.2015
2	Century Microfinance Bank Ltd	17.09.2012
3	Choice Microfinance Bank Ltd	13.05.2015
4	Daraja Microfinance Bank Ltd	12.01.2015
5	Faulu Kenya Microfinance Bank Ltd	21.05.2009
6	Remu (Key) Microfinance Bank Ltd	31.12.2010
7	Kenya Women Microfinance Bank Ltd	31.03.2010
8	Rafiki Microfinance Bank Ltd	14.06.2011
9	Maisha Microfinance Bank Ltd	21.05.2016
10	SMEP Microfinance Bank Ltd	14.12.2010
11	Sumac Microfinance Bank Ltd	29.10.2012
12	U&I Microfinance Bank Ltd	08.11.2010
13	Uwezo Microfinance Bank Ltd	08.11.2010
14.	Muongano Microfinance Bank Plc	29.11.2019

Source: CBK Listing (2020)

<https://www.centralbank.go.ke/wp-content/uploads/2020/01/Directory-of-Licensed-Microfinance-Banks.pdf>

Appendix III: Research Authorization



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Tel. 020-8704150

Our Ref: D86/CTY/38733/2017

DATE: 28th June, 2021

Director General,
National Commission for Science, Technology
& Innovation
P.O. Box 30623-00100,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MR. OMWANZA ODONGO CHARLES – REG. NO. D86/CTY/38733/2017

I write to introduce Mr. Omwanza Odongo Charles who is a Postgraduate Student of this University. He is registered for Ph.D Degree programme in the **Department of Accounting and Finance**.

Mr. Omwanza intends to conduct research for Ph.D. Proposal entitled, **“Financial Innovations and Financial Performance of Microfinance Banks in Kenya”**.

Any assistance given will be highly appreciated.






Yours faithfully,


PROF. ELISHIBA KIMANI
FOR: DEAN, GRADUATE SCHOOL



ll/m

Appendix IV: Nacosti Permit

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 264546	Date of Issue: 02/July/2021
RESEARCH LICENSE	
	
This is to Certify that Mr. CHARLES OMWANZA ODONGO of Kenyatta University, has been licensed to conduct research in Nairobi on the topic: FINANCIAL INNOVATIONS AND FINANCIAL PERFORMANCE OF MICROFINANCE BANKS IN KENYA for the period ending : 02/July/2022.	
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