EFFECT OF FINANCIAL TECHNOLOGY ON FINANCIAL PERFORMANCE OF DEPOSIT-TAKING SAVINGS AND CREDIT COOPERATIVE SOCIETIES IN NAIROBI COUNTY, KENYA

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DECLARATION

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

Signed:  Date: 28/07/2023

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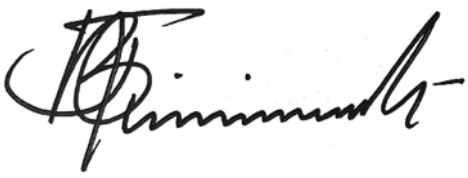
This research project has been submitted for examination with my approval as the University Supervisors.

Signed :  Date: 28/07/2023

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DEDICATION

It is with genuine gratitude and warm regard that I dedicate this research project to my family and friends. To my wife Jackline Ikuwa and my daughter Nia Nakubilia you have been a pillar to my progress in life and an encouragement to pursue my studies. My Mother Mrs. Janice Naliaka and my late father Mr. Joseph Mukhebi who always pushed me to achieve what they were not able to achieve and I am proud that I have achieved that. It's through your dedication and love that I have made it. My siblings I thank you for believing in me and for your prayers and support. God Bless you all.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
DT SACCO	Deposit Taking Savings and Credit Cooperatives
GDP	Gross Domestic Product
MFI	Micro Finance Institution
NPL	Non- Performing Loans
ROA	Return on Assets
SME	Micro, Small and Medium Enterprises
SPSS	Statistical Package for Social Sciences
VIF	Variance Inflation Factors

ABSTRACT

The adoption of fintech among Deposit Taking Savings and Credit Cooperatives in Kenya is still in its early phases. Some DT SACCOs have implemented fundamental fintech technologies, such as automated loan processing and underwriting systems, mobile and online banking platforms, and electronic payment systems. However, DT SACCOs vary significantly in their complexity and adoption levels, and many of the smaller and less well-funded SACCOs have trouble acquiring and deploying cutting-edge fintech technologies. The current study sought to investigate how financial technology influences the financial performance among DT SACCOs in Nairobi City County, Kenya. The independent variables for the research was fintech as measured by value of transactions through fintech solutions. Credit risk, liquidity, capital adequacy and DT SACCO size were the control variables while the dependent variable was financial performance measured as ROA. The study was guided by digital divide theory, inclusion financial theory, and technology diffusion theory. Descriptive research design was utilized in this research. The 43 DT SACCOs in Nairobi City County, Kenya as at December 2022 served as target population. The study collected secondary data for five years (2018-2022) on an annual basis from SASRA and individual DT SACCOs annual reports. Descriptive, correlation as well as regression analysis were undertaken and outcomes offered in tables followed by pertinent interpretation and discussion. The research conclusions yielded a 0.530 R square value implying that 53% of changes in DT SACCOs ROA can be described by the five variables chosen for this research. The multivariate regression analysis further revealed that individually, fintech has a positive and significant effect on ROA of DT SACCOs (β=0.162, p=0.001). Capital adequacy and liquidity exhibited a positive but not statistically significant influence on ROA. Credit risk had a negative effect on ROA of DT SACCOs as shown by (β=-0.157, p=0.000). Firm size exhibited a positive and significant ROA influence as shown by (β=0.293, p=0.000). The study concludes that fintech plays a significant role on financial performance of DT SACCOs. The study recommends the need for policymakers to encourage and support the adoption of fintech solutions within the cooperative sector. The study further recommends that DT SACCOs should implement robust credit risk assessment models, diversify their loan portfolios, and set appropriate risk tolerance levels. Future research ought to focus on other financial institutions in Kenya to corroborate or refute the conclusions of this research.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Research and discussion on the connection between financial technology (fintech) and business financial performance are continuing. Using fintech solutions can boost financial performance by lowering expenses, boosting productivity, and expanding access to capital (Hannoon, Al-Sartawi, & Khalid, 2021). Through cutting-edge goods and services like mobile payments and online financing, fintech may potentially create new income sources. By automating tedious procedures, minimizing paperwork, and speeding up transactions, fintech may assist businesses in streamlining their operations (Dhiaf, Khakan, Atayah, Marashdeh, & El Khoury, 2022). This may lead to cost savings and improved efficiency, which will benefit a company's bottom line. Fintech solutions may also make it simpler for businesses to acquire cash by offering alternative financing choices like crowdfunding and peer-to-peer lending. The link between fintech and financial success, however, is not without its difficulties. As installation costs for fintech solutions can be high and not every solution may be appropriate for every firm, businesses must carefully weigh the costs and advantages of implementing these solutions (Al Hammadi & Nobanee, 2019).

The digital divide theory, inclusion financial theory, and technology diffusion theory were all used to support this study. The anchor theory was the Technology Diffusion Theory of Rogers (1962), which offers a framework for comprehending how new technologies, like Fintech, may spread and be embraced by people and organizations. The hypothesis may be used to explain the circumstances under which previously underserved communities might adopt Fintech and how it can help to improve financial performance. Fintech has the potential to improve financial inclusion and access to financial services, according to Polillo's (2011) inclusion financial theory. However, it

also emphasizes the need for regulatory and policy measures to guarantee that fintech solutions are secure, available, and affordable for all. According to Van Dijk's (1999) digital divide hypothesis, access to digital technology may worsen already-existing disparities, resulting in a digital split between those who have access to it and those who do not.

The study focused on Deposit Taking Savings and Credit Cooperatives (DT SACCOs) in Kenya; this is because DT SACCOs in Kenya have started to adopt financial technology solutions in recent years (Bornfas & Githira, 2022). Many DT SACCOs in Kenya have made adopting fintech a top priority as they work to modernize their businesses and enhance the services they offer to members. Mobile banking, online banking, and electronic payment systems are a few of the fintech tools that DT SACCOs in Kenya have used. These options have made it possible for users to log in to their accounts and make transactions using computers or mobile devices, increasing accessibility and convenience. Additionally, the loan application and disbursement processes for members have been expedited as a result of DT SACCOs' collaboration with fintech firms to offer services including digital savings and loan applications (Hemed, 2022). DT SACCOs therefore offer a good context to investigate the effect of fintech on financial performance.

1.1.1 Financial Technology

Financial technology, commonly referred to as fintech, is the application of technology to improve and automate financial services (D'Andrea & Limodio, 2023). The term fintech refers to a broad variety of technologies, including blockchain, mobile banking, digital payments, AI, and machine learning. Any technological breakthrough with a focus on improving or automating financial services, procedures, or products is referred

to as fintech. This includes advancements in industries like asset management, loans, payments, and insurance. Fintech also describes the application of technology to enhance and automate financial services, increasing their effectiveness and customer accessibility (Dhiaf et al., 2022). According to Nguyen, Sermpinis, and Stasinakis (2023), fintech encompasses developments in fields including payments, loans, financial planning, and investment management.

Fintech is significant because it may make financial services more easily accessible, effective, and affordable for both individuals and enterprises (Jasti & Varalakshmi, 2023). By allowing new companies to enter the market and providing creative solutions that conventional financial institutions might not be able to give, fintech has disrupted traditional financial services (Nugroho & Sugiyanto, 2023). New business models that make use of technology to provide financial services more affordably have been produced by fintech. Due to the greater competition that has emerged, consumers and companies now have more alternatives and access to better services. Additionally, by offering services to previously underserved populations, such as those who lack access to traditional banking services, fintech has the potential to increase financial inclusion (Coffie & Hongjiang, 2023).

Fintech has been operationalized in a variety of methods in the past with relation to operationalization. According to one popular definition, fintech refers to any technological innovation intended to enhance or automate financial services, procedures, or products (Jeffs, 2018). This concept covers a wide variety of technologies, including machine learning, artificial intelligence, block chains, mobile banking, and electronic payments. Some academics have concentrated on certain fintech applications, such as peer-to-peer lending or mobile banking (Kandpal &

Mehrotra, 2019). This study attempted to quantify the level of fintech usage, as defined by the value of transactions carried out via online platforms.

1.1.2 Financial Performance

Financial performance is a metric used to assess how well a business is managing its assets, obligations, and costs while still producing money. It serves as a crucial gauge of a company's sustainability and financial health (Daryanto & Rizki, 2021). The capacity of a company to achieve its financial objectives and goals over a predetermined time period is another definition of financial performance. Financial performance may be evaluated by contrasting actual and anticipated outcomes, as well as performances against rivals or industry standards (Siska, 2022). According to Sayat, Silva, and Seaman (2019), an organization's financial success may also be defined as its capacity to generate income, control spending, and create value for all of its stakeholders, including shareholders, staff members, clients, and suppliers.

Financial performance is an important indicator of an organization's financial health and sustainability. It provides valuable insights into how well the organization is generating revenue, managing its expenses, and creating value for its stakeholders, including shareholders, employees, customers, and suppliers (Barauskaite & Streimikiene, 2021). The ability to make educated decisions about investing in the company, whether it be via the purchase of shares, the provision of loans, or other types of finance, is one of the main advantages of financial performance. Stakeholders can analyze the organization's capacity to create returns and manage risks and, as a result, make better informed judgments about their investment possibilities by assessing financial performance parameters including profitability, liquidity, solvency, and efficiency (Cho, Chung & Young, 2019).

Profitability, liquidity, solvency, and efficiency are a few examples of the metrics that may be used to evaluate financial performance (Gardenberg & Serafeim, 2019). A company's profitability is determined by how much profit it is making in relation to its sales or investments. This covers figures for return on assets (ROA), net income, and gross profit margin. How quickly a corporation can fulfill its immediate financial commitments is measured by its liquidity. Metrics like the current ratio, quick ratio, and cash ratio are examples of this (Barardehi, Bernhardt & Davies, 2019). A company's capacity to fulfill its long-term financial obligations is gauged by its level of solvency. Metrics like the debt-to-equity ratio and the interest coverage ratio fall under this category. Efficiency assesses how effectively a business uses its resources and assets to produce sales and profits. Metrics like the asset turnover ratio and inventory turnover ratio fall under this (Nugroho & Sugiyanto, 2023). The current study measured financial performance using ROA as used before by Mwangudza, Jagongo and Ndede (2020).

1.1.3 Financial Technology and Financial Performance

Fintech is seen to have the ability to enhance financial performance, hence theoretically, there should be a positive association between fintech and financial performance (Siska, 2022). By automating processes and lowering the demand for human labor and physical infrastructure, fintech can assist in lowering operating expenses (Chhaidar et al., 2022). This can assist raise profitability, decrease fraud and mistakes, and promote production and efficiency. Fintech may also make it easier for people to access financial services and products, especially those who are underserved or live in distant or rural locations. This can expand the customer base and increase revenue streams, while also promoting financial inclusion and economic development (Al-Sartawi, Al-Okaily, Hannoon & Khalid, 2022).

By offering real-time data and analytics, supporting better detection and evaluation of risks and opportunities, and enabling quicker and more informed decision-making, fintech may improve risk management and decision-making (Adiandari, 2022). By stimulating the creation of new goods and services and allowing new market entrants to compete with established financial institutions, fintech may also foster innovation and competitiveness. This may spur development, generate fresh sources of income, and boost client happiness. However, the actual impact of fintech on financial performance may depend on several factors, such as the specific fintech applications being used, the regulatory environment, and the competitive landscape (Liu et al., 2022).

Financial intermediaries are said to be essential to the economy since they transfer money from savers to borrowers, manage risks, and offer clients financial services and goods (Manasseh, Okoh, Abada, Ogbuabor, Alio, Lawal & Asogwa, 2021). According to Papadimitri, Tasiou, Tsagkarakis and Pasiouras (2021), financial intermediaries make money by charging a gap between the interest rates they pay on deposits and the interest rates they gain on loans or investments. By enabling alternative forms of financing and disintermediation, where borrowers and lenders may contact and interact with each other directly without the need for a traditional financial middleman, fintech has the potential to disrupt traditional financial intermediation. Bypassing banks and other financial institutions, peer-to-peer lending platforms and crowdfunding websites, for instance, enable individual investors to lend money to borrowers directly (Anyebe, Zubairu & Onuh, 2021).

1.1.4 Deposit Taking Savings and Credit Cooperative Societies in Kenya

Deposit Taking Savings and Credit Cooperatives (DT SACCOs) in Kenya have experienced significant growth and transformation over the years. As of December

2022, there were 175 registered DT SACCOs in Kenya, with a total asset base of Ksh. 601.5 billion (approximately USD 5.6 billion) and a membership of over 5 million individuals (Ndegwa & Koori, 2019). DT SACCOs have played a crucial role in promoting financial inclusion and economic development in Kenya, particularly in rural and underserved areas where formal financial services are limited. The Kenyan government has taken steps to strengthen the regulation and supervision of DT SACCOs, including the introduction of a new regulatory framework in 2018, the establishment of the SACCO Societies Regulatory Authority (SASRA), and the provision of technical assistance and capacity building support (Buro, 2019).

Many businesses are still investigating and experimenting with various fintech solutions, therefore the adoption of fintech among Deposit Taking Savings and Credit Cooperatives (DT SACCOs) in Kenya is still in its early phases (Onyango, 2021). Some DT SACCOs have implemented fundamental fintech technologies, such as automated loan processing and underwriting systems, mobile and online banking platforms, and electronic payment systems. However, DT SACCOs vary significantly in their complexity and adoption levels, and many of the smaller and less well-funded SACCOs have trouble acquiring and deploying cutting-edge fintech technologies. Additionally, DT SACCOs and fintech firms are increasingly working together, especially in the fields of digital lending, mobile payments, and digital financial management tools (Mwangudza, Jagongo & Ndede, 2020).

In regards to financial performance, the total assets of Kenya's DT SACCO industry rose from Ksh. 422.7 billion in 2016 to Ksh. 601.5 billion in September 2022, reflecting the sector's recent strong expansion. Increased membership and deposits, as well as enhanced loan portfolio quality and profitability, have all contributed to this expansion

(SASRA, 2022). However, DT SACCOs in Kenya are also dealing with a number of issues that might harm their financial success. These difficulties include constrained liquidity and funding options, poor capitalization, and heightened competition from other financial service providers. Additionally, the Covid-19 pandemic has had a significant impact on the financial performance of DT SACCOs, with many experiencing reduced revenues and increased loan defaults (Hemed, 2022).

1.2 Research Problem

Fintech has the potential to have a substantial influence on how well financial service providers operate financially (Siska, 2022). Fintech technologies may increase the profitability and operational effectiveness of financial institutions while lowering expenses. Fintech solutions may help businesses serve more members and consumers at the same or lower prices by automating routine tasks like loan processing and underwriting. This reduces the amount of time and resources needed to supply financial services (Hannoon et al., 2021). Fintech solutions may also improve risk management procedures, helping financial organizations better understand and control operational and credit risks while also boosting their financial performance. Additionally, financial solutions may improve customer experience, which can raise sales and profitability (Adiandari, 2022).

In Kenya's financial system, DT SACCOs are crucial, especially in terms of serving underserved and low-income populations with financial services (Ndegwa & Koori, 2019). In addition to the SACCOs themselves, policymakers and other stakeholders in the Kenyan financial industry should also be aware of the impact of fintech on the financial performance of DT SACCOs (Moki, Kanini & Kinyua, 2019). Additionally, DT SACCOs in Kenya are only just beginning to implement fintech solutions, and there

are considerable differences in the scope and kind of adoption amongst SACCOs (Bornfas & Githira, 2022). As such, conducting a study on the effect of fintech on financial performance among DT SACCOs in Kenya can provide valuable insights into the potential benefits of fintech adoption in this context.

Although there have been international studies in this field, they have mostly focused on certain elements of fintech and how they correlate to other variables such as poverty alleviation, income inequality and economic development. Demir, Pesqué-Cela, Altunbas and Murinde (2022) investigates the interrelationship between Fintech, financial inclusion and income inequality for a panel of 140 countries. The study reveals that financial inclusion is a key channel through which Fintech reduces income inequality. Liu and Walheer (2022) adopt a composite index approach for determining the interrelationship between fintech, financial inclusion and economic development. The empirical exercise reveals important patterns useful in understanding financial inclusion differences and designing future policy implementations. Banna, Mia, Nourani and Yarovaya (2022) focused on the effect of fintech-based financial inclusion and risk-taking of microfinance institutions from Sub-Saharan Africa. The study revealed that higher involvement in fintech solutions is associated with lower risk-taking of MFIs. All these investigations were conducted in a distinct setting thus; their results cannot be applied to the current situation.

Locally, Kombe (2023) studied how commercial banks in Kenya financial performance is influenced by financial innovations and concluded that fintech has a favorable effect on performance. Chepkorir, Kemboi and Bett (2022) investigated the relationship between mobile banking and financial performance of deposit taking saving and credit cooperatives in Kericho County and found a significant positive relationship.

Odhiambo (2020) sought to determine the effects of financial innovation on the financial performance of savings and credit cooperatives in Kenya. A case of WINAS SACCO society in Embu County and found a positive effect. The current study was motivated by the fact that despite the existence of prior studies there exist contextual, conceptual and methodological gaps that need to be filled. Conceptually, prior studies have operationalized fintech differently hence findings depend on the operationalized method. Contextually, prior conclusive studies have mostly focused on developed economies. Methodologically, the research methodologies adopted have not been uniform hence explaining variance in results. The current research was based on these gaps and attempted to answering the research question; what is the effect of fintech on financial performance of DT SACCOs in Kenya?

1.3 Research Objective

The objective of this study was to determine the effect of fintech on financial performance of deposit taking savings and credit cooperative societies in Kenya.

1.4 Value of the Study

From a policy perspective, the study can provide valuable insights into the potential benefits and challenges of fintech adoption among DT SACCOs in Kenya. These insights may be used by policymakers to develop laws and rules that encourage SACCOs to implement fintech responsibly and sustainably. The report also highlights the importance of fintech in enhancing access to financial services for low-income and underserved groups, which can help Kenya and other emerging nations implement financial inclusion plans.

For DT SACCOs in Kenya looking to use fintech technologies to enhance their financial performance, the report can offer useful advice. The study can pinpoint the best fintech options for various SACCO kinds and offer insights into the most efficient ways to deploy fintech. These insights may be used by DT SACCOs to guide their strategic planning and investment choices relating to the implementation of fintech, thereby improving financial performance.

The study can add to the body of knowledge on how fintech affects financial performance in developing economies. The study can shed light on the distinct issues and possibilities faced by SACCOs in emerging economies by concentrating on DT SACCOs in Kenya. The study may contribute to the creation of a theoretical framework for comprehending how the use of fintech impacts financial performance in emerging economies by offering insights into the mechanisms via which adoption of the technology affects financial performance.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter covers the theoretical framework, the determinants of financial performance, empirical literature review, a summary of research gaps and a conceptual framework.

2.2 Theoretical Framework

This segment examines the theories that underpin the study of fintech and financial inclusion. The study will be anchored on technology diffusion theory and supported by inclusion financial theory as well as the digital divide theory.

2.2.1 Technology Diffusion Theory

This theory was developed by Rogers (1962) and it is the anchor theory for the current study. According to the theory, new technology spreads and diffuses over time among a population, with the rate and patterns of diffusion being influenced by five key factors: the innovation itself, the channels used to disseminate information about the innovation, the amount of time it takes for the innovation to diffuse, the social system in which the innovation is diffusing, and the decision-making processes of the people who adopt the innovation. The idea postulates that a population adopts new technology in phases, including early adopters, early majorities, late majorities, and laggards. Different levels of risk tolerance, inventiveness, and influence over others are characteristics of each stage, and a number of factors can affect the dissemination pattern (Neaime & Gaysset, 2018).

The complicated and multifaceted process of technology adoption, according to critics, is oversimplified by the technology diffusion idea. According to Rasheed et al. (2016), the adoption process is frequently impacted by a variety of factors, including personal preferences, cultural norms, and political and economic circumstances, contrary to the theory's assumption that people accept new technologies in a linear and predictable manner. The role of dominance and power in the spread process is another point of contention raised by critics of the technology diffusion hypothesis. According to the theory, individuals take up new technology because they see its advantages, but in

practice, adoption may also be impacted by the power relationships between adopters and non-adopters as well as inside and within groups of adopters (Onyinye et al., 2018). The technology diffusion theory offers a framework for comprehending the elements that affect the rate and pattern of diffusion as well as how new technology spreads through a community. It has been extensively utilized to research how various technologies, including information and communication technologies, healthcare technologies, and agricultural technologies, among others, are disseminating. This hypothesis contends that the spread of fintech technology may broaden access to financial services and enhance DT SACCOs' financial performance.

2.2.2 Inclusion Financial Theory

Polillo (2011) was the pioneer of this theory. The idea is a multidisciplinary strategy that seeks to give excluded or underprivileged communities access to financial services. The core tenet of financial inclusion is that having access to financial services may help reduce poverty and promote economic development and financial stability. Its objective is to offer inexpensive and suitable financial services and products to those who are left out of the official financial system, such as low-income households, small companies, and rural communities. By giving these people the resources they need to manage their money, make investments in their future, and engage in the formal economy, the objective is to empower them (Liu et al., 2022).

Financial institutions may not be able to afford to provide financial services to low-income and marginalized groups, according to critics. Additionally, some detractors contend that the financial services and products provided to low-income areas may not be suitable for their requirements, resulting in a high likelihood of default or excessive debt. There are also worries that some financial inclusion programs may not be long-

term viable, especially if they fail to bring in enough money to pay expenditures (Freytag & Fricke, 2017).

This theory argues that fintech has the potential to improve financial inclusion and access to financial services, but it also emphasizes the need for regulatory and policy measures to guarantee that fintech solutions are secure, available, and affordable for all. Financial inclusion proponents contend that the advantages of giving underserved populations access to financial services far outweigh the difficulties and that financial technology can be a potent tool for enhancing the financial performance of financial institutions and overall economic development.

2.2.3 Digital Divide Theory

The digital divide theory was developed by Van Dijk (1999). The hypothesis contends that having access to and using digital technology widens the divide between those who do and those who do not. As individuals who are excluded from digital technologies are also excluded from the advantages that these technologies give, such as access to information, education, work prospects, and financial services, this gap can worsen already existing social and economic inequities. The social, economic, and cultural aspects that influence access to digital technology are equally important and are highlighted by the digital divide hypothesis. These variables include the distribution and use of digital technology, as well as aspects such as income, education, race, ethnicity, location, and gender (Demir et al., 2022).

The argument put up by detractors of the digital divide hypothesis is that it oversimplifies the problem of uneven access to digital technology by dividing people into two groups: those who have access and those who do not. In actuality, the problem is more intricate and varied, with various levels of accessibility and use among various

communities. The digital divide argument, according to critics, ignores the structural factors like poverty, inequality, and prejudice that lead to uneven access to digital technology. The efficacy of initiatives to close the digital gap may be hindered if these structural problems aren't fixed (Iqbal & Sami, 2017).

According to this argument, having access to digital technology may make already existing disparities worse, leading to a digital gap between those who do and those who do not. Fintech may, however, be utilized to close this gap by giving previously underserved groups access to financial services via mobile phones and other digital devices. Particularly in developing nations and marginalized populations, the digital divide idea has been crucial in influencing policies and activities aimed at closing the gap between those who have access to digital technology and those who do not.

2.3 Determinants of Financial Performance

This section covers factors that are theoretically expected to influence financial performance of firms. The factors discussed in this section are financial technology, credit risk, firm liquidity, firm size and capital adequacy.

2.3.1 Financial Technology

By automating procedures and lowering the demand for human labor and physical infrastructure, fintech can assist in lowering operational expenses (Broby, 2021). This can assist raise profitability, decrease fraud and mistakes, and promote production and efficiency. Fintech may also make it easier for people to obtain financial services and goods, especially those who are underserved or live in distant or rural locations. This can boost economic growth and financial inclusion while also growing the customer base and income sources (Kagan, 2020).

By delivering real-time data and analytics, supporting better detection and evaluation of risks and opportunities, and enabling quicker and more informed decision-making, fintech may improve risk management and decision-making (Gautam, Kanoujiya, Bhimavarapu & Rastogi, 2021). By stimulating the creation of new goods and services and allowing new market entrants to compete with established financial institutions, fintech may also foster innovation and competitiveness. This may spur development, generate fresh sources of income, and boost client happiness (Agarwal, Qian, Tan, Agarwal, Qian & Tan, 2020).

2.3.2 Credit Risk

In general, a favorable correlation between asset quality and financial success is anticipated. Higher revenues and less credit losses are anticipated from high-quality assets, such as loans that are likely to be returned on time, which will boost financial performance. On the other side, low-quality assets like non-performing loans may cause more credit losses and fewer revenues, which would result in a decline in financial performance (Chindengwike, & Mnyampanda, 2021).

Additionally, a financial institution's reputation and trustworthiness may be impacted by the quality of the assets it holds, which may have an influence on its capacity to get finance and draw in new clients (Bae, 2020). As a result, it is frequently thought that maintaining excellent asset quality is essential to a financial institution's capacity to expand and preserve its finances over the long term. It is crucial to remember that a number of variables, including the kind of financial institution, the location in which it operates, and the regulatory environment, can have an impact on the link between credit risk and financial performance (Parvin, Hossain, Mohiuddin & Cao, 2020).

2.3.3 Firm Liquidity

The capacity of a business to fulfill its immediate financial responsibilities, such as paying invoices and debts when they become due, is referred to as liquidity. As it enables the firm to take advantage of investment opportunities and weather unforeseen financial shocks, sufficient liquidity is essential for a company's financial health and growth (Guerini, Nesta, Ragot & Schiavo, 2020). High levels of liquidity can protect against financial risks and uncertainties from the standpoint of financial performance, enabling a business to continue operations and make money. On the other hand, inadequate cash levels may result in lost opportunities, greater borrowing costs, and even insolvency (Pattiruhu & Paais, 2020).

It's crucial to remember, too, that excessive liquidity can sometimes hurt a company's financial success. Lowered returns on investment and decreased profitability might arise from holding excessive amounts of cash or other liquid assets (Sari & Sedana, 2020). Furthermore, certain financial organizations could conceal underlying financial issues with excessive liquidity, which might eventually result in lower financial performance. Therefore, although while a link between liquidity and financial performance is typically assumed to be positive, the ideal degree of liquidity might vary depending on a number of variables, such as the sector the firm operates in, its business plan, and its risk appetite (Hacini, Boulenfad & Dahou, 2021).

2.3.4 Firm Size

Larger businesses often have more access to resources like money, people, and technology, which may help them seize growth opportunities and realize economies of scale (Kamau, 2023). These benefits may contribute to better financial performance by increasing revenue generation, reducing expenses, and increasing profitability. Additionally, larger businesses could have more negotiating leverage with suppliers

and clients, which might lead to better pricing conditions and higher profit margins. Due to their increased diversification and larger networks, they may also be more robust to economic downturns and other external shocks (Yang & Wang, 2023).

However, it is crucial to keep in mind that different contextual variables, such as competition, regulation, and market saturation, can also have an impact on the link between business size and financial success (Khan, Jia, Lei, Niu, Khan, & Tong, 2023). Smaller companies may occasionally be more inventive and agile, enabling them to take advantage of unique market possibilities that bigger companies would ignore and to react more swiftly to shifting market conditions. As a result, while a correlation between company size and financial success is typically assumed to be positive, the ideal firm size can vary by sector and environment and be influenced by a number of different factors (Weinzimmer, Esken, Michel, McDowell & Mahto, 2023).

2.3.5 Capital Adequacy

Capital adequacy refers to the amount of capital that a financial institution holds in relation to its risk-weighted assets (Suroso, 2022). A higher level of capital adequacy indicates that the institution has a stronger financial buffer against potential losses and is better positioned to weather financial downturns. From a financial performance perspective, higher levels of capital adequacy can lead to increased investor confidence, improved credit ratings, and lower borrowing costs. This can result in higher profitability and better financial performance over the long term (Nyanyuki, Nyanga'u, & Onwonga, 2022).

On the other hand, insufficient capital adequacy can result in higher risk of insolvency and decreased financial performance. A lack of capital can limit the institution's ability to take advantage of growth opportunities, such as expanding lending activities or

investing in new technologies (Gallati, 2022). Therefore, maintaining adequate levels of capital is critical for the financial stability and performance of an institution. In addition, regulatory requirements for capital adequacy have become increasingly stringent in recent years, highlighting the importance of this factor for financial institutions (Ogunode, Awoniyi & Ajibade, 2022).

2.4 Empirical Review

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

2.4.1 Global Studies

Baker, Kaddumi, Nassar and Muqattash (2023) investigates the main financial technologies adopted by banks to improve their financial performance. The study population consists of commercial banks listed on the Amman Stock Exchange and Abu Dhabi Securities Exchange, and includes financial information and data from 2012 to 2020. A total of 115 questionnaires, consisting of five questionnaires for each bank, were distributed to the study population in Jordan and the United Arab Emirates. The dependent variable is financial performance, while the independent variable is financial technology. Multiple linear regression analysis was conducted to test the hypotheses. The results showed that Fintech has a positive effect on both total deposit and net profits. The study presents a contextual gap as it was conducted in a developed context and its findings might not hold in other contexts.

Yudaruddin (2023) aims to examine the impact of financial technology startups on Islamic and conventional banking performance in Indonesia. Data were collected from a sample of 124 conventional and Islamic banks in Indonesia from 2004 to 2018. The

two-step generalized methods of moments was used to estimate the system model. This study finds that Fintech startups have a detrimental effect on bank performance. This study also finds that Islamic banks have low performance compared to conventional banks. However, when Fintech startups interact with Islamic banks, this paper discovers that a greater number of Fintech startups have a positive effect on the performance of Islamic banks, particularly the peer-to-peer lending category. This study focused on banks and therefore need to investigate if the findings hold in a DT SACCO setting.

Banna, Mia, Nourani and Yarovaya (2022) focused on the effect of fintech-based financial inclusion and risk-taking of microfinance institutions from Sub-Saharan Africa. They developed a fintech-based financial inclusion (FinFI) index. They focused on Sub-Saharan African MFIs with a remarkable and recent development in fintech solutions. The study revealed that higher involvement in fintech solutions is associated with lower risk-taking of MFIs. Small scale MFIs largely benefited from fintech solutions. This study presents a contextual gap as the focus was on MFIs and therefore cannot be used to generalize other institutions or countries.

Chhaidar, Abdelhedi and Abdelkafi (2022) examines the dynamic relationship between fintech investments and financial performance, and it explores whether the bank size could influence the performance in the context of the digital transformation. The fully modified ordinary least squares model is estimated for 23 European banks throughout the whole period ranging from 2010 to 2019 and for the two sub-periods spanning from 2010 to 2014 and from 2015 to 2019. The econometric results evince that fintech are positively and significantly related to the bank profitability. The findings also provide evidence that the bank size is a moderator factor in affecting the relationship between digital investments and the profitability. The study presents a conceptual gap as it

conceptualized fintech in terms of investments without taking into account how the various fintech channels influences performance.

Al-Mudimigh and Anshari (2020) studied fintech and financial inclusion in South East Asian region. Via the Binary Logistic model and data from 300,000 families from the countries' economic surveys, the study found that fintech has the potential to increase financial access and usage, but the impact varies across different countries and regions, and depends on factors such as regulation, infrastructure, and consumer demand. The study reveals a contextual gap as it was conducted in South East Asia whose social and economic setting is different from Kenya where the current study will be conducted.

2.4.2 Local Studies

Kombe (2023) studied how commercial banks in Kenya financial performance is influenced by financial innovations. A literature review technique was adopted in the research. The study's overall conclusions demonstrate that financial innovations improve financial performance, as seen by an increase in transactions, the creation of convenience, and decreased maintenance costs. Banks that are incorporating financial innovations are therefore better positioned to boost their revenue and customer satisfaction, both of which are linked to increased performance. According to the report, authorities should make sure that there are laws in place that can foster an environment where banks may keep innovating. This study was a review of literature and therefore lacks empiricism.

Chepkorir, Kemboi and Bett (2022) investigated the relationship between mobile banking and financial performance of deposit taking saving and credit cooperatives in Kericho County. A correlational research design was adopted where the target population was 108 managers of all levels in the five deposits taking savings and credit

cooperatives in Kericho County. Data were collected by the use of primary and secondary methods. Data was analysed using both descriptive statistics which comprises means and standard deviations while hypotheses were tested using correlation coefficient and multiple regression analysis. Data was presented in form of frequency tables and pie charts. The findings established that mobile banking had a strong positive relationship with financial performance of DT-Saccos. This study presents a conceptual gap as it only focused on mobile banking leaving a gap on other forms of fintech.

Muthengi (2022) sought to find out how financial technology and financial inclusion affect SMEs in Kenya's Kabati market. Descriptive cross-sectional approach was adopted for use in this study whereby stratified random sampling method was applied with sample size of 223 enterprises on all merchants and wholesalers SMEs in the Kabati market which had a total population of 502 SMEs. Questionnaires were used in the study to collect primary data. The data was analyzed by descriptive statistics as well as inferential statistics. The study concluded that financial technology has significant effect on financial inclusion. The study presents a methodological gap as it relied on primary data and therefore need for a study utilizing secondary data to compliment the findings.

Misati, Osoro and Odongo (2021) evaluated the impact of financial innovation on financial inclusion and economic growth in Kenya. They employed autoregressive distributive lag models. Real gross domestic product (GDP) and Credit to private sector indicators were used to measure economic growth and financial depth respectively. The results reveal that mobile transactions in value, the number of mobile agents and internet have significant positive impact on financial deepening. However, with advancement in mobile and agency banking models, bank branches have negligible

contribution to financial inclusion. The findings further reveal that the impact of innovations on economic growth is indirect through financial depth channels. They therefore concluded that investment in cost effective innovation will be key determinant of bank's profitability. This study presents a conceptual gap as it did not address the direct effect between fintech and financial performance.

Odhiambo (2020) sought to determine the effects of financial innovation on the financial performance of savings and credit cooperatives in Kenya. A case of WINAS SACCO society in Embu County. Past studies gave an insight of what have already been done in the field of financial innovation and its impact on the financial performance. The researcher pointed on the strength and weaknesses in the reviewed literature. The study adopted a descriptive research design. WINAS SACCO employees formed the research sample. Secondary data was obtained from financial reports, libraries and Sacco's databases. Data was analyzed using the SPSS. The study concluded that financial innovation was significant in improving financial performance of Sacco's. The study presents a methodological gap as it was a case study and its findings might not hold among other DT SACCOs.

2.5 Summary of the Literature Review and Research Gaps

Based on the available literature, there are several research gaps in the relationship between fintech and financial performance of DT SACCOs in Kenya. These gaps can be classified into conceptual, contextual, and methodological categories. Conceptually, there is a need for a theoretical framework that explicitly outlines the underlying mechanisms through which fintech affects financial performance of DT SACCOs. The existing literature mostly focuses on case studies and descriptive analyses, without providing a clear conceptual framework to guide the analysis.

Contextually, most of the existing literature on fintech and financial performance has focused on developed economies, with limited attention given to emerging markets such as Kenya. This makes it difficult to generalize findings to the Kenyan context, which has its unique characteristics and challenges. Further, most of the studies on fintech and financial performance have focused on traditional financial institutions, such as banks, with limited attention given to DT SACCOs. Given the important role that DT SACCOs play in providing financial services to underserved populations in Kenya, there is a need for more research in this area.

Methodologically, most of the existing literature on fintech and financial performance of DT SACCOs in Kenya is qualitative, descriptive, and based on case studies. There is a need for more quantitative studies that can provide robust statistical evidence on the relationship between fintech and financial performance. Further, many of the existing studies do not adequately control for confounding factors that may affect the relationship between fintech and financial performance, such as macroeconomic conditions, regulatory environments, and internal factors such as management quality. There is a need for more studies that can effectively isolate the impact of fintech on financial performance while controlling for other factors that may affect the outcome.

2.6 Conceptual Framework

Displayed in figure 2.1 is the predicted relationship between the variables. The predictor variable was fintech given by the value of transactions carried out via online platforms. The control variables were credit risk given as NPL to total loans, liquidity given by liquid assets to total assets, firm size given by total assets natural log and capital adequacy by core capital to risk weighted assets. The response variable was financial performance given by ROA.

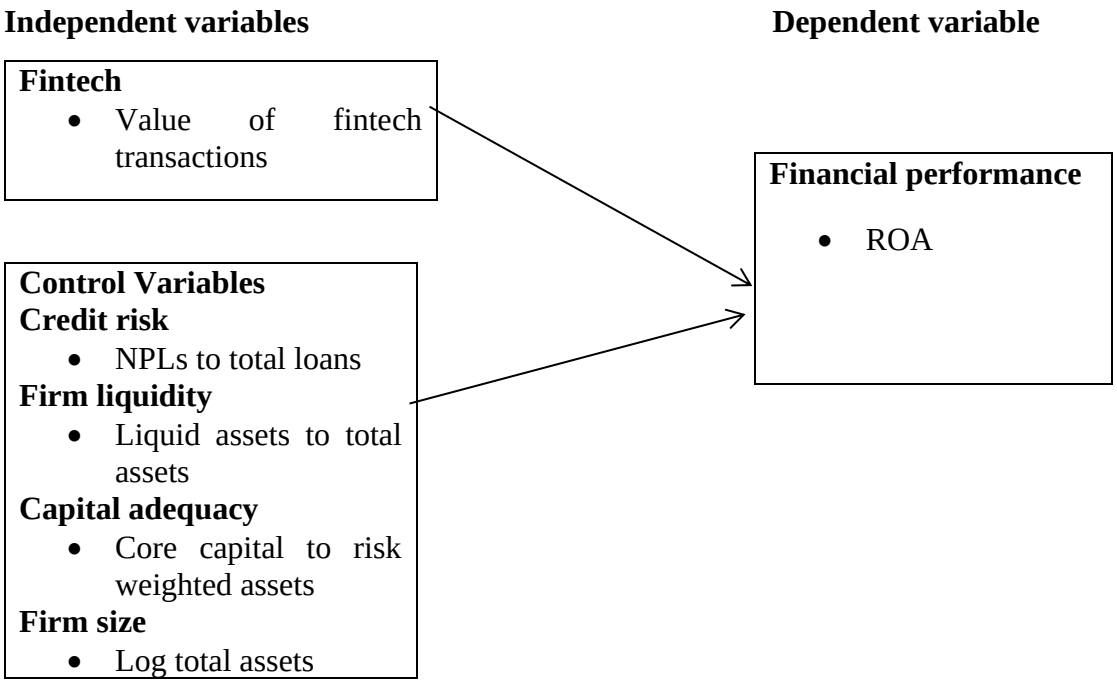

Figure 2.1: The Conceptual Model

Source: Researcher (2023)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The chapter describes the methodology that was adopted to answer the research objective. The chapter covers the research design, the target population, data collection and analysis procedure.

3.2 Research Design

A descriptive research design was adopted in this study. This is because the study aimed to establish the relationship between fintech and financial performance of DT SACCOs in Kenya using secondary data. The use of quantitative research design enabled the researcher to analyze numerical data and test hypotheses statistically. This provided

more accurate and objective results that can be replicated and generalized to a larger population. Additionally, quantitative research allowed for a larger sample size, which increased the representativeness of the findings. The data collected was analyzed using statistical software, which helped to eliminate errors and biases that may arise in manual analysis (Cooper & Schindler, 2018).

3.3 Population and Sample

A population is all observations from a collection of interest like events specified in an investigation (Burns & Burns, 2018). The study population was the 175 licensed DT SACCOs in Kenya as at December 2022. This study's sample comprised of the 43 DT SACCOs in Nairobi as at 31st December 2022 (see appendix I). The choice of Nairobi County was informed by the fact that the County is home to different types of SACCOs offering a good context to study the effect of fintech on financial performance.

3.4 Data Collection

Secondary data was relied on in this investigation which was extracted from annual published financials of the DT SACCOs in Nairobi County from 2018 to 2022 and captured in data collection forms. The reports were extracted from the SASRA financial publications of the specific DT SACCOs annual reports. The specific data collected included net income, total assets, value of fintech transactions, total loans, total assets, liquid assets, core capital, risk weighted assets.

3.5 Data Analysis

SPSS software version 27 was used to analyze the data. Descriptive analysis involved calculating measures such as mean, median, mode, standard deviation, and range to describe the distribution of variables such as fintech adoption, financial performance, credit risk, liquidity, firm size, and capital adequacy among DT SACCOs in Kenya. Correlation analysis involved examining the strength and direction of the relationship

between fintech adoption and financial performance, as well as the relationship between financial performance and other variables such as credit risk, liquidity, firm size, and capital adequacy. Multiple regression analysis was used to estimate the effect of fintech adoption on financial performance while controlling for other factors that may influence the relationship.

3.5.1 Analytical Model

The following equation was applicable:

$$Y_{it} = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \varepsilon_t$$

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

β_0 =y intercept of the regression equation.

β_1, β_2, β_3, β_4, β_5 =are the regression coefficients

X_1 = Value of fintech transactions given by log total value of fintech transactions

X_2 = Credit risk as measured by the ratio of NPLs to total loans on an annual basis

X_3 = Liquidity as measured by the ratio of liquid assets to total assets

X_4 = Capital adequacy as given by the ratio of total core capital to risk weighted assets

X_5 = Firm size as measured by the natural logarithm of total assets

ε =error term

3.5.2 Diagnostic Tests

The researcher conducted diagnostic tests to ensure that the assumptions of the statistical tests used in the analysis are met. Diagnostic tests helped to identify potential problems such as outliers, multicollinearity, heteroscedasticity, and normality of residuals, which may affect the validity and reliability of the results. Table 3.1 shows the tests that were conducted.

Table 3.1: Diagnostic Tests

Assumption	**Description**	**Type of Tests**	**Interpretations**	**Treatment**
Normality Test	Normally distributed data assumes a bell-shaped curve. It implies that errors should be distributed normally.	Shapiro-Wilk test.	$p > 0.05$ suggest that variables are distributed normally.	Data can be transformed using logs and square roots.
Autocorrelation Test	This quantifies the similarity between a sequence of observations at different time points.	Durbin-Watson test	Autocorrelation exists if the statistic is greater than 2.5 or less than 1.5	Data can be transformed using logs and reciprocal techniques.
Homoscedasticity	Homogeneity of variance is a presumption that outcome variable exhibits similar magnitude of variation across entire values of explanatory variables.	Breusch Pagan Test	$P > 0.05$ implies homoscedasticity	Data can be transformed using logs and reciprocal techniques.
Multicollinearity test	Multicollinearity is a situation where the explanatory variables are highly correlated.	Variance Inflation Factor	VIF factor >10 infers presence of multicollinearity.	Obtaining additional data and omitting collinear variables.

3.5.3 Tests of Significance

The t-test and F-test was used to test the significance of individual coefficients and overall model fit, respectively. The F-test was used to test the overall significance of the regression model. It compared the variance explained by the model to the variance

that cannot be explained by the model. The t-test was used to test the significance of individual coefficients in a regression model.

CHAPTER FOUR: DATA ANALYSIS RESULTS AND FINDINGS

4.1 Introduction

The focus of this chapter was to analyze the collected date in order to ascertain the effect of fintech on financial performance of deposit taking savings and credit cooperative societies in Kenya. Using descriptive statistics, correlation and regression analyses, findings were illustrated on tables as illustrated in the subsequent sections.

4.2 Descriptive Statistics

This section presents the descriptive findings from the collected data. The descriptive results include mean and standard deviation for each of the study variables. The analyzed data was obtained from SASRA and individual DT SACCOs annual reports

for a period of 5 years (2018 to 2022). The number of observations is 210 (42*5) as 42 DT SACCOs provided complete data for the 5-year period. The results are as shown in Table 4.1

Table 4.1: Descriptive Results

	N	Minimum	Maximum	Mean	Std. Deviation
ROA	210	.0015	.3650	.111186	.0861992
Fintech	210	.2463	11.3884	4.579898	2.1674014
Credit risk	210	.0000	.5700	.091332	.0901119
Liquidity	210	1.0237	10.0893	2.357213	1.4603429
Capital adequacy	210	.0227	1.9617	.261818	.2545612
Firm size	210	6.0724	8.7303	7.773746	.5705462
Valid N (listwise)	210				

Source: Field Data (2023)

The average ROA was found to be 0.111186, indicating a reasonable return on assets for the cooperatives on average. Fintech usage ranged from 0.2463 to 11.3884, with an average of 4.579898. This suggests a diverse range of fintech adoption levels among the societies. Credit risk, with an average of 0.091332, was relatively low on average, but the range extended up to 0.5700, signifying varying degrees of credit risk across cooperatives. Liquidity, with an average of 2.357213, demonstrated that the societies generally maintained a reasonable level of liquidity, although some exhibited higher liquidity than others. The mean capital adequacy was 0.261818, highlighting that most cooperatives adhered to regulatory requirements, but there was considerable variation. Finally, the average firm size stood at 7.773746, indicating that the societies, on average, were of moderate size. These statistics provide a foundation for further analysis, enabling researchers and policymakers to explore the relationship between fintech adoption and financial performance, risk management, and operational aspects among the cooperative societies in Kenya.

4.3 Diagnostic Tests

The researcher conducted diagnostic tests to ensure that the assumptions of the statistical tests used in the analysis are met. Diagnostic tests helped to identify potential problems such as outliers, multicollinearity, heteroscedasticity, and normality of residuals, which may affect the validity and reliability of the results.

4.3.1 Normality Test

Table 4.2 presents the results of the Kolmogorov-Smirnov test for various variables in the study. The Kolmogorov-Smirnov test is a statistical test used to assess whether a sample follows a particular distribution. In this context, it is applied to determine if each variable's data distribution (ROA, Fintech, Credit risk, Liquidity, Capital adequacy, and Firm size) deviates significantly from a normal distribution.

Table 4.2: Test for Normality

	Kolmogorov-Smirnov	**P-value**
ROA	0.823	0.171
Fintech	0.869	0.178
Credit risk	0.874	0.191
Liquidity	0.892	0.201
Capital adequacy	0.923	0.220
Firm size	0.874	0.194

Source: Research Findings (2023)

Based on the results of the Kolmogorov-Smirnov test, there is no strong evidence to suggest that the data for any of the variables significantly departs from the assumed distribution (normal distribution). This implies that the data for ROA, Fintech, Credit risk, Liquidity, Capital adequacy, and Firm size can be reasonably approximated by the respective theoretical distributions chosen for analysis. However, further analysis and

consideration of other statistical tests may be necessary to draw more robust conclusions about the data and its distributional characteristics.

4.3.2 Multicollinearity Test

Table 4.3 provides collinearity statistics, specifically the Tolerance and Variance Inflation Factor (VIF), for variables in the study. Collinearity refers to the extent of correlation between predictor variables in a regression model, and it can cause issues in the interpretation of coefficients and lead to unstable predictions.

Table 4.3: Multicollinearity

	Collinearity Statistics	
Variable	**Tolerance**	**VIF**
Fintech	0.523	1.912
Credit risk	0.528	1.894
Liquidity	0.672	1.488
Capital adequacy	0.598	1.672
Firm size	0.671	1.490

Source: Research Findings (2023)

The results reveal that fintech, credit risk, liquidity, capital adequacy, and firm size exhibit tolerances ranging from 0.523 to 0.672 with corresponding VIF values between 1.488 and 1.912. Since the VIF was less than 5, it can be implied that there was no severe Multicollinearity and the data can be used to conduct inferential analysis.

4.3.3 Heteroscedasticity Test

Heteroscedasticity refers to the situation where the variability of the residuals (the differences between the observed and predicted values) changes across different levels of the predictor variables. The test's chi-square statistic is 0.8352 with 1 degree of freedom, and the associated probability (Prob > chi2) is 0.6182. A high p-value (greater than 0.05) suggests that there is no significant evidence of heteroscedasticity in the data. The results are as shown in Table 4.4.

Table 4.4: Heteroscedasticity Results

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

Source: Research Findings (2023)

Based on the test results, the variability of the residuals in the regression model is approximately constant, and there is no compelling indication of heteroscedasticity.

4.3.4 Autocorrelation Test

Table 4.5 presents the Durbin-Watson statistic, which is a measure used to detect the presence of autocorrelation in the residuals of a regression model. The Durbin-Watson statistic has a value of 2.364. The Durbin-Watson statistic ranges from 0 to 4, with a value close to 2 indicating no significant autocorrelation (positive or negative) in the residuals. In this case, the value of 2.364 suggests that there is little to no autocorrelation in the model's residuals.

Table 4.5: Test of Autocorrelation

Durbin Watson Statistic
2.364

Source: Research Findings (2023)

4.4 Correlation Results

Table 4.6 presents a correlation matrix, which shows the Pearson correlation coefficients between various variables: ROA, fintech, credit risk, liquidity risk, capital adequacy, and firm size.

Table 4.6: Correlation Results

		ROA	Fintech	Credit risk	Liquidity	Capital adequacy	Firm size
ROA	Pearson Correlation	1					
	Sig. (2-tailed)						
Fintech	Pearson Correlation	.141**	1				
	Sig. (2-tailed)	.015					
Credit risk	Pearson Correlation	-.567**	-.072	1			
	Sig. (2-tailed)	.000	.300				
Liquidity	Pearson Correlation	-.575**	-.034	.115	1		
	Sig. (2-tailed)	.000	.620	.096			
Capital adequacy	Pearson Correlation	.467**	.035	-.166*	.060	1	
	Sig. (2-tailed)	.000	.618	.016	.387		
Firm size	Pearson Correlation	.585**	.095	-.131	.225**	.023	1
	Sig. (2-tailed)	.000	.171	.059	.001	.743	

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

Source: Research Findings (2023)

The correlation coefficient between ROA and Fintech is 0.141. This positive correlation suggests that there is a weak association between the adoption of fintech and the return on assets of the cooperative societies. The correlation coefficient between ROA and Credit risk is -0.567. This negative correlation indicates a moderately strong relationship. The correlation coefficient between ROA and Liquidity is 0.575. This positive correlation is moderately strong, indicating that higher liquidity is associated with higher ROA.

The correlation coefficient between ROA and Capital adequacy is 0.467. This positive correlation suggests a moderate relationship. As the capital adequacy increases, the ROA tends to increase, indicating that better capital adequacy may positively influence the financial performance of the cooperative societies. The correlation coefficient

between ROA and Firm size is 0.585. This positive correlation shows a moderate relationship between firm size and ROA.

4.5 Regression Results

Table 4.7 presents the summary statistics for the regression model.

Table 4.7: Model Summary

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

a. Predictors: (Constant), Firm size, Fintech, Capital adequacy, Liquidity, Credit risk

Source: Research Findings (2023)

The model's goodness of fit is measured by the R Square, which is 0.530. This indicates that approximately 53% of the variability in the dependent variable can be explained by the independent variables (firm size, fintech, capital adequacy, liquidity, and credit risk) included in the model. The R Square suggests a moderate level of explanation, meaning that these predictors collectively have a reasonably strong association with the dependent variable.

Table 4.8: ANOVA Analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.035	5	.172	62.900	.000[b]
	Residual	.570	204	.003		
	Total	1.605	209			

a. Dependent Variable: ROA
b. Predictors: (Constant), Firm size, Fintech, Capital adequacy, Liquidity, Credit risk

Source: Research Findings (2023)

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

Table 4.9: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.472	.052		7.038	.000
	Fintech	.162	.013	.114	3.219	.001
	Credit risk	-.157	.042	-.150	-3.376	.000
	Liquidity	.003	.004	.055	.761	.448
	Capital adequacy	.027	.024	.080	1.129	.260
	Firm size	.293	.006	.286	6.723	.000

a. Dependent Variable: ROA

Source: Research Findings (2023)

The coefficient of regression model was as below;

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

Where:

Y = ROA; X_1 = Fintech; X_2 = Credit risk; X_3 = Firm size

4.6 Discussion of Research Findings

The objective of this research was to establish the effect of fintech on ROA of DT SACCOs in Kenya. The study utilized a descriptive design while population was the 43 DT SACCOs in Nairobi City County, Kenya. Complete data was obtained from 42 DT SACCOs in Kenya and which were considered adequate for regression analysis. The research utilized secondary data which was gotten from SASRA and individual DT SACCO annual reports. The specific attribute of fintech considered was value of fintech transactions in a given year. The control variables were credit risk, liquidity, firm size and capital adequacy. Both descriptive as well as inferential statistics were used to analyze the data. The results are discussed in this section.

Multivariate regression results revealed that approximately 53% of the variability in financial performance among the DT SACCOs can be explained by the independent variables (firm size, fintech, capital adequacy, liquidity, and credit risk) included in the

model. The R Square suggests a moderate level of explanation, meaning that these predictors collectively have a reasonably strong association with the dependent variable.

The multivariate regression analysis further revealed that individually, a one-unit increase in fintech is associated with a 0.162 increase in ROA. A one-unit increase in Credit risk leads to a 0.157 decrease in ROA. Liquidity and capital adequacy variables have small coefficients, with p-values greater than 0.05, indicating that they are not statistically significant predictors of ROA. On the other hand, firm size has a substantial positive impact on ROA, with a coefficient of 0.293 and a Beta value of 0.286, signifying that a one-unit increase in firm size corresponds to a 0.293 increase in ROA.

These conclusions concur with those of Chhaidar et al. (2022) who examines the dynamic relationship between fintech investments and financial performance, and it explores whether the bank size could influence the performance in the context of the digital transformation. The fully modified ordinary least squares model is estimated for 23 European banks throughout the whole period ranging from 2010 to 2019 and for the two sub-periods spanning from 2010 to 2014 and from 2015 to 2019. The econometric results evince that fintech are positively and significantly related to the bank profitability. The findings also provide evidence that the bank size is a moderator factor in affecting the relationship between digital investments and the profitability.

The research findings also concur with Kombe (2023) who studied how commercial banks in Kenya financial performance is influenced by financial innovations. A literature review technique was adopted in the research. The study's overall conclusions demonstrate that financial innovations improve financial performance, as seen by an increase in transactions, the creation of convenience, and decreased maintenance costs.

Banks that are incorporating financial innovations are therefore better positioned to boost their revenue and customer satisfaction, both of which are linked to increased performance. According to the report, authorities should make sure that there are laws in place that can foster an environment where banks may keep innovating.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

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

5.2 Summary

The objective of this research was to establish the effect of fintech on ROA of DT SACCOs in Kenya. The study utilized a descriptive design while population was the 43 DT SACCOs in Kenya. Complete data was obtained from 42 DT SACCOs in Kenya and which were considered adequate for regression analysis. The research utilized secondary data which was gotten from SASRA and individual DT SACCO annual

reports. The specific attribute of fintech considered was value of fintech transactions in a given year. The control variables were credit risk, liquidity, firm size and capital adequacy. Both descriptive as well as inferential statistics were used to analyze the data. The results are discussed in this section.

The correlation results disclose that that there is a weak association between the adoption of fintech and the return on assets of the cooperative societies. The correlation coefficient between ROA and credit risk indicates a moderately strong negative relationship. The correlation coefficient between ROA and liquidity is moderately strong, indicating that higher liquidity is associated with higher ROA. The correlation coefficient between ROA and capital adequacy is also positive suggesting that as capital adequacy increases, the ROA tends to increase. The correlation coefficient between ROA and firm size indicated a positive and moderate relationship between firm size and ROA.

Multivariate regression results revealed that approximately 53% of the variability in financial performance among the DT SACCOs can be explained by the independent variables (firm size, fintech, capital adequacy, liquidity, and credit risk) included in the model. The R Square suggests a moderate level of explanation, meaning that these predictors collectively have a reasonably strong association with the dependent variable.

The multivariate regression analysis further revealed that individually, a one-unit increase in fintech is associated with a 0.162 increase in ROA. A one-unit increase in Credit risk leads to a 0.157 decrease in ROA. Liquidity and capital adequacy variables have small coefficients, with p-values greater than 0.05, indicating that they are not statistically significant predictors of ROA. On the other hand, firm size has a substantial

positive impact on ROA, with a coefficient of 0.293 and a Beta value of 0.286, signifying that a one-unit increase in firm size corresponds to a 0.293 increase in ROA.

5.3 Conclusions

The study investigated the effect of fintech on the financial performance of deposit-taking savings and credit cooperative societies in Kenya. The findings revealed several key insights regarding the relationship between fintech adoption and financial performance metrics. Firstly, there was a significant positive correlation between fintech adoption and ROA, albeit with a weak strength. This suggests that cooperative societies that embraced fintech solutions tended to exhibit slightly higher ROA values compared to those with limited fintech integration.

The study identified a significant negative correlation between ROA and credit risk. Cooperative societies facing higher credit risk tended to experience lower ROA values, indicating that sound risk management practices are crucial for maintaining profitability. This underscores the importance of effective credit assessment and risk mitigation strategies in enhancing the financial performance of these societies.

The study revealed a significant positive correlation between ROA and firm size. Larger cooperative societies tended to achieve higher ROA values, indicating potential economies of scale and increased efficiency associated with size. Larger cooperatives might benefit from cost advantages, better bargaining power, and increased access to resources, enabling them to deliver better financial performance.

5.4 Recommendations for Policy and Practice

Policymakers should focus on creating an enabling regulatory environment that promotes fintech innovation while ensuring consumer protection and data security.

Additionally, providing financial incentives and capacity-building initiatives for cooperative societies to integrate fintech tools and digital platforms can foster increased efficiency, enhanced customer experience, and better financial inclusion. Policymakers must also address potential barriers to fintech adoption, such as infrastructure limitations and lack of technological expertise, to ensure a level playing field for all cooperative societies to benefit from fintech advancements.

Cooperative societies should also implement robust credit risk assessment models, diversify their loan portfolios, and set appropriate risk tolerance levels. Regular monitoring and stress testing of credit portfolios can help identify potential vulnerabilities and prevent the buildup of non-performing loans. Training and capacity-building programs for cooperative society staff in credit risk management can also strengthen their ability to assess and manage credit risks effectively. Additionally, cooperative societies should consider leveraging fintech solutions, such as credit scoring algorithms and automated credit underwriting processes, to enhance the accuracy and efficiency of their credit risk assessments.

Lastly, the study found a significant positive correlation between ROA and Firm size, suggesting that larger cooperative societies tend to achieve higher financial performance. However, this should not discourage smaller cooperatives. Policymakers and practitioners should recognize the unique strengths and challenges faced by different-sized cooperative societies. Smaller cooperatives can explore collaborations and partnerships to leverage economies of scale and share resources. Additionally, policymakers should consider offering targeted support and capacity-building initiatives for smaller cooperatives, aimed at enhancing their efficiency, market penetration, and competitiveness.

5.5 Limitations of the Study

The study's focus on a specific set of variables, such as Fintech, Credit risk, Liquidity, Capital adequacy, and Firm size, may not capture the full range of factors influencing financial performance in cooperative societies. Omitted variables, such as managerial practices, market dynamics, and macroeconomic conditions, could be relevant and potentially affect the results.

The study's findings are limited to deposit-taking savings and credit cooperative societies in Nairobi City County, Kenya. The cooperative sector's characteristics and regulations in Kenya may differ from those in other countries, affecting the generalizability of the results. Replicating the study in different contexts and regions would be essential to confirm the robustness of the findings and their applicability to other cooperative systems.

The study employed quantitative analysis techniques based on secondary data. While quantitative analysis provides valuable statistical insights, it may not capture the complete picture. Qualitative research methods, such as interviews or case studies, could complement the findings by providing a deeper understanding of the underlying mechanisms and factors influencing the observed relationships. Additionally, qualitative analysis could help uncover any contextual nuances or industry-specific dynamics that may impact the relationship between fintech and ROA among DT SACCOs.

5.6 Suggestions for Further Research

This study focused on DT SACCOs in Nairobi City County, Kenya. Extending the research to include a comparative analysis of cooperative societies across different countries or regions would enhance the generalizability of the findings. Investigating

how different regulatory environments, market structures, and socio-economic conditions impact the relationship between fintech adoption, credit risk, firm size, and financial performance could provide valuable cross-country insights.

This study focused on fintech as a whole. Focusing on specific fintech solutions and their impact on financial performance would offer deeper insights into the mechanisms through which fintech influences cooperative societies. For example, studying the adoption of mobile banking, digital lending platforms, or block chain-based solutions and their effects on efficiency, customer engagement, and risk management could be explored.

The research only used quantitative data; combining quantitative data with qualitative data, such as interviews and focus groups with cooperative society stakeholders, could provide a more comprehensive understanding of the challenges and opportunities faced by these institutions. Understanding the perspectives and experiences of cooperative management, members, and regulators in relation to fintech adoption, credit risk management, and firm size could enrich the analysis.

REFERENCES

Adiandari, A. M. (2022). Financial performance innovation since digital technology entered Indonesian MSMEs. *International Journal for Applied Information Management*, *2*(1), 50-58.

Agarwal, S., Qian, W., Tan, R., Agarwal, S., Qian, W., & Tan, R. (2020). Financial inclusion and financial technology. *Household finance: A functional approach*, 307-346.

Al Hammadi, T., & Nobanee, H. (2019). FinTech and sustainability: A mini-review. *Available at SSRN 3500873*.

Al-Mudimigh, A., & Anshari, M. (2020). Financial technology and innovative financial inclusion. In *Financial technology and disruptive innovation in ASEAN* (pp. 119-129). IGI Global.

Al-Sartawi, A., Al-Okaily, M., Hannoon, A., & Khalid, A. A. (2022). Financial technology: literature review paper. *Artificial Intelligence for Sustainable Finance and Sustainable Technology: Proceedings of ICGER 2021 1*, 194-200.

Anyebe, D. I., Zubairu, M. U., & Onuh, O. D. (2021). A Systematic Review of Financial Intermediaries Research. *International Research Journal of Business Studies*, *14*(1), 69-84.

Bae, D. S. (2020). Internal credit rating framework for real asset investment. *International Journal of Strategic Property Management*, *24*(1), 38-50.

Baker, H., Kaddumi, T. A., Nassar, M. D., & Muqattash, R. S. (2023). Impact of Financial Technology on Improvement of Banks' Financial Performance. *Journal of Risk and Financial Management*, *16*(4), 230.

Banna, H., Mia, M. A., Nourani, M., & Yarovaya, L. (2022). Fintech-based financial inclusion and risk-taking of microfinance institutions (MFIs): Evidence from Sub-Saharan Africa. *Finance Research Letters*, *45*, 102149.

Barardehi, Y. H., Bernhardt, D., & Davies, R. J. (2019). Trade-time measures of liquidity. *The Review of Financial Studies*, *32*(1), 126-179.

Barauskaite, G., & Streimikiene, D. (2021). Corporate social responsibility and financial performance of companies: The puzzle of concepts, definitions and assessment methods. *Corporate Social Responsibility and Environmental Management*, *28*(1), 278-287.

Bornfas, S. L., & Githira, C. (2022). Relationship between non-withdrawable deposits and financial intermediation efficiency of deposit taking SACCO's in Kenya. *International Academic Journal of Economics and Finance, 3 (8), 225*, *242*, 2.

Broby, D. (2021). Financial technology and the future of banking. *Financial Innovation*, *7*(1), 1-19.

Burns, N. & Burns, S. (2018). *The Practice of Nursing Research: Conduct, Critique and Utilization*: 5th Edition: St Louis, Elsevier Saunders

Buro, I. A. (2019). Credit Risk Management and Performance of Loan Portfolios of Deposit Taking Savings and Credit Co-Operative Societies in Garissa County, Kenya. *Journal of Financial Management of Property and Construction*, *15*(1), 71-94.

Chepkorir, N., Kemboi, R., & Bett, A. (2022). Relationship between Mobile Banking and Financial Performance of Deposit taking savings and credit cooperatives in Kericho County, Kenya. *East African Journal of Business and Economics*, *5*(1), 62-71.

Chindengwike, J., & Mnyampanda, A. M. (2021). Relationship between Credit risk and Financial Performance of Commercial Banks Before and After Shifting Capital City Located to Dodoma Region, Tanzania. *Tanzania (December 20, 2021)*.

Chhaidar, A., Abdelhedi, M., & Abdelkafi, I. (2022). The effect of financial technology investment level on european banks' profitability. *Journal of the Knowledge Economy*, 1-23.

Cho, S. J., Chung, C. Y., & Young, J. (2019). Study on the Relationship between CSR and Financial Performance. *Sustainability*, *11*(2), 343.

Coffie, C. P. K., & Hongjiang, Z. (2023). FinTech market development and financial inclusion in Ghana: The role of heterogeneous actors. *Technological Forecasting and Social Change*, *186*, 122127.

Cooper, D. R., & Schindler, P. S. (2018). *Business research methods*. New Delhi: Tata McGraw-Hill Publishing Company Limited

D'Andrea, A., & Limodio, N. (2023). High-Speed Internet, Financial Technology, and Banking. *Management Science.*

Demir, A., Pesqué-Cela, V., Altunbas, Y., & Murinde, V. (2022). Fintech, financial inclusion and income inequality: a quantile regression approach. *The European Journal of Finance*, *28*(1), 86-107.

Dhiaf, M. M., Khakan, N., Atayah, O. F., Marashdeh, H., & El Khoury, R. (2022). The role of FinTech for manufacturing efficiency and financial performance: in the era of industry. *Journal of Decision Systems*, *7*(9);1-22.

Daryanto, W. M., & Rizki, M. I. (2021). Financial performance analysis of construction company before and during COVID-19 pandemic in Indonesia. *International Journal of Business, Economics and Law*, *24*(4), 99-108.

Freytag, A., & Fricke, S. (2017). Sectoral linkages of financial services as channels of economic development—An input–output analysis of the Nigerian and Kenyan economies, *Review of Development Finance*, 7(1), 36-44

Gallati, R. R. (2022). *Risk management and capital adequacy*. McGraw-Hill.

Gartenberg, C., Prat, A., & Serafeim, G. (2019). Corporate purpose and financial performance. *Organization Science*, *30*(1), 1-18.

Gautam, R. S., Kanoujiya, J., Bhimavarapu, V. M., & Rastogi, D. (2021). Financial Technology and Its Impact on Poverty in India. *International Journal of Management and Humanities*, *6*(3), 1-10.

Guerini, M., Nesta, L., Ragot, X., & Schiavo, S. (2020). Firm liquidity and solvency under the Covid-19 lockdown in France. *OFCE policy brief*, *76*, 1-20.

Hacini, I., Boulenfad, A., & Dahou, K. (2021). The impact of liquidity management on the financial performance of Saudi Arabian Banks. *EMAJ: Emerging Markets Journal*, *11*(1), 67-75.

Hannoon, A., Al-Sartawi, A. M. M., & Khalid, A. A. (2021). Relationship between financial technology and financial performance. In *the Big Data-Driven Digital Economy: Artificial and Computational Intelligence* (pp. 337-344). Cham: Springer International Publishing.

Hemed, H. R. (2022). *The Effects of Financial Inclusion Strategies on Financial Performance of Deposit Taking Savings and Credit Co-operatives Societies (Saccos) in Kenya* (Doctoral dissertation, University of Nairobi).

Iqbal, B.A., & Sami, S. (2017), Role of banks in financial inclusion in India. *Contaduría y Administración*, *62*(2), 644-656

Jasti, K., & Varalakshmi, C. (2023). Measurement of users Acceptance of Selected Financial Technology Products and Services. *International Journal of Professional Business Review*, *8*(2), e01530-e01530.

Jeffs, J. (2018). Fintech Innovation: A Digital Opportunity Beyond Finance for Canada.

Kagan, J. (2020). Financial technology–fintech. *Datum pristupa dokumentu*, *13*(6), 2020-2031.

Kamau, A. M. (2023). Underwriting risk, firm size and financial performance of insurance firms in Kenya. *Eastern Journal of Economics and Finance*, *8*(1), 1-14.

Kandpal, V., & Mehrotra, R. (2019). Financial inclusion: The role of fintech and digital financial services in India. *Indian Journal of Economics & Business*, *19*(1), 85-93.

Khan, I., Jia, M., Lei, X., Niu, R., Khan, J., & Tong, Z. (2023). Corporate social responsibility and firm performance. *Total Quality Management & Business Excellence*, *34*(5-6), 672-691.

Kombe, V. (2023). Effects of Financial Innovations on Performance of Commercial Banks in Kenya. *African Journal of Commercial Studies*, *2*(1), 12-26.

Liu, F., & Walheer, B. (2022). Financial inclusion, financial technology, and economic development: A composite index approach. *Empirical Economics*, *63*(3), 1457-1487.

Liu, H., Yao, P., Latif, S., Aslam, S., & Iqbal, N. (2022). Impact of Green financing, FinTech, and financial inclusion on energy efficiency. *Environmental Science and Pollution Research*, 1-12.

Manasseh, C., Okoh, J., Abada, F., Ogbuabor, J., Alio, F., Lawal, A., ... & Asogwa, O. (2021). Impact of financial intermediaries on Nigerian economic growth. *International Journal of Financial Research*, *12*(348), 10-5430.

Misati, R., Osoro, J., & Odongo, M. (2021). Does financial innovation enhance financial deepening and growth in Kenya? KBA Centre for Research on Financial Markets & Policy. Working paper 3/ 21

Moki, N. M., Kanini, S., & Kinyua, G. M. (2019). Financial innovation strategy and financial performance of deposit taking sacco's in nairobi city county. *International Academic Journal of Economics and Finance*, *3*(3), 398-417.

Muthengi, A. K. (2022). *Financial technology and financial inclusion of small and medium enterprises in Kabati Market Kitui County, Kenya* (Doctoral dissertation, Kenyatta University).

Mwangudza, C. K., Jagongo, A., & Ndede, F. W. (2020). Liquidity Management and Financial Performance of Teachers Deposit Taking Savings and Credit Cooperative Societies in Kenya. *International Journal of Finance and Accounting*, *5*(2), 1-26.

Ndegwa, M. W., & Koori, J. (2019). Financial inclusion and performance of deposit taking savings and credit cooperative societies in Meru County, Kenya. *International Academic Journal of Economics and Finance*, *3*(4), 286-307.

Neaime, S., & Gaysset, I. (2018). Financial inclusion and stability in MENA: Evidence from poverty and inequality. *Finance Research Letters*, *24(1*), 230-237

Nguyen, D. K., Sermpinis, G., & Stasinakis, C. (2023). Big data, artificial intelligence and machine learning: A transformative symbiosis in favour of financial technology. *European Financial Management*, *29*(2), 517-548.

Nugroho, H. H., & Sugiyanto, F. X. (2023). The Impact of Financial Technology on Banking Profitability. *IKRAITH-EKONOMIKA*, *6*(2), 255-264.

Nyanyuki, M. N., Nyanga'u, A., & Onwonga, M. (2022). Evaluation of the effects of capital adequacy on financial performance of commercial banks in Kenya. *International Academic Journal of Economics and Finance, 3 (7), 113-126*

Odhiambo, A. G. (2020*). Financial innovations and financial performance of Saccos in Kenya: A Case of Winas Sacco in Embu County,* Unpublished MBA Project, University of Embu

Ogunode, O. A., Awoniyi, O. A., & Ajibade, A. T. (2022). Capital adequacy and corporate performance of non-financial firms: Empirical evidence from Nigeria. *Cogent Business & Management*, *9*(1), 2156089.

Onyango, D. (2021). *Technoloological innovation and competitive advantage of Deposit taking savings and Credit Cooperative Societies in Nairobi City County* (Doctoral dissertation, University of Nairobi).

Onyinye, I., Orji, A., Jonathan, E., & Emmanuel, O. (2018). Economic growth and financial inclusion in a developing economy: Empirical evidence from Nigeria. *Journal of Empirical Studies*, *5*(1), 1-11

Papadimitri, P., Tasiou, M., Tsagkarakis, M. P., & Pasiouras, F. (2021). FinTech and financial intermediation. *The Palgrave handbook of fintech and blockchain*, 347-374.

Parvin, S. S., Hossain, B., Mohiuddin, M., & Cao, Q. (2020). Capital structure, financial performance, and sustainability of micro-finance institutions (MFIs) in Bangladesh. *Sustainability*, *12*(15), 6222.

Pattiruhu, J. R., & Paais, M. (2020). Effect of liquidity, profitability, leverage, and firm size on dividend policy. *The Journal of Asian Finance, Economics and Business, 7*(10), 35-42.

Polillo, S. (2011). Wildcats in banking fields: the politics of financial inclusion. *Theory and Society*, *40*, 347-383.

Rasheed, B., Law, S.-H., Chin, L., & Habibullah, M. S. (2016). The role of financial inclusion in financial development: International evidence. *Abasyn University Journal of Social Sciences, 9(*2), 330-348

Rogers, E. M. (1962). A prospective and retrospective look at the diffusion model. *Journal of Health Communication*, 9(1), 13-19

Saidat, Z., Silva, M., & Seaman, C. (2019). The relationship between corporate governance and financial performance: Evidence from Jordanian family and nonfamily firms. *Journal of Family Business Management*, *9*(1), 54-78.

Sari, I. A. G. D. M., & Sedana, I. B. P. (2020). Profitability and liquidity on firm value and capital structure as intervening variable. *International research journal of management, IT and Social Sciences*, *7*(1), 116-127.

Siska, E. (2022). Financial Technology (FinTech) and Its Impact on Financial Performance of Islamic Banking. *ARBITRASE: Journal of Economics and Accounting*, *2*(3), 102-108.

Suroso, S. (2022). Analysis of the Effect of Capital Adequacy Ratio (CAR) and Loan to Deposit Ratio (LDR) on the Profits of Go Public Banks in the Indonesia Stock Exchange (IDX) Period 2016–2021. *Economit Journal: Scientific Journal of Accountancy, Management and Finance*, *2*(1), 45-53.

Van Dijk, J. (1999). The Network Society: Social Aspect-s of New Media. *Trans. Leontine*.

Weinzimmer, L., Esken, C. A., Michel, E. J., McDowell, W. C., & Mahto, R. V. (2023). The differential impact of strategic aggressiveness on firm performance: The role of firm size. *Journal of Business Research*, *158*, 113623.

Yang, X., & Wang, J. (2023). The relationship between sustainable supply chain management and enterprise economic performance: does firm size matter?. *Journal of Business & Industrial Marketing*, *38*(3), 553-567.

Yudaruddin, R. (2023). Financial technology and performance in Islamic and conventional banks. *Journal of Islamic Accounting and Business Research*, *14*(1), 100-116.

APPENDICES

Appendix I: Deposit-Taking SACCOs in Nairobi County, Kenya

1. AFYA SACCO SOCIETY LTD
2. AIRPORTS SACCO SOCIETY LTD
3. ARDHI SACCO SOCIETY LTD
4. ASILI SACCO SOCIETY LTD
5. CHAI SACCO SOCIETY LTD
6. CHUNA SACCO SOCIETY LTD
7. COMOCO SACCO SOCIETY LTD
8. ELIMU SACCO SOCIETY LTD
9. FUNDILIMA SACCO SOCIETY LTD
10. HARAMBEE SACCO SOCIETY LTD
11. HAZINA SACCO SOCIETY LTD
12. JAMII SACCO SOCIETY LTD
13. KENPIPE SACCO SOCIETY LTD
14. KENVERSITY SACCO SOCIETY LTD
15. KENYA BANKERS SACCO SOCIETY LTD
16. KENYA POLICE SACCO SOCIETY LTD
17. KINGDOM SACCO SOCIETY LTD
18. MAGEREZA SACCO SOCIETY LTD
19. MAISHA BORA SACCO SOCIETY LTD
20. METROPOLITAN NATIONAL SACCO SOCIETY LTD
21. MWALIMU NATIONAL SACCO SOCIETY LTD
22. MWITO SACCO SOCIETY LTD
23. NACICO SACCO SOCIETY LTD
24. NAFAKA SACCO SOCIETY LTD
25. NATION SACCO SOCIETY LTD
26. NSSF SACCO SOCIETY LTD
27. NYATI SACCO SOCIETY LTD
28. SAFARICOM SACCO SOCIETY LTD
29. SHERIA SACCO SOCIETY LTD
30. SHIRIKA SACCO SOCIETY LTD
31. SHOPPERS SACCO SOCIETY LTD
32. STIMA SACCO SOCIETY LTD
33. TAQWA SACCO SOCIETY LTD
34. TEMBO SACCO SOCIETY LTD
35. UFANISI SACCO SOCIETY LTD
36. UKRISTO NA UFANISI WA ANGLICANA SACCO SOCIETY LTD
37. UKULIMA SACO SOCIETY LTD
38. UNAITAS SACCO SOCIETY LTD
39. UNITED NATIONS SACCO SOCIETY LTD
40. USHURU SACCO SOCIETY
41. WANAANGA SACCO SOCIETY LTD

42. WANANDEGE SACCO SOCIETY LTD
43. WAUMINI SACCO SOCIETY LTD
Source: SASRA (2022)

Appendix II: Research Data Collection

DT SACCO	Year	ROA	Fintech	Credit risk	Liquidity	Capital adequacy	Firm size
1	2018	0.0826	5.1251	0.1600	3.9703	0.1723	8.2162
1	2019	0.1139	4.5563	0.0600	3.9512	0.1645	8.2177
1	2020	0.1465	6.7565	0.1500	3.9318	0.1528	8.2509
1	2021	0.1945	7.4478	0.0400	3.9120	0.1560	8.2695
1	2022	0.1736	7.2316	0.0500	3.8918	0.1844	8.3168
2	2018	0.2410	2.7423	0.1400	3.9120	0.1592	8.3379
2	2019	0.1590	3.2537	0.1500	3.8918	0.1639	8.4239
2	2020	0.0644	2.8869	0.1200	3.8712	0.1616	8.4141
2	2021	0.0604	2.9535	0.0900	3.8501	0.1578	8.4557
2	2022	0.0310	2.7541	0.1100	3.8286	0.1602	8.4859
3	2018	0.0279	6.4279	0.0100	4.3944	1.8796	8.2067
3	2019	0.0248	6.6621	0.0200	4.3820	1.9617	8.2879
3	2020	0.0139	6.6387	0.0200	4.3694	0.3053	8.3768
3	2021	0.0019	6.5259	0.0400	4.3567	0.3229	8.4253
3	2022	0.1050	6.3715	0.0600	4.3438	0.3466	8.4516
4	2018	0.0840	1.1578	0.1300	3.1781	0.1596	7.5576
4	2019	0.1331	1.3225	0.1200	3.1355	0.1840	7.6198
4	2020	0.1709	1.6563	0.1300	3.0910	0.1786	7.5878
4	2021	0.0574	1.4725	0.1700	3.0445	0.1803	7.5652
4	2022	0.1230	1.2701	0.2200	2.9957	0.1638	7.5406
5	2018	0.0887	7.0066	0.0400	2.0794	0.3941	8.0577

DT SACCO	Year	ROA	Fintech	Credit risk	Liquidity	Capital adequacy	Firm size
5	2019	0.0937	6.9122	0.0500	1.9459	0.4230	8.1238
5	2020	0.0986	7.0197	0.0100	1.7918	0.4574	8.1659
5	2021	0.0999	6.5030	0.0100	1.6094	0.5397	8.2286
5	2022	0.1514	5.3769	0.0700	1.3863	0.4392	8.3287
6	2018	0.0609	7.3306	0.1000	3.5835	0.2730	8.5767
6	2019	0.2966	6.6133	0.0800	3.5553	0.2832	8.6278
6	2020	0.2323	5.9541	0.0200	3.5264	0.2637	8.6514
6	2021	0.2298	6.0810	0.3900	3.4965	0.2555	8.6986
6	2022	0.1657	5.4965	0.0600	3.4657	0.2764	8.7303
7	2018	0.0105	3.8258	0.0400	3.9703	0.1791	8.0019
7	2019	0.0572	3.5541	0.1500	3.9512	0.1792	8.0506
7	2020	0.0125	4.0251	0.3100	3.9318	0.1845	8.0485
7	2021	0.0912	5.7342	0.0200	3.9120	0.1732	8.1428
7	2022	0.0185	5.6053	0.1100	3.8918	0.1573	8.1599
8	2018	0.1863	2.8898	0.3500	3.9120	0.1099	7.9815
8	2019	0.0950	5.5063	0.1800	3.8918	0.0939	8.0263
8	2020	0.1526	4.3085	0.3900	3.8712	0.0790	8.0767
8	2021	0.1072	7.6511	0.1900	3.8501	0.0509	8.1894
8	2022	0.0096	5.8032	0.0500	3.8286	0.0280	8.2824
9	2018	0.0175	2.4783	0.1000	4.3944	0.1883	8.0201
9	2019	0.0041	2.4053	0.1100	4.3820	0.1551	8.0438
9	2020	0.1415	3.5773	0.1200	4.3694	0.2285	7.9725
9	2021	0.1548	2.2843	0.0400	4.3567	0.1477	7.9744
9	2022	0.1681	2.2110	0.0500	4.3438	0.1451	7.9950

DT SACCO	Year	ROA	Fintech	Credit risk	Liquidity	Capital adequacy	Firm size
10	2018	0.0296	5.1441	0.0200	3.1781	0.2165	8.1877
10	2019	0.0382	5.2963	0.0200	3.1355	0.2126	8.2356
10	2020	0.0419	5.8661	0.1900	3.0910	0.2277	8.2709
10	2021	0.0275	6.9341	0.0200	3.0445	0.0227	8.3291
10	2022	0.0570	6.0711	0.0300	2.9957	0.1618	8.3508
11	2018	0.0402	5.3464	0.0900	2.0794	0.2345	8.3898
11	2019	0.0415	5.9238	0.0900	1.9459	0.2442	8.4802
11	2020	0.2296	5.0765	0.1000	1.7918	0.2508	8.5279
11	2021	0.2144	6.9348	0.0400	1.6094	0.2355	8.5719
11	2022	0.1606	7.6295	0.0200	1.3863	0.2456	8.6261
12	2018	0.1440	7.9523	0.0200	2.3571	0.2291	7.2060
12	2019	0.1219	7.8483	0.0200	2.2968	0.1463	7.1988
12	2020	0.0957	6.9704	0.0300	2.6813	0.1850	7.2236
12	2021	0.2794	6.6765	0.0400	2.3480	0.1901	7.3186
12	2022	0.2788	6.8287	0.0300	2.6204	0.2111	7.3549
13	2018	0.1096	3.0733	0.0600	1.3164	0.4230	7.7230
13	2019	0.0593	2.2910	0.1900	1.1960	0.4574	7.6766
13	2020	0.2438	0.3275	0.1900	1.1739	0.5397	7.5374
13	2021	0.1236	8.1011	0.0200	1.2056	0.7005	7.4993
13	2022	0.1261	7.4564	0.0400	1.2276	0.2990	7.4789
14	2018	0.1169	1.5561	0.3000	1.0562	0.3184	7.6874
14	2019	0.0870	1.7376	0.2400	1.0962	0.2496	7.7237
14	2020	0.0850	3.3564	0.2000	1.1120	0.1944	7.5611
14	2021	0.0769	3.2217	0.1700	1.1601	0.1599	7.6254

DT SACCO	Year	ROA	Fintech	Credit risk	Liquidity	Capital adequacy	Firm size
14	2022	0.0621	3.7710	0.1400	1.1233	0.1659	7.6188
15	2018	0.0665	3.9301	0.0000	4.5106	0.2120	8.2162
15	2019	0.0515	4.4434	0.2000	6.2963	0.2019	8.2177
15	2020	0.0227	3.8448	0.0100	10.0893	0.1966	8.2509
15	2021	0.0227	3.2752	0.0200	4.2579	0.2041	8.2695
15	2022	0.2837	2.6956	0.1200	8.8431	0.2041	8.3168
16	2018	0.0015	1.4248	0.0200	1.1065	0.2691	7.3921
16	2019	0.0337	1.0373	0.0300	1.1464	0.1441	7.3912
16	2020	0.1402	0.9045	0.1300	1.3815	0.2078	7.4269
16	2021	0.0819	1.8812	0.3800	1.5359	0.1986	7.4953
16	2022	0.3061	2.9505	0.0100	1.4639	0.1952	7.6089
17	2018	0.1685	5.8197	0.0500	1.2832	0.1125	7.7088
17	2019	0.2919	5.2869	0.0500	1.1679	0.1145	7.7925
17	2020	0.2136	5.6893	0.0700	1.3048	0.1399	7.7958
17	2021	0.0041	4.6180	0.0500	1.1971	0.1534	7.8087
17	2022	0.0041	5.0652	0.0500	1.1606	0.0911	7.7387
18	2018	0.1179	4.3657	0.0700	1.5853	0.2335	8.1416
18	2019	0.2618	4.6527	0.0600	1.9464	0.2649	8.2161
18	2020	0.1030	4.8576	0.0500	1.0851	0.2547	8.2482
18	2021	0.1341	4.9525	0.0400	1.0237	0.2387	8.2873
18	2022	0.0918	6.1537	0.0300	1.4691	0.2597	8.2934
19	2018	0.0045	10.0598	0.2100	1.9836	0.1712	7.0270
19	2019	0.0527	7.9749	0.0500	1.3339	0.1763	6.9998
19	2020	0.0538	9.6619	0.0500	1.5404	0.1904	6.9773

DT SACCO	Year	ROA	Fintech	Credit risk	Liquidity	Capital adequacy	Firm size
19	2021	0.0737	3.6584	0.0800	1.2591	0.2022	6.9368
19	2022	0.0201	4.4554	0.0300	1.1154	0.2275	6.9339
20	2018	0.0475	4.1929	0.5700	4.1442	0.1351	6.8581
20	2019	0.0879	8.6744	0.5300	7.9538	0.1577	6.8614
20	2020	0.1244	5.2022	0.0800	8.4745	0.1872	6.9607
20	2021	0.0180	4.7512	0.0600	3.3451	0.1620	7.0390
20	2022	0.0180	4.6638	0.0000	1.9506	0.1866	7.1179
21	2018	0.1605	3.8078	0.0600	1.0966	0.2022	8.3379
21	2019	0.1071	3.8256	0.0700	1.4218	0.3213	8.4239
21	2020	0.0045	3.9366	0.0600	1.4858	0.3911	8.4141
21	2021	0.0225	4.7076	0.0400	1.7358	0.1700	8.4557
21	2022	0.0400	2.7861	0.1200	1.2374	0.1534	8.4859
22	2018	0.0397	2.8513	0.1300	1.9502	0.3909	8.3379
22	2019	0.0421	2.9480	0.1600	1.9346	0.1813	8.4239
22	2020	0.1185	2.6592	0.2000	1.9684	0.1769	6.7611
22	2021	0.0468	2.7969	0.2300	1.2242	0.1700	6.7943
22	2022	0.0662	2.7711	0.0200	1.6434	0.1534	8.2879
23	2018	0.1105	2.4030	0.0600	1.0320	0.1885	8.2067
23	2019	0.0800	2.6147	0.0600	1.9226	0.2020	8.2879
23	2020	0.0468	2.4046	0.1000	1.8973	0.1815	8.3768
23	2021	0.0759	2.1650	0.0800	1.1574	0.1858	8.4253
23	2022	0.2283	8.2019	0.1200	1.5021	0.1793	8.4516
24	2018	0.2214	8.8776	0.1600	1.4648	0.2610	8.4859
24	2019	0.3650	8.0052	0.1400	1.5627	0.1625	8.3379

DT SACCO	Year	ROA	Fintech	Credit risk	Liquidity	Capital adequacy	Firm size
24	2020	0.0561	8.5523	0.1100	1.4005	0.2008	8.4239
24	2021	0.0168	8.6836	0.1100	1.0634	0.1933	6.0724
24	2022	0.1243	0.7826	0.1700	1.6245	0.1915	6.5049
25	2018	0.1145	0.9095	0.0500	1.7402	0.2101	7.5107
25	2019	0.1364	1.4783	0.0100	4.3944	0.1536	7.5376
25	2020	0.0400	1.9144	0.0900	4.3820	0.1801	7.5084
25	2021	0.0199	2.3880	0.1000	4.3694	0.1663	7.6403
25	2022	0.0111	2.6507	0.0300	2.2050	0.1955	7.6508
26	2018	0.2872	2.2119	0.0500	2.5238	0.1945	8.3898
26	2019	0.0267	2.2886	0.0100	3.3740	0.4270	8.4802
26	2020	0.0035	2.5349	0.0900	2.8332	0.3933	8.5279
26	2021	0.1599	3.0281	0.0300	3.0200	0.5708	8.5719
26	2022	0.1599	2.9394	0.0500	4.4016	0.4494	8.6261
27	2018	0.1966	2.8013	0.0100	2.3280	0.4576	7.6734
27	2019	0.2632	2.8432	0.0700	1.7710	0.3498	7.7973
27	2020	0.0323	3.8223	0.0900	1.8952	0.3869	7.6170
27	2021	0.0706	2.8331	0.0700	2.1309	0.3316	7.6754
27	2022	0.1038	2.7102	0.0800	1.9554	0.3093	7.6856
28	2018	0.1004	2.6740	0.0100	1.2192	0.1393	7.1251
28	2019	0.0773	2.3577	0.0000	1.1561	0.1399	7.0917
28	2020	0.0718	2.4099	0.0800	1.1158	0.0715	7.1023
28	2021	0.0745	11.3884	0.0700	1.0780	0.0542	7.1695
28	2022	0.0365	9.3893	0.2500	1.5236	0.0370	7.1649
29	2018	0.0635	7.2817	0.1400	1.4882	0.2104	7.4691

DT SACCO	Year	ROA	Fintech	Credit risk	Liquidity	Capital adequacy	Firm size
29	2019	0.0277	6.7329	0.1600	1.2774	0.2059	7.4211
29	2020	0.0882	5.8688	0.0000	1.2997	0.2304	7.4344
29	2021	0.0327	4.7591	0.0100	1.1003	0.2227	7.4408
29	2022	0.0327	4.3676	0.0000	1.6298	0.1869	7.4577
30	2018	0.2284	3.8762	0.0300	1.5950	0.2545	7.1018
30	2019	0.3270	3.4674	0.0100	1.4871	0.2412	7.0967
30	2020	0.2227	3.4581	0.0300	1.2846	0.2741	7.0904
30	2021	0.2210	3.4841	0.0400	1.4099	0.2946	7.1179
30	2022	0.2283	3.4685	0.0300	1.0780	0.2853	7.1249
31	2018	0.2175	3.0992	0.0200	1.5236	0.1676	7.1984
31	2019	0.2715	3.5693	0.0400	1.4882	0.1729	7.2791
31	2020	0.2842	3.6862	0.0600	1.0983	0.2216	7.3376
31	2021	0.2461	6.8343	0.2300	1.0861	0.2248	7.4162
31	2022	0.2692	6.7928	0.0300	2.3685	0.3729	7.4263
32	2018	0.3188	5.9359	0.0300	2.2713	0.2056	6.5049
32	2019	0.3282	7.6256	0.1000	1.8378	0.2468	7.5107
32	2020	0.3134	7.5373	0.0300	2.3583	0.2325	7.5376
32	2021	0.0600	3.6862	0.0400	2.5221	0.1646	7.5084
32	2022	0.0642	6.8343	0.0400	1.3097	0.1440	7.6403
33	2018	0.0383	6.7928	0.1000	1.1747	0.1723	7.6508
33	2019	0.0409	9.0631	0.0000	1.1699	0.1870	8.3898
33	2020	0.1052	8.8924	0.0300	1.1666	0.1812	8.4802
33	2021	0.1249	5.3014	0.0800	1.1380	0.1684	8.5279
33	2022	0.1203	5.2639	0.0300	2.5641	0.1723	8.5719

DT SACCO	Year	ROA	Fintech	Credit risk	Liquidity	Capital adequacy	Firm size
34	2018	0.2358	5.3700	0.0000	1.0423	0.1982	8.6261
34	2019	0.1874	4.5236	0.0000	1.0590	0.2116	7.6734
34	2020	0.1596	4.0286	0.1100	1.1121	0.2091	7.7973
34	2021	0.1253	0.4569	0.1000	1.1251	0.1852	7.6170
34	2022	0.1372	0.7479	0.0900	1.0611	0.1947	7.6754
35	2018	0.0661	0.7480	0.1600	1.1587	0.1071	7.6856
35	2019	0.0758	0.8429	0.1900	1.1441	0.1745	7.1251
35	2020	0.0722	3.6403	0.2300	1.1447	0.1627	7.0917
35	2021	0.0795	5.5968	0.1900	1.0939	0.1265	7.1023
35	2022	0.0795	5.2449	0.2600	1.0332	0.2201	7.1695
36	2018	0.0868	5.2609	0.2700	1.2705	0.2773	7.1649
36	2019	0.0940	5.5477	0.2300	1.2776	0.2164	7.4691
36	2020	0.0215	0.2463	0.2200	1.1715	0.2230	7.4211
36	2021	0.0961	7.1792	0.0600	1.1658	0.2908	7.4344
36	2022	0.0562	7.0968	0.2300	1.5334	0.2111	7.4408
37	2018	0.0812	6.3610	0.1200	1.6234	0.5862	7.4577
37	2019	0.0910	5.6699	0.0500	1.6385	0.2379	7.1018
37	2020	0.0507	4.9121	0.0600	1.6048	0.3868	7.0967
37	2021	0.0743	4.9245	0.0500	1.5050	0.3878	7.0904
37	2022	0.0581	4.4818	0.0900	1.2653	0.3316	7.1179
38	2018	0.0650	4.2288	0.1300	1.2875	0.2908	7.1249
38	2019	0.0540	4.3671	0.1700	1.2781	0.1723	7.1984
38	2020	0.0468	4.8607	0.1200	1.2225	0.2545	7.2791
38	2021	0.0138	3.9169	0.0400	1.1691	0.2274	7.3376

DT SACCO	Year	ROA	Fintech	Credit risk	Liquidity	Capital adequacy	Firm size
38	2022	0.0138	2.8042	0.0300	1.1254	0.2109	7.4162
39	2018	0.3482	5.2970	0.0400	1.0996	0.1592	7.4263
39	2019	0.2536	4.6800	0.0498	1.0417	0.1639	8.2161
39	2020	0.0833	4.5000	0.0389	1.2396	0.1616	8.2482
39	2021	0.0851	4.4200	0.0387	2.2624	0.1578	8.2873
39	2022	0.0991	3.4100	0.0360	2.9326	0.1602	8.2934
40	2018	0.2214	2.8300	0.0284	3.5336	1.8796	7.0270
40	2019	0.3650	4.0000	0.0498	2.5000	1.9617	6.9998
40	2020	0.0561	3.1800	0.0389	3.1447	0.3053	6.9773
40	2021	0.0168	3.9900	0.0387	2.5063	0.3229	6.9368
40	2022	0.1243	4.0000	0.0360	2.5000	0.3466	6.9339
41	2018	0.0912	3.3500	0.0284	2.9851	0.1596	6.8581
41	2019	0.1378	3.2600	0.0449	3.0675	0.1840	6.8614
41	2020	0.1111	3.3800	0.0446	2.9586	0.1786	6.9607
41	2021	0.0781	3.7600	0.0471	2.6596	0.1803	7.0390
41	2022	0.0672	3.3700	0.0278	2.9674	0.1638	7.1179
42	2018	0.0664	4.6000	0.0374	2.1739	0.3941	8.3379
42	2019	0.0664	6.7900	0.0417	1.4728	0.4230	8.4239
42	2020	0.0673	4.1400	0.0414	2.4155	0.4574	8.4141
42	2021	0.0547	7.3700	0.0427	1.3569	0.5397	8.4557
42	2022	0.0547	5.4600	0.0386	1.8315	0.4392	8.4859