DIGITAL FINANCIAL INNOVATIONS AND FINANCIAL INCLUSION IN COMMUNITY-BASED DEPOSIT TAKING SAVINGS AND CREDIT COOPERATIVES IN KENYA

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DECLARATION

This research endeavor is entirely original with no submissions made for a degree at another university.

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I affirm that the candidate authored this project under my guidance and supervision.

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DEDICATION

This research is dedicated to my spouse, Moreen Monayo, whose unwavering inspiration and moral support have been a constant source of strength. I also dedicate this work to those who have paved the way in this field of research, laying the foundation upon which my own project is built. Their contributions have been instrumental in shaping the path of my research.

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My appreciation also to my entire family for being my rock throughout this process. Their love and support have been invaluable and have kept me motivated. I am incredibly fortunate to have such an amazing support network.

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ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis of Variance
APP	Application
ATM	Automated Teller Machine
CEO	Chief Executive Officer
CGAP	Consultative Group to Assist the Poor
DT-SACCO	Deposit Taking Savings and Credit Cooperative
FOSA	Front Office Service Activity
FSDK	Financial Sector Deepening Kenya
GDP	Gross Domestic Product
GOK	Government of Kenya
ICT	Information and Communications Technology
IFC	International Finance Corporation
ILO	International Labour Organization
KIB	Kenya Institute of Bankers
MPT	Modern Portfolio Theory
NACOSTI	National Commission for Science, Technology and Innovation
Non-WDT SACCO	Non-Withdrawable Deposit-Taking Savings and Credit Cooperative
SACCO	Savings and Credit Co-operative
SASRA	SACCO Societies Regulatory Authority
SDGs	Sustainable Development Goals
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
UN	United Nations
UNCDF	United Nations Capital Development Fund

UNCTAD	United Nations Conference on Trade and Development
USSD	Unstructured Supplementary Service Data
VIF	Variance Inflation Factor

OPERATIONAL DEFINITION OF TERMS

ATM Connectivity: Refers to the integration of SACCOs with Automated Teller Machines (ATM) platforms to provide their members with access to a range of banking services such as cash withdrawals, transfers, payments and account inquiries, through ATMs.

Community Based DT-SACCOs: These are deposit-taking savings and credit cooperatives whose membership is based on social associations within the community, such as churches, non-governmental organizations, or similar groupings in the community.

Deposit Taking SACCOs: These are SACCOs engage in deposit-taking business by mobilizing deposits payable on demand, in addition to the non-withdrawable deposits for the members.

Digital Credit Services: Refers to the application of digital platforms by the community-based DT-SACCOs to offer credit facilities to their members in a more accessible and efficient manner.

Digital Financial Innovation: this is the utilization of technology and digital solutions by the community-based DT-SACCOs to enhance the delivery of financial products to members. They include digital credit services, connectivity to mobile money and connectivity to ATM platforms to improve accessibility and convenience for members.

Financial Inclusion: This is the active and regular utilization of SACCO products and services such as savings, credit, or payment

products due to their affordability, convenience, and alignment with member needs.

Mobile Money Connectivity: This is the ability to access SACCO financial services and manage financial transactions though mobile devises. The access can be done through unstructured supplementary service data (USSD) codes, dedicated mobile banking apps or web-based apps.

SACCOs: These are co-operatives that mobilize savings, offer returns on the savings, extend credit, and serve as a means for members to invest though offering an array of financial products and services.

ABSTRACT

Financial inclusion is widely recognized as a crucial element in providing formal financial access to the poor and the underserved at affordable costs. While Savings and Credit Co-operatives (SACCOs) have been fundamental in advancing financial inclusivity, there has been a discernible decline in the utilization of SACCO products and services in the country. According to the FinAccess baseline survey conducted in 2006, the usage of SACCO products and services stood at 13.1 percent. However, this proportion has since decreased to 9.6 percent in 2021. In light of this, the research employed exploratory research design to evaluate the effect of digital financial innovations on financial inclusion in community-based DT-SACCOs in Kenya. The research was underpinned on the Theory of Planned Behavior, the Technology Acceptance Model, the Financial Innovations Model and the Modern Portfolio Theory. A census survey was administered to all 25 community-based DT-SACCOs in Kenya, and through purposeful sampling, respondents, comprising of Front Office Service Activities (FOSA) managers were selected to complete a structured questionnaire with a 5-point likert scale. The internal consistency of the research tool was evaluated via Cronbach's alpha test. Diagnostic tests were done to assess the quality and appropriateness of the data, focusing on multicollinearity, normality, heteroscedasticity and correlation. The study utilized a multiple regression analysis to examine the effect of digital financial innovations (digital credit services, mobile money connectivity and ATM connectivity) on financial inclusion in community-based DT-SACCOs in Kenya. The results show that digital credit services (β=0.102, p=0.6689) and mobile money connectivity (β=0.098, p=0.6387) had positive but insignificant influence on financial inclusion in community-based DT-SACCOs while ATM connectivity (β=- 0.055, p=0.4800) had a negative but insignificant relationship. The study came to a conclusion that digital financial innovations do not have a statistically significant effect on financial inclusion in community-based DT-SACCOs in Kenya. Community-based DT SACCOs are yet to embrace digital credit services, mobile banking connectivity and ATM connectivity as a strategy to enhance financial inclusion.

CHAPTER ONE

INTRODUCTION

1.1Background of the Study

The concept of financial inclusion has gained prominence globally due to its critical role in fostering inclusive economic growth. Accessing and using affordable and appropriate financial services are critical drivers for the attainment of Sustainable Development Goals. The SDGs include eradication of poverty, ensuring good health, ending hunger, attaining gender equality, promoting innovation, sustainable industrialization, promoting fair employment and economic expansion. Access to formal financial services, as per the Global Findex database, increased to 76 percent of the adult population in 2021, compared to 51 percent a decade earlier (Demirgüç-Kunt, Klapper, Singer, & Ansar, 2022). In developing economies, the rate of bank account ownership stood at 71 percent of the adult population in 2021, representing an increase of 8 percent from 63 percent in 2017. While the gaps in access to formal accounts are narrowing, underserved groups such as women, impoverished adults, persons with lower education levels, and the unemployed continue to face exclusion.

Financial exclusion in the African continent has become a key concern for policymakers and development practitioners. Over 60% of the adult population in Africa Are financially disadvantaged, constraining their capacity for saving, investing or managing risks. Sub-Saharan Africa has a bank account ownership rate of 55%, with mobile banking accounting for a greater proportion of this population (Demirgüç-Kunt, Klapper, Singer, & Ansar, 2022). The adoption of mobile money has paved the way for improved access to financial services by underserved groups enhancing inclusive access to finance within the region. The underserved segments present an opportunity for policymakers, regulators, and financial service providers to intervene by developing products and services that target their unmet financial needs.

In Kenya, Savings and Credit Cooperatives (SACCOs) constitute one of the sectors that immensely contributed to the country's earlier stages of financial inclusion (SASRA, 2022). The usage of SACCO's financial services stood at 13.1 percent in 2006, second after banks, which stood at 14.2 percent (FinAccess, 2021). Studies indicate that SACCOs have the potential to reach customers from areas that are not appealing to banks. For instance, the geographical coverage of SACCOs brings financial services closer to the people, the lower costs of SACCOs increase the usage of their products and SACCO regulations boost customer confidence (Ndegwa, 2020).

Given the emphasis many scholars place on the importance of SACCOs in discussions surrounding financial inclusion, it is critical to examine their contribution to Kenya's financial inclusion, particularly in regard to access and usage, in the recent past. From the FinAccess data (2021), it is observed that the usage of SACCOs dropped from 13.1% in 2006 to 9.6% in 2021.

The comparison of the usage of SACCOs with that of banks and mobile money is illustrated in Figure 1.1.

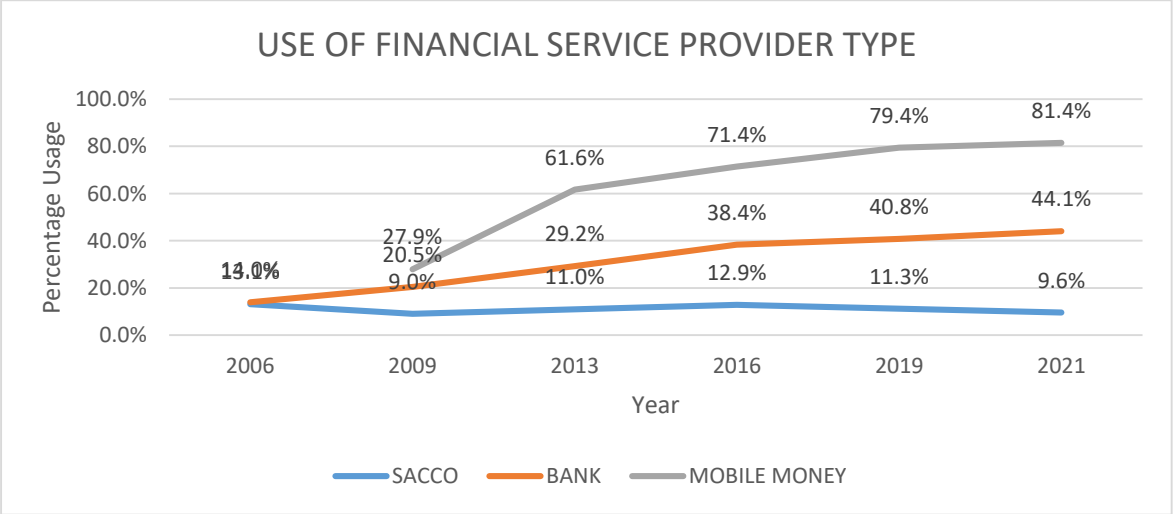

Figure 1.1: Usage of Financial Service Provider Type

Source: FinAccess (2021)

Figure 1.1 shows a decline in SACCO usage from 13.1 percent in 2006 to 9 percent in 2009, followed by a slight increase to 11 percent in 2013. In 2016, there was a further increase to 12.9 percent, before dropping to 11.3 percent in 2019 and then to 9.6 percent in 2021. The trend in SACCO usage shows some fluctuations over the years, with a general decline in recent years. On the contrary, banks and mobile money have shown a steady increase in their usage and have been identified as key drivers of financial inclusion in Kenya (FinAccess 2021).

There seems to be a shift in the financial service preferences of Kenyan adults, with banks and mobile money gaining popularity, while the usage of SACCOs is declining. Therefore, against this backdrop, the research aimed to evaluate whether the level of adoption of digital financial innovations in community-based DT-SACCOs was related to the declining trend.

1.1.1Digital Financial Innovations

Digital financial innovations refer to the utilization of technology and digital solutions by the community-based DT-SACCOs to enhance the delivery of financial products to members. This could be attained through the provision of digital credit services, connectivity to mobile money or ATM platforms to improve accessibility and convenience for members.

Digital financial innovations are empowering financial institutions to move away from traditional brick and mortar operations. Such transformations increase operational efficiency and enhance service delivery. According to Kabir (2022), the adoption of mobile banking, online banking, digital payments by financial institutions provide additional means to deliver products and services to customers enhancing efficiency, convenience and improved reach.

Financial institutions are partnering with fintechs and money transfer operators to expand their products and delivery of services. The adoption of digital financial innovations is aimed at increasing the customer base, reducing transaction cost, enhancing delivery of services and improving financial performance. The 2021 supervisory report by SASRA indicates that

integrating technology into the delivery of SACCO financial services will be a significant game-changer in the sector, benefiting members (SASRA, 2022). Convenience and accessibility to financial services will remain critical factors influencing client or customer patronage. Therefore, SACCOs must integrate technology into their products and services; otherwise, the ever-growing technologically adept demographic will inevitably seek similar services elsewhere.

1.1.2Financial Inclusion

Financial inclusion is the active and regular utilization of products and services such as savings, credit, or payment products due to their affordability, convenience and alignment with the customer needs. Financial inclusion offers individuals and entities the opportunity to access affordable and high-quality financial services, tailored to cater to their needs (World Bank, 2022). The origins of this concept trace back to the late 1990s, a period when organizations began providing fundamental access to financial services, particularly savings and microcredit services, to underserved populations (UNCDF, n.d.). The UNCDF has since made a shift in its financial inclusion interventions, which aim at creating an enabling environment for organizations to address the challenges that may prevent the financial sector from being inclusive.

UNCTAD (2021) has identified the use of technological innovations and digital solutions, innovative business models, and improved financial literacy as opportunities to tackle some of concerns that may impede financial inclusion. Increased accessibility and affordability to financial services also remain important in driving inclusion. The utilization of mobile money and other digital financial innovations has showcased considerable promise in promoting financial inclusion. IFC (2018) recognizes that such services reduce infrastructure costs and increase financial services coverage. The emergence and adoption of innovative business models have opened up fresh opportunities and overcome obstacles barriers to conventional

financial services. Such models address issues related to market failures and consumers concerns that subsequently affect the user's choice of financial services.

Financial inclusion has attracted significant attention from various stakeholders, encompassing governments, NGOs, international financial institutions, researchers, and the wider development community (World Bank, 2014). UNCTAD (2021) acknowledges the significance of financial inclusion in facilitating inclusive and sustainable development and promoting shared prosperity. Financial inclusion is a key priority for developing countries, including Kenya, in the pursuit of the Sustainable Development Goals (SDGs). Attention should, therefore, focus on populations with unmet financial needs.

The 2021 supervisory report by SASRA indicates that membership in SACCOs stood at 5.99 million members by the end of December 2021. As indicated in the FinAcess Survey Report of 2021, this represents approximately 10.9 percent of the 27,212,052 Kenyan adult population. This underscores the importance of the SACCO sector in fostering financial inclusion within the country.

1.1.3Community-Based DT-SACCOs in Kenya

Community-Based DT-SACCOs are deposit-taking savings and credit cooperatives whose membership is based on social associations within the community, such as churches, non-governmental organizations, or similar groupings in the community. They undertake financial intermediation and other activities by way of receipt of deposits, domestic money transfer services, and the provision of credit services.

Cooperatives, including Community-Based DT-SACCOs, are considered as people-centered enterprises owned and controlled by members. According to ILO (2015), members of the cooperatives voluntarily join to fulfill their shared social, economic and cultural needs. In their joint policy brief of 2015, the International Cooperative Alliance and the International Labour

Organization suggested that cooperatives are well-positioned to contribute to the accomplishment of the SDGs. Through the mobilization of savings and offering of affordable credit services in alignment with Kenya's Big Four Agenda, SACCOs have the potential of contributing to the deepening of financial access in the Country. As a key player in the economy, SASRA (2022) reported that the SACCO sector alone controlled 6.67 percent of Kenya's GDP in 2021. This shows a significant role that SACCOs can play in the achievement of the country's developmental goals.

There are two broad categories of SACCOs: Deposit-Taking (DT) and Non-Withdrawable Deposit-Taking (Non-WDT) (SASRA, 2022). The distinction between the two categories is that DT-SACCOs engage in deposit-taking business by mobilizing deposits payable on demand, in addition to the non-withdrawable deposits for the members while non-WDT SACCOs limit themselves exclusively to only non-withdrawable deposits. However, in both types, the non-accessible deposits are utilized as collateral for loans advanced to members and can only be withdrawn upon leaving a SACCO.

In each type, they are further classified into four: government-based, agricultural-based, private-based, community-based, and private-based depending on the common bond characteristics of original membership (SASRA, 2022). According to SASRA (2022), the SACCO subsector in Kenya has an aggregate of 176 DT-SACCOs and 183 Non-WDT-SACCOs. The 176 DT-SACCOs comprise 82 government-based, 49 agricultural-based, 25 community-based, and 20 private-based SACCOs.

Contrary to other DT-SACCOs that draw their membership from closed fields, community-based SACCOs are open, and members are drawn from various fields and mostly tend to bring together members who are not within specific professions. Their memberships are based on social associations within the community, such as churches, non-governmental organizations,

or similar groupings in the community. By drawing membership from specific social associations within the community, these SACCOs cultivate a sense of trust, shared values and familiarity among their members.

The social association-based membership approach allows community-based DT-SACCOs to cater to their members' the unique needs and circumstances, helping them meet their financial needs and thus improving their living standards. Their financial products, services, and programs are customized and align with the specific requirements and objectives of the members they serve. Additionally, these SACCOs leverage existing social networks to promote financial literacy, encourage savings habits, and provide targeted financial education and support to their members. *Appendix III* provides an overview of SACCO products.

1.2Statement of Problem

The FinAccess report of 2021 highlight how the concept of financial inclusion is pivotal for countries, especially developing ones, in improving financial access to their population. In the period between 2006 and 2021, Kenya's financial sector has shown remarkable developments, with various institutions designing their products and services to increase market penetration and accessibility to financial services. Despite this expansion, the triennial global findex data from the World Bank reveals that 86 percent of individuals in low-income countries who are living in poverty still face exclusion from accessing and utilizing financial services. This exclusion is primarily attributed to the inadequate implementation of financial inclusion strategies. In spite of SACCOs being identified as key players in the country's financial inclusion efforts, they have experienced a decrease in the usage of their products and services. For instance, the 2019 FSD survey indicated a decline in the daily utilization of SACCO financial services, dropping from 3 percent to 0.5 percent between 2016 and 2019. Moreover, the 2021 FinAccess survey indicate that usage of SACCO products and services declined by 3.3 percent from 12.9 percent in 2016 to 9.6 percent in 2021, with mobile money and banks

recording higher proportions of usage of technological innovations, which stood at 81.4 percent and 44.1 percent, respectively. Likewise, as indicated in the 2021 SACCO supervision report by SASRA, 1.18 million out of 5.99 million members during the year that ended in December 2021 were dormant, which implied that approximately 19.7 percent had not transacted with their respective SACCOs for more than six months. These observations also imply that the uptake of SACCO products and services is declining, while a proportion of the population is dropping their use of SACCO financial services.

Recognizing the growing significance of SACCOs in the economy, numerous studies on the subject have emerged, exploring various perspectives. These studies cover a spectrum of topics, ranging from the role SACCOs play in the financial inclusion landscape to the strategies implemented by SACCOs to achieve financial inclusion. A review of empirical studies shows that there are limited analyses of the factors contributing to the decreasing trend in the utilization of SACCO products and services in Kenya in past few years. This is noteworthy, especially considering that alternative providers have witnessed a rise in usage during the same period.

Mumanyi (2014) aimed to ascertain the obstacles faced by SACCOs in Mombasa, such as inadequate finances, discrimination, and administrative issues with the county government, among others. The study concluded that there was a need to introduce new, high-quality products and services to help SACCOs effectively compete with other financial institutions, such as banks. However, the study did not explore the possibility that the low level of adoption of digital financial innovations within SACCOs as a potential aspect in the declining utilization of financial products and services.

While appreciating the role that SACCOs in Kenya play in promoting financial inclusion, Barasa, Musiega, and Mungai (2023) only researched the effect of expansion decisions on the

financial success of SACCOs. They observed that growth decisions were a major predictor of financial success but did not consider the critical role that digital innovations might play in promoting financial inclusion.

Therefore, this research aimed to address the gap in the literature by evaluating the influence of digital financial innovations on financial inclusion in community-based DT-SACCOs in Kenya

1.3Study Objectives

The research study focused on the following objectives;

1.3.1General Objective

The research general objective was to establish the effect of digital financial innovations on financial inclusivity in community-based deposit taking savings and cooperatives in Kenya.

1.3.2Specific Objectives

The specific study objectives were: -

i. To ascertain the effect of digital credit services on financial inclusion within community-based deposit taking SACCOs in Kenya.
ii. To determine the effect of mobile money connectivity on financial inclusion within community-based deposit taking SACCOs in Kenya.
iii. To determine the effect of ATM connectivity on financial inclusion within community-based deposit taking SACCOs in Kenya.

1.4Research Hypotheses

The hypotheses tested in the study include: -

H_{01}: There is no statistically significant effect of digital credit services on financial inclusion within community-based deposit taking SACCOs in Kenya.

H_{02}: There is no statistically significant effect of mobile money connectivity on financial inclusion within community-based deposit taking SACCOs in Kenya.

H_{03}: There is no statistically significant effect of ATM connectivity on financial inclusion within community-based deposit taking SACCOs in Kenya.

1.5Significance of the Study

The outcomes of the research are critical to various stakeholders, including SASRA and other financial inclusion policymakers, SACCO management, researchers, and academicians.

The research may benefit SASRA and other financial inclusion policymakers by providing invaluable insights into how digital financial innovations by deposit-taking SACCOs affect financial inclusion in Kenya. This information would guide policies and regulations designed to enhance financial inclusion. The findings particularly guide on the specific areas that need more attention and support to ensure Community Based DT-SACCOs are promoting financial inclusion effectively.

For the management of Community Based DT-SACCOs, the research provides invaluable insights on the effectiveness of their products and services in promoting financial inclusion. The research has identified ways to improve their services to better serve their members and hence promote financial inclusion. Similarly, the research has contributed to the existing literature by providing new insights into financial inclusion and SACCOs and in particular, the Community Based DT-SACCOs. This establishes an empirical foundation for future research on the topic, and advancing related theories and models.

1.6Scope of the Study

The research provides an in-depth examination of digital financial innovations on financial inclusion within community-based DT-SACCOs in Kenya. The study utilized a census survey design whereby data was gathered from all Community-Based DT-SACCOs in Kenya. Census

survey design was used to gather information from each community-based DT-SACCO in Kenya.

The research offers invaluable perspectives on the current status of financial inclusion by community-based DT-SACCOs in Kenya, exploring how various factors influence their ability to reach and serve the underbanked populations.

1.7Limitation of the Study

One of the confines of the research included having access to non-public information, which the SACCOs deemed to be confidential. However, this concern was addressed by the researcher furnishing the respondents with a letter from Kenyatta University's graduate school, confirming that the data collection request would be used exclusively for educational reasons.

Time was another limitation that was encountered as some respondents delayed in providing responses within the expected timelines. However, through follow-up calls and emails, most Community Based DT-SACCOs provided their responses and as a result a response rate of 80% was achieved. Only five (5) of the target population did not provide their responses.

1.8Organization of the Study

This chapter provides an overview of financial inclusion and community-based DT-SACCOs in Kenya and the role of digital innovations in the financial inclusion space. It further outlines the problem statement and research objectives, which link digital financial innovations with financial inclusion within community-based DT-SACCOs in Kenya. It also indicates the significance the study has for various stakeholders, i.e., SASRA and other financial inclusion policymakers, SACCO management, researchers, and academicians; the research scope; and the potential limitations. The subsequent chapter covers literature review on theoretical framework and empirical review of SACCO digital financial innovations and financial

inclusion, and a conceptual framework that links the study variables. The third chapter discusses the approach that was applied so as to accomplish the research objectives.

The fourth chapter outlines an analysis of the collected data related to digital financial innovations and financial inclusion in community-based DT-SACCOs while the final chapter provides the conclusions by discussing the findings of the analysis of the research results. Additionally, it provides key recommendations for enhancing financial inclusion in community-based DT-SACCOs and proposals for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1Introduction

In this chapter, comprehensive review of the theories that make up the foundation of the research are explored, along with empirical studies related to digital financial innovations and their effect on financial inclusion.

A conceptual framework that provides a summary of the interactions among the research variables is also provided as an illustration in the chapter.

2.2Theoretical Review

This section provides an overview of the theoretical foundations that underpin the study. The research will be determined by theories which are- Theory of Planned Behavior, Technology Acceptance Model, Modern portfolio theory and Financial Innovations Theory.

2.2.1Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB), was postulated in 1991 by Icek Ajzen in 1991 as a psychological theory that serves as a framework for analyzing and predicting human behavior (Ajzen, 1991). The theory illustrates how a person's behavioral intention is shaped by a combination of three core factors: perceived behavioral control, subjective norms and attitudes. The core idea behind TPB is that individuals make rational and systematic decisions based on their intentions, which are in turn shaped by perceived behavioral control, subjective norms and attitudes. Figure 2.1. provides an illustration on how these factors work together to influence an individual's behavioral intentions, which, in turn, guide their actual behavior.

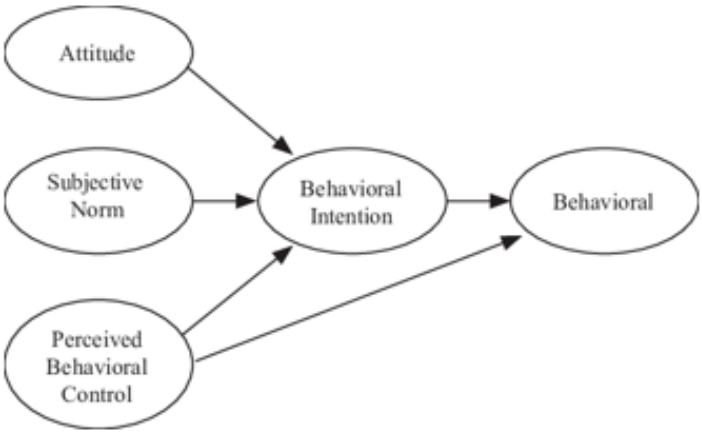

Figure 2.1: Theory of Planned Behavior

Source: Ajzen (1991)

According to TPB, stronger positive attitudes, perceived social support, and greater perceived control over the behavior increase the likelihood of forming strong intentions to engage in the behavior.

Hapsari (2021) affirms that the approach of TPB framework can apply in predicting an individual's inclination to invest in mutual fund products. Similarly, this study utilized TPB to in gaining the understanding on how the social norms, perceived control over behaviour and attitudes of SACCO members shapes their uptake of SACCO products and services, thereby influencing their levels of financial inclusion.

2.2.2Technology Acceptance Model (TAM)

Hypothesized in 1989 by Davis, Bagozzi, & Warshaw, the TAM provides a comprehensive framework of explaining and predicting how users come to accept and use a new technology based on their perceptions. TAM proposes that the crucial factors influencing adoption of technology are primarily the perception of expediency and ease of use. Various factors such as prior experience, social influence and perceived compatibility with existing practices influence

the perception of usefulness and ease of use of technology. This, in turn, influences the attitude that users have towards using technological innovations. This is illustrated in Figure 2.2.

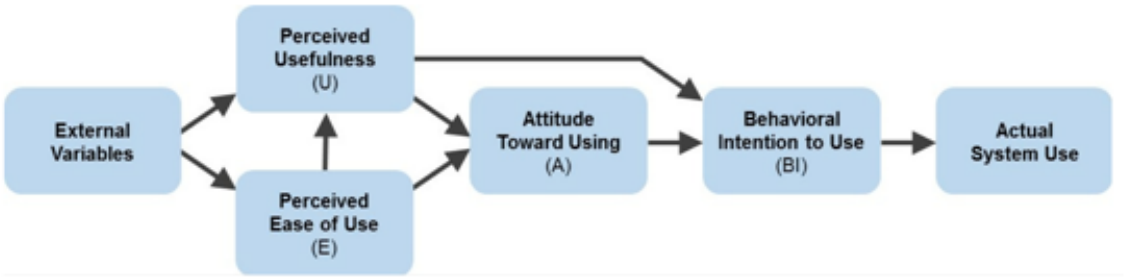

Figure 2.2: Technology Acceptance Model (TAM)

Source: Davis, Bagozzi & Warshaw (1989).

According to Davis, Bagozzi and Warshaw (1989), these perceptions determine the attitude of users towards a particular technological innovation, their inclination towards using the technology, and its eventual actual use. The theorists characterized the perception of utility as the theory that utilizing the technology will improve profitability or productivity, and the perception of ease of use as the belief in how easy it is to use the technology.

TAM supports variables related to technology, including ATM banking, agency banking, internet banking and mobile banking. It elucidates the significance of various determining factors in users' decisions to embrace technological solutions. Subsequently, these decisions culminate in observable behavior in usage, which can take the form of either acceptance or rejection.

Studies have applied TAM to understand the acceptance and utilization of technology within the financial services sector. The perception of usefulness and ease of use of technology plays a crucial role in influencing the adoption and usage of technology-enabled financial services. Based on this theory, the research aimed to assess the perceptions of usefulness and ease of use regarding digital innovations implemented by community-based DT-SACCOs. It helped when

exploring the effect of adoption and acceptance of digital innovations on financial inclusion within the community-based DT-SACCOs.

2.2.3Modern Portfolio Theory (MPT)

Modern Portfolio Theory was introduced in the 1950s by Harry Markowitz as an investment framework that balances risk and return. The theory argues that investing in different asset classes, sectors and regions reduces the risks in the investment portfolios. Different types of investments entail varying risks and returns, and overall portfolio risk can be reduced without sacrificing returns through diversification. Markowitz (1952) proposed that when investing, one should select portfolios based on the risk-return characteristics of the investment choice rather than on the characteristics of individual securities. In addition, investors could result in portfolios that either reduce risk for a given projected return or maximize returns for a particular level of risk.

Research has shown that diversification can be an effective strategy for reducing portfolio risk and promoting financial inclusion. Diversification of investments enables financial institutions to mitigate risk and enhance their ability to serve to a more extensive clientele, encompassing underserved and unbanked populations. This can help expand credit and increase access to savings and other financial services to the underserved population.

In summary, modern portfolio theory has been widely accepted as an effective way to manage portfolio risk, improve investment performance, and broaden access to diverse financial services for the marginalized groups. This, in turn, fosters financial inclusion, contributing to the advancement and development of small businesses and individuals.

In the context of this research, modern portfolio theory was employed to assess how the diversification of SACCO products by community-based deposit-taking SACCOS influenced

the ability to reach more members, increase member retention, and in turn increase the ability to promote financial inclusion.

2.2.4Theory of Financial Innovation

In 1983, Silber introduced the Theory of Financial Innovation, which asserts that the primary catalyst for promoting financial inclusion in financial institutions is the expansion of financial services (Sekhar, 2013). Accordingly, the theory considers financial innovations as novel solutions or established methods through which the latest elements of progress are introduced to improve firms' liquidity and attract new participants. The proponents of the theory assert that the development of financial institutions is fostered through improved efficiency and reduced administrative and financial costs resulting from innovations.

The theory also suggests that financial innovation, which involves introducing new products and delivery methods, has the probable to boost financial inclusion to the marginalized population by increasing financial access. It further suggests that financial innovations enhance the financial system's effectiveness and efficiency, leading to increased access to new opportunities that contribute to deepening financial inclusion. According to Kimotho (2016), financial innovation is positively correlated with financial inclusion, thereby supporting this theory.

It is noted that diversification of SACCO products, mainly resulting from digital innovations, positively influences financial inclusion among SACCOs in Kenya. Therefore, the theory applies to this study when examining how digital innovations by community-based DT-SACCOs help promote financial inclusion among their members. This was particularly useful in defining SACCO product innovations and service delivery channels available within community-based DT SACCOs reducing transaction costs. It was noted that diversification

makes it more cost-effective for organizations to serve previously unserved or underserved populations.

2.3Empirical Literature Review

An empirical literature review was conducted to examine and synthesize various research studies on digital credit services, mobile money connectivity and ATM connectivity. The aim was to consolidate and assess the current state of knowledge on each of these topics.

2.3.1Digital Credit Services and Financial Inclusion

Digital credit services refer to the use of digital platforms to offer loans and credit facilities in a more accessible and efficient manner. Research indicates that digital credit has the potential to facilitate borrowing through digital platforms, thereby enhancing financial inclusion, especially in underserved and remote areas (Tiony, 2023; Manasseh, Nwakoby, Okanya, Nwonye, Odidi, Thaddeus & Nzidee, 2023). Digital credit services, specifically, have shown a positive correlation with financial inclusion by addressing barriers such as physical access to financial institutions, lack of credit history, and insufficient documentation or collateral. A study by Wathome (2020) found out that digital credit contributed to a reduction in poverty levels and increased financial autonomy among the youths, concluding that digital credit directly affects financial inclusion.

While some studies indicate that the provision of digital credit services increases access to credit and positively influences financial inclusion, others reach contrasting conclusions. For example, a study by Agufa (2016), which aimed to ascertain the correlation between digital finance and financial inclusion in Kenyan banks, found no significant correlation. The study concluded that the uptake of digital financial services was primarily intended at lowering operational costs and boosting profitability and financial success, rather than enhancing financial inclusion. Similarly, Wamuyu, Jagongo, and Musau (2022) examined the relationship

between access to digital credit and financial inclusivity among Kenyan youth and found a positive but negligible relationship. The research suggested that digital credit had no statistically significant effect on financial inclusion amongst the Kenyan youth.

2.3.2Mobile Money Connectivity and Financial Inclusion

Mobile money connectivity is the integration of financial services with mobile devices, enabling users to conduct a wide range of financial transactions—such as payments, transfers, and account management—directly from their mobile phones. The access of financial products and services through mobile phones has been discovered to favorably influence financial inclusion. According to the World Bank, digital transactional platforms and mobile banking are crucial elements of digital financial inclusion (CGAP, 2016). A study by Asif, Khan, Tiwari Wani and Alam (2023) indicate that mobile money connectivity has broadened financial access by marginalized groups, such as low-income individuals and women. Results in a study by Wanjiku, Koori and Atheru (2020) indicated that, within commercial banks in Nairobi County, mobile banking had a positive influence on financial inclusion. While some studies support the same proposition, others present mixed findings regarding mobile money. For instance, Koske and Njoroge (2017) reported that while mobile banking positively affected financial inclusion, the impact was less significant than anticipated, with uneven adoption across different demographic groups. Similarly, a study by Kariuki and Onsiro (2022) found no direct association between the utilization of mobile banking products and financial inclusion within SACCOs in Nyandarua County. These outcomes suggest that while mobile money can facilitate access to financial services, its influence on financial inclusion is complex and context-dependent. Therefore, mobile banking alone may not directly contribute to financial inclusion in SACCOs.

2.3.3ATM Connectivity and Financial Inclusion

ATM connectivity refers to the integration with Automated Teller Machines (ATM) platforms to provide access to a range of banking services such as cash withdrawals, transfers, payments and account inquiries. The use of ATMs as part of digital financial innovations can improve accessibility to financial services by providing convenient access points for transactions. According to the World Bank, digital transactional platforms such as Automated Teller Machines (ATMs), the use of digital devices, and retail agents constitute crucial elements of digital financial inclusion (CGAP, 2016). Winga and Ndede (2021) found out that ATM usage had a significantly positive effect on financial deepening. However, the scope of data was limited to one of the tier one financial institutions in Kenya. Sanga and Aziakpono (2022) sought to examine the influence of technological innovations such as ATM and branch among 43 African countries for the period 2010–2019. The study suggested that ATM and branch network had a favorable and substantial influence on the constructs of financial deepening. However, KIB (2022) reported that the Banking Industry Customer Satisfaction Survey 2021 observed a declining trend in the use of bank ATMs as mobile money usage increased.

2.4Literature Review Summary and Research Gaps

This section synthesized the findings of the literature review and provided insights into the review and research gaps, summarized in Table 2.1. The table offered an synopsis of the current state of knowledge in the field and identified areas that this research aimed to address regarding unanswered questions.

Table 2.1Literature Review Summary and Research Gaps

Author/ Year	Study Topic	Key Insights	Identified Research Gaps	*Areas Considered in the Current Study*
Manasseh et al., 2023	Impact of digital financial innovation on financial system development in COMESA countries.	Digital innovations notably affect the advancement of the financial system.	While the study centered on digital innovations, it did not link this variable with financial inclusion.	The current study sought to link digital innovations with financial inclusion, and in particular, within the community-based DT-SACCOs.
Yan, C., et al 2023	Influence adoption intention of using mobile financial service during the COVID-19 pandemic: The role of FinTech. Environmental Science and Pollution Research.	Factors such as trust, security, and social influence are significant contributors for the adoption of mobile financial services.	The connection between the mobile financial services adoption and financial inclusion has not been explored.	The current research explored the relationship between mobile banking connectivity and financial inclusion.
Kariuki & Onsiro, 2022	Analyzing the Effect of Usage of DT-Sacco Financial Products on Financial Inclusion in Nyandarua County, Kenya	There is no direct relationship on the usage of credit services and mobile banking of financial inclusion	Limited scope in terms of geographical coverage. It covered DT-SACCOs in Nyandarua County Limited variables studied in relation to their influence on financial inclusion	The current study covered a wider geographical scope and used more variables

Author/ Year	Study Topic	Key Insights	Identified Research Gaps	*Areas Considered in the Current Study*
Isabwa, 2021	Effect of Mobile Banking on Financial Inclusion Amongst Financial Institutions in Kenya.	Mobile banking significantly influences financial inclusion	The research was limited to only mobile banking	The scope was broad as it covered more variables which include mobile banking connectivity, internet banking connectivity and ATM connectivity
Wathome, 2020	Effects of Digital Credit on Financial Inclusion of the Youth in Kenya: A Survey of Kangemi, Nairobi County.	Digital credit directly affects the financial inclusivity among the youths.	The target population was the youths (a demographic segment) The geographic coverage was limited to Kangemi	The demographical coverage was broadened spanning from the youth to the elderly. The geographical spread of the community-based DT-SACCOs was wide covering the entire country.
Mutua, 2018	The effect of financial innovation on financial inclusion in Kenya	Financial inclusion was noted to be significantly influenced by financial innovation.	Focused on financial inclusion within deposit taking micro finance banks. Used secondary data held by the CBK.	The current study focused on financial inclusion in community-based DT-SACCOs. The research utilized primary data that was acquired from community-based DT-SACCOs.

Author/ Year	Study Topic	Key Insights	Identified Research Gaps	*Areas Considered in the Current Study*
Koske & Njoroge, 2017	Assessing the impact of mobile money on financial inclusion in Kenya.	Mobile money does not have a notable favorable influence on financial inclusion in Kenya.	Limited variables of digital financial innovations.	More variables of digital innovations were used in determining their effect on financial inclusivity.
Agufa, 2016	The Effect of Digital Finance on Financial Inclusion in the Banking Sector in Kenya.	Digital finance has no correlation on financial inclusion	Looked at financial inclusion as credit penetration Focused on the banking sector	Financial inclusion was evaluated in terms of diversification, accessibility, simplicity and clarity, affordability, timely delivery and existence of possible restrictions in the context of community-based DT-SACCOs.

Source: Researcher (2024)

2.5Conceptual Framework

According to Bryman and Bell (2020), a conceptual framework is a structured, theoretical approach used to guide research by defining key concepts, variables, and their relationships (Bryman & Bell, 2020). It provides a foundational structure for understanding and analyzing a particular phenomenon or problem.

The main aim of the research was to ascertain the effect of digital financial innovations on financial inclusion within community-based DT-SACCOs in Kenya. The constructs of the independent variable included digital credit services, mobile money connectivity and ATM connectivity.

The conceptual framework in Figure 2.3 guided the research by offering a visual representation of the fundamental concepts, variables, and relationships within the study.

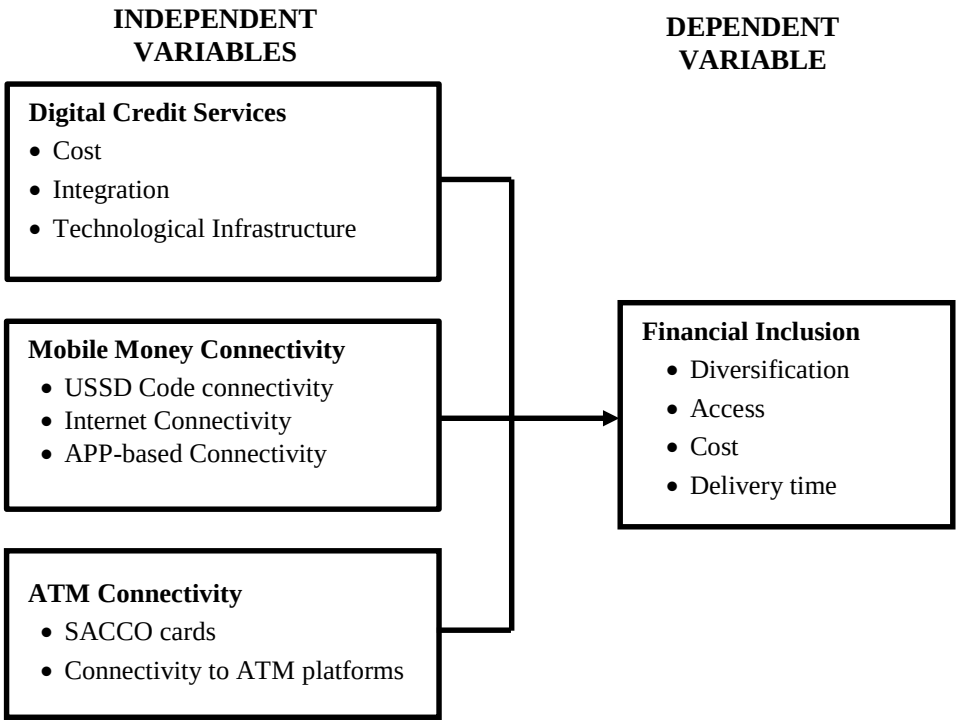

Figure 2.3Conceptual Framework

Source: Researcher (2024)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1Introduction

This chapter provides the approach that was employed in conducting the research. It includes several components: the research design, target audience, sampling approach, data collection tools, and procedures, assessment of the validity and reliability, operationalization and measurement of research variables, analysis and presentation of findings, and a section on addressing ethical issues to strengthen the validity and trustworthiness of the research.

3.2Research Design

Bryman (2016) aver that research design is the systematic approach employed to guide the process of addressing the research problem in a logical and efficient manner. It outlines the framework for collecting, analyzing, and interpreting data to address the research questions or hypotheses. A well-designed research study allows the researcher to gain comprehension of the types of associations that exist between and among variables, ensuring that the results are reliable, valid and generalizable.

This study adopted an exploratory research design to explore digital financial innovations in community-based DT-SACCOs in Kenya and the effect they have on financial inclusion in within these SACCOs. An exploratory research design facilitates a deeper understanding of a phenomena and investigates research questions leaving room for future studies (Saka, Osademe, & Ononokpono, 2023). A survey was administered to all 25 community-based DT-SACCOs in Kenya to collect data on the independent variables, which included digital credit services, mobile money connectivity and ATM connectivity as well as the dependent variable, financial inclusion. The research used a survey that was administered online, and the collected data went through quantitative analysis employing descriptive and inferential statistics, as well as multiple regression analysis.

3.3Target Population

Determining the target population is crucial since it enables a researcher to establish the sample design and assess the feasibility of generalizing the study findings. In research, a target population, as defined by Kothari (2019), refers to the complete set of items or individuals under examination. In this research, the target population comprised of the 25 community-based DT-SACCOs in Kenya (SASRA, 2022). The selection of community-based DT-SACCOs as the target population was because they have an open membership structure, unlike other categories that draw membership from closed fields. The list and geographical distribution of these SACCOs are as indicated in *Appendix IV.*

3.4Sampling Design

Kothari (2019) describes sampling design as the method of selecting a few items from the study population, and these few items constitutes a sample. A census was conducted as the target demographic was tiny; thus, all 25 community-based DT-SACCOs in Kenya as of December 31, 2022, were targeted but responses were received from 20 SACCOs and only the 20 were studied.

The research used purposeful sampling techniques to select SACCO's Front Office Services Activity (FOSA) managers as respondents to the questionnaire. The selection of FOSA managers was based on their responsibility for all aspects of FOSA business, including driving growth by offering attractive products and services that attract potential members and retain the existing ones. Therefore, the study targeted a total of 25 participants.

3.5Data Collection Instrument

The methods of data collection are a crucial component of research design, and as Sekaran and Bougie (2016) opine, a well-chosen data collection method enhances the value of the research. The research utilized a structured questionnaire that was designed to assess various aspects of

digital financial innovations and financial inclusion in Community-based DT-SACCOs using a Likert-scale approach. In this approach, the questionnaire is designed to present respondents with a statement, prompting them to specify their level of agreement or disagreement by selecting from a range of options assigned different weights, ranging from 1 to 5 (where; 5=a great extent, 4=large extent, 3=somewhat, 2=little extent and 1=not at all). The Likert-scale method is favored due to its simplicity in understanding, quick response time, and efficiency in transforming qualitative responses into quantitative values. The respondent's ratings for all the Likert items related to a specific construct are aggregated, yielding an index that measures the underlying latent variable (Chandrakandan, Venkatapirabu, Sekar & Anandakumar, 2001).

The questionnaire had five sections; the first sought general responders demographic information; the second covered information related to financial inclusion in community-based DT-SACCOs; the third focused on digital credit services; the fourth addressed mobile money connectivity; and the fifth examined ATM connectivity. The research tool is provided in *Appendix II.*

3.6Empirical Model

The study employed multiple regression analysis to identify the best-fitting linear relationship between financial inclusion and study variables relating to digital financial innovations in community-based DT SACCOs. According to Roberts and Roberts (2020), multiple regression analysis is a testing method that assesses the degree of variance explained in a dependent variable by multiple predictors. The empirical model covering the objectives of the study was expressed mathematically as:

$$\text{Financial Inclusion} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

X_1 = digital credit services.

X_2 = mobile money connectivity.

X_3 = ATM connectivity.

β_0 = intercept term.

β_1, β_2 and β_3 = multiple regression coefficients. They were estimated through statistical techniques to assess the individual and combined effects of digital credit services, mobile money connectivity and ATM connectivity on financial inclusion in community-based DT-SACCOs in Kenya.

ε = error term. It represents unobserved factors affecting financial inclusion and are not accounted for by the independent variables.

3.7Procedure for Data Collection

This research adopted a primary data collection method in which questionnaires were distributed as an online survey using a reliable and secure platform, allowing respondents to access the questionnaire via a unique web link. An invitation containing the survey link and an introduction letter (*Appendix 1*) with brief explanation of the study's intent and discretion was dispatched via the same platform to the targeted respondents.

Respondents were able to access and complete the questionnaire at their convenience using a computer, tablet, or smartphone with internet access. They were to submit their responses electronically within a period of 2 weeks but few responses were received. Reminder emails and follow up calls were made continually made which led to a response rate of 80% after a period of one month. As respondents completed the online survey, their responses were automatically collected and securely stored.

The utilization of an online survey questionnaire ensured the data collection process was more efficient, as respondents participated from their domicile locations and at a time convenient to them. The online survey procedure ensures time efficiency, cost effectiveness and allows for confidentiality making respondents feel more comfortable to provide honest and candid

responses. According to Smith (2023), electronic data collection efforts such as online surveys or phone resulted in higher response rates as compared to traditional methods.

3.8Testing for Reliability and Validity of Research Instrument

3.8.1Reliability of Research Instrument

Testing the reliability of research involves checking for consistency and stability of the measurements obtained using the data collection instrument (Sekeran & Bougie, 2016). Ensuring that the instrument is dependable is essential in mitigating the risk of obtaining inaccurate findings for the research questions. Cronbach's alpha test was employed to evaluate how well the items within the research instrument correlated with each other for internal consistency. As suggested by Bonnett and Wright (2015), an alpha of 0.7 or higher indicates a higher level of internal consistency, but this is subject to contextual factors such as the sample size.

3.8.2Validity of Research Instrument

Validity is the precision with which an instrument accurately measures its intended construct (Sekeran & Bougie, 2016). This ensures that the collected data is accurate and meaningful. Validity was assessed with the help of the supervisor and peers and relevant adjustments were made on the research questionnaire before distribution. Their recommendations were particularly useful in ensuring accuracy and relevancy of the questionnaire.

3.9Operationalizing and Measuring Study Variables

The various variables selected for this study, details of their nature, indicators and types of measurements are detailed in Table 3.1.

Table 3.1: Measurement and Operationalization of Variables

Variable	Type of Variable	Operationalization	Measurement
Financial Inclusion	Dependent	• Access • Diversification • Cost • Delivery time	Likert scale 1 to 5
Digital Credit Services	Independent	• Cost • Integration • Technological infrastructure	Likert scale 1 to 5
Mobile Money Connectivity	Independent	• USSD code connectivity • Internet based connectivity • APP-based connectivity	Likert scale 1 to 5
ATM Connectivity	Independent	• SACCO cards • Connectivity to ATM platforms	Likert scale 1 to 5

Source: Researcher (2024*)*

3.10Analysis and Presentation of Data

Cleansing and transforming raw data into meaningful insights is critical in drawing conclusions and supporting decision making. As part of the data analysis process, all data collected via the survey, comprising of a total of 20 respondents, were coded and entered in Eviews for analysis. One respondent had not provided responses to section 5 of the questionnaire on ATM connectivity and this was addressed by listwise deletion where the observation was omitted during the analysis using Eviews.

The research employed descriptive statistics to provide summaries of the primary quantitative data. This included tallying up responses and computing percentage of responses to each question per variable. The findings were organized and visually represented using charts and tables.

Inferential statistics were utilized to establish the degree of correlation among the variables under examination, which enabled drawing of inferences about the population and facilitating the formulation of recommendations.

3.11Diagnostic Tests

The research utilized diagnostic tests: multi-collinearity, normality and heteroskedasticity to assess the quality and appropriateness of the data and to validate the assumptions of the multiple regression model.

3.11.1Multicollinearity Test

The research assessed multicollinearity to identify strong intercorrelations among independent variables, which could have led to challenges in estimating multiple regression coefficients making it tough to identify the specific impacts of the correlated independent variable of the dependent variable. The multicollinearity test was performed using the White Test.

3.11.2Normality Test

The research performed normality tests to assess whether the distribution of data followed a normal or Gaussian distribution. Normality is considered to be present when the residuals are normally distributed and are characterized by a consistent variance. Normality test was conducted using the Jarque-Bera Test.

3.11.3Homoscedasticity

The research conducted a heteroscedasticity test to recognize and resolve concerns pertaining to the reliability of the multiple regression analysis. This step ensured that the assumptions of the model were met by confirming that the variability or dispersion of errors remained constant across the entire range of values of the independent variables. This assumption is crucial in statistical analysis as it guarantees the validity and reliability of the model's predictions and estimates. Violations of this assumption could result in biased estimates of standard errors and, consequently, inaccurate hypothesis testing.

3.12Ethical Consideration

The researcher upheld ethical standards by obtaining an introductory letter from the university and seeking authorization from NACOSTI. Copies of these documents were attached to the questionnaire and the procedures of the survey were outlined in order to mitigate suspicion and enhance the response rate.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1Introduction

This chapter offers an analysis of the research findings with the aim of providing an analysis and interpretation of the results. The analysis was conducted using two main techniques; descriptive statistical analysis to provide a summary and context of further analysis and inferential analysis to empirically explain the individual and combined effect of digital financial innovations constructs - digital credit services, mobile money connectivity and ATM connectivity on financial inclusion on community-based DT-SACCOs in Kenya. The data was gathered from a census of 25 community-based DT-SACCOs in Kenya.

4.2Response Rate

This sub-section analyzes the response rate to the questionnaire, and the results are exhibited in Figure 4.1.

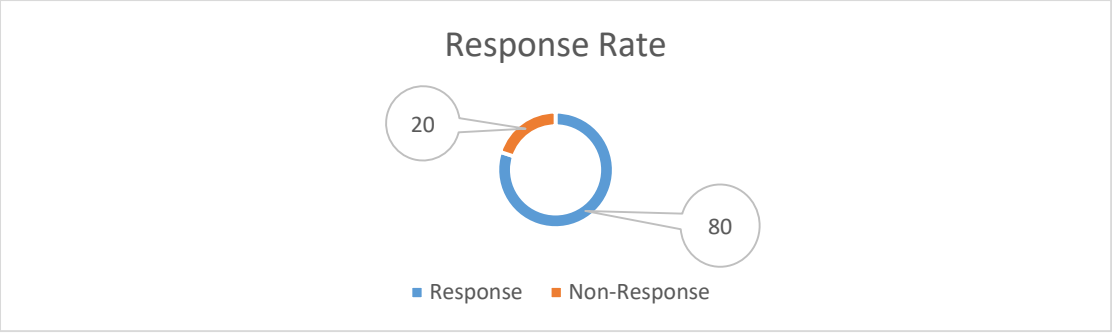

Figure 4.1: Response Rate

Source: Researcher (2024)

The survey questionnaire was directed to 25 respondents comprising of all the 25 Community-based DT SACCOs in Kenya. The survey was conducted over a duration of one month during which follow-up reminders were made to encourage non-respondents to maximize

participation. The link to the online survey was shared via phone for those who faced challenges accessing the survey from their emails. The efforts resulted in collecting data from 20 out of 25 SACCOs contacted, representing a response rate of 80%. A response rate of 50 percent and above seems appropriate and signals deservingness (Baruch & Holtom, 2008). Therefore, the response rate of this research represented an acceptable return rate rendering the survey-based study appropriate. The representativeness formed the basis of the research findings and analysis.

4.3Demographic Analysis

This section analyzes the characteristics of the responders to help contextualize the research findings. It describes the demographic details of the participants which include gender, age, educational level and the number of years worked in a SACCO.

4.3.1Gender of the Respondents

The research sought to analyze the proportions of male and female who took part in the survey and the findings are exhibited in Figure 4.2.

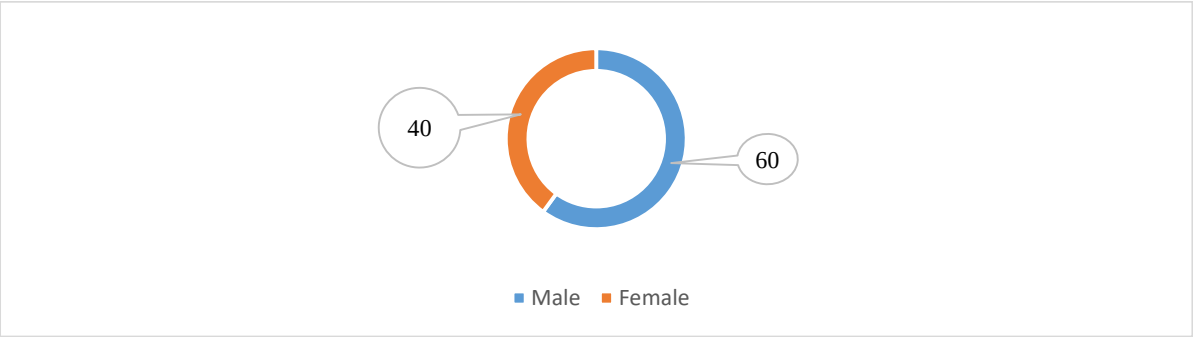

Figure 4.2: Gender Distribution

Source: Researcher (2024)

The analysis demonstrated that 60% of the responders were male whereas 40% were female. This is an indication that most male hold senior management positions Community Based DT-

SACCOs in Kenya as compared to their female counterparts within the Community Based DT-SACCOs in Kenya. The predominance of males in senior management roles can be attributed to cultural norms and gender roles, which have traditionally placed men in positions of authority and leadership in Kenya. Additionally, men have historically had greater access to education and professional development opportunities compared to women, creating a disparity in the number of qualified male candidates for senior management positions.

4.3.2Age of the Respondents

The research aimed to ascertain the distribution of responders across different age groups and the findings are exhibited in Figure 4.3.

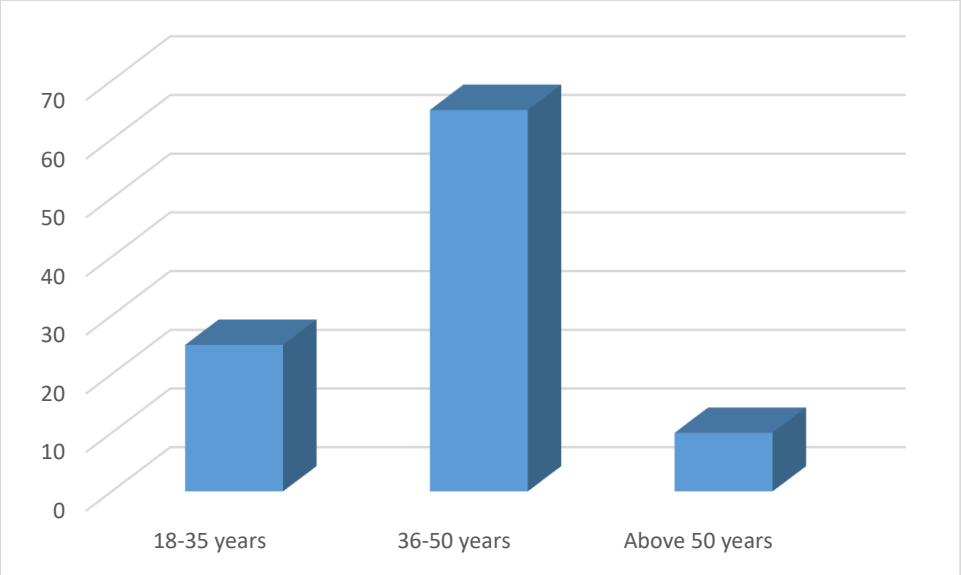

Figure 4.3: Age Distribution

Source: Researcher (2024)

The results suggested that 25% of the responders were of the age bracket of 18-35 years, 65% were of the age bracket of 36-50 years while 10% of the responders were aged above 50 years. This shows that the proportion of the survey participants are middle-aged adults closely followed by the youth.

4.3.3Educational Level of the Respondents

The research analyzed the highest educational level of the responders and the results are shown in Figure 4.4.

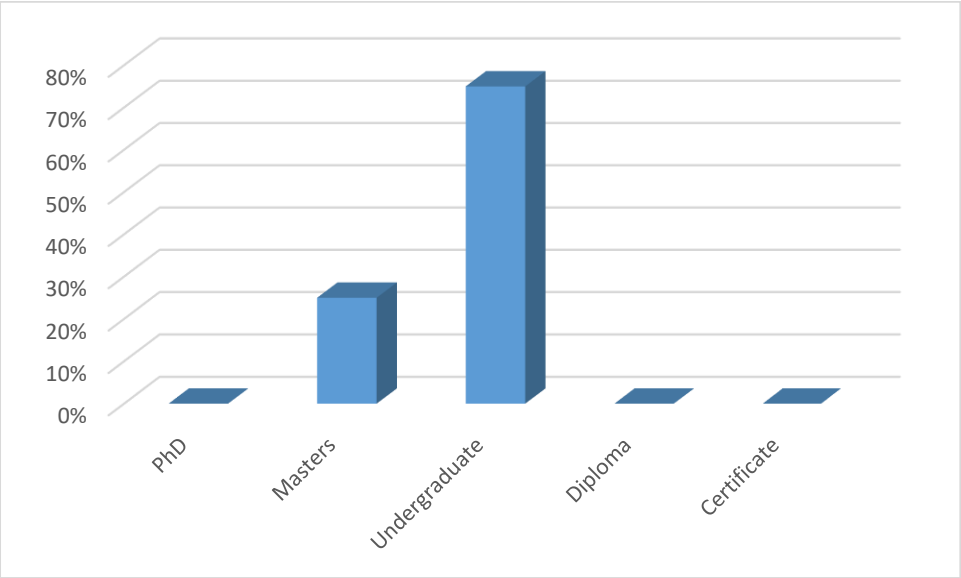

Figure 4.4Highest Level of Education

Source: Researcher (2024)

The results suggested that the lowest educational qualification of the respondents is an undergraduate degree. Most of the responders have a Bachelor degree as the highest educational qualification representing 75%, while a smaller proportion have pursued further academic qualifications at the master's level representing 25%. There was no respondent with the highest qualification of a PhD degree. Having fewer respondents with advanced degrees - master’s or PhD suggests a potential gap in advanced financial management knowledge or strategic planning expertise within the Sacco. Thus, it highlights a need for additional training or professional development for individuals in managerial or decision-making roles within the community-based deposit taking SACCOs in Kenya.

4.3.4Number of years worked in a SACCO

The research aimed to ascertain the years of work experience that the responders had in the SACCO and the results are exhibited in Figure 4.5.

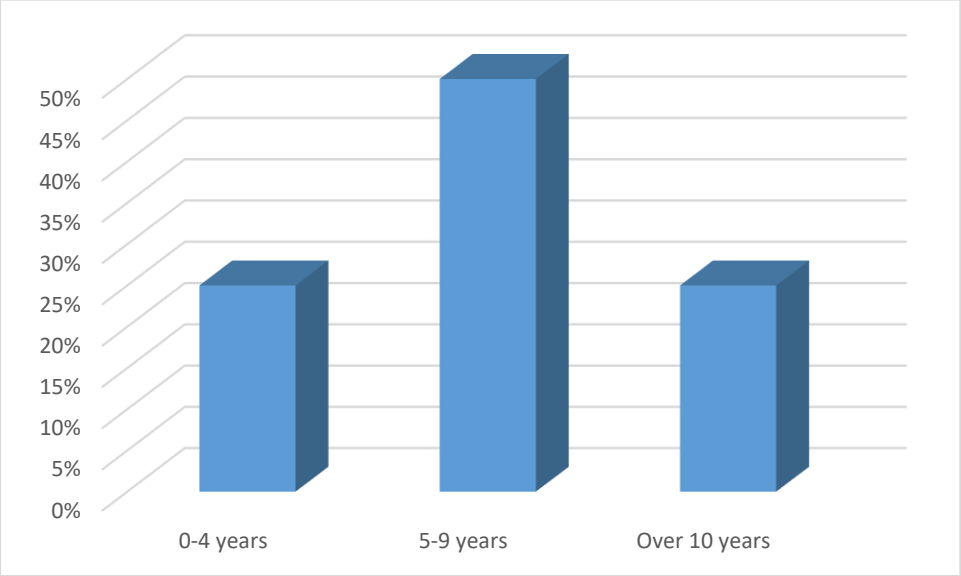

Figure 4.5: Number of years worked in a SACCO

Source: Researcher (2024)

The results suggested that a majority of the responders (50%) had worked in a SACCO for 5 to 9 years while out of the remaining half, a quarter (25%) had worked in a SACCO for 10 years and the other quarter (25%) for 0 to 4 years, respectively. This indicates that most senior management staff of the community-based DT-SACCOs are in the middle stages of their careers within the SACCO sector.

4.4Descriptive Statistical Analysis

This section provides a summary and description of the main features of the constructs under study in a quantitative manner.

4.4.1Descriptive Analysis of Financial Inclusion

The respondents were asked questions about the availability, diversification, access, cost, adequacy, and convenience of the SACCO products and services available to them. The research aimed to analyze the extent to which respondents perceived that their members had access to and utilized SACCO financial products. Table 4.1 offers a summary of the responses as percentages (where; 5=great extent, 4=large extent, 3=somewhat, 2=a little extent and 1=not at all).

Table 4.1: Financial Inclusion

	Statement	**1**	**2**	**3**	**4**	**5**
1.	The SACCO's products and services are well diversified i.e. the SACCO offers a variety of savings and credit products, including insurance and other payments services	0	0	25	40	35
2.	The SACCO's products and services are easily accessible to members i.e. the SACCO offers a variety of delivery channels through which members access the SACCO's financial products	0	0	15	35	50
3.	The clarity and simplicity of the SACCO processes contributes to the ease of access and usage of SACCO's products and services	0	5	10	50	35
4.	The cost of SACCO financial products and services is affordable for the members i.e. the interest rates for loans offered and fees charged for services are low	0	0	10	40	50
5.	The SACCO's financial products and services are availed to the members on a timely basis i.e. faster processing time for transactions and loan applications reducing unnecessary wait times	0	0	25	35	40
6.	Physical presence of a member is not required for a member to access the SACCO's financial products i.e. members are not necessarily required to physical deliver their applications	5	15	45	10	25
7.	The loan amounts disbursed to members are adequate to cover their individual needs	0	10	30	25	35
8.	While the loan amount that a member qualifies is pegged on the amount of the member's deposits, there are no additional restrictions with regards to the	20	20	25	15	20

	duration such a person has been a member of the SACCO to qualify for certain products					

Source: Researcher (2024)

The results indicate that the most of the responders believed that SACCO's products and services are well diversified, the clarity and simplicity of the SACCO processes contribute to the ease of access and usage of SACCO's products and services by a large extent. Similarly, a majority believed that SACCO's products and services are easily accessible to members, the cost of SACCO financial products and services is affordable for the members, SACCO's financial products and services are availed to the members on a timely basis and the loan amounts disbursed to members are adequate to cover their individual needs by a great extent.

Also, the requirement of physical presence of a member to access SACCO's financial products, the requirement of the loan amount that a member qualifies being pegged on the amount of the member's deposits and lack of no additional restrictions with regards to the duration that a person has been a member of the SACCO to qualify for certain products was believed to exist to some extent.

4.4.2Descriptive Analysis of Digital Credit Services

The research sought to analyze the level to which respondents perceived provision of digital credit services to their members influenced their access to credit. Table 4.2 offers a summary of the responses as percentages (where; 5=great extent, 4=large extent, 3=somewhat, 2=little extent and 1=not at all).

Table 4.2: Digital Credit Services

	Statement	**1**	**2**	**3**	**4**	**5**
1.	There are no limitations in the SACCO's technological infrastructure that may pose challenges when offering digital credit services	10	15	30	20	25

2.	Regulatory constraints have not impacted the design and delivery of digital credit to members	10	15	25	35	15
3.	The provision of digital credit products to members has not been influenced by the costs associated with the roll out of digital credit	0	5	35	30	30
4.	Digital credit services are effectively integrated into the SACCO's operations	0	0	45	25	30
5.	Digital literacy and awareness of digital credit among members has positively influenced its uptake	0	0	15	45	40
6.	Cyber security concerns have not affected the provision of digital credit services by the SACCO	0	0	40	25	35
7.	The reliability and stability of internet connectivity facilitates seamless delivery of digital credit services	0	5	10	25	60

Source: Researcher (2024)

The results indicate that the most of the respondents believed that there are no limitations in the SACCO's technological infrastructure that may pose challenges when offering digital credit services, the provision of digital credit products to members has not been influenced by the costs associated with the roll-out of digital credit, digital credit services are effectively integrated into the SACCO's operations and cyber security concerns have not affected the provision of digital credit services by the SACCO was somewhat true.

The majority also believed that regulatory constraints have not impacted the design and delivery of digital credit to the members and that digital literacy and awareness of digital credit among members have positively influenced its uptake was true to a large extent. To a great extent, it was also believed that the reliability and stability of internet connectivity facilitate the seamless delivery of digital credit services.

4.4.3Descriptive Analysis of Mobile Money Connectivity

The research aimed to analyze how respondents perceived mobile money connectivity in their SACCOS as contributing to access and usage of SACCO financial products. Table 4.3 provides a summary of the responses as percentages (where; 5=great extent, 4=large extent, 3=somewhat, 2=little extent and 1=not at all).

Table 4.3: Mobile Money Connectivity

	Statement	**1**	**2**	**3**	**4**	**5**
1.	The SACCO has deployed USSD code services to all its members increasing the usage of SACCO financial products	0	0	15	20	65
2.	The SACCO has deployed Internet/App - based services to all its members increasing the usage of SACCO financial products	5	0	25	30	40
3.	Mobile phone penetration is not a hinderance to the usage of SACCO financial products and services by members	10	10	20	15	45
4.	Mobile money connectivity has impacted the timeliness of completing transactions by the members	5	5	25	65	5
5.	Mobile money connectivity is reliable to facilitate smooth transactions and services i.e. there are limited network issues or coverage issues and thus not affected the timeliness of completing members' transactions	5	5	5	25	60
6.	Feedback collected from SACCO members indicate that they are satisfied with mobile money services offered by the SACCO	0	10	20	55	15
7.	Members's financial transactions conducted through mobile money services are secure and are kept confidential	0	0	10	30	60

Source: Researcher (2024)

The results suggested that the most of the responders believed that their SACCO had deployed both the USSD code services and Internet or App-based services to their members increasing the usage of SACCO financial products. Majority believe, to a great extent, that mobile phone penetration is not a hindrance to the utilization of SACCO financial products and services, mobile money connectivity has impacted the timeliness of completing transactions, mobile money connectivity is reliable to facilitate smooth transactions and services and online transactions conducted through mobile money services are secure and are kept confidential. The majority also believed that feedback collected from SACCO members indicated that they were satisfied with mobile money services offered by SACCO to a large extent.

4.4.4ATM Connectivity

The research sought to establish how respondents perceived ATM connectivity in their SACCOS as contributing to the access and usage of SACCO financial products. Table 4.1 offers a summary of the responses as percentages (where; 5=great extent, 4=large extent, 3=somewhat, 2=little extent, 1=not at all and N/A=response not provided).

Table 4.4: ATM Connectivity

	Statement	**1**	**2**	**3**	**4**	**5**	**N/A**
1.	Members are provided with SACCO cards which they utilize in making withdrawal transactions	25	10	10	10	40	5
2.	The SACCO cards offered to members allow them to transact online and make payments online	35	5	5	10	40	5
3.	The SACCO cards offered to members allow them to make payments at different merchant shops	25	0	15	5	50	5
4.	The SACCO cards offered to members allow them to make balance enquiries at different ATM platforms	30	5	5	10	45	5
5.	The SACCO cards offered to members allow them to access their FOSA statements at different ATM platforms	35	25	0	20	15	5
6.	Members do not experience any challenges when using their SACCO cards	25	10	15	35	10	5
7.	The ATM connectivity complement and supplement other digital financial services enhancing the SACCO's service delivery	25	0	10	15	45	5

Source: Researcher (2024)

The results suggested that most of the respondents believed that members are provided with SACCO cards which they utilize in making withdrawal transactions, these SACCO cards allow them to transact online, the cards allow members to make payments for goods and services at different merchant shops, they allow them to make balance enquiries and access their FOSA statements at different ATM platforms and that the usage of cards complement or supplement other digital financial services enhancing the SACCO's service delivery by a great extent. The

majority also believed that members do not experience any challenges when using their SACCO cards to a large extent.

4.5Reliability and Validity Testing

4.5.1Testing for Reliability

The research aimed to test the reliability of the research tool to evaluate how well the responses to the different items in each study construct correlated with one another. The Cronbach's alpha test was used to assess the internal consistency of the collected responses, and the outcomes are exhibited in Table 4.5.

Table 4.5: Reliability Statistics for Internal Consistency

Variable	Cronbach′s Alpha	Number of Items
Financial Inclusion	0.454	8
Digital Credit Services	0.514	7
Mobile Money Connectivity	0.669	7
ATM Connectivity	0.958	7

Source: Researcher (2024)

The study results suggests that the level of internal consistency was 0.454 for the financial inclusion variable, 0.514 for digital credit services, 0.669 for mobile money connectivity was 0.669 and 0.958 for ATM connectivity. As suggested by Bonnett and Wright (2015), an alpha of 0.7 or higher indicates a higher level of internal consistency. Other researchers such as Nunnally (1967) and Hair, Black, Babin and Anderson (2010) suggest that values as low as 0.5 and 0.6 respectively, may be acceptable for exploratory research. Therefore, the alpha values in the current research indicate an acceptable level of internal consistency, suggesting that the research instrument is reliable.

4.5.2Validity of Research Instrument

Validity of the questionnaire was assessed with the help of the supervisor and peers and relevant adjustments were made on the research questionnaire before distribution. Their recommendations were particularly useful in ensuring accuracy and relevancy of the questionnaire.

4.6Diagnostic Test Results

In multiple regression analysis, diagnostic tests are essential for testing the assumptions underlying the model to ensure it provides unbiased estimates of the study parameters. The diagnostic tests performed included: - multicollinearity, normality and heteroskedasticity test and the results presented.

4.6.1Multicollinearity Test

Multicollinearity assumption was tested utilizing VIF values. The test was performed to verify whether the independent variables in the multiple regression model were highly correlated with each other or not and the findings are exhibited in Table 4.7.

Table 4.7: Centered Variance Inflation Factor

Variable	VIF Value
Digital Credit Services	1.046208
Mobile Money Connectivity	1.067090
ATM connectivity	1.034015

Source: Researcher (2024)

The results of the analysis show that the Centered VIF values fell within the acceptable range of 1 and 10. Kim (2019) notes that multicollinearity is indicated by a VIF exceeding 5 to 10 or condition indices surpassing 10 to 30. This confirms absence of multicollinearity among the independent variables.

4.6.2Normality Test

The research sought to ascertain whether the residuals of the multiple regression model were normally distributed, a characteristic that is a common assumption in many statistical methods. Jarque-Bera Test, which combines skewness and kurtosis, was undertaken and the results represented in Table 4.8.

Table 4.8 Jarque-Bera Test

Skewness	Kurtosis	Jarque-Bera	Probability
-0.004981	2.042731	0.725534	0.695749

Source: Researcher (2024)

A valid multiple regression analysis relies on the normality of residuals (Roberts & Roberts Jr, 2020). The normality test yielded a Jarque-Bera value of 0.725534 with a probability of greater than 5% ($p>0.05$) inferring that the residuals were normally distributed and thus meeting the normality assumption.

4.6.3Heteroskedasticity Test

The research tested for Heteroskedasticity using the White Test to ascertain whether the variance of the residuals was inconsistent across all levels of independent variables. Existence of heteroskedasticity in a model violates one of the key assumptions of OLS regression, which assumes that the residuals have constant variance (homoskedasticity). The results of the observed R-squared and its probability are exhibited in the Table 4.9.

Table 4.9: Value of R-Squared using White Test

Observed R-Squared	Probability Chi-Square
15.50536	0.0780

Source: Researcher (2024)

The results indicate an R-Squared value of 15.50536 with a p-value of 0.0780, which is greater than 0.05. This supports the null hypothesis that there was no heteroskedasticity in the model, concluding that the variance of the residuals is homogeneous.

4.6.4Correlation Analysis

Correlation analysis was conducted to evaluate the strength of the effect of digital financial innovations on financial inclusion in community-based DT-SACCOs and the outcomes are exhibited in Table 4.10.

Table 4.10: Correlation Matrix

Correlation Probability	Financial Inclusion	Digital Credit Services	ATM Connectivity	Mobile Connectivity
Financial Inclusion	1.000000			
	-			
Digital Credit Services	0.076946	1.000000		
	0.7542	-		
ATM Connectivity	-0.159082	0.065162	1.000000	
	0.5154	0.7910	-	
Mobile Connectivity	0.075064	-0.187378	0.154054	1.000000
	0.7601	0.4424	0.5289	-

Source: Researcher (2024)

As shown in Table 4.6 there was a positive but insignificant connection between digital credit and financial inclusion in community-based DT-SACCOs in Kenya (r=0.077, p=0.754). The findings are corroborated by a study conducted by Wamuyu, Jagongo, and Musau (2022), which showed negligible positive relationship between digital credit and financial inclusion. Mobile money connectivity has a positive but insignificant relationship with financial inclusion in community-based DT-SACCOs in Kenya (r=0.075, p=0.760). This is consistent with the findings of Kariuki and Onsiro (2022) who demonstrated that there was no link between the usage of digital credit and financial inclusion in the SACCO sector. ATM connectivity shows an adverse but not meaningful link with financial inclusion in community-based DT-SACCOs in Kenya (r=-0.159, p=0.515). The research suppositions are in line with those of Williams,

Adegoke, and Dare's (2017) research, which discovered that since there aren't many or any ATMs in rural regions, there is a substantial adverse relationship between ATM use and financial inclusion.

4.7Multiple Regression Results

The research aimed to assess the individual and combined effects of digital credit services, mobile money connectivity and ATM connectivity on financial inclusion. Construct variables were generated/computed by calculating the mean of all the items representing each of the four variables.

4.7.1Multiple Regression Model

The research tested whether digital credit services, mobile money connectivity and ATM connectivity could be used to predict financial inclusion in community-based DT-SACCOs in Kenya using multiple regression analysis. The summary is provided in Tables 4.11.

Table 4.11 Multiple Regression Model Summary

SD. Financial Inclusion	R-Squared	Adjusted R-Squared	Std. Error of Regression
0.449882	0.047541	-0.142951	0.480964

Source: Researcher (2024)

The R-square value was R^2=0.047541 which means that digital credit services, mobile money connectivity and ATM connectivity account for 4.7% of the variation in financial inclusion within community-based DT-SACCOs. This study assumes that the difference of 95.3% of the variation in financial inclusion within community-based DT-SACCOs could be attributed to other factors other than digital innovations.

4.7.2F-Statistic Model

To establish the significance of the effect of digital credit services, mobile money connectivity and ATM connectivity on financial inclusion of community-based DT-SACCOs in Kenya, ANOVA test was conducted and the findings are exhibited in Table 4.12.

Table 4.12F-Statistic Model

	Sum of Squares	F	Prob (F-statistic)
Regression	0.480964	0.249568	0.860383
Residual	3.469897		
Total	3.950861		

Source: Researcher (2024)

The F-statistic of the model was 0.249568 with a p-value of 0.860383 indicating that there is insufficient evidence to conclude that the model as a whole is statistically significant. This suggests that the independent variables (digital credit services, mobile money connectivity and ATM connectivity) in the model did not collectively have a significant effect on financial inclusion in community-based DT-SACCOs in Kenya.

4.7.3Summary of Regression Coefficients

The research carried out an analysis to come up with predictive values of financial inclusion in community-based DT-SACCOs in Kenya from digital credit services, mobile money connectivity and ATM connectivity. The results of the coefficients of the multiple regression model are presented in Table 4.13.

Table 4.13 Multiple Regression Coefficients

Variable	Coefficient	Std. Error	t – statistic	Prob.
(Constant)	3.277520	1.341170	2.443776	0.0274
Digital Credit Services	0.101599	0.232953	0.436137	0.6689

Variable	Coefficient	Std. Error	t − statistic	Prob.
Mobile Money Connectivity	0.097554	0.203599	0.479145	0.6387
ATM Connectivity	-0.054819	0.075673	-0724412	0.4800

Source: Researcher (2024)

The t-statistics for the coefficients of the independent variables, at a 5% level of significance, as shown in Table 4.9, are as follows: digital credit services (t = 0.436137, p = 0.6689), mobile money connectivity (t = 0.479145, p = 0.6387), and ATM connectivity (t = -0.724412, p = 0.480). The p values >0.05 suggesting that the coefficients are statistically insignificant.

The multiple regression equation for this analysis is:

Financial Inclusion = 3.278 + 0.102(Digital Credit Services) + 0.098(*Mobile Money Connectivity*) - 0.055*(ATM Connectivity*)

The multiple regression equation derived from the coefficients shows that for digital credit services, an increase in digital credit services score by a single unit corresponds to an improvement in financial inclusion by 0.102 units. For mobile money connectivity, an improvement in mobile money connectivity by a single unit corresponds to an improvement in financial inclusion score by 0.098 units. For ATM connectivity, an improvement in ATM connectivity by 1 unit corresponds to a decrease in financial inclusion by 0.055 units.

4.8Discussion of Hypotheses Results

This section deliberates on the results of hypotheses testing with the aim of establishing whether digital financial innovations had a statistically significant effect on financial inclusion within community-based DT-SACCOs in Kenya.

4.8.1Effect of Digital Credit Services

The research aimed to ascertain the effect of digital credit services on financial inclusion within community-based deposit taking savings and cooperatives in Kenya. The formulated hypothesis for this objective was;

H_{01}: There is no statistically significant effect of digital credit services on financial inclusion within community-based DT-SACCOs in Kenya.

The results suggested a statistically insignificant positive effect of digital credit services and financial inclusion (β=0.102, p=0.6689). This suggests that the null hypothesis cannot be rejected because the p-value is above 0.05. Thus, it may be assumed that there insufficient evidence to support the claim of an effect of digital credit services on financial inclusion in community-based deposit taking SACCOs. While the research by Wamuyu, Jagongo, and Musau (2022) looked into the effect of digital credit amongst the youth in Kenya, the current research focused on the effect of digital credit services on financial inclusion in community-based DT-SACCOs in Kenya and found almost similar results that there is no statistically significant effect by digital credit and financial inclusion. The results of the study contradict the findings of Wathome (2020), which found that digital credit has a positive correlation with financial inclusion. However, Wathome's study focused on bank-owned digital credit services linked to mobile phones, and the demographic characteristics of the target population were different—the youth in Kangemi, an urban town. The contrasting results could be due to the demographic differences, as the youth are generally more inclined toward technology compared to community-based DT-SACCOs, which have older members from different regions, including rural areas.

4.8.2Effect of Mobile Money Connectivity

The research aimed to ascertain the effect of mobile money connectivity on financial inclusion within community-based deposit taking savings and cooperatives in Kenya. The formulated hypothesis for this objective was;

H_{02}: There is no statistically significant effect of mobile money connectivity on financial inclusion within community-based DT-SACCOs in Kenya.

The results demonstrated a statistically insignificant positive effect of mobile money connectivity on financial inclusion (β=0.098, p=0.6387). This suggests that the null hypothesis cannot be rejected because the p-value is above 0.05. Thus, it may be argued that there insufficient evidence to support the claim of an effect of mobile money connectivity on financial inclusion in community-based deposit taking SACCOs. Various studies present similar findings, noting that mobile banking shows a positive but insignificant effect (Koske & Njoroge, 2017; Kariuki & Onsiro, 2022). The scope in the study by Kariuki and Onsiro (2022) was SACCOs in Nyandarua County, whose members might have similar demographic characteristics to the members of community-based DT-SACCOs, that was a focus in the current study. The results contrasts with findings by Wanjiku, Koori and Atheru (2020), which focused on the influence of mobile banking on commercial banks and found a positive and significant effect. Other studies suggest that factors such as trust, security, and social influence are also significant contributors to the adoption and usage of technology-enabled financial services (Yan, Siddik, Akter, & Dong, 2023).

4.8.3Effect of ATM Connectivity

The research aimed to evaluate the effect of mobile money connectivity on financial inclusion within community-based deposit taking savings and cooperatives in Kenya. The formulated hypothesis for this objective was;

H_{03}: There is no statistically significant effect of ATM connectivity on financial inclusion within community-based deposit taking SACCOs in Kenya.

The results indicate a statistically insignificant negative effect of ATM connectivity on financial inclusion (β=- 0.055, p=0.4800). This suggests that the null hypothesis cannot be rejected because the p-value is above 0.05. Thus, it can be suggested that there is insufficient evidence to support the claim of an effect of ATM connectivity on financial inclusion in community-based deposit taking SACCOs. The current research outcomes contrast with that of Winga and Ndede (2021) and Sanga and Aziakpono (2022) who found ATM banking and ATM network, respectively, as having a positive and significant influence on financial inclusion. SACCOs have partnered with banks to issue SACCO cards and rely on the ATM platforms provided by banks for the members to access financial services. Such arrangements could be the reasons for lack of effect by ATM on financial inclusion. Some of the community-based DT-SACCOs may not have partnered with the banks to provide ATM connectivity. In addition, mobile banking could be providing an alternative for access to transactions abandoning the use of ATMs. This observation is supported by the KIB' survey that indicated a declining trend in usage of ATMs (KIB, 2022).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1Introduction

This chapter offers a summary of key findings, discusses the conclusions drawn and offers recommendations.

5.2Summary of the Study

The study aimed to establish the effect of digital financial innovations on financial inclusion within community-based DT SACCOs in Kenya. Several conclusions can be drawn from the analysis regarding the financial inclusion, digital credit services, mobile banking connectivity and ATM connectivity in Community Based DT-SACCOs. The analysis provided the following insights:

A significant majority of respondents believe SACCO's products and services are not complex and are easily accessible and affordable. Most feel that the financial products are well diversified and are provided in a timely manner to meet their needs. Many respondents feel that physical presence is somewhat required when accessing SACCO's products, indicating that the current system has not fully enabled remote interactions. There is a general perception that loan qualifications are based on deposits rather than duration of membership, with some variation in opinions as to whether the loan amounts that a member qualifies are adequate to meet their needs.

5.2.1Digital Credit Services and Financial Inclusion

The majority of respondents believe that their SACCO’s technological infrastructure is somewhat well-integrated and does not face major limitations, suggesting existence of enabling systems for digital credit services. Most respondents feel that regulatory constraints and costs have a minimal impact on digital credit provision, indicating a well-managed regulatory and

financial environment. Digital literacy and member awareness of digital credit are seen to positively affect the uptake of digital credit. Many respondents are not quite confident on the cyber security infrastructure which could be a potential hinderance for the uptake of digital credit services. Majority believe that reliable internet connectivity is crucial for effective digital credit services. The multiple regression analysis indicated a weak effect by digital credit services on financial inclusion in community-based DT SACCOs in Kenya.

5.2.2Mobile Money Connectivity and Financial Inclusion

On Mobile Banking Connectivity, there is a strong belief that USSD and app-based services are widely deployed and effectively increase the access to SACCO financial products. Most respondents find mobile money connectivity reliable and believe that mobile transactions are secure and confidential. Feedback from members indicates high satisfaction levels with mobile money services and to a greater extent, mobile phone penetration is not a hinderance to members' access and usage of SACCO products. The multiple regression analysis indicated a weak positive effect by mobile money connectivity on financial inclusion in community-based DT SACCOs in Kenya.

5.2.3ATM Connectivity and Financial Inclusion

While there is a general positive perception of SACCO cards' functionality such as making online transactions, merchant payments, balance inquiries. However, some respondents indicate limited usage or availability of these services to their members, especially having access to their FOSA statements. A majority of the respondents believe that most members with access to ATM card services experience challenges using their cards. Similarly, they believe that ATM connectivity within the community-based DT SACCOs has not been well integrated or card services embraced in enhancing their SACCO's service delivery. The multiple regression analysis indicated weak negative effect by ATM connectivity on financial inclusion in community-based DT SACCOs in Kenya.

5.3Conclusions

Regarding the first objective, the study finds that members of community-based DT SACCOs are yet to embrace digital credit services. The outcomes of the multiple regression analysis indicate that digital credit services in community-based DT SACCOs in Kenya do not significantly influence financial inclusion.

Regarding the second objective, while it is believed that members appreciate the availability of services through mobile banking and report high satisfaction levels, the multiple regression analysis results indicate that mobile banking connectivity is not a significant determinant of financial inclusion in community-based DT SACCOs in Kenya.

For the last objective, the research concludes that there is insignificant effect by ATM connectivity on financial inclusion in community-based DT SACCOs. The descriptive statistics indicate varied perceptions on the availability and usage of card services within this particular category of DT-SACCOs.

5.4Recommendations

Despite the positive relationship between digital credit services, mobile banking, and financial inclusion, the study points out the absence of a statistically significant effect on financial inclusion in community-based DT-SACCOs. ATM connectivity had a negative relationship whose effect is not statistically significant on financial inclusion within community-based DT-SACCOs in Kenya. It is quite outright that there are challenges in SACCO cards services which can be addressed to enhance overall service delivery. Addressing this area could further enhance the effectiveness and enhance inclusivity in community-based DT-SACCOs in Kenya.

While the community-based DT-SACCOs are successfully meeting many needs and are leveraging digital tools to deliver credit and provide access to SACCO products, the level of financial inclusivity is still low and requires improvement. Community based DT-SACCOs

therefore have the potential to utilize digital financial innovations as a strategy to deliver their products and services, ultimately contributing to improved financial inclusivity.

5.5 Further Research

The study recommends a comparable analysis but utilizing a relatively larger sample size and collecting data from the demand side (from the SACCO members). This will assist to triangulate whether digital financial innovations in have an effect in the financial inclusion exhibited by community-based DT-SACCOs in Kenya. Further research on specific barriers that prevent community based-deposit taking saccos from increasing financial inclusion of their members is also encouraged.

REFERENCES

Agufa, M. M. (2016). The Effect of Digital Finance on Financial Inclusion in the Banking Industry in Kenya.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Asif, M., Khan, M. N., Tiwari, S., Wani, S. K., & Alam, F. (2023). The Impact of Fintech and Digital Financial Services on Financial Inclusion in India. *Journal of Risk and Financial Management, 16*(2), 122.

Barasa, L. W., Musiega, M., & Mungai, A. (2023). Effect of expansion decisions on the financial performance of SACCOs in Bungoma County, Kenya. *African Journal of Empirical Research, 4*(2), 394-405.

Bonett, D. G., & Wright, T. A. (2015). Cronbach's Alpha Reliability: Interval Estimation, Hypothesis Testing, and Sample Size Planning. *Journal of Organizational Behavior, 36*, 3-15.

Bryman, A. (2016). *Social Research Methods* (5th ed.). New York: Oxford University Press.

Bryman, A., & Bell, E. (2020). *The conceptual framework: An introduction to the principles and practices*. Oxford University Press.

CGAP. (2016). CGAP Annual Report 2016: Advancing Financial Inclusion to Improve the Lives of the Poor. The Consultative Group to Assist the Poor.

Chandrakandan, K., Venkatapirabu, J., Sekar, V., & Anandakumar. (2001). *Tests and Measurements in Social Research*. APH Publishing Corporation, New Delhi. India. 216-34.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982-1003.

Demirgüç-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2022). *The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19*. Washington, DC: World Bank.

FinAccess (2021). *2021 FinAccess Household Survey Report*, Central Bank of Kenya.

Government of the Republic of Kenya (GOK). (2007). *Kenya Vision 2030: A Globally Competitive and Prosperous Kenya.* National Economic and Social Council (NESC), Nairobi.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis*: Pearson College Division.

Hapsari, S. A. (2021). The Theory of Planned Behavior and Financial Literacy to Analyze Intention in Mutual Fund Product Investment. *Advances in Economics, Business and Management Research, 187.*

IFC (2018). *Corporate Governance for Financial Inclusion- Insights for Boards of Microfinance Institutions: Managing Current Issues, Crisis and Change.* International Financial Corporation.

International Labour Organization (2015). Cooperatives and the Sustainable Development Goals: A Contribution to the Post-2015 Development Debate, A Policy Brief

Isabwa, H. K. (2021). Effect of Mobile Banking on Financial Inclusion Among Commercial Banks in Kenya. *International Journal of Business, Management and Economics, 2*(3), 184-197.

Kabir, H. (2022). Financial Innovation: Accelerating Financial Inclusion in South Asia. In I.A. Boitan & M. B. Kamila (Eds.), *Fostering Innovation and Competitiveness with FinTech, RegTech, and SupTech* (pp. 61-79).

Kariuki, N. P. & Onsiro, M. R. (2022). Analyzing the Effect of Usage of Deposit-Taking Sacco Financial Products on Financial Inclusion in Nyandarua County, Kenya. *IOSR Journal of Business and Management*, *24*(6), 11-23.

KIB (2022, April). *KIB Monthly Bankers Journal - April 2022 Edition*. KIB Publishing.

Kim, J. H. (2019). Multicollinearity and misleading statistical results. *Korean Journal of Anesthesiology, 72*(6), 558-569.

Kimotho, J. W. (2016). Determinants of Digital Innovations Adoption by Financial Institutions in Kenya.

Koske, I., & Njoroge, M. (2017). Assessing the impact of mobile money on financial inclusion in Kenya.

Kothari, C. R., & Garg, G. (2019). *Research Methodology: Methods and Techniques (2nd ed.)*. New Age International, New Delhi.

Manasseh, C. O., Nwakoby, I. C., Okanya, O. C., Nwonye, N. G., Odidi, O., Thaddeus, K. J., E…. Nzidee, W. (2023). Impact of digital financial innovation on financial system development in Common Market for Eastern and Southern Africa (COMESA) countries. *Asian Journal of Economics and Banking.* **https://www.emerald.com/insight/2615-9821.htm**

Markowitz, H. (1952). Portfolio selection. *Journal of Finance, 7*(1), 77-91.

Mumanyi, E. A. L. (2014). Challenges and opportunities facing SACCOs in the current devolved system of government of Kenya: A case study of Mombasa County. *International Journal of Social Sciences and Entrepreneurship, 1* (9), 288-314.

Mutua, P. N. (2018). The effect of financial innovation on financial inclusion in Kenya.

Ndegwa, R. (2020). The Role of Communication in SACCOS in Promoting Financial Inclusion in Kenya. *European Journal of Economic and Financial Research, 4*(2), 154-173

Nunnally, J. C. (1967). *Psychometric theory*: McGraw-Hill.

Roberts, A., & Roberts Jr., J. M. (2020). *Multiple Regression: A Practical Introduction*. California: SAGE Publications.

SACCO Societies Regulatory Authority (SASRA), (2022). *The SACCO Supervision Annual Report, 2021*. The Annual Statutory Report on the operations and performance of Regulated SACCO Societies in Kenya.

Saka, R. O., Osademe, G. C., & Ononokpono, N. J. (2023). Exploratory research design in management science: A review of literature on conduct and application. *International Journal of Research and Innovation in Social Science (IJRISS), 7*(4), 1384-1395.

Sanga, B., & Aziakpono, M. (2022). The impact of technological innovations on financial deepening: Implications for SME financing in Africa. *African Development Review, 34*(4), 429-442.

Sekaran, U. & Bougie, R. (2016). *Research methods for business. A skill building approach.* West Sussex: John Willey & Sons.

Sekhar, S. (2013). Theorems and Theories of Financial Innovation: Models and Mechanism Perspective. *Financial and Quantitative Analysis*, 1(2), 26-29.

Shukla N. & Sharma, D. (2017). A Review on Construction of Summated Rating Attitude Scales. *International Journal for Innovative Research in Multidisciplinary Field*, 3(7), 230-232.

Smith, J. (2023). *The impact of electronic data collection on response rates*. Journal of Survey Research, 45(2), 123-135.

Tiony, O. K. (2023). The impact of digital financial services on financial inclusion in Kenya. *American Journal of Industrial and Business Management, 13*(6), 593-628

UN Capital Development Fund (UNCDF). (n.d.). *Our History on Financial Inclusion.* **https://www.uncdf.org/50/history-on-financial-inclusion**

UNCTAD (2021), Financial Inclusion for Development Better Access to Financial Services for Women, the Poor, and Migrant Work, UNCTAD/DITC/TNCD/2020/6, 2021 (Geneva).

Vogt, W. P., Gardner, D. C., & Haeffele, L. M. (2012). When to Use What Research Design. New York, NY: Guilford Press.

Wamuyu, V., Jagongo, A., & Musau, S. (2022). Digital credits and financial inclusion among the youth in Kenya. *Emerging Issues (AJOEI), 4*(3), 130-139.

Wanjiku, N. G., Koori, J., & Atheru, G. (2020). Technological banking innovations and financial inclusion by commercial banks in Nairobi County, Kenya. *International Journal of Current Aspects in Finance, Banking and Accounting, 1*(1), 1-27.

Wathome (2020), Effects of Digital Credit on Financial Inclusion of the Youth in Kenya: A Survey of Kangemi, Nairobi County.

Williams, H., Adegoke, A., & Dare, A. (2017). Role of Financial Inclusion in Economic Growth and Poverty Reduction in a Developing Economy. *International Journal of Research in economics and Social Sciences (IJRESS), 7*(5), 265-271.

Winga, E., & Ndede, F. (2021). Adoption of financial innovations by tier one commercial banks and financial deepening in Kenya. *The Strategic Journal of Business & Change Management, 8*(2), 566-576.

World Bank (2022). *Understanding Poverty: Financial Inclusion Overview*. **https://www.worldbank.org/en/topic/financialinclusion/overview**

World Bank. (2014). *Global Financial Development Report 2014: Financial Inclusion.* Washington, DC: World Bank.

Yan, C., Siddik, A., Akter, N., & Dong, Q. (2023). Factors influencing the adoption intention of using mobile financial service during the COVID-19 pandemic: The role of FinTech. Environmental Science and Pollution Research. *International*, *30(*22), 61271-61289.

APPENDICES

Appendix I: Introduction Letter

Greeting

RE: DATA COLLECTION

I am a MBA (Finance Option) student at Kenyatta University. I am carrying out a research project which is a prerequisite for the award of the degree. The topic of my research study is "**Digital Financial Innovations and Financial Inclusion in Community-Based DT-SACCOs in Kenya**".

I thus request your support in answering to the attached questionnaire. Every piece of data gathered will be handled with the utmost confidentiality and utilized only to further this research.

Your assistance will be highly valued.

Yours Faithfully,

Ogendo Ogake Bernard

D53/OL/CTY/24419/2014

Appendix II: Research Questionnaire

The objective of this questionnaire is to gather information only for scholarly research. In Kenya's community-based deposit-taking SACCOs, the research aims to determine the link between digital financial innovations and financial inclusion. All data will be handled with absolute confidentiality. Do not add any personally identifiable or identifying information on this questionnaire.

Section A: Demographic Information

(Please tick (√) correct answer)

1. Indicate your gender:
   Female [ ] Male [ ]

2. Indicate your age bracket:
   18- 35 years [ ] 36 - 49 years [ ] 50 and above [ ]

3. Indicate the highest educational level:

   Certificate [ ] Diploma [ ] Bachelor [ ] Masters [ ] PhD [ ]

4. Please indicate your years worked in a SACCO:

   0- 4 yrs [ ] 5 - 9 yrs [ ] Over 10 yrs [ ]

Section B: Financial Inclusion in Community Based DT-SACCOs

Please rate the level to which the following assertions are true with regards to availability, diversification, access, cost, adequacy, convenience of the SACCOs products and services in your SACCO on a scale of 1-5 whereby; 5=great extent,4=large extent,3=somewhat,2=little extent and 1=not at all

	Statement	**1**	**2**	**3**	**4**	**5**
1.	The SACCO's products and services are well diversified i.e. the SACCO offers a variety of savings and credit products, including insurance and other payments services					
2.	The SACCO's products and services are easily accessible to members i.e. the SACCO offers a variety of delivery channels through which members access the SACCO's financial products					
3.	The clarity and simplicity of the SACCO processes contributes to the ease of access and usage of SACCO's products and services					
4.	The cost of SACCO financial products and services is affordable for the members i.e. the interest rates for loans offered and fees charged for services are low					
5.	The SACCO's financial products and services are availed to the members on a timely basis i.e. faster processing time for transactions and loan applications reducing unnecessary wait times					
6.	Physical presence of a member is not required for a member to access the SACCO's financial products i.e. members are not necessarily required to physical deliver their applications					
7.	The loan amounts disbursed to members are adequate to cover their individual needs					
8.	While the loan amount that a member qualifies is pegged on the amount of the member's deposits, there are no additional restrictions with regards to the duration such a person has been a member of the SACCO to qualify for certain products					

Section C: Digital Credit Services and Financial Inclusion

Please rate the level to which the following assertions are true regarding digital credit in your SACCO on a scale of 1-5 whereby; 5=great extent,4=large extent,3=somewhat,2=little extent and 1=not at all

	Statement	**1**	**2**	**3**	**4**	**5**
1.	There are no limitations in the SACCO's technological infrastructure that may pose challenges when offering digital credit services					
2.	Regulatory constraints have not impacted the design and delivery of digital credit to members					
3.	The provision of digital credit products to members has not been influenced by the costs associated with the roll out of digital credit					
4.	Digital credit services are effectively integrated into the SACCO's operations					
5.	Digital literacy and awareness of digital credit among members has positively influenced its uptake					
6.	Cyber security concerns have not affected the provision of digital credit services by the SACCO					
7.	The reliability and stability of internet connectivity facilitates seamless delivery of digital credit services					

Section D: Mobile Money Connectivity and Financial Inclusion

Please rate the level to which the following assertions are true regarding mobile money services in your SACCO on a scale of 1-5 whereby; 5=great extent,4=large extent,3=somewhat,2=little extent and 1=not at all

	Statement	**1**	**2**	**3**	**4**	**5**
1.	The SACCO has deployed USSD code services to all its members increasing the usage of SACCO financial products					
2.	The SACCO has deployed Internet/App - based services to all its members increasing the usage of SACCO financial products					
3.	Mobile phone penetration is not a hinderance to the usage of SACCO financial products and services by members					
4.	Mobile money connectivity has impacted the timeliness of completing transactions by the members					
5.	Mobile money connectivity is reliable to facilitate smooth transactions and services i.e. there are limited network issues or coverage issues and thus not affected the timeliness of completing members' transactions					
6.	Feedback collected from SACCO members indicate that they are satisfied with mobile money services offered by the SACCO					
7.	Members's financial transactions conducted through mobile money services are secure and are kept confidential					

Section E: ATM Connectivity and Financial Inclusion

Please rate the level to which the following assertions are true regarding ATM connectivity in your SACCO on a scale of 1-5 whereby; 5=great extent,4=large extent,3=somewhat,2=little extent and 1=not at all

	Statement	**1**	**2**	**3**	**4**	**5**
1.	Members are provided with SACCO cards which they utilize in making withdrawal transactions					
2.	The SACCO cards offered to members allow them to transact online and make payments online					
3.	The SACCO cards offered to members allow them to make payments at different merchant shops					
4.	The SACCO cards offered to members allow them to make balance enquiries at different ATM platforms					
5.	The SACCO cards offered to members allow them to access their FOSA statements at different ATM platforms					
6.	Members do not experience any challenges when using their SACCO cards					
7.	The ATM connectivity complement and supplement other digital financial services enhancing the SACCO's service delivery					

Thank you.

Appendix III: SACCO Product Categories

Product Category	Description
1. Savings Products	
a) Demand Savings Accounts	Basic savings accounts for members to deposit and accumulate their funds over time that can be accessed on demand.
b) Non-withdrawable savings	These are savings accumulated over time and they are used as collateral for borrowing and are not available to the member for withdrawal except when the member is exiting membership.
b) Fixed Deposit Accounts	These are savings accounts offering higher interest rates for funds deposited for a specific period.
c) Target Savings Accounts	These are specialized accounts to help members save for specific goals (e.g., education, housing, Christmas, holiday, retirement, and funeral).
d) Children's Savings Accounts	Accounts created specifically for children to encourage savings from a young age.
2. Credit Products	
a) Personal Loans	Loans for personal use, such as development, salary advances, loan offsetting/consolidation, school fees or medical expenses.
b) Business Loans	Loans for starting or expanding businesses, purchasing equipment, or meeting working capital needs.
c) Agricultural Loans	Loans tailored for farmers to finance agricultural activities or purchase inputs.
d) Asset Financing	Loans for the purchase of assets like vehicles, machinery, or real estate.
d) Emergency Loans	Quick-access loans to assist members during unexpected financial emergencies.
3. Insurance Products	
a) Life Insurance	Coverage providing financial protection to members and their families in case of the member's death.
b) Credit Life Insurance	Insurance covering outstanding loan balances in case of member's death or disability.
c) Property Insurance	Coverage for homes or other property against damage, theft, or other risks.
d) Medical Insurance	Health insurance plans covering medical expenses, hospitalization, and healthcare needs.
4. Electronic Banking and Payment Services	
a) ATM and Debit Cards	Cards for accessing accounts, making withdrawals, and purchases.
b) Mobile Banking	Services enabling banking transactions using mobile devices.
c) Online Banking	Internet-based platforms for managing accounts, transfers, and accessing services online.
d) Bill Payments	Facilities for electronic bill payments (utilities, credit cards, loan installments).
e) Payment Processing	This includes services such as salary processing, pension processing, dividends processing, and processing of women and youth funds to members

Appendix IV: List of Community-Based Deposit Taking SACCOs in Kenya

	NAME OF COMMUNITY-BASED DT SACCO	COUNTY
1	Kenya Bankers Sacco Society Ltd	Nairobi
2	Kimisitu Sacco Society Ltd	Nairobi
3	Waumini Sacco Society Ltd	Nairobi
4	K-Unity Sacco Society Ltd	Kiambu
5	Dimkes DT Sacco Society Ltd	Kiambu
6	Ukristo Na Ufanisi Wa Anglicana Sacco Society Ltd	Nairobi
7	Kingdom Sacco Society Ltd	Nairobi
8	Taqwa Sacco Society Ltd	Nairobi
9	Universal Traders Sacco Society Ltd	Machakos
10	Centenary Sacco Society Ltd	Meru
11	2NK Sacco Society Ltd	Nyeri
12	Shoppers Sacco Society Ltd	Nairobi
13	Supa Sacco Society Ltd	Samburu
14	NRS Sacco Society Ltd	Kiambu
15	Vision Africa Sacco Society Ltd	Nakuru
16	Fariji Sacco Society Ltd	Kiambu
17	Acumen Sacco Society Ltd	Kajiado
18	Strategic-Urembo Sacco Society Ltd	Nairobi
19	Viktas Sacco Society Ltd	Nyandarua
20	Home Business Sacco Society Ltd	Laikipia
21	Ilkisonko Sacco Society Ltd	Kajiado
22	Ammar Sacco Society Ltd	Kiambu
23	Ndosha Sacco Society Ltd	Tharaka-Nithi
24	Nexus Sacco Society Ltd	Meru
25	Biashara Tosha Sacco Society Ltd	Embu

(Source: SASRA)