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Abstract

The general objective of the study was to determine the effect of FinTech on the operational costs of microfinance institutions in Nairobi County, Kenya. Specific objectives included examining the effect of process innovation, internet banking agency banking, and mobile banking on operation cost of microfinance institutions. The study was anchored on Demand and Supply Theory of Innovation, Theory of Innovation Diffusion, Transaction Cost Innovation Theory, and Technology Acceptance Theory. Correlational research design was used in this study and target population comprised of managers working with 10 MFIs in Nairobi County, Kenya registered with AMF-Kenya. The primary data was collected using questionnaire, while secondary data was obtained from bank supervision report. Data processing and analysis was facilitated by the use of the Statistical Package for Social Sciences. Descriptive statistics was used to calculate frequencies, percentages, and measures of central tendency and dispersion from the collected data. Again, inferential statistics was adopted to establish the kind of relationship that exists between the study variables using the regression analysis model. The findings revealed that process innovation, internet banking, agency banking and mobile banking were satisfactory variables in explaining the operational costs of MFIs in Nairobi County. The study also found that process innovation had a negative and significant influence on operation costs (β =-0.136, p=.007<.05), internet banking

had a significant negative influence on operation costs (β =-0.194, p=.000<.05), agency banking and a negative and insignificant influence on operation costs (β =-0.880, p=.312>.05) and finally mobile banking had a significant negative influence on operation costs of the MFIs (β =-0.420, p=.000<.05). The study concluded that the implementation of technologies such as process innovation, internet banking, agency banking and mobile banking have negative effects on the operation costs of MFIs in Nairobi County. The study thus recommended that managements of MFIs in Nairobi County should strive to fully and properly adopt and implement the use of financial technology in their operations and that innovations can be a source of competitive advantage if a firm understands customer needs, competitors' actions and technological development and act accordingly to stay at par with rivals, therefore such institutions should take the advantage of fully adopting financial technologies in their operations.

Keywords: *Technology, Operation, Cost, Microfinance, Process, Internet, Banking, Agency, Mobile Innovation.*

1.1 Background to the Study

Financial technology is used to enhance business operations and overall approaches to delivering financial services (Imalingat, 2015). In the contemporary world, financial technology is applied in diverse sectors such as mobile payment, Robo-advisers, insuretech and MicroFinTech (Moro-Visconti, 2021). MFIs can incorporate many FinTech features in their business models. This may lead to cost savings and to revenue increases. Even if what matters for sustainability is positive economic and financial marginality, there is a trade-off that derives from the intrinsic riskiness of lending (banking) activity. In MFIs, there is a problem in developing adequate Management Information Systems (MIS) (Sahoo & Sahoo, 2013. The implementation of an appropriate MIS lies at the heart of a microfinance business, being a necessary requisite for MFIs' management both to monitor the effectiveness, sustainability, quality, and efficiency of their loan portfolio and to manage general administrative tasks, thanks to easy access to all critical management information.

The application of FinTech has both positive and negative effects on an organization's operational cost. The process of adopting financial technologies in an organization is initially expensive because the components required are expensive (Vives, 2017). The technology is not only expensive in its acquisition, but also requires adequate training of the employee's organizational employees and a series of maintenance practices that significantly increase the organization's operational cost (Gai, Qiu, & Sun, 2018). Generally, changing from the operations of an organization from the normal to the technology way is an expensive practice that entails a lot of expenses, starting from the acquisition of the technologies, setting all the required systems within the organization, putting all the necessary security measures, and training the employees on the new technology (Vives, 2017).

Importantly, the customers need to be trained on how to use the system that usually requires a series of updates over time as technologies change. On the other hand, FinTech can reduce an organizational cost because it does not require constant checking and monitoring when done adequately (Vives, 2017). Importantly, the technology eliminates the need for middlemen who might make the process of accessing financial services expensive for financial institutions because they must pay middlemen as their representatives (Gai, Qiu, & Sun, 2018). As such, adopting

financial technology might reduce an organization's operations cost efficiency or increase it based on its efficiency.

Internet banking has not replaced traditional banking but it has significantly improved on quality delivery of services, reduced costs, speed and optimized the efficiency of banking services. Internet banking in Kenya has emerged as a strategic resource of attaining higher efficiency, reducing costs, controlling the operations and minimizing costs by replacing paper based and labor-intensive methods with automated processes (Nawirah, 2020). The automated processes lead to more productivity and profitability. Banks in Kenya are enhancing the traditional banking methods with internet banking because of its broad advantages. Internet banking has improved customer service because it is self-service in nature. It also enables banks to increase their sales through a broad market and bringing in new market opportunities to increase the deposits. Internet banking has contributed to better operational efficiency by reducing expenses such as cheque processing expenses, cashiers and customer service staff costs, and data entry expenses. In the Kenyan banking sector, internet banking has substantial marginal effects on the return on assets. It has made banking transactions easier by bringing the services to customers hence improving the overall performance of the banking industry. Nawirah (2020) noted that there is positive relationship between the monetary performance of banks and internet banking. Internet banking enables banks to reduce the operational costs while reducing the need for a broad territorial network. Providing e-banking services has become a strategic approach for any banking institution that is seeking to improve the overall quality of services.

The recent times have seen banks in Kenya adopt the agency banking mode in their operations. The agency banking mode entails the contraction of third-party retail networks as their banking agents who act on their behalf (Wambugu, 2011). Generally, the agents carry out almost all the operations done by the banks starting from making money deposits, transfers, service payments, and withdrawal. The agents benefit from their engagements on commission basis, meaning that for every transaction carried by the agent, a small percentage of the transaction fees goes into their accounts (Pantielieieva et al., 2020). As such, the more the transactions made by the agents, the more they earn and the less they transact within a month, the less they earn as their commission.

The introduction of agency banking has seen a reduction in the average time taken by customers to deposit, withdraw or carry out any banking activity through the agents (Wambugu, 2011). The agents have provided banks with a different avenue to reach to their customers and offer their services without necessarily travelling for long distances to the banking halls because they can easily access a bank agent in their nearest town (Ndungu, & Njeru, 2014). The process has led to a reduction in the bank's operational costs because they do not pay the agents with their money, but they pay them through a commission basis that also benefits the bank. As such, agency banking has been useful in reducing the operational costs of banks.

Mobile banking uptake by the microfinance institutions has led to a significant improvement in operations efficiency because it has reduced the number of tellers needed to attend to customers. Mobile banking technologies like M-Pesa have made it easy for microfinance customers to make deposits and withdraw money from their accounts without necessarily visiting their microfinance banking halls (Moturi & Ogoti, 2020). Recently, mobile banking has advanced to a point where customers can apply for a loan and receive it within minutes of application without having to go through the lengthy paper application process (Njenga, 2009).

Studies indicate that the microfinance industry is struggling with high operational costs and minimal earnings. According to (Buckley & Webster (2016), MFIs provide hundreds of millions of low-income households across the world with access to various financial services such as credit loans, payment transfers, and savings accounts. MFIs find business opportunities in countries and markets where traditional financial firms have failed to reach low-income families (Buckley & Webster, 2016).

Microfinance is an example of a reverse social innovation that started in the developing world and later spread to the developed nations. In Europe, the innovation and spread of microfinance institutions is being promulgated with help of networks such as the Microfinance Platform and the European Microfinance Network. Ashta (2018) notes that European microfinance is struggling to get significant visibility in the media and finance market. However, a considerable percentage of microfinance institutions in Europe are using innovative financial technologies to minimize costs, increase outreach, and have an impact on the market (Imalingat, 2015).

Global Findex has a broad range of worldwide database that provides comprehensive insights on how adults borrow, save, make their payments and manage risks. A Findex report that was released in 2017 showed that digital technology in microfinance is still underutilized in most parts of the world except Sub-Saharan Africa (Ashta, 2018). One of the rapidly growing FinTech operators in Europe is TransferWise, a payment transfer service that was introduced in 2010. It competes with banks and western union for international payments.

In Africa, MFIs have embraced digitization as an opportunity of leveraging their customer base and reach low-income customers and rural clients. Digital solutions from financial technology have enabled microfinance institutions to increase customer engagement, and product usages (African Financial Inclusion Policy Initiative, 2016) This has subsequently led to a reduction of operational costs since financial technology leverages the use of expensive traditional approaches. The African Financial Inclusion Policy Initiative (2016) remarks that large portions of the African population are financially excluded and this necessitates financial education. Microfinance institutions have made remarkable progress in providing financial literacy to the population and improving their inclusivity. In the Sub-Saharan region, FinTech is championing greater financial inclusion. In 2017, there were 339 million registered accounts in the region (Sy et al., 2019). This was a major penetration boost from 12% in 2014 to 21% in 2017. Currently, financial technology and digital financial services in the Sub-Saharan region have diversified from basic cash transfer and bill payments to insurance, savings, merchant payments, value-added services like pay-as-you-go, savings group, crowd funding, and value chain digitization. Digital credit offers are growing rapidly in FinTech markets such as Kenya, Tanzania, and Uganda (Ndungu & Moturi, 2020). In such regions, digitization of financial services is a race, and microfinance institutions are working hard to stay relevant in the fast-evolving markets.

In the Kenyan market, the microfinance industry emerged about twenty years ago and it spread across the country (Ndungu & Moturi, 2020). They emerged to fill the many gaps that were left by banks in offering credit to people. SMEs spear-headed the quick adoption of micro financing. Innovations in financial technology have transformed the delivery of financial services. Findings by Ayayi & Sene (2010) indicate the high levels of poverty in Kenya create a suitable environment for MFIs to loan small finances to different creditors. The adoption of financial technology by microfinance institutions in Kenya has led to the development of convenient services such as mobile banking, internet banking, electronic funds transfer. A study conducted by Ndungu &

Moturi (2020) showed that the Kenyan MFI used mobile financial technology with the following percentage allocation; 73.3%- (SMS) short message services, 70%- USSD (unstructured supplementary service data). SMS and USSD are widely preferred for the minimal costs of getting financial services and the ease of access with nearly any mobile phone. The adoption of these services has brought changes in the Kenyan market that are attributed to low costs, efficiency, and convenience to customers and financial service providers (Ndungu & Moturi, 2020).

The integration of FinTech to the Kenyan microfinance sector gives the customers the benefits of increased privacy, increased agent networks, value-added services, and growth of the formal accounts (Bharadwaj, Jack & Suri, 2019). The Kenyan microfinance industry benefits through additional business, lines minimized operational costs, feature innovation, and diversification of financial providers. In Kenya, micro finance institutions play an essential role in the economic development by serving the population ignored by the big banks (Mwasi & Nyasaka, 2020). This is the micro savings and credit service where banks failed to meet the needs of the poor customers and citizens. Currently, statistics indicate that banks serve approximately 22.6% of the population, 17.9% is served by the micro population unreached by any financial service (KNBS, 2018). In the last three decades, there has been emergence of numerous MFIs to serve this segment, by serving the enormous poor population successfully there has been transformation of some MFIs to fully fledged banks like Equity Bank, KRep Bank (now Sidian Bank), Kenya Women Finance Trust (KWFT) and Family Bank (Mutua, 2016).

In Kenya, MFIs were pioneered by non-governmental organization (NGOs) in collaboration with the government (Abdi, Odunga & Ayora, 2020). The government aided the development of micro finance institution (MFI s) by providing the policy framework and platform for donor support; these NGOs include World Bank, USAID (U.S. Agency for International Development), UNDP (United Nations Development Programme) and later the commercial banks supported NGOs by financing the operations (Mutua, 2016). As at 2010 there were 24 large micro finance institutions in Kenya, which provided US $1.5 billion to approximately 1.5 million active borrowers. Most Microfinance Institutions in Kenya (MFI) are using M-pesa to provide micro-credit to their clients. The MFIs in Kenya are licensed and regulated by the Central Bank of Kenya (CBK). This is under the Microfinance Act of 2006 and the Microfinance Regulations for Deposit Taking MFIs of 2008. Most Microfinance Institutions in Kenya double-up as Deposit Taking Institutions. The benefits of using mobile money such as M-pesa when taking deposits include reduced costs, increased convenience and lower risk of fraud (Dayour, Adongo & Agyeiwaah, 2020). Access to credit has played a significant role when it comes to economic growth in any country.

1.2 Statement of the Problem

FinTech is aimed at improving an organization's operational efficiency thus leading to decreased operational costs. However, MFI institutions in Nairobi County have had a high operational cost and in several instances, they have recorded lower profits. A Central Bank of Kenya 2017 report states that, Kenya`s microfinance sector faced a loss of $7.3 million as at December 2017. The CBK also reported a decrease in the deposits by customers from $401.9 million in 2016 to $394.1 million in 2017 (Central Bank of Kenya, 2017). Providing financial services to poor people is costly and this in part because of the high cost of providing small loans and the fact that these clients transact small amounts of money, live in sparsely populated areas, and hardly have documented credit histories. If the cost of processing a loan is quite similar, whether the loan amount is large or small, it is quite obvious that the smaller loan is relatively more costly to service.

According to a study by Ivatury (2006), MFIs, handling small transactions for dispersed populations, have operating costs of 12-15 % of assets, while the similar ratio for banks rarely exceeds 5 %. Therefore, innovative operating methods are needed to reduce transaction and managerial costs.

It is essential to find delivery channels that are inexpensive to set up, a wider range of financial services according to poor characteristics, in order to handle transactions at low cost." MFIs traditionally face high staff costs and related operating expenses for their core credit scoring and lending activities. Delinquency from untrustworthy borrowers represents another significant cost that contributes to the economic and financial absorption of resources. To the extent that technology contributes to decreasing costs, economic marginality automatically improves. This surplus can be allocated, at least partially, to decreasing unitary interest rate margins, converging towards fair loan rates (Jarrow & Protter, 2018). MFIs can incorporate many FinTech features in their business models. This may lead to cost savings and to revenue increases. Even if what matters for sustainability is positive economic and financial marginality, there is a trade-off that derives from the intrinsic riskiness of lending (banking) activity. In MFIs, there is a problem in developing adequate Management Information Systems (MIS) (Sahoo and Sahoo, 2013) with consequent difficulties in managing their credit delivery to clients and in gatherings data of clients. But this lack has deep consequences on MFIs management's ability to have a timely and proper decision-making process. The implementation of an appropriate MIS lies at the heart of a microfinance business, being a necessary requisite for MFIs' management both to monitor the effectiveness, sustainability, quality, and efficiency of their loan portfolio and to manage general administrative tasks, thanks to easy access to all critical management information.

MIS increases productivity lowers transaction costs and reduces the risk of failure, but most of the MFIs have yet to realize the importance of its use to achieve outreach and sustainability. As a strong core, MIS can deliver cost-effective integration of data, channels, and processes, easing a consolidated view of the whole portfolio, the implementation of the right MIS becomes really one the most important strategic aim for MFIs, which would allow also better integration of MFIs with the other elements of the financial sector.

It remains largely unclear whether MFIs are adequately employing FinTech in running their businesses given that they are faced with the challenge of limited growth and expansion (Kibugo, 2017). This is underscored by the fact that up until now only 13 MFIs are registered with the Association of Microfinance Institution of Kenya (AMFI-Kenya) as compared to a total of 42 commercial banks registered with the Central Bank of Kenya (CBK). Regardless of the growing research in the area of investigating the efficiency of microfinance institutions worldwide including Africa; due to the strong nexus between microfinance and poverty reduction and the fact that MFIs have become central players in this development agenda, the study on the reduction of operation costs of MFIs in Kenya is highly unexplored. Operating costs are high in microfinance institutions as compared to ordinary banks where the largest cost item is the funding costs (Mersland & Strøm, 2012).

Prior research shows that many commercial banks in Kenya have several benefits over players in the microfinance industry (Munala & Korir, 2017). These benefits include better access to customers due to large networks, financial sustainability and better accounting systems which improve the operational efficiency (Munala & Korir, 2017). Despite the financial underperformance of microfinance institutions in Kenya, minimal empirical evidence exists on the

effects of financial technology on operation costs of microfinance institutions in Kenya. Thus, this study was aimed at investigating the effects of FinTech on the operational costs of MFI's in the Nairobi County, Kenya.

1.3 Research Objectives

The general objective of the study was to determine the effect of FinTech on the operational costs of microfinance institutions in Nairobi County, Kenya.

2.0 Literature Review

2.1 Theoretical Review

2.1.1 Demand and Supply Theory of Innovation

The theory of demand and supply for innovation was suggested by Tidd (2006). He suggested that the source of innovations can be analyzed from either the supply theory or demand theory. The demand theory argues that, innovations in a business are created in response to demand in an aim to gain competitive advantage. Demand-driven innovations are aimed at meeting the needs of customers (Zhao & Wang, 2018). Developments in a business are part of adjustment in a business strategy in aim to improve its activities, influenced by changes in the environment. Demand driven innovations enhance innovativeness in the market, "Demand orientation places particular emphasis on the macro perspective in promoting the innovativeness of markets while taking advantage of market demand" (Peltonen, 2010)

The supply side theory argues that innovations for products is determined by providers and later tested by end-users of innovations, who in this case may be businesses. The supply- driven innovation is achieved through three phases; creativity phase, innovation phase and diffusion phase. The diffusion phase is realized by diffusion of innovative solutions from the supplier to the end user. Supply-driven innovation focuses mainly on the development of new products based on the perspective of the firm (Zhao & Wang, 2018).

The theory is relevant to this study as it explains product innovation through introduction of new, improves and differentiated products in MFIs. Stiff competition within the financial sector has pushed firms to develop new products in aim to gain a competitive edge and remain in the market. This theory has also helped in explaining how demand and supply influences the innovation of new products in MFIs to respond to the market needs and align to the institution's strategy. Moreover, MFIs are driven by the aim to be creative in product development to meet the needs of their customers in the market. The theory also facilitated the explanation of the rationale behind product differentiation and improvement.

2.1.2 Theory of Innovation Diffusion

This theory was developed by Rogers (1995), and it states that innovation diffusion is based on the spread of the new ideas for innovation to occur in a given firm. He defined innovations as ideas or practices that are perceived new by the participants of a social setting. He argues that diffusion is the process by which an idea is conveyed among different actors in a social system. The innovation should be acceptable to the participants for relevance depending on several factors such as suitability and complexity.

Rogers suggested that innovations perceived to be simple are easily adopted and those that are complex ignored (Rogers, 2003). Diffusion is also dependent on the characteristics of the

innovation such as its compatibility, complexity, observability, trialability and relative advantage. Moreover, the perception of change is important as its only when the idea is perceived to be new, that the participants adopt it. This theory was therefore important in explaining process innovation in the MFIs in Nairobi County where technology is the major component. This also helped this project explain automation of services in MFIs through adoption of new ideas to remain competitive in the market. Moreover the theory will help in explaining how the MFIs have changed the way they offer services to customers through innovation in new processes in service delivery. The theory also facilitated understanding of the changes that have been experienced in the delivery process of services through innovation.

2.1.3 Transaction Cost Innovation Theory

The transaction cost innovation theory was developed by Hick and Niehans (1983). The theory studied financial innovation from the perspective of structural changes in the economy including costs of operations in a firm. Hick and Niehans idea was that the main factor for financial innovation in a firm is to reduce transaction costs which are part of the operating expenses. Technology in this case enables firms to shift to financial innovation thus enabling them to reduce operating costs in the long run. Moreover, a firm's ability to reduce costs stimulates financial innovation in aim to improve financial service delivery. Operational costs may threaten a firm to shift to financial innovation for sustainability in the market.

This theory was considered relevant to this study since helped in explaining how MFIs are able to reduce operating costs through financial innovation. MFIs just like any organization are faced with the threat of increased operation costs hence the only option is to come up with new practices of doing business to reduce operation costs. Moreover, the theory was important to this study as it helped in explaining the aim of MFIs in maximizing profit through reduction of operation costs.

2.1.4 Technology Acceptance Theory

The Technology Acceptance Theory was proposed by Davis in 1989. It is broadly used to describe user technology acceptance behavior. The theory states that there are two main factors which influence a person`s intention to use new technology; perceived ease of use and the perceived usefulness (Lou & Li, 2017). The perceived usefulness of new technology describes an individual`s belief to enhance the level of work performance through use of new technologies. The perceived use of new technology describes how easy a person learns to use or operate new technology. For example, an older person who views digital games as too challenging to play or waste of time will be unlikely to want to embrace this technology. Contrary, an older person who views digital games as providing mental stimulation and easy to learn will likely want to learn how to play the digital games.

The Technology Acceptance Theory emphasizes on how the perceived ease of new technology affects the perceived usefulness of a certain technology (Lou & Li, 2017). It is highly applied in research studies that involve information technology. The theory is relevant to this study since it is among the most influential and discussed theories in predicting and explaining end-user behavioral technology adoption in the context of microfinance institutions.

2.2 Empirical Review

Kibugo and Kimani (2016) carried a study to analyze the effect of financial innovations on profitability of microfinance institutions In Nakuru town, Kenya. The research used descriptive research design for extensive data collection through administration of questionnaires. The study

concluded that innovations such as financial technology in process innovation resulted in cost efficiency besides speed and quality of services. It is was also concluded that innovations can be a source of competitive advantage if a firm understands customer needs, competitors' actions and technological development and act accordingly to stay at par with rivals.

Miringu and Namusonge (2019) study attempted to determine the effect of entrepreneurship innovation on financial performance of the deposit taking saving and credit co-operative societies in Kenya. The study followed a descriptive survey design. Descriptive statistics was used to analyze quantitative data. Multiple regression models were used to show the relationship between independent and dependent variables. Data was analyzed with the help of Statistical Package for Social Science (SPSS) Version 22. The study concluded that innovation adoption greatly influence the financial performance of DTS in Kenya. The study also concluded that one type of innovations adopted by DTS to enhance financial performance was the introduction of new products.

Onchong`a (2018) carried a study to evaluate the effects of financial innovations on the performance of microfinance institutions in Kenya. The independent variables used for the study were loan portfolio, number of customer deposits, number of bank branches and the number of staff members. The dependent variable was the financial performance of microfinance institutions. The research was conducted through a descriptive survey design and the target population was microfinance institutions that were registered in Kenya by the Central Bank of Kenya. The collected data was analyzed using correlation and regression analysis. Statistical Package for Social Science and Microsoft Excel were used as the statistical tools. The study concluded that there are specific aspects of the financial industry that cause developments and innovations in the microfinance industry. These factors include the usage of bank accounts, inequalities in financial inclusion, mobile money facilitating financial arrangements and bank lending not supporting comprehensive growth.

Abdulkadir (2018) conducted a research to investigate the effects of financial technology on the financial performance of commercial banks in Kenya. The independent variables of the study were mobile banking and internet banking. The dependent variable was the financial performance (return on investment). The research was based on the technology acceptance, diffusion innovation and resource-based theories. The descriptive research design was used to summarize data using SPSS 21. The Pearson moment correlation was used to determine the linear relationships between the variables of the study. The research concluded that there is a positive relationship between financial technology and financial performance. The study recommended commercial banks to continue investments in financial technology.

Haabazoka (2018) conducted a study on the effects of technological innovations on the performance of commercial banks in developing countries. A descriptive research design was used in this study. Secondary data was collected from the Bank of Zambia and various audited financial and other statements of individual commercial bank. SPSS as software was used for data analysis. The study concluded that mobile banking transactions had a strong positive influence on the financial performance of commercial banks in Zambia.

Wasilwa and Omwenga (2016) conducted a study on Effects of ICT Strategies on Performance of Commercial Banks in Kenya. This study adopted a descriptive design to answer the research questions. Secondary data was obtained from financial statements of Equity group records. Correlation analysis was used to give an insight into the relationship between ICT strategies and performance. This was done with the help of the statistical package for social sciences (SPSS)

version 23.0 for production of graphs, tables, descriptive statistics and inferential statistics. The findings reveal that ICT strategies had statistically significant influence on income, profitability and customer deposits of commercial banks in Kenya. The findings also revealed that mobile phones had a higher effect than Internet services on the ICT strategies when influencing performance of commercial banks in Kenya.

Monica (2016) conducted a study to establish the impact of agency banking on the financial performance of commercial banks in Kenya. Descriptive. The data collected was analyzed using Statistical Package for Social Sciences (SPSS). The study findings indicate that there is strong and positive correlation between the commercial banks' return on assets, volume of cash transactions and the banks' size with the financial performance. The study concluded that increase in the number of agents of commercial banks lead to their increased financial performance hence there is a positive correlation between the number of agent outlets and financial performance.

Karimi (2018) conducted a study to establish the effects of agency banking on bank performance with a focus of Equity Bank Meru Branch, Kenya. The study adopted a descriptive research design and the target population was the eighteen agency bank agents. Data was analyzed and presented using descriptive statistical tools. The study findings indicated that the general cost such as operations and transaction costs were still high even for agency banking especially for agents. Agents also felt that the costs did not enable them to earn enough profits as they would have anticipated.

3.0 Research Methodology

The study adopted a correlational research design. There are thirteen registered Microfinance institutions by the Association of Microfinance Institution of Kenya. The study targeted to acquire data from 10 selected registered MFIS in Nairobi County. Purposive sampling was used to pick the study subjects for this research. Out of these, 10 MFIS that have adopted FinTech were purposively selected from Nairobi county and one of their top management randomly picked to respond to the questionnaires. Both questionnaire and secondary data collection template/data collection sheet were used. Both primary and secondary data collection methods were used in this study. The primary data was collected using questionnaire, while secondary data was obtained from bank supervision reports. A quantitative data analysis method was adopted. The quantitative data analysis method was used to determine the number of participants who accept that FinTech affects the operations of MFIS in the selected study area. For this analysis, the SPSS software was used. During the analysis, descriptive statistics was used to calculate frequencies, percentages, and measures of central tendency and dispersion from the collected data. Again, inferential statistics was adopted to establish the kind of relationship that exists between the study variables. The study adopted a regression model to establish the relationship between adopting FinTech and changes in operational costs of the microfinance organizations adopted. The regression model to be adopted in this study is as follows:

$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4i}t + €$

$B_1 - \beta_3$, are the regression coefficients

Y_{it} is the operational costs

X_{1it} represents process innovation

X_{2it} represents internet banking

X_{3it} represents agency banking

X_{4it} represents mobile banking

B_0 = gradient or slope of the regression measuring the unit of change in y associated with a unit change in X

€ = Error term within a confidence interval of 5

t= Period of time

4.0 Findings and Discussion

4.1 Descriptive Statistics

Descriptive statistics results were presented in Table 1.

Table 1: Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
No of changes in service provision	80	1	5	4.13	0.848
No of process automations	80	1	5	4.01	0.849
No of delivery processes	80	3	5	4.18	0.725
No of Bank-bank transfers	80	56	6012	1125.75	1520.254
No of online payments made	80	712	119083	7788.67	14516.823
No of Cheque Books Ordered	80	7	1011	284.14	263.183
Number of branch networks	80	5	245	31.93	53.552
Number of staffs	80	23	2816	659.8	466.352
No of High volume transactions	80	412	25801	6206.64	6203.442
No of E-wallet solutions	80	56	12094	1540.75	2316.689
No of Mobile payments	80	823	21995	9499.3	5181.08
No of Mobile savings	80	652	41890	12155.55	6275.028
Staffing costs	80	4018000	68177548	18141445	15039917.08
Amortization Costs	80	2363000	65338215	15027165	10125566.04
Business Development Cost	80	2095596	14955833	7775121	3517442.385

The results show that most of the respondents agreed that their financial institutions had many changes in their service provisions over the past eight years with a mean of 4.13 and standard deviation of 0.848. This implies that in most of the MFIs, there existed many changes in service provision over time and the responses were not far dispersed from the mean response. The results also show that most of the respondents were in agreement with the fact that their institutions were fully involved in process automation to enhance service to customers with a mean and standard deviation of 4.01 and 0.849 respectively. This implies that most of the MFIs in Nairobi County are fully involved in process automation to enhance service delivery to their customers which in turn is targeted at improving operation cost efficiency. Additionally, the results show that most of the

respondents agreed that the delivery processes of services in their institutions had improved over the past eight years with a mean of 4.18 and standard deviation of 0.725.

The results show that the minimum number of bank to bank transfers recorded by the institutions was 56 with a maximum number of transfers being 6,012. The results on bank to bank transfers had a mean of 1125.75 and standard deviation of 1520.254. This implies that the average number of bank to bank transfers being recorded by MFIs in Nairobi County is 1126. The results in addition show that the minimum number of online payments made by customers was 712 with a maximum online payment of 119083. The results show that the average number of online payments was 7788.67 with a standard deviation of 14516.823. This implies that on average each MFI recorded at least 14,000 online payments. Regarded the number of cheque books order online, the study found that the minimum number of cheque books ordered between 2013 and 2020 was 7 with the maximum number being 1,011 cheque books. The average number of cheque books ordered online was 284.14 with a standard deviation of 263.183. The results imply that on average each of the ten MFIs recorded had 284 cheque books ordered by their customers online.

Further, the results show that the institution with the least number of branch networks had 5 branches, while the largest number of branches recorded was 245 branches. The mean number of branch networks was found to be 31.93 with a standard deviation of 53.552. It was also established that the minimum number of staff was 23 with a maximum number of staff being 2816 implying that the MFI with the least number of employees had 23 staff and none of the institutions had more than 2816 staff between 2013 and 2020. The results also show that the minimum number of high volume transactions recorded by the institutions was 412 with a maximum of 25,801 high volume transactions. The average number of high volume transactions was found to be 6206.64 with standard deviation of 6203.442.

Regarding the number of e-wallet solutions, the study found that the minimum number of E-wallet solutions initiated by the institutions between 2013 and 2020 was 56 with a maximum of 12,094 E-wallet solutions. The average number of E-wallet solutions was found to be 1540.75 and a standard deviation of 2316.689. Additionally, the study found that the minimum number of mobile payments recorded by the financial institutions between 2013 and 2020 was 823 with a maximum number of mobile payments being 21995. The average number of mobile payments was found to be 9499.3 and a standard deviation of 5181.08 mobile payments. The minimum number of mobile savings recorded by the institutions between 2013 and 2020 was 652 and a maximum of 41890 mobile savings. It was established that the mean number of mobile savings was 12155.55 with a standard deviation of 6275.028.

The study found that the institution with the least staffing cost had a staffing cost of KES 4,018,000 and the maximum staffing cost was found to be KES 68,177,548 with mean and standard deviations being KES 18,141,445 and KES 15,039,917.08 respectively. Additionally, the study found that the minimum amortization Costs was KES 2,363,000 and a maximum of amortization costs of KES 65,338,215. The average amortization cost for the institutions for the eight year period was found to be KES 15027165 and standard deviation of KES 10125566.04. The study finally found that the minimum business development cost was KES 2095,596 with a maximum business development cost of KES 14,955,833. The average business development cost by the MFIs was KES 7,775,121 with standard deviation of KES 3,517,442.385.

4.2 Correlation Analysis

Correlation analysis was used to show the association between the independent variables and the dependent variable. Table 2 show correlation matrix.

Table 2: Correlation Matrix

		Operation Costs	Process Innovation	Internet Banking	Agency Banking	Mobile Banking
Operation Costs	Pearson Correlation	1.000				
	Sig. (2-tailed)					
Process Innovation	Pearson Correlation	-0.701**	1.000			
	Sig. (2-tailed)	0.003				
Internet Banking	Pearson Correlation	-.605**	-0.019	1.000		
	Sig. (2-tailed)	0.000	0.869			
Agency Banking	Pearson Correlation	-.511**	-0.038	.903**	1.000	
	Sig. (2-tailed)	0.000	0.735	0.000		
Mobile Banking	Pearson Correlation	-.499**	-0.023	.853**	.948**	1.000
	Sig. (2-tailed)	0.000	0.841	0.000	0.000	

** Correlation is significant at the 0.01 level (2-tailed).

The correlation analysis results in Table 2 show that process innovation and operational cost were negatively and significantly associated ($r=-0.701$, $p<.05$). This implies that an improvement in process innovation results into a reduced cost of operation. The results also show that internet banking had a negative and significant association with operational cost ($r=-0.605$, $p<.05$), implying that as the institution improves on internet banking, their cost of operation decreases. Similarly, the study found that agency banking and operational costs were negatively and significantly associated ($r=-0.511$, $p<.05$) which imply that an improvement in adoption of agency banking results into reduced cost of operation.

Finally, the results show that there was negative and significant association between mobile banking and operational cost of the MFIs ($r=-0.499$, $p<.05$). This implies that when the institution increases the adoption of mobile banking, their operational cost is reduced significantly. The reduction in operational cost then means that the general performance of the institution increases. These findings are consistent with the findings of a study by Kariuki (2010) which noted that financial engineering strategies such as process innovation assisted commercial banks to reduce operation costs and improve performance. The results are also in agreement with the conclusion made by Macharia & Tirimba (2018) that branch network, product range, product location and product cost had a significant direct relationship to financial performance of deposit taking Saccos in Nairobi County.

4.3 Regression Analysis

Table 3 show the model summary results.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.693a	0.480	0.453	0.158771

a Predictors: (Constant), Mobile banking, Process innovation, Internet banking, Agency banking

Source: Field Data, 2021

The model summary results in Table 3 show that process innovation, internet banking, agency banking and mobile banking were satisfactory variables in explaining the operational costs of MFIs in Nairobi County. This is supported by coefficient of determination also known as the R squared of 0. 480 and an adjusted R squared of 0.453. R squared of 0.480 implies that that process innovation, internet banking, agency banking and mobile banking jointly explain 48.0% of the variations in operational costs among MFIs in Nairobi County. The adjusted R squared of 0.453 depicts that process innovation, internet banking, agency banking and mobile banking in exclusion of the constant variable jointly explains the variation in operation costs by 45.3% .The remaining 52.0% of the variation in operation cost for the MFIs can be explained by other factors which were not part of the current study. Table 4 show the Analysis of Variance (ANOVA) results.

Table 4: Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.747	4	0.437	17.329	.000[b]
	Residual	1.891	75	0.025		
	Total	3.638	79			

a. Dependent Variable: Operation Costs
b Predictors: (Constant), Mobile banking, Process innovation, Internet banking, Agency banking

Source: Field Data, 2021

Table 4 indicate that the overall model was statistically significant in explaining the relationship between process innovation, internet banking, agency banking and mobile banking and operation costs of MFIs in Nairobi County. Further, the results imply that the variables process innovation, internet banking, agency banking and mobile banking are good predictors of operation costs of MFIs in Nairobi County. This was supported by an F statistic of 17.329 and the reported p-value of 0.000<.05. It was therefore concluded that process innovation, internet banking, agency banking and mobile banking had significant combined effects on the operation costs of MFIs in Nairobi County. Table 5 show the regression coefficient results.

Table 5: Regression of Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**T**	**Sig.**
1	(Constant)	7.681	0.162		47.436	0.000
	Process Innovation	-0.136	0.042	-0.002	-3.250	0.007
	Internet Banking	-0.194	0.053	-0.784	-3.678	0.000
	Agency Banking	-0.880	0.863	0.357	-1.019	0.312
	Mobile Banking	-0.420	0.092	-0.169	-4.589	0.000

a. Dependent Variable: Operation Costs

Source: Field Data, 2021

The regression model therefore became;

$$\mathbf{Y = 7.681 - 0.136X_1 - 0.194X_2 - 0.880X_3 - 0.420X_4}$$

Where:

Y = Operation Costs

X_1= Process Innovation

X_2 = Internet Banking

X_3 = Agency Banking

X_4= Mobile Banking

Table 5 show that process innovation had a negative and significant influence on operation costs of MFIs in Nairobi County (β =-0.136, p=.007<.05). This was supported by a calculated t-statistic of -3.250 that was larger than the critical t-statistic of -1.96 further confirming the significance. The results also show that internet banking had a significant negative influence on operation costs (β =-0.194, p=.000<.05). This was supported by a calculated t-statistic of -3.678 that was larger than the critical t-statistic of -1.96 further confirming the significance. The study however found that agency banking and a negative and insignificant influence on operation costs of the MFIs (β =-0.880, p=.312>.05). This was also supported by a calculated t-statistic of -1.019 that was smaller than the critical t-statistic of -1.96 further confirming the insignificance.

Finally, the results show that mobile banking had a significant negative influence on operation costs of the MFIs (β =-0.420, p=.000<.05). This was supported by a calculated t-statistic of -4.589 that was larger than the critical t-statistic of -1.96 further confirming the significance. The regression coefficient results are contrary to the findings of a study by Ndungu and Njeru (2014) which found that agency banking had significant influence of operational costs. The study found that, the adoption of agency banking had led to a reduction in the bank's operational costs because they do not pay the agents with their money, but they pay them through a commission basis that also benefits the bank. As such, agency banking has been useful in reducing the operational costs of banks. The results were however found to be consistent with the assertions by Mugodo (2016) which indicated that mobile, internet banking and use of ATM cards positively and significantly

influenced the financial performance of Kenya's commercial banks as measured by the return on assets.

5.0 Conclusion

On the basis of the study findings, this study concluded that the implementation of technologies such as process innovation, internet banking, agency banking and mobile banking have negative effects the operation costs of MFIs in Nairobi County. The study concluded that over the past eight years, MFIs in Nairobi County have strived to adopt various technologies in their financial services. The study also concludes that the MFIs in Nairobi County have seen consistent growth in the use of technologies to carry out financial transactions.

The study concludes that adoption of process innovations significantly affects the operation costs of MFIs in Nairobi County. The more processes the institution adopt the lower their operation costs are since the use of process innovation results into improved performance. Based on the results, it also suffices to conclude that by not investing adequately in the innovation process means that no new technologies will be injected into the system, leaving operations in the microfinance operations being done by outdated technologies that are slow and inefficient hence increased operation costs.

The study also concludes that internet banking negatively and significantly influences the operation costs of MFIs in Nairobi County, indicating that when the institution adopts internet banking, their cost of operation will be reduced since most of the transactions are done online on the internet. The study also concludes that agency banking has negative but insignificant effect on the operation costs of MFIs in Nairobi County.

Further, the study concludes that mobile banking is negatively and significantly influencing operation costs of MFIs in Nairobi County in the sense that, as the institutions improves on the adoption of mobile banking, their costs of operation are reduced. Finally, the study concludes that financial technologies can reduce MFIs' cost because it does not require constant checking and monitoring when done adequately. Importantly, the technology eliminates the need for middlemen who might make the process of accessing financial services expensive for financial institutions because they must pay middlemen as their representatives. As such, adopting financial technology might reduce an organization's operations cost efficiency or increase it based on its efficiency.

6.0 Recommendation

On the basis of the findings and the conclusions, this study recommends to the managements of MFIs in Nairobi County that they should strive to fully and properly adopt and implement the use of financial technology in their operations. Innovations can be a source of competitive advantage if a firm understands customer needs, competitors' actions and technological development and act accordingly to stay at par with rivals. Therefore, it is important that the managements of MFIs try and outsmart their main rivals such as commercial banks by adopting financial technologies that will improve their operations and reduce cost of operation.

6.1 Areas for Further Research

This study focused on determining the effect of FinTech on operational costs of microfinance institutions in Nairobi County. The findings revealed that the independent variables in the study which included process innovation, internet banking, agency banking and mobile banking jointly explained 48 percent of variation in the operation costs of MFIs in Nairobi County. It is thus

important that further research is conducted to identify other variables aligned to operation costs of financial institutions that can account for the remaining 52 percent. In addition, the researcher suggests that a similar study could also be conducted in other financial institutions especially in the commercial banks and findings compared with those of the current study. This study did not use either moderating or mediation variable, therefore, future studies could consider including an intervening variable such as government policies or moderating variable such as firm size and the findings obtained compared with those of the current study.

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