CREDIT RISK MANAGEMENT PRACTICES, TECHNOLOGICAL INNOVATION AND LOAN PERFORMANCE: A STUDY OF REGISTERED DEPOSIT TAKING SACCOS IN KENYA

BY

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DECLARATION

Declaration by the Candidate

This research project is my original work and has not been presented for a degree in any other university .No part of this research project may be reproduced without prior written permission of the author and /or Moi University.

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DEDICATION

I would like to dedicate this research project to my family members especially my husband Rev Alfred Rutto, my children Ian & Brain and my friends Lydia and Joy, who nurtured in me the desire to work hard and have been my greatest supporters. They have given me the inspiration to pursue my education to the highest level. I appreciate all their efforts.

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ABSTRACT

Savings and Credit Cooperative Organizations in Kenya have embraced technological innovation such as mobile SACCOs, online SACCOs, electronic fund transfer and branch networking to improve service delivery and increase the number of loyal customers in their SACCOs. However, Kenyan SACCOs are still experiencing increased non-performing loans. Therefore, the main aim of the study was to investigate credit risk management practices, technological innovation and loan performance of registered deposit taking SACCOS in Kenya. Specific objectives were to determine whether collection policy, client appraisal, credit risk control and credit terms effect loan performance and whether technological innovation moderates their relationship. The study was guided by credit risk, liquidity, and innovation diffusion theories. This study adopted an explanatory design. The study targeted registered deposit taking SACCOS in Kenya. A questionnaire was used to collect data for the study. Descriptive inferential statistics was used in data analysis. Descriptive statistics included frequency, percentages, mean, standard deviation skewness, kurtosis, minimum and maximum. Inferential statistics were correlation and regressions analysis used for testing hypotheses. The analyzed data were presented using tables and charts. The findings indicated that, collection policy had a positive and significant effect on loan performance of SACCOs (β_1=0.427, p<.05). Client appraisal practice had a positive and significant effect on loan performance of SACCOs (β_2=0.131, p<.05). Credit risk control practice had a positive and significant effect on loan performance of SACCOs (β_3=0.170, p<.05). Credit terms had a positive and significant effect on loan performance of SACCOs (β_4=0.208, p<.05). Technological innovation had an enhancing moderating effect on the relationship between collection policy and loan performance (β=-0.170, p<.05). The technological innovation had an enhancing moderating effect on the relationship between client appraisal and loan performance (β=0.019, p<.05). Technological innovation had an enhancing moderating effect on the relationship between credit risk control practices and loan performance (β=-0.020, p<.05). Technological innovation had an enhancing moderating effect on the relationship between credit terms practices on loan performance (β=0.014, p<.05).The study concluded that loan performance of registered deposit taking SACCOS in Kenya was significantly affected by collection policy, client appraisal, credit risk control and credit terms. Technological innovation moderates the relationship between credit risk management practices and the loan performance of registered deposit taking SACCOS in Kenya. The study recommended that in order to ensure that credit risks are detected and documented, SACCOs should constantly examine and update processes relating to collection policy, customer appraisal, credit risk control, and credit terms. The research also suggests that SACCOs continuously enhance their internal control system to better establish the collection policy, client appraisal methods, credit risk management, and credit terms. The study recommends that policymakers and regulatory bodies in Kenya develop and enforce clear guidelines and regulations for credit risk management practices and technological innovation in the SACCO sector.

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Client appraisal refers to methods by which a SACCO approximates the soundness of a. loan request from the financial and technical feasibility or liability point of view (Huang *et al.*, 2021).

Collection policy refers procedures adopted by SACCOs to ensure that disbursed credit facilities to customers are all recovered without much struggle (Cerqueiro *et al.*, 2016).

Credit risk control is the practice of mitigating losses by understanding the adequacy of a bank's capital and loan loss reserves at any given time a process that has long been a challenge for financial institutions (Gupta *et al.*, 2020).

Credit risk management practice is the potential that a SACCO borrower or counterparty will fail to meet its obligations in accordance with agreed terms and therefore appropriate measures must be put in place by the SACCO to safeguard itself against credit risk exposure (Saputra *et al.*, 2021).

Credit terms refers to the payment terms and conditions made by the SACCO to the customers in exchange for the credit benefit (Fourcade *et al.*, 2017).

Loan performance refers to the financial soundness of a financial institution on the performance of their disbursed loan to SACCOs (Berkovec *et al.*, 2018).

Technological innovation is a new or improved product or process whose technological characteristics are significantly different from before (Coccia, 2018).

Savings and Credit Co-Operative Societies (SACCOs), are member-based financial institutions owned and controlled by their members who use their services (Said, Annuar & Hamdan, 2019).

ABBREVIATION AND ACRONYMS

AIS	Accounting Information System
CNA	Computer Network Attack
CNE	Computer Network Exploitation
CP	Collection Policy
CRC	Credit Risk Control
CRM	Credit Risk Management
CTP	Credit Terms and Policy
GDP	Gross Domestic Product
HMRA	Hierarchical Moderating Regression Analysis
ICT	Information and Communications Technology
IFMIS	Integrated Financial Management. Information System
IT	Information Technology
LP	Loan Performance
MPT	Modern Portfolio Theory
NACOSTI	National Commission of Science, Technology and Innovation
NIMS	Net Interest Margin Security
OLS	Ordinary Least Square
RoA	Return on Assets
RoE	Return on Equity
SACCO	Savings and Credit Cooperative Organization
SASRA	SACCO Societies Regulatory Authority
SMEs	Small and Medium Enterprises
SPSS	Statistical Package for the Social Science
VIF	Variance Inflation Factor

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter presented the background of the study, statement of the problem, research objectives, research hypotheses, significance of the study and scope of the study.

1.1 Background of the Study

Performance of loans in the financial institutions is measured by the loan default rate of the borrowers. Loan performance in the Savings and Credit Cooperative Societies is measured by the loan default rate of the customers (Nderitu, 2022). Savings and Credit Cooperative Societies play a vital role in the economic resource allocation of countries (Dsouza, Rabbani, Hawaldar & Jain, 2022). They channel funds from depositors to investors continuously. They can do so, if they generate necessary income to cover their operational cost they will be incurring in the due course. In other words, for sustainable intermediation function, SACCOs need to be profitable. Beyond the intermediation function, the financial performance of SACCOs has critical implications for economic growth of countries (Acquah & Ibrahim, 2020). Good financial performance rewards the shareholders for their investment. This, in turn, encourages additional investment and brings about economic growth.

Savings and Credit Cooperative Societies performance, can be measured through Return on Assets (RoA), Return on Equity (RoE) or cost-to-income ratio being the most widely used (Letsoalo, 2021). In addition, given the importance of the intermediation function for SACCOs, net interest margin is typically monitored. Financial performance of a SACCOs can be measured by profitability. Financial

performance will look at the statement of an accounting summary that details a business organization's revenues, expenses and net income (Bhattu-Babajee & Seetanah, 2022). Further SACCOs performance can be measured by loan performance. Loan performance in the SACCOs is measured by interest and principal payments less than 90 days overdue (Ndichu, 2021).

Client appraisal is a process undertaken mainly to determine the acceptance or rejection of a proposal for credit by the clients. This involves an evaluation of the repayment capacity of the borrowers (Migwi, 2019). The primary objective is to ensure the loans are issued only to credit worthy customers. Client appraisal process involves evaluating the capability of the borrower and any specific risks associate (Muigai & Mwangi, 2022). Client appraisal is a very important component of SACCOs as it plays a key role in ensuring that the main objective of the SACCOs (to issue loans) results into the desired outcome of making a margin out of the loans advanced. The process entails gathering of adequate information concerning the customer prior to granting the credit services. Hence, through proper client appraisals, the loans are granted to the right customers through securing the relative incomes of the banks. SASRA in an attempt to address deficiencies in credit management issued guidelines to be followed by SACCOs (Agaba, 2022).

Collection policy is a formal process and a key function in all major computer network exploitation CNE and potentially computer network attack CNA efforts (Smeets & Work, 2020). Collection management is the tasking and coordination of intelligence efforts. An effective collections process requires significant interaction with the client, beginning with a careful analysis of the client’s situation and continuing through timely and frequent contact over the duration of the loan (Agada

et al., 2019). Clients should be offered payment alternatives that are timely and appropriate to each situation, and all collections activities should be recorded to facilitate continuous monitoring and follow-up as well as control of client compliance with negotiated agreements (Mundiripo, 2020).

Credit risk control is identification, measurement, monitoring and control of risk arising from the possibility of default in loan repayments (Moshi, 2019). Credit extended to borrowers by SACCOs may be at the risk of default such that whereas banks extend credit on the understanding that borrowers will repay their loans, some borrowers usually default and as a result, SACCOs income decrease due to the need to provision for the loans. Many SACCOs and credit unions offer secured personal loans, which are personal loans backed by funds in a savings account (Munene, Ndambiri & Wanjohi, 2019).

SACCOs reforms have played an important role in China's overall effort to transform a centrally planned economy into a market-based economy since 1978 (Wang *et al.*, 2018). Although the SACCOs sector has undergone remarkable changes over the period, deep-seated structural problems of asset quality, capital adequacy and profitability continue to pose a challenge to the sector. During the last year, China has ostensibly accelerated reform of the SACCOs sector (Wamwara, Spillan & Onchoke, 2023). Focus has been given to addressing the cumulated performing loans both bad loans inherited from the past and new loans that will deteriorate to become classified loans. Arguably, the major problem in the Chinese SACCOs sector is the high level of performing loans and continued lending to loss-making SOEs (Kinyua, 2021).

The UK SACCOs system has witnessed a substantial growth and change in recent years and its total assets have expanded rapidly since 1990 (Mushonga, Arun &

Marwa, 2019). Major trends in the UK SACCOs sector over the last years include the conversion of building societies into SACCOs, the consolidation of the UK SACCOs and the entrance of non-financial firms into the financial services market (McLeod, 2019). Following the Building Societies Act 1986 a number of building societies converted into SACCOs, especially between 1994 and 1997. In addition, the remaining building societies witnessed an increase in their commercial freedom in 1997 with the building societies act 1997 (World Bank, 2019).

Accumulation of NPLs in Sub-Saharan Africa has been attributed to terms of trade deterioration and interbank loans which are present in the context of low equity and absence of diversification (Torku, 2020). Interbank loans also have the tendency of increasing the risks and prospects of moral hazard. Moral hazard can be high in times when SACCOs capitalization is low and this may result in adoption of imprudent lending strategies with direct implications for SACCOs' loans portfolios which are mostly skewed towards high-risk projects (Maurizi, 2018). Using a pseudo panel-based model for several countries in Africa found out that economic growth, real exchange rate appreciation, the real interest rate, net interest margin security (NIMS), and inter-bank loans are significant determinants of NPLs in these countries (Mumba, 2019).

SACCOs of Egypt are one of the most important financial institutions in supporting the economic environment as they help the business firms to enhance their performance by granting them the required capital to expand their operations and sustain growth to increase their profitability (Chakroun *et al.*, 2017). SACCOs are exposed to different types of risks; interest rate risk, exchange rate risk, market risk, Insolvency risk, credit risk, liquidity risk, political risk, and operational risk (Al

Kerdawy, 2019). SACCOs grant credit based on the creditworthiness of the loan applicants to make sure that the applicants have the ability to meet all their debt obligations on schedule without any delays (Nyebar, 2021).

South Africa performing loans ratio stood at 5.0 % in November 2020, compared with the ratio of 5.0 % in the previous month. South Africa performing loans ratio data is updated monthly, available from Jan 2008 to Nov 2020 (Zulu, 2020). The data reached an all-time high of 6.0 % in Nov 2009 and a record low of 2.1 % in Jan 2008. Impaired Advances are advances in respect of which the bank has raised specific credit impair. In the latest reports, Money Supply M2 in South Africa increased 15.1 % in Dec 2020. South Africa Foreign Exchange Reserves was measured at 44.3 USD in Dec 2020 (Talha & Trayo, 2017). Household Debt of South Africa reached 138.3 USD bn in Sep 2020, accounting for 46.8 % of the country's Nominal GDP (Alagidede *et al.*, 2018).

Loans performance in Uganda's SACCOs has exhibited a negative trend, in spite of the reforms undertaken in the industry (Nathan *et al.*, 2020). The continued decrease in loans performance has not only affected credit growth, but also resulted in the collapse and closure of some SACCOs. Against this backdrop, it was necessary to understand the determinants of NPLs in Uganda's SACCOs sector (Nathan *et al.*, 2020). NPLs increase with increase in lending rates, real effective exchange rate and unemployment rate while increase in returns on assets and GDP growth rate lower NPLs. In addition, SACCOs need to focus more on internationally competitive sectors (Assessment, 2019).

The loan will become non-performing depending the stipulated regulations that the bank or that which is put forth by the monetary regulatory authority. Normal category

includes well documented facilities to financially sound clients where no weaknesses exist. Such advances must not have been rescheduled (Kibet, 2020). Substandard are facilities which though still operative involve some degree of risk and there exists possibility of some future loss unless close supervision is given and corrective action is taken to strengthen the position, for instance, three months‟ installments in arrears (Hersel, Helmuth, Zorn, Shropshire & Ridge, 2019).

1.1.1 Kenyan Context- SACCOs in Kenya

The SACCO Societies Act (Cap 490B) and the Regulations provides for prudential norms and requirements which SACCOs are required to fully comply with in order to maintain financial stability (SASRA, 2020). The key requirements include core capital and capital adequacy ratios, asset quality, non-earning assets, liquidity requirements, limits on external borrowing and equity investments; and generation of earnings. These are supplemented by regulatory guidelines issued by the Authority from time to time, together with financial best practices (SASRA, 2020). The regulatory framework requires SACCOs to maintain minimum core capital of Kshs 10 million, together with the following capital adequacy ratios: core capital to total assets, core capital to deposit liabilities and institutional capital to total assets at the ratios of 10 percent, 8 percent and 8 percent respectively (SASRA, 2020) (Opondo, 2020).

According to the 2016 SACCO supervision report released by the SACCO Societies Regulatory Authority, the industry's loan portfolio risk increased to 5.23 per cent up from 5.12 in 2015, with the value of loan not performing increasing from Sh13.21 billion to Sh15.57 billion. The loan portfolio risk of 5.23 per cent is higher than five per cent recommended maximum by the World council of Credit Unions and three per

cent recommended by the local SACCO regulator. The report further showed that the number of loan ratio to deposits remained unchanged at 108 per cent above the 70-80 per cent recommended by WOCCO, an indication that members are borrowing more than their deposits. This has forced SACCO's to turn to borrowing from local banks to fund members' high loan appetite, exerting more pressure on their balance sheets. (Om'mbongo, 2020).

SASRA supervisory report (2020) showed that loans performance have been decreasing since 2016. The Authority continues to be very concerned with the ever-growing amounts of non-remitted deductions which some employers continue to owe to DT-SACCOs. For example, the total amount of non-remitted funds as at September, 2020 stood at a staggering Kshs 5.04 Billion compared to Kshs 3.87 Billion as at September 2019. To worsen the scenario, the highest proportion of the non-remitted funds owed to the DT-SACCOs amounting to Kshs 4.31 Billion related to repayment of loans. Consequently, all the loans which were expected to be repaid with these non-remitted deductions remains non-performing and to the DT-SACCO system was being denied liquidity in the equivalent of the same sums (SASRA supervisory report 2020) (Furusawa, 2021).

An increase in NPLs has forced SACCOs to put aside substantial cash as insurance against possible defaults, thus reducing their profitability (Boot *et al.*, 2021). The loan repayment holiday that saw SACCOs freely restructure loans valued at Sh1.31 trillion has since ended, which means that SACCOs will have to flag any abnormal loan and provision for those that have high risk of default (Uddin *et al.*, 2021). SACCOs sell the non-performing loans at significant discounts, and the collection agencies attempt to collect as much of the money owed as possible. Alternatively, the

lender can engage a collection agency to enforce the recovery of a defaulted loan in exchange for a percentage of the amount recovered (Johora, 2020).

1.2 Statement of the Problem

The Savings and Credit Cooperative Societies in Kenya play an important role, in providing the speedy financial services to the members. However, Kenyan SACCOs have not been spared from the threat of increased nonperforming loans. These is because a large portion of the Savings and Credit Cooperative Societies have huge levels of provisions, medium to high asset quality ratios and also have advanced credit card facilities to their members. The percentage of gross non-performing loans to gross loans increased to 14.1% in December 2020 from 12% in December 2019. The percentage of gross non-performing loans to gross loans measures the health of the Savings and Credit Cooperative Societies and a high percentage show that SACCOs are struggling to recover issued loans and interest on the loans (Mwangi, 2020). SACCOs recording a large percentage of its outstanding loans as non-performing loans has hurt their financial performance.

Since the SACCOs mainly make money from the interest they charge on loans, when they are unable to collect the owed interest payments from NPLs, it means that they have less money available to create new loans and pay operating costs. The money represents an income that is potentially lost, and it affects the profitability of the SACCOs. Not only does it affect the SACCOs, but it also leaves potential borrowers with fewer options to get loans from the SACCOs. When the percentage of non-performing loans increases, the lender's stock price will also go down (Singh *et al.*, 2021). The NPLs a SACCOs holds in its books, the less attractive it is for potential investors because its future profitability will suffer if the lender will not earn an

income from its credit business. Therefore, the current study aims to fill the existing research gap by investigating collection policy, client appraisal, credit risk control, credit terms and loan performance among SACCOs in Kenya.

1.3 Research Objectives

The study was guided by both general and specific objectives;

1.3.1 General Objective

The main objectives of this study were to investigate credit risk management practices, technological innovation and loan performance of registered deposit taking SACCOS in Kenya.

1.3.2 Specific Objectives

1. To determine the effect of collection policy on loan performance of registered deposit taking SACCOS in Kenya
2. To examine the effect of client appraisal on loan performance of registered deposit taking SACCOS in Kenya
3. To establish the effect of credit risk control on loan performance of registered deposit taking SACCOS in Kenya
4. To analyze the effect of credit terms on loan performance of registered deposit taking SACCOS in Kenya
5. To examine the effect of technological innovation on loan performance of registered deposit taking SACCOS in Kenya
6. (a) To analyze the moderating effect of technological innovation on the relationship between collection policy and loan performance of registered deposit taking SACCOS in Kenya.

6. (b) To test the moderating effect of technological innovation on the relationship between client appraisal and loan performance of registered deposit taking SACCOS in Kenya.

6. (c) To establish the moderating effect of technological innovation on the relationship between credit risk control and loan performance of registered deposit taking SACCOS in Kenya.

6. (d) To examine the moderating effect of technological innovation on the relationship between credit terms and loan performance of registered deposit taking SACCOS in Kenya.

1.4 Research Hypotheses

i) **H_{01}:** Collection policy has no significant effect on loan performance of registered deposit taking SACCOS in Kenya

ii) **H_{02}:** Client appraisal has no significant effect on loan performance of registered deposit taking SACCOS in Kenya

iii) **H_{03}:** Credit risk control has no significant effect on loan performance of registered deposit taking SACCOS in Kenya

iv) **H_{04}:** Credit terms have no significant effect on loan performance of registered deposit taking SACCOS in Kenya.

v) **H_{05a}:** Technological innovation does not moderate the relationship between collection policy and loan performance of registered deposit taking SACCOS in Kenya.

vi) **H_{05b}:** Technological innovation does not moderate the relationship between client appraisal and loan performance of registered deposit taking SACCOS in Kenya

vii) **H_{05c}:** Technological innovation does not moderate the relationship between credit risk control and loan performance of registered deposit taking SACCOS in Kenya

viii) **H_{05d}:** Technological innovation does not moderate the relationship between credit terms and loan performance among SACCOs in Kenya.

1.5 Significance of the Study

The findings of the study were beneficial to several stakeholders: SACCOs, investors, policy makers and academicians: The study findings provided important information to the SACCOs managers when making decision about adopting new technological innovations in the SACCOs sector. In addition, the study helped gauge the extent to which the adoption of technology innovation has enhanced accessibility of SACCOs services and the level of customer loyalty. The study findings provided a guide to the top management of SACCOs on how to improve the financial performance of the SACCOs through financial innovations. The study made investors recognize the overall level of loan performance among SACCOs affecting their return on investment and hence not ignore the critical need of credit risk management practices and technological innovation. The study findings be also helped the government in policy making process in setting rules governing the process of SACCOs. Findings from the research were of great importance to other researchers and SACCOs professionals. The academicians being charged with dissemination of knowledge to various stakeholders hence found this study useful. The study contributed to the body of knowledge and literature in the SACCOs. Scholars might use the study for reference and research based on findings of study.

The findings of this study have significant policy implications for the government in shaping regulations and guidelines for SACCOs. By understanding the impact of technology innovation on the accessibility of SACCOs services and customer loyalty, policymakers can develop appropriate frameworks to encourage and support the

adoption of technological innovations in the sector. Additionally, the study highlights the importance of credit risk management practices for SACCOs' loan performance. This information can inform the government's policies on risk management and help establish rules and guidelines for SACCOs to mitigate credit risks effectively.

The study contributes to the existing literature on credit risk theory, liquidity theory of credit, and innovation diffusion theory. By examining the relationship between technological innovation, accessibility of SACCOs services, customer loyalty, and financial performance, the study provides empirical evidence and insights that further enrich these theoretical frameworks. The findings offer a practical application of these theories in the context of SACCOs, providing a deeper understanding of how technology adoption and financial innovations can impact their operations and outcomes.

The study's findings have valuable implications for SACCO managers in making informed decisions about technology adoption and improving financial performance. The research highlights the potential benefits of adopting technological innovations in enhancing accessibility and customer loyalty. This information can guide SACCO managers in identifying and implementing appropriate technological solutions to improve service delivery and attract and retain customers. Additionally, the study emphasizes the importance of financial innovations for enhancing the financial performance of SACCOs, providing managers with insights into strategies they can employ to enhance their organizations' overall financial health.

This study opens up opportunities for future research in the field of SACCOs and technological innovation. Further investigation can delve into specific types of technological innovations and their impacts on different aspects of SACCOs'

operations. For example, studying the effects of mobile banking applications, online platforms, or artificial intelligence-driven systems on SACCOs' efficiency, risk management, and customer satisfaction would provide more comprehensive insights. Additionally, future research can explore the role of regulatory frameworks in facilitating or hindering the adoption of technological innovations in the SACCOs sector. Such studies can contribute to the ongoing development and refinement of theories and practices in the field, leading to continuous improvements and innovation in SACCO operations.

1.6 Scope of the Study

The study examined the credit risk management practices, technological innovation and loan performance among SACCOs in Kenya. The study focused on four components of technological innovation which include; collection policy, client appraisal, credit risk control and credit terms. This study adopted explanatory design. The target population for this study was 174 operational managers of 174 Savings and Credit Cooperative Societies in Kenya (SASRA, 2021). The study employed census survey in selecting the respondents. The study was carried out from May 2023 to July 2023.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter focused on literature review. It discussed the concepts, theoretical literature, empirical literature, conceptual framework, summary of literature, critique of existing literature and literature gaps.

2.1 Loan Performance among SACCOs

Loan performance analysis is the process of measuring and analyzing the effects of a loan transaction on an entity's financial position, cash flows and profitability (Nangih, Ofor & Ven, 2020). Loan performance analysis can be used to evaluate the impact of a loan on an entity's financial position, cash flows and profitability. Loan performance analysis can be used to evaluate the impact of a loan on an entity's financial position, cash flows and profitability.

Loan performance analysis is the process of systematically analyzing the performance of loans in order to identify areas for improvement. There are a variety of methods that loan performance analysts can use to analyze loans, and the most important factor in choosing a method is the data available. There are three main types of loan performance analysis: financial analysis, performance tracking, and outcome evaluation. Financial analysis focuses on measuring loan performance against financial goals, such as reducing interest rates or increasing loan origination rates. Performance tracking tracks loan performance over time in order to identify any trends. Outcome evaluation assesses the success of a loan program by looking at both financial and non-financial measures. Different methods can be used to analyze loans according to their data availability. Extensive financial data can be analyzed using

regression analysis, while performance data that is less detailed can be analyzed using trend analysis. Both regression and trend analysis require data that is monthly or weekly in format. Less detailed performance data can be analyzed using simple measures such as average monthly delinquency or average number of days delinquent.

Successful SACCOs operations require managers to weigh complex trade-offs between growths, return, and risk. By forcing line managers to include the opportunity cost of equity when making investment and operating decisions, SACCOs expect to elicit better decision-making by managers. Implementing performance measurement and incentive systems driven by economic profit and allocated equity capital, senior managers also hope to align managerial behavior more closely with the interests of shareholders (Edem, 2017). To measure SACCOs' creditworthiness and risk exposures is a complicated issue and it is not easy to interpret SACCOs' accounting data. Indicators of business failures and nonperforming loans are also usually available only at low frequencies, if at all; the latter are also made less informative by SACCOs desire to hide their problems for as long as possible (Kaplan & Mikes, 2016).

One way to measure SACCOs performance is by determining the profitability of the SACCOs. Profitability is the ability of a SACCOs to make profits by earning more money that exceeds the yearly expenses and taxes every financial year. The SACCOs make profits from fees charged for their services and the interests levied on assets. On the other hand, the main expense incurred by SACCOs is in the interest paid on their liabilities every financial year (Djalilov & Piesse, 2016). A positive difference between the earnings and the expenses represents the profitability of any financial institution. The SACCOs' assets that attract revenue to the institution include loans to

individuals, companies, and other institutions and securities the SACCOs hold. The principal liabilities for the SACCOs include deposits and the funds borrowed from other SACCOs or through selling of commercial paper in the money market (Yusuf & Surjaatmadja, 2018).

2.2 Credit Risk Management

Credit risk management is a structured approach to managing uncertainties through risk management, developing strategies to manage it, and mitigation of risk using managerial resources (Settembre-Blundo et al., 2021). The strategies include transferring to another party, avoiding the risk, reducing the negative effects of the risk, and accepting some or all of the consequences of a particular risk. Some traditional risk managements focused on risk stemming from physical or legal causes such as natural disasters or fires, accidents, deaths and lawsuits. SACCO with high credit risk has high bankruptcy risk that puts the members' funds in jeopardy. Among the risk that face SACCO's, credit risk is one of great concern to most SACCO authorities and government regulators (Mulinge, 2019). This is because credit risk is that risk that can easily and will most likely prompt SACCO failure.

The SACCO loan is commonly referred to the borrower who got an amount of money from the lender, and need to pay back, known as the principal. In addition, the SACCOs normally charge a fee from the borrower, which is the interest on the debt risk associated with loans is credit risk (Silas & Maringa, 2021). Credit risk is perhaps the most significant of all risks in terms of size of potential losses. Credit risk can be divided into three risks: default risk, exposure risk and recovery risk. As the extension of credit has always been at the core of SACCO operation, the focus of these institutions' risk management has been credit risk management. It applied both to the

SACCO loan and investment portfolio. Credit risk management incorporates decision making process; before the credit decision is made, follow up of credit commitments including all monitoring and reporting process (Bhatt, Ahmed, Iqbal & Ullah, 2023). The credit decision is based on the financial data and judgmental management of the market outlook, borrower, management and shareholders.

Credit risk management in a SACCO therefore starts with the establishment of sound lending principles and an efficient framework for managing the risk. Policies, industry specific standards and guidelines together with risk concentration limits are designed under the supervision of Risk management Committee (Chavleishvili et al., 2021). In credit risk management, they use various methods such as credit limits, taking collateral, diversification, loan selling, syndicated loans, credit insurance, securitization and credit derivative.

The SACCOs credit management need to deal with the selection of portfolios which maximizes expected returns and should be consistence with the individual acceptable levels of risk. Loan collection management should provide a framework that specifies and measures investment risk. It should also develop the relationship between risks expected and returns (Iyinomen, Okoye & Ifeoma, 2022). The main assumption is that investment must be considered because the return from the investment interest has a relationship with the returns from assets portfolio which is important in credit management.

Credit risk management is one of the most expensive ventures in any financial institutions in comparison to other risks in financial institutions (Ndikumana et al., 2019). Majority of financial institutions worldwide face varied difficulties, but credit risks is the most profound compared to others. The main difficulty associated with

credit risks is laxity of credit standards for borrowers, counterparties, poor loan collection methods, lack of attention and not putting into considering the risk management policies.

A SACCOs' sustainability and levels of development basically depend on high recovery of its loan portfolio (Kowa, Turinawe & Mukokoma, 2023). Therefore, the policies and implementation of the collection actions and disciplines have unquestionable importance and must be carried out constantly and with consistency required by the results of the analysis of the loan portfolio. The responsibility for implementing collection actions and enforcing both their policies and procedures falls directly on the SACCOs' management and loans officer. The policies and procedures for implementing credit and collection activities shall basically be based on the levels of legalization of the loans and prior conditions with which the disbursements have been agreed to. Therefore, it is stressed that collection policies and procedures are measures and disciplines complementary to the primary loan portfolio granting and management activities.

2.3 Technological Innovation

Technological innovation has had a major impact on the banking sector in recent years. Mobile banking allows customers to access their accounts and perform transactions from their smartphones or tablets (Elhajjar & Ouaida, 2020). This includes checking balances, transferring funds, making payments, and even depositing checks. Mobile banking is a convenient and secure way to bank, and it is becoming increasingly popular. ATMs (automated teller machines) allow customers to withdraw cash, deposit checks, and perform other transactions without having to visit a bank branch. ATMs have made banking more convenient and accessible, and they have

also helped to reduce costs for banks. Online banking allows customers to access their accounts and perform transactions from their computers. This includes checking balances, transferring funds, making payments, and even opening new accounts. Online banking is a convenient and secure way to bank, and it is becoming increasingly popular. Contactless payments allow customers to make payments by tapping their credit or debit cards or mobile devices on a payment terminal. Contactless payments are a convenient and secure way to pay for goods and services, and they are becoming increasingly popular.

According to Anderson and Tushman (2018), technological innovation is a new or better product or procedure whose technological qualities change substantially from those of the past. Implemented technological product innovations are new products (product innovations) or processes in application (process innovations) that have been introduced into the marketplace. The product or method is considered innovative if it provides specific benefits for the enterprise in question; these benefits do not need to be novel from the perspective of other businesses or the market (Zhan *et al.*, 2019).

In today's fast-paced corporate climate, technological innovation is laden with both possible rewards and threats (Granter *et al.*, 2019). As more businesses feel pressure to innovate, understanding the dangers posed by disruptive technology might go by the wayside. Professionals in the field of credit risk management who are cognizant of both the benefits and dangers associated with the adoption of new technology can aid their organizations in achieving success.

Risk managers have been viewed as secluded within their respective firms and as a result, Gallati (2022), posit that the so-called innovators and disruptors within a firm may avoid consulting the risk team for advice. They are afraid that doing so will result

in a lecture on why a new initiative, process, or technology is detrimental and should not be undertaken. Thankfully, risk professionals are becoming increasingly aware of this predicament nowadays**.**

Analysis of the practice of introducing and technological innovations in financial institutions reveals that operational risks (via information, technical, and technological violations and impact) are realized (Lee & Shin, 2018) on the operational stability of financial institutions) and regulatory risks (compliance risks) impact their performance the most. This aspect involves the effect of innovative tools, products, and their associated dangers and technology is due to the fact that, as part of the digitalization of the financial sector, there is a shift from largely retail businesses to institutional use of new technologies throughout the monetary framework.

2.4 Theoretical Review

The study was guided by Credit Risk theory, Liquidity theory of credit and innovation Diffusion theory.

2.4.1 Credit Risk Theory

This theory was proposed by Melton in 1974. The theory postulates that the default occasion comes from the company’s evolution of assets modeled by the process of diffusion with constant parameters. Those evolution models are also called structural models and are based on models related to a particular issuer. Asset model represent an evolution of this category where default loss is caused by exogenous factors. Long staff and Schwartz (1995) argue that the default may occur throughout the life of a particular bond but not only in the maturity.

Merton (1977) introduced the credit risk theory otherwise called the structural theory which said that the default event derives from a firm's assets evolution, modeled by a

diffusion process with constant parameters. Such models are commonly defined "structural models" and based on variables related to a specific issuer. An evolution of this category is represented by a set of models where the loss conditional on default is exogenously specified (can be deterministic or stochastic), nonetheless maintaining the endogenous nature of default event. In these models, the default can happen throughout all the life of a corporate bond and not only at maturity; the assets dynamics are generally modeled as a constrained diffusion with respect to an absorbing barrier, the latter being deterministic or stochastic and representing the default threshold.

According to Long staff and Schwartz (1995) credit risk model presents that the default of bonds can happen in the whole life of the corporate bond and but not only in the maturity. According to Saa-Requejo and Santa Clara (1997) the changes in assets is generally constrained by the changes in the risks facing a particular organization and these in the end justifies the default rate of the majority of the institutions loans. The second approach of reduced for models, the event of the default and the default rate is determined solely the pricing of the assets and mostly the credit derivatives and the probabilities of the occurrence of default determined by exogenous factors.

2.4.2 Liquidity Theory of Credit

This theory was postulated by Emery (1984), who proposed that credit rationed firms use more trade credit than those with normal access to financial institutions. The vital point of this idea is that when a firm is financially challenged the offer of trade credit can make up for the reduction of the credit offer from financial institutions. In accordance with this view, those firms presenting good liquidity or better access to

capital markets can finance those that are credit rationed. Several approaches have tried to obtain empirical evidence in order to support this assumption.

Nielsen (2002), using small firms as a proxy for credit rationed firms, finds that when there is a monetary contraction, small firms react by increasing the amount of trade credit accepted. As financially unconstrained firms are less likely to demand trade credit and more prone to offer it, a negative relation between a buyer's access to other sources of financing and trade credit use is expected. Long *et al.* (1993) obtained evidence supporting this negative relation.

2.4.3 Innovation Diffusion Theory

Rogers' Diffusion of Innovation Theory developed by Rogers (1995) sought to explain how new ideas or innovations are adopted, and this theory proposes that there are five attributes of an innovation that effect adoption: relative advantage, compatibility, complexity, trial-ability and observability. Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes. Rogers' theory suggests that innovations that have a clear, unambiguous advantage over the previous approach was more easily adopted and implemented. Current research evidence indicates that if a potential user sees no relative advantage in using the innovation, it will not be adopted (Greenhalgh, 2004). Compatibility is the degree to which an innovation fits with the existing values, past experiences, and needs of potential adopters. There is strong direct research evidence suggesting that the more compatible the innovation is, the greater the likelihood of adoption (Greenhalgh, 2004).

Complexity is the degree to which an innovation is perceived as difficult to understand and use. Furthermore, Rogers suggested that new innovations may be

categorized on a complexity-simplicity continuum with a qualification that the meaning or the relevance of the innovation may not be clearly understood by potential adopters. When key players perceive innovations as being simple to use the innovations was more easily adopted (Greenhalghl, 2004). Trial ability is the degree to which an innovation may be experimented with on a limited basis. Because new innovations require investing time, energy and resources, innovations that can be tried before being fully implemented are more readily adopted. Finally, observability is the degree to which the results of an innovation are visible to the adopters. If there are observable positive outcomes from the implementation of the innovation then the innovation is more adoptable.

The relevance of the theory outlines the adoptability of SACCOs to generate and pinpoint the innovative ideas in credit risk management practices, technological innovation and loan performance and implement the idea to suits the SACCO in terms of operationalization and functionality of the innovative ideas the organization came up with. For these reasons the complexity, compatibility, trial ability and observability of the technological innovation definitely can lead to loan performance.

2.5 Empirical Review

This section covered the relationships between collection policy, client appraisal, credit risk control, credit terms and loan performance for SACCOs in Kenya.

2.5.1 Relationship between Collection Policy and Loan Performance

Boateng and Dean (2020) examined the determinants of loan default and its effects on financial performance of SACCOs in Ghana by using Fidelity SACCOs Limited as a case study. The study employed quantitative and qualitative research techniques as the research design. Simple random technique was used to select 120 loan clients and a

purposive sampling was used to select a credit staff. It was realized that the delays in loan approval, poor management, poor credit appraisal and diversion of loans are the main determinants of loan default in Fidelity SACCOs. The study also found that SME clients (49.5%) defaults more than agriculture, personal and salary loan clients. The major cause of loan default according to the findings of this study was decrease in demand of goods and service (16.1%) sold by the loan clients. Again, it was realized that loan default has a negative impact on profitability. The study however was done in Ghana unlike the current study which is a case of Kenya.

Ajiambo (2015) did a study on the relationship between loan policy and financial performance in SACCOs in Nairobi County. This study adopted a descriptive survey research design. From the findings, the provision for bad and doubtful debts was positively related to the financial performance of the Kenyan SACCOs. Declining loan default rate significantly enhanced the financial performance of the Kenyan SACCOs. Collateral significantly enhanced the financial performance of the Kenyan SACCOs. There is a positive relationship between loan policy and financial performance of the Kenyan SACCOs. The study however focused on loan policy and financial performance unlike the current study which is on credit risk management strategies under collection policy.

Gweyi (2018) did a study on investigate loan collection strategies adopted by 44 the SACCOs currently operating in Kenya. The study was descriptive in nature. The study opted for both primary and secondary forms of data. The study found out that the SACCOs had policies and strategies that governed the loan collection. Though this existed most of the SACCOs did not seem to efficiently implement the same. The SACCOs assumed some of the economic factors which could affect their loan

performance. The SACCOs also concentrated highly on collateral as the main security for loans which at times made the SACCOs assume other strategies of preventing risk. The study however failed to show loan performance as it is the case of the current study.

Karanja (2019) established the loan collection and lending performance of registered deposit taking SACCOS in Kenya. Descriptive survey research design was employed whilst the target population for this study was employees of the 42 SACCOs in Kenya as at 1st January, 2018. The results of the study revealed that the combined effect of credit collection policies positively effectd the lending performance of SACCOs. The study concluded that loan collection activities significantly effectd the lending performance of SACCOs; and as a result, the operating capital of SACCOs had gone down to very low levels since lending is a source of income for the SACCOs and this has affected the performance of the entire SACCOs sector. The study nonetheless focused on lending strategies and lending performance not like the current study which is mainly focused on loan performance based on collection policy.

Obae and Jagongo (2022) aimed at examining the effect of credit management practices on loan performance of commercial banks in Kenya. Specifically, the study sought to establish the effect of debt collection policy, client appraisal and lending policy on the loan performance of commercial banks in Kenya. The underpinning theory of the study was the 5Cs model for credit. The study used explanatory research design and the research philosophy adopted was positivism. The target population was 44 commercial banks in Kenya and a census approach was used. Both primary and secondary data were used. Primary data was collected through structured questionnaires and related to credit management practices while secondary data was

obtained from review of existing bank loan records in relation to loan amount advanced and non-performing loans for a period of four years from 2015-2018. The data collected was analyzed using both descriptive and inferential statistics with the help of SPSS version 22. The study found out that debt collection policy and lending policy had a positive significant effect on loan performance of commercial banks in Kenya. However, client appraisal had no significant effect on loan performance of commercial banks in Kenya.

Antony and Otuya (2019) investigated the effect of loan collection policies on financial performance SACCOs in Kakamega County, Kenya. This study is supported by Modern portfolio theory. A descriptive survey was adopted and targeted 143 senior management staff from 13 SACCOs located in Kakamega County with a sample size of 105 selected using stratified random sampling techniques. A structured questionnaire was used as instrument. A pilot study was conducted among 20 senior management staff of SACCOs in Bungoma County, Kenya, so as to check validity and reliability. This study aided SACCO management committees, staff and relevant shareholders in understanding the importance of loan collection policy that enables them seek solutions to the loan defaults. The study findings showed a positive correlation between Loan Collection Policies and financial performance (R= 0.758 with ROA). It was evident from results that adherence to Loan Collection Policies positively contributes to financial performance of SACCO's in Kenya and there was variation on financial performance due to changes in loan collection policies.

2.5.2 Relationship between Client Appraisal and Loan Performance for SACCOs

Chilukuri and Rao (2015) conducted a study on appraisal and credit approval effectiveness and loan review in commercial banks. The study found that credit risk is

the greatest risk faced by many commercial banks in the world. The study found that many banks face the uncertainty that some of its customers may fail to pay in the required time or may fail to pay at all, it is therefore the obligation of many banks to monitor and appraise each and every loan on a frequent basis to gauge the borrower's current and future ability to fulfill its interest and principal repayment. The study found that the loan review mechanism should aim at enabling improvement in terms of the unpaid interest and the level of non-performing loans in the books of account. The process of application, processing to disbursement must be smooth and predictable by many borrowers in the country. Banks facing high non-performing loans should intensify on loan recovery. This study was a case of commercial banks whereas current study focuses on SACCOs.

Katula and Kiriinya (2018) established the effect of loan appraisal, on financial performance of deposit taking SACCO'S in Embu County, Kenya. The study employed descriptive research design and targeted a total population of 250 respondents selected from of 10 SACCO'S operating in Embu County, Kenya. Out of the 250 respondents, Slovin's formula was adopted to select 158 respondents to be the sample size of the study. The study used primary and secondary data. Primary data was collected using questionnaires through drop and pick later method. Secondary data was gathered by a review of existing materials that included financial statements and related empirical studies. Data was analysed using Statistical Packages for Social Sciences (SPSS) version 21. Data was analysed using descriptive statistics like mean, percentages, standard deviation and frequencies. The findings of the study were presented using Tables and graphs. After conducting descriptive, correlation and regression analysis, it was revealed that there was a statistical relationship between independent variables loan appraisal, and financial performance of deposit-taking

Savings and Credit Cooperative Societies in Embu County, Kenya). The study concluded that unless SACCO's embrace models of minimizing financial risks such as loan appraisal, achieving financial performance will be an uphill task.

George (2015) analyzed the effects of loan appraisal practices on the profitability of deposit taking SACCO's in Nairobi County. Specifically, to determine the effect of credit monitoring on the profitability of deposit taking SACCO's in Nairobi. This study was carried out through a descriptive research method. The regression results revealed that credit appraisal practices, credit monitoring had a positive and significant effect on the financial profitability of SACCOs in Nairobi. Based on the findings above the study concluded that credit appraisal practices and credit monitoring have a positive effect on the financial profitability of the SACCOs. The study recommended that management of SACCOs should adopt effective credit appraisal practices and credit monitoring practices to enhance effective and efficient performance.

2.5.3 Relationship between Credit Risk Control and Loan Performance for SACCOs

A study by Muasya (2015) analyzed relationship between loan losses and credit risk management. The target population was the 44 commercial banks in Kenya. The study utilized descriptive research design. The objective of the study was to establish the relationship between risk management practices and the loan losses. The findings indicate that majority of the commercial banks in Kenya utilized to a great extent the risk management practices method of measuring, monitoring, identifying and control. Information sharing amongst the banks was found to significantly contributing to reducing the risk exposure levels in the banks. The study concluded that in majority of

the commercial banks the aspect of risk management practice is commonly practiced and the government legislation on information sharing act to credit risk management is appreciated by the management of most banks. The study found that there is a negative significant relationship between loan portfolio losses and credit risk management practices in Kenyan commercial banks.

According to Abdelaziz, Rim and Helmi (2022) credit risk is the most expensive risk in financial institutions and its effect is more significant as compared to other risks as it directly threatens the solvency of financial institutions. While financial institutions have faced difficulties over the years for a multitude of reasons, the major cause of banking problems continue to be directly related to lax credit standards for borrowers and counterparties, poor portfolio risk management, or lack of attention to changes in economic or other circumstances that lead to deterioration in the credit standing of financial institution's counterparties.

Waitherero and Wangari (2022) conducted study on determinants of growth of SACCO's wealth. The study findings indicated that Growth of SACCOs wealth depended on financial stewardship, capital structure and funds allocation strategy. The study further found that SACCOs inadequately complied with their by-laws; incomes from investments did not adequately cover their costs. The study recommended that SACCO should; continuously review credit policies, establish irrecoverable loan provision policies, develop sound staff recruitment policies, use appropriate financing mix. In was also suggested that the Government should review legal framework to ensure that institutional capital is used to grow SACCO's wealth. The study however failed to indicate the effect of credit risk on loan performance.

Belás *et al.*, (2018), examined credit risk management policies for financial institution in the United States using a multivariate model and found that banks that adopt advanced credit risk management techniques (proxies by the issuance of at least one collateralized loan obligation) experience a permanent increase in their target loan level of around 50%. Partial adjustment to this target, however, means that the impact on actual loan levels is spread over several years. The findings confirm the general efficiency- enhancing implications of new risk management techniques in a world with frictions suggested in the theoretical literature.

2.5.4 Relationship between Credit Terms and Loan Performance for SACCOs

Ronoh (2019) did a study to establish the effect of credit terms on performance of SACCOs in Kitale. This study adopted a descriptive research design. Data was analysed using descriptive statistics such as frequencies and percentages and the multiple regression analysis was used to analyse and summarize the data. Regression estimates was used to describe data and to explain the relationship between one dependent variable and one or more independent variables. The study found that credit terms have a positive and significant effect on the performance of SACCOs in Kitale Town, customer appraisal has a positive and significant effect on the Performance of SACCOs in Kitale Town, debt collection procedure has a positive and significant effect on the performance of SACCOs in Kitale Town and internal control system has a positive and significant effect on the performance of SACCOs in Kitale Town. The study however focused on performance of SACCOs unlike the current study which is on loan performance of SACCOs.

Muigai and Maina (2018) sought to establish the credit monitoring and recovery strategies adopted by SACCOs in Kenya All the SACCOs in Kenya formed the

population for this study. The data was collected from these SACCOs and quantitative analysis was done. The findings were presented in Tables and figures. The findings indicated that all the SACCOs monitor loans to ensure proper payment. This indicates that SACCOs take keen interest of loan repayment to ensure that they undergo minimal losses. The study has established that the SACCOs in Kenya do generate reports to monitor loans by their clients. The study has established that SACCOs have various strategies of debt recovery. The strategies indicated by the study include securing their loans, adequate training of the relationship officers, informing their customers and visiting their customers to convince them to pay the loans. The study however failed to focus on use of debt recovery analytics on loan performance has it is the case of the current study.

Kagoyire, and Shukla (2016) sought to determine the effect of credit management on the financial performance of SACCOs in Rwanda. The study adopted a descriptive survey design. The target population of study consisted of 57 employees of Equity SACCOs in credit department. Entire population was used as the sample giving a sample size of size of 57 employees. Purposive sampling technique was used in sampling where the entire population was included in the study. Primary data was collected using questionnaires which were administered to the respondents by the researcher. Descriptive and inferential statistics were used to analyze data. The study found that client appraisal, credit risk control and collection policy had effect on financial performance of Equity SACCOs. The study established that there was strong relationship between financial performance of Equity SACCOs and client appraisal, credit risk control and collection policy. The study established that credit terms significantly effect financial performance of Equity SACCOs. Credit terms were found to have a higher effect on financial performance and that a stringent policy is

more effective in debt recovery than a lenient policy. It was not clear however on this study on how using of credit terms and loan performance of SACCOs.

Wambugu (2016) investigated the effect of loan credit terms strategies on the financial performance of local authorities in Kenya and towards the realization of the research objective both a descriptive analysis and correlation and regression analysis was undertaken. Data was collected through the use of a questionnaire that was distributed to a sample of 40 local authorities selected from the population. The study found out that the popular debt collection strategies that are employed by the councils are, subcontracting of debt collection to third party agents that work on commission and this is also supplemented by use of internal debt collection unit in the councils, adoption of both enforcement and proactive debt collection strategies. The results show that the council's internal debt collection strategies are updated frequently to cope with the challenges that arise in the operating environment since the market will always develop mechanism to evade paying the rates and levies. The study found that the subcontracting of the debt collection to third parties and the enforcement strategies had a positive relationship with the level of debts while proactive debt collection strategies and the use of internal debt collection units were found to have a negative relationship with the level of debt collection in the councils. The study however focused on credit terms in general unlike the current study which is specific on use of debt recovery analytics on loan performance.

Peter *et al.*, (2018) sought to enlighten SACCOs on the importance of loan policies for improved financial performance. The researcher sampled 36 SACCOs using stratified sampling. The research was carried out using both primary and secondary data. The data collected was processed and analyzed using statistical packages for

social sciences (SPSS) software. Correlation and multiple linear regression analysis were used to test the relationship between dependent and independent variables. The findings of the study recommended that SACCOs should continuously review credit policies to enhance the evaluation of loan applications and ensure that loan applications are appraised and ranked according to merit. The findings also recommended that SACCOs to ensure timely loan disbursement to facilitate loan recovery and minimize administrative costs which would lead to growth of SACCOs' wealth. Further, it was recommended that SACCOs should establish irrecoverable loan provision policies that make adequate loan provisions to promote safety of funds and ensure that loan assets are not overstated. This study was on financial performance and not loan performance as the case of the current study.

2.6 Moderating Role of Technological Innovation

Muia (2017) did a study to establish the effects of technological innovations on financial performance of registered deposit taking SACCOS in Kenya. The study adopted descriptive survey as it provided for explanation of the cause and effect between independent variables and the dependent variables. From the findings, a steady rise in return on assets values from 2009 indicated that the SACCOs' financial performance has been very well over the last 3 years in Kenyan financial industry. A significant positive relationship between mobile SACCOs and financial performance was also established by the study. The study as well established a significant positive relationship between Electronic Funds Transfer at Point-of-Sale Terminals and financial performance. Loan performance was not however featured out as it is the case of the current study.

Koori, Wanjiku and Atheru (2020) did a study to analyze technological SACCOs innovations and financial inclusion by SACCOs in Nairobi County Kenya. A descriptive research design and a positivism philosophy were used because the conceptual hypotheses were drawn from existing theories and identified knowledge gaps as founded on the research design. Results of the study indicated that the predictor variables; mobile SACCOs, agency SACCOs, electronic SACCOs outlets and internet SACCOs have an effect on financial inclusion. Correlation results also indicated that mobile SACCOs, agency SACCOs, electronic SACCOs outlets and internet SACCOs were positively associated with financial inclusion. Additionally, the regression findings indicated that mobile SACCOs, agency SACCOs and electronic SACCOs outlets were statistically significant predictors of financial inclusion. However, Internet SACCOs had a significance level of 0.586 which is higher than the conventional threshold of 0.05 which rendered the variable as statistically insignificant in prediction of financial inclusion. Financial inclusion in this study was however not the focus of the current study.

Okoth and Muia (2017) investigated the effects of technological innovations on the financial performance of the SACCOs in Kenya where the focus was on Equity SACCOs of Kenya. Quantitative data collected was analyzed by the use of descriptive statistics using SPSS and presented through percentages, means, standard deviations and frequencies. From the findings, the study concludes that adoption of technological innovations by SACCOs affect their financial performance. Balance enquiry, automatic advices to clients on credits and airtime purchase, money transfer as well as mini-statement affects the financial performance in the SACCOs. Competition, minimum SACCOs reserve, operational costs, operational risk, capital requirements, customer base/reach, regulatory requirements, customer relation, profitability and

customer trust on internet SACCOs affect the financial performance. The study however focused on general financial performance of the SACCOs unlike the current study which is specific on loan performance.

Haabazoka (2018) endeavored to determine the effects of technological innovation on the performance of registered deposit taking SACCOS in Kenya. The study, which was a census, employed a descriptive cross-sectional design and targeted all the SACCOs in Kenya. Most of the respondents affirmed the positive impacts of technological innovations including ease of access, convenience, user friendliness among others. The study showed that customer care employees at the SACCOs valued technological innovations. Moreover, the results revealed a positive and significant relationship between SACCOs' performance in terms of profitability and adoption of various technological innovations including customer independent technology, customer assisted technology and customer transparent technology. The combined effect of the predictor variables (customer independent technology, customer assisted technology and customer transparent technology) was positively correlated with profitability with 50.8% of the variations in profitability of registered deposit taking SACCOS in Kenya being explained by the model.

2.7 Conceptual Framework

The hypothesized relationship between the independent variables and the dependent variable is depicted in the conceptual framework, as shown in Figure 2.1**.** The independent variables were collection policy, client appraisal, credit risk control, and credit terms. The moderating variable were technological innovation. The dependent variable was loan performance among SACCOs.

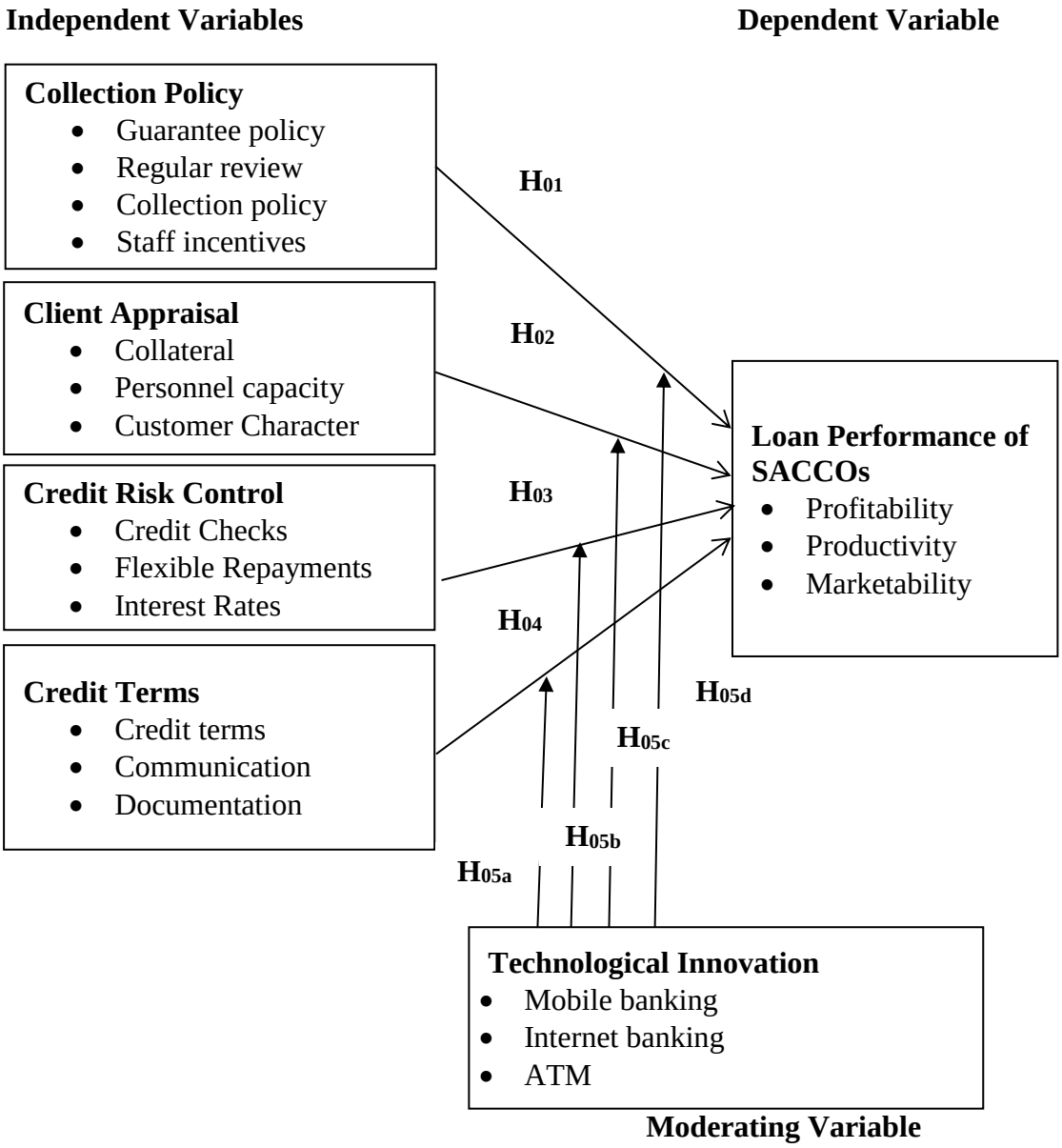


Figure 2.1 Conceptual Framework model:

Source: Researcher (2023)

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter described the research design, targeted population, sample size and sampling procedure, research instruments, pilot study, data collection procedure, data processing and analysis.

3.1 Research Design

This study adopted explanatory design. In this study the design helped to investigate credit risk management practices, technological innovation and loan performance among SACCOs in Kenya and other variables of interest as they exist in a defined population at a single point in time or over a short period of time (Levin, 2011). This design was chosen because it was relatively quick and easy to conduct; data on all variables is only collected once. It was also good for descriptive and inferential statistics analysis. This study used quantitative approach.

The use of an explanatory research design in this study is justified based on empirical evidence from previous research in the field. Explanatory designs are particularly suitable when investigating the relationships and causal links between variables in a defined population. Empirical evidence supports the effectiveness of explanatory designs in examining credit risk management practices, technological innovation, and loan performance in financial institutions. For example, a study conducted by Jokipii and Milne (2011) investigated the impact of credit risk management practices on loan performance in European banks. Their findings revealed a significant relationship between effective risk management practices and improved loan performance.

3.2 Target Population

Target population are study subjects who are similar in one or more ways and which forms the subject study in a particular survey (Orodho, 2012). A target population is a complete set of individuals, cases, or objects with some common observable characteristics. The target population of the study was all operational managers of the 174 registered deposit taking SACCOS in Kenya (SASRA, 2021). Therefore, the target population for this study was 174 operational manager of registered deposit taking SACCOS in Kenya.

The target population for this study, which focuses on credit risk management practices, technological innovation, and loan performance among SACCOs in Kenya, consists of the operational managers of the 174 registered deposit taking SACCOs in the country. This choice of target population is justified by the identified problem of increased non-performing loans in Kenyan SACCOs. The problem statement highlights the negative impact of high nonperforming loan ratios on the financial performance of SACCOs, as well as the limited options available for potential borrowers and reduced attractiveness for investors. By targeting the operational managers of registered SACCOs, who are responsible for the day-to-day operations and decision-making processes, the study aims to investigate the collection policy, client appraisal, credit risk control, credit terms, and loan performance factors contributing to the problem. By examining this specific population, the research sought to provide insights and recommendations that can directly address and mitigate the challenges faced by SACCOs in Kenya, ultimately improving their financial performance and sustainability.

3.2.1 Census Survey

Sampling frames refers to the physical representativeness of all the elements in the population from which the sample is drawn (Sekaran & Bougie, 2010). A sampling frame includes a numerical identifier for each individual, plus other identifying information about characteristics of the individuals, to aid in analysis and allow for division into further frames for more in-depth analysis. The sampling frame for this study were 174 registered deposit taking SACCOS in Kenya. This means that all 174 registered deposit taking SACCOS were eligible to be included in the study. This would have allowed them to collect more detailed data from each SACCO.

This study used census survey to collect information from all the 174 operational manager of registered deposit taking SACCOS in Kenya. This is due the fact that the target population for this study was small and manageable implying that sampling did not apply. Using census survey, the researcher was able to collect accurate and complete information.

3.3 Data Collection Instruments and Procedures

3.3.1 Data Types and Source

This study used primary sources of data to produce quantitative information. A primary source gives the researcher direct evidence about study variables. Since primary sources provide raw information and first-hand evidence (Sobolewski, Long & Ashmore, 2019). Research instruments used in this study were developed using measures from previous studies. Respondents were asked the extent to which they agree/disagree with a series of statements about their perceptions concerning the study variables on a 5-point Likert scale of (5) strongly agree to (1) strongly disagree each variable with five items.

Collection Policy

A collection policy is a set of guidelines and rules that a company establishes to guide its employees in handling collections and reaching company goals. It defines the mission and rules for employees to follow when dealing with collections. A collection policy typically includes procedures for contacting customers, setting payment terms, and handling delinquent accounts (Rivaldo *et al.*, 2021).

Client Appraisal

Client appraisal refers to the process of engaging an appraiser by employment or contract in a specific assignment. The client is the party or parties who engage the appraiser in the assignment, whether directly or through an agent. The value of the collateral will help to determine the amount of loan that a client can qualify for, and it will also be used to secure the loan in case the client defaults. A client with a strong management team is more likely to be successful, and they are also less likely to default on their loans (Gupta & Sikarwar, 2020). A client with a good credit history and a positive reputation is less likely to default on their loans.

Credit Risk Control

Credit risk control refers to the practice of mitigating losses by assessing borrowers' credit risk, including payment behavior and affordability. Credit risk arises from the potential that a borrower or counterparty will fail to perform on an obligation. Credit risk management involves examining a series of steps to ensure that amounts are lent to reliable hands, evaluating loan applications from borrowers thoroughly, and ensuring that borrowers can make monthly payments in the future. Lenders typically conduct credit checks to assess a borrower's credit history and credit score. Lenders may offer flexible repayment terms to borrowers, such as the ability to make interest-

only payments for a certain period of time or to adjust their monthly payments based on their income (Huang *et al.*, 2021). Lenders may charge higher interest rates to borrowers with lower credit scores or who are considered to be a higher risk of default.

Credit Terms

Credit terms refer to the payment requirements stated on an invoice. They are the terms which indicate when payment is due for sales made on account (or credit). Credit terms can include the amount of credit extended to the customer, the payment period, and any applicable interest or late payment fees (Fourcade & Healy, 2017). Credit terms define the payment schedule for a credit sale. Communication is essential for managing credit effectively. Sellers need to communicate with buyers regularly to ensure that payments are made on time and in full. Documentation is also important for managing credit. Sellers should keep copies of all invoices, contracts, and other documents related to credit sales. This documentation can be helpful in resolving disputes and enforcing credit policies.

Technological Innovation

Technological innovation is the process of creating new or improved products, processes, or services through the application of new scientific knowledge or technology. Mobile banking allows customers to access their bank accounts and perform various transactions using their smartphones or tablets. Internet banking, also known as online banking, enables customers to manage their bank accounts and conduct financial transactions through a secure website or mobile app (Coccia, 2018). ATMs have been a significant technological innovation in banking for several decades. ATMs allow customers to perform basic banking transactions, such as cash

withdrawals, deposits, balance inquiries, and fund transfers, without the need for a bank teller.

Loan Performance

Loan performance is a measure of how well a loan is meeting its obligations. It is typically measured by the borrower's ability to make timely payments, the amount of debt that has been repaid, and the overall health of the borrower's finances (Berkovec *et al.*, 2018). The loan performance of SACCOs can be measured by three key indicators: profitability, productivity and marketability.

Table 3.1: Data Measurements

Type	Variable	Measurement	Measurement scale	Authors
Independent variable	Collection Policy	• Guarantee policy • Regular review • Collection policy • Staff incentives	5-point linkert scale	Rivaldo *et al.*, 2021
Independent variable	Client Appraisal	• Collateral • Personnel capacity • Customer Character	5-point linkert scale	Gupta & Sikarwar, 2020
Independent variable	Credit Risk Control	• Credit Checks • Flexible Repayments • Interest rates	5-point linkert scale	Huang *et al.*, 2021
Independent variable	Credit Terms	• Credit terms • Communication • Documentation	5-point linkert scale	Fourcade & Healy, 2017
Moderator	Technological Innovation	• Mobile banking • Internet banking • ATM	5-point linkert scale	Coccia, 2018
Dependent variable	Loan performance of SACCOs	• Profitability • Productivity • Marketability	5-point linkert scale	Berkovec *et al.*, 2018

3.3.2 Data Collection Instruments

A questionnaire was used to collect primary data for the study. A questionnaire is a printed self-report form designed to elicit information that can be obtained through written responses of the research study (Best, 2011). Questionnaire was developed in form of closed questions which are in line with the objectives. The questionnaire captured specific information investigate credit risk management practices, technological innovation and loan performance among SACCOs in Kenya. Respondents were required to rank in a 5-point Likert scale as follows; 5 for Strongly Agree, 4 for Agree, 3 for Not Sure, 2 for Disagree and 1 for strongly disagree. Structured questions conserved time money and made analysis easier, a reason that informed the researcher to use them.

3.3.3 Data Collection Procedures

Data collection procedures refer to the process that the researcher undertakes in order to get the required information (Alam, 2021). The researcher obtained authorization letter from the University to obtain a permit from National Commission of Science, Technology and Innovation (NACOSTI). After the permit, the researcher collected data from 174 registered deposit taking SACCOS. The questionnaires were administered online to the respondents of various targeted SACCOs through emails.

3.3.4 Pilot Study

In order to ascertain reliability and validity of the research instruments, the researcher did pilot study by distributing 17 questionnaires to operational managers of SACCOs in Eldoret town, which was not part of the area sampled in the main study. The pilot respondents represented 10% of the sample size. The results of the piloted research

instruments enabled the researcher to determine the consistency of responses made by respondents and adjust the items accordingly by revising the document.

Eldoret town was chosen for the pilot study because it offered a diverse and representative sample of operational managers of SACCOs, while being geographically distinct from the main study area. By selecting Eldoret town, which was not part of the sampled area in the main study, the researcher ensured that the responses obtained during the pilot study were independent of the data collected for the actual research. This helped to validate the research instruments and assess the consistency of responses across different locations, allowing for adjustments and revisions to be made based on the pilot study results. Additionally, Eldoret town likely provided a variety of SACCOs with different characteristics and operational contexts, contributing to the overall reliability and validity of the research instruments.

3.4 Reliability and Validity Research Instruments

In order to ascertain validity and reliability of the research instruments, the researcher piloted the instruments.

3.4.1 Reliability of the Research Instruments

Reliability is a measure of consistency of the research instrument if and when administered to respondents drawn from different populations but exhibiting similar characteristics. The reliability of data collection instruments were determined from a pilot study where the researcher administered the research instruments to the respondents of SACCOs who were not included in the sample. The test method was used to obtain two scores for the pilot test data. The two scores from the pilot test data was subjected to Cronbach’s reliability coefficient formula to compute reliability

coefficient. Cronbach Alpha coefficient ranges from 0 to 1 where Excellent: 0.90-0.94, Strong: 0.80-0.89, Reliable: 0.70-0.79, Questionable: 0.60-0.69, Poor: 0.50-0.59 and Unacceptable: 0.49 or below (Nunnally, 1978; Lance, Butts & Michels, 2006; Gliem & Gliem, 2003; DeVellis, 2012; Cortina, 1993). As a general rule a value of $\alpha > 0.7$ is considered reliable enough for each of the data sets where α is the item being tested for reliability (Al-Adwan et.al, 2019).

3.4.2 Validity of the Research Instruments

Validity is the extent to which an instrument measures what it is supposed to measure and performs as it is designed to perform. It is rare, if nearly impossible, that an instrument be 100% valid, so validity is generally measured in degrees. Content validity was used to show whether the test items represented the content that the test is designed to measure. In order to ensure that all the items used in the questionnaires are consistent and valid, the instruments were subjected to scrutiny and review by experts specifically the supervisors. The items were revised and modified as per the advice of the supervisors to avoid ambiguity before being used for data collection.

3.5 Data Analysis and Presentation

Data analysis involved cleaning, sorting, coding of relevant data from the participants. The study used SPSS version 25 during data analysis which generated information from the data into an observable pattern of the occurrence. Descriptive statistics was used in data analysis to describe the basic features of the respondents and data to be collected. It provided simple summaries on quantitative data. Descriptive statistics included frequency, percentages, mean, standard deviation skewness, kurtosis, minimum and maximum.

Inferential statistics was correlation and multiple regressions. Correlation helped the researcher to describe the linear relationship between independent variables and dependents variable as well as moderator. It showed direction and strength of relationship between study variables. Regression analysis examined the relationship between the dependent and the independent variables which best predict the value of the said dependent variable. This analysis estimates the coefficients of this predictive linear equation involving more than one of dependent variables.

3.5.1 Regression Analysis Model

The effect of the moderating factor was investigated using hierarchical moderating regression analysis. Scores for predictor variable y, scores for second predictor x, and scores for third predictor variable z were included in the ordinary least square (OLS) equation and hierarchical moderating regression analysis equations (Aquinis & Gottfredson, 2010).

According to Aiken *et al.* (1991) the hierarchical multiple regression approach involves entering the predictor variables into the model in a series of steps. In the first step, the main effects of the predictor variables are entered into the model. In the second step, the interaction terms are entered into the model. This allows the researcher to test whether the interaction terms add significantly to the model after the main effects have been accounted for. Aiken *et al.* (1991) proposed the following guidelines for interpreting interactions in hierarchical multiple regression models. The interaction term should be significant in order to conclude that there is an interaction effect. The simple slopes of the predictor variables should be examined to determine the nature of the interaction effect. The interaction effect should be interpreted in the context of the overall model.

Baron and Kenny (1986) proposed a set of four criteria that can be used to test for moderation in hierarchical multiple regression. These criteria are the independent variable (X) must be significantly related to the dependent variable (Y). The independent variable (X) must be significantly related to the moderator (M). The moderator (M) must be significantly related to the dependent variable (Y) when the independent variable (X) is controlled for. The relationship between the independent variable (X) and the dependent variable (Y) must be reduced when the moderator (M) is controlled for. If all four of these criteria are met, then it is likely that moderation is occurring.

Hayes (2018) define hierarchical multiple regression as a research design in which independent variables are entered into the regression equation in a predetermined order. This means that the researcher decides which variables to enter into the equation first, second, and so on. Hayes (2018) step-by-step guide on how to test hierarchical multiple regression; Specify the order in which the independent variables will be entered into the regression equation. Conduct a preliminary regression analysis to examine the overall fit of the model. Enter the independent variables into the regression equation in the predetermined order. Evaluate the significance of each independent variable. Evaluate the change in R-squared for each step in the model. Evaluate the statistical significance of the indirect effects, if mediation is being tested.

Hierarchical multiple regression was used to check effects of a moderating variable. In testing the moderation, the interaction effect between x and z is checked and whether or not such an effect is significant in predicting Y. The hierarchical model calls for a determination of R^2 and the partial coefficients of each variable at the point at which it is added to the equation. The hierarchical MRR analysis the analyst

entered the IVs in the specified order and determining R^2 after each addition in order to check incremental variance (Lu, 2023).

To test for moderation, hierarchical moderating regression analysis was employed in the study. This analysis examined the effect of a third variable, referred to as the moderator, on the relationship between the independent and dependent variables. The conditions that were fulfilled included having interval or ratio scales for the variables, establishing a significant relationship between the independent and dependent variables, determining a significant effect of the moderator on this relationship, and conducting statistical tests to assess the significance of the interaction effect. By meeting these conditions and conducting the hierarchical moderating regression analysis, the study was able to determine the presence and significance of moderation, providing insights into the relationship between credit risk management practices, technological innovation, and loan performance among SACCOs in Kenya.

Equation 1: Regressing the independent variables on dependent variables.

OLS Equation

Model 1 $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$ …….…. **Equation 3.1**

Hierarchical Regression Model

Model 2 $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 Z + \varepsilon$……..**Equation 3.2**

Model 3 $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 Z + \beta_6 Z * X_1 + \varepsilon$…….**Equation 3.3**

Model 4 $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 Z + \beta_6 Z * X_1 + \beta_7 Z * X_2 + \varepsilon$ ……**Equation 3.4**

Model 5 $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_6 Z + \beta_6 Z * X_1 + \beta_7 Z * X_2 + \beta_8 Z * X_3 + \varepsilon$……..……**Equation 3.5**

Model 6 $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 Z + \beta_6 Z * X_1 + \beta_7 Z * X_2 + \beta_8 Z * X_3 + \beta_9 Z * X_4 + \varepsilon$……..…**Equation 3.6**

Where:

$\boldsymbol{Y}$ Represents loan performance among SACCOs in Kenya

$\boldsymbol{X_1}$ Represents collection policy

$\boldsymbol{X_2}$ Represents client appraisal

$\boldsymbol{X_3}$ Represents credit risk control

$\boldsymbol{X_4}$ Represents credit terms

Z Represents technological innovation (the moderator)

ε represents Error term (Disturbance factors) which represents residual

$\boldsymbol{\beta_{0+}}$ Represents a constant

From $\boldsymbol{\beta_{1,}}$ to β_9 represents the regression model's coefficients

The data was presented in frequency Tables after it has been analysed.

3.5.2 Assumption of Regression Model

The assumptions of multivariate analysis that are identified as primary concern in the research include: linearity; independence of errors; homoscedasticity; multicollinearity.

Linearity defines the dependent variable as a linear function of the predictor (independent) variables. Multiple regressions can accurately estimate the relationship between dependent and independent variables when the relationship is linear in nature (Osborne & Waters, 2002). To detect violation of linearity was by Pearson Correlation analysis (Osborne *et al.*, 2001). A linear relationship between the variables is inferred if there is a significant correlation between the independent variables and the dependent variable. There is no linear relationship between the independent variables and the dependent variable if the correlation coefficient is not significantly different from zero.

The assumption of homoscedasticity refers to equal variance of errors across all levels of the independent variables (Osborne & Waters, 2002). This assumption states that the variance of error terms is similar across the values of the independent variables. The homoscedasticity assumption was tested using the Levenes test of equality of error variances (Osborne & Waters, 2002).

Multicollinearity refers to the assumption that the independent variables are uncorrelated. Multiple regressions assumes that the independent variables are not highly correlated with each other. This assumption is tested using Variance Inflation Factor (VIF) value. A tolerance of below 0.10 or a VIF greater than 10 is regarded as indicative of serious multicollinearity problem. Tolerance below 0.2 indicates a potential problem. When tolerance is close to 1 it implies that there is little multicollinearity. If tolerance is close to 0, it indicates that multicollinearity may be a threat (Williams, 2015). A VIF greater than 10 is considered unsatisfactory hence the independence variable should be removed from the analysis (Hair *et al.*, 2006).

Normality- Multiple regression assumes that the residuals are normally distributed. To find out whether residuals follow a normal probability distribution, Shapiro-Wilk, histograms was used to test normality (Lind, Marchal & Wathen, 2012).

3.6 Ethical Consideration

The researcher obtained an introductory letter from Moi University that was presented to the National Commission for Science Technology and Innovation (NACOSTI). Confidentiality of participants in the study was strictly adhered to at all times throughout the course of, and following the study and publication of the results. The researcher used an informed consent sheet which contains phrases indicating that the study participation is voluntary, the objectives of the study, the procedures, the

selection criteria, the anticipated benefits of their involvement, any risk, assurance of the confidentiality aspect, and privacy during data collection. After the participants have read and comprehended the informed consent, the participants were requested to indicate their voluntary participation by signing the informed consent sheet.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter summarizes the study's analysis and findings in line with the research methodology. The results were presented on credit risk management practices, technological innovation and loan performance of registered deposit taking SACCOS in Kenya.

4.2 Response Rate

The study established the response rate of the respondence and results were presented in Table 4.1.

Table 4.1: Response Rate

Responses	**Frequency**	**Percentages**
Responded	148	85.1
Not responded	26	14.9
Administered questionnaires	**174**	**100**

The researcher administered 174 copies of the questionnaire to all respondents. Out of 174 questionnaires administered 148 questionnaires were returned. Table 4.1 indicates that the response rate was (85.1%). Since this rate was more than 50%, it met Mugenda's criteria for statistical analysis (2010). A follow up on the reasons that made sampled members not participate in this study indicated that some were not present during study period and some returned incomplete questionnaires having missing values.

4.3 Discussions and Results from Descriptive Statistics

This section contains descriptive statistics about the study namely; collection policy, client appraisal, credit risk control, credit terms and loan performance. To achieve this, a five-point Likert scale was used where; 1=Strongly Disagree, 2=Disagree, 3=Undecided.4=Agree, 5=Strongly Agree.

4.3.1 Descriptive statistics Findings for Collection Policy

The respondents were given a series of statements about collection policy and asked to respond. Table 4.2 showed the study findings of collection policy

Table 4.2 Descriptive Statistics Findings for Collection Policy

Statements	Mean	SD	Skewness	Kurtosis
1. We have formulated collection policies for credit management	3.878	1.148	-1.317	1.056
2. We have enforced of guaranteed policies to provides for loan recovery in case of loan defaults	3.926	1.184	-1.299	0.868
3. Regular reviews have been done on collection policies to improve state of credit management	3.912	1.118	-1.452	1.563
4. A stringent policy is more effective in debt recovery than a lenient policy	3.878	1.142	-1.368	1.171
5. Available collection policies have assisted towards effective credit management	4.372	0.971	-2.073	4.357
6. Staff incentives are effective in improving recovery of delinquent loans	4.155	0.871	-1.186	1.690

Sources: Research Data (2023)

Table 4.2 showed that the respondents agreed with the statement that they have formulated collection policies for credit management (Mean=3.878, standard deviation=1.148). They also agreed that we have enforced of guaranteed policies to provides for loan recovery in case of loan defaults (Mean=3.926, standard deviation=1.184). The findings are line with Gatuhu (2013) who found that client appraisal, credit risk control and collection policy had effect on financial performance

of MFIs in Kenya. There was strong relationship between financial performance of MFIs and client appraisal, credit risk control and collection policy. The respondents further agreed that regular reviews have been done on collection policies to improve state of credit management (Mean=3.912, standard deviation=1.118). The findings concurred with Olabamiji and Michael (2018) who noted that client appraisal, credit risk control, and collection policy are major predictors of financial performance of First bank.

The respondents agreed that a stringent policy is more effective in debt recovery than a lenient policy (Mean=3.878, standard deviation=1.142). The findings concur with Maina, Kinyariro and Muturi (2016) who revealed that there exists a strong relationship between credit risk controls, collection policy and loan delinquency in SACCOs. Credit risk management practices significantly affect loan delinquency in SACCOs in Meru County. The respondents also agreed that available collection policies have assisted towards effective credit management (Mean=4.372, standard deviation=0.971). The findings agree with Gatuhu (2013) who established that there was strong relationship between financial performance of MFIs and client appraisal, credit risk control and collection policy. Collection policy was found to have a higher effect on financial performance and that a stringent policy is more effective in debt recovery than a lenient policy.

Finally, they agreed that staff incentives are effective in improving recovery of delinquent loans (Mean=4.155, standard deviation=0.871). The findings concur with Olabamiji and Michael (2018) whose result revealed that credit management practices have a significant positive effect on the financial performance of First bank. The study results further, revealed that all values of skewness and Kurtosis were less than +1

and above 0, indicating that skewness or kurtosis for the distribution is not outside the range of normality, so the distribution were considered normal distributed.

4.3.2 Descriptive Statistic Findings for Client Appraisal

The study sought to find out client appraisal. Table 4.3 showed the study findings for client appraisal.

Table 4.3 Descriptive Statistic Findings for Client Appraisal

Statements	Mean	Std	Skewness	Kurtosis
1. All required information on credit is gathered and applications are screened in the SACCO	4.08	.944	-1.540	2.680
2. Our SACCO has competent personnel for carrying out client appraisal	3.92	1.040	-1.417	1.701
3. Client appraisal in our SACCO considers the character of the customers seeking credit facilities	3.89	1.020	-1.441	1.833
4. Our SACCO considers aspects of collateral awhile appraising customers	3.97	.958	-1.722	3.276
5. SACCO has a proper credit monitoring system which ensure prompt corrective actions on credit defaulting	3.96	1.003	-1.642	2.743

Key: Research Data (2023)

Table 4.3 showed that the respondents agreed with the statement that all required information on credit is gathered and applications are screened in the SACCO (Mean=4.08, standard deviation=.944). They also agreed that our SACCO has competent personnel for carrying out client appraisal (Mean=3.92, standard deviation=1.040). The findings disagree with Hesborn, Onditi and Nyagol (2016) whose results revealed that SACCOs in Kisii County need credit risk management to prevent their recession.

Also, they agreed that client appraisal in our SACCO considers the character of the customers seeking credit facilities (Mean=3.89, standard deviation=1.020).). Further, they agreed that their SACCO considers aspects of collateral awhile appraising customers (Mean=3.97, standard deviation=0.958). The findings agree with Aliija and Muhangi (2017) who established that client appraisal is a viable strategy for mitigating credit risk. There was a strong relationship between credit performance of MFIs and client appraisal. Finally, the respondents agreed that SACCO has a proper credit monitoring system which ensure prompt corrective actions on credit defaulting (Mean=3.96, standard deviation=1.003). The findings agree with Kibui and Moronge (2014) who found out that credit risk management help to improve the performance of SACCOs to a great extent the study results further, revealed that all values of skewness and Kurtosis were less than +1 and above 0, indicating that skewness or kurtosis for the distribution is not outside the range of normality, so the distribution were considered normal distributed.

4.3.3 Descriptive Statistics Findings for Credit Risk Control

The study results for credit risk control are shown in Table 4.4.

Table 4.4 Descriptive Statistics Findings for Credit Risk Control

Statements	Mean	Std	Skewness	Kurtosis
1. The use of credit checks on regular basis enhances credit management	3.82	.976	-1.315	1.709
2. The SACCO thoroughly checks a new customer's credit record.	4.02	.778	-1.530	4.163
3. The use of customer credit application forms improves monitoring and credit management as well	3.98	.877	-1.804	4.170
4. The SACCO has developed a standard process for handling overdue accounts	3.88	.864	-1.748	3.777
5. Imposing loan size limits is a viable strategy in credit management	3.78	.939	-1.288	1.712
6. Penalty for late payment enhances customers commitment to loan repayment	3.92	.796	-1.744	4.388
7. Credit committee's involvement in making decisions regarding loans are essential in reducing default/credit risk	3.87	.931	-1.986	4.106

Key: Research Data (2023)

Table 4.4 showed that the respondents agreed with the statement that the use of credit checks on regular basis enhances credit management (Mean=3.82, Standard deviation=0.976). the findings are incoherent with Olabamiji, and Michael (2018) who revealed that credit management practices have a significant positive effect on the financial performance of First bank.

Also, they agreed the SACCO thoroughly checks a new customer's credit record (Mean=4.02, Standard deviation=0.778). Further, they agreed that the use of customer credit application forms improves monitoring and credit management as well (Mean=3.98, Standard deviation=0.877). The findings concur with Gatuhu (2013) who found that client appraisal, credit risk control and collection policy had effect on financial performance of MFIs in Kenya. Collection policy was found to have a higher effect on financial performance and that a stringent policy is more effective in debt recovery than a lenient policy.

The respondents seem to agree that the SACCO has developed a standard process for handling overdue accounts (Mean=3.88, Standard deviation=0.864). Further, the respondents agree that Imposing loan size limits is a viable strategy in credit management (Mean=3.78, Standard deviation=0.939). T The findings agree with Omar and Samantar (2018) who found out that client appraisal and credit risk control play a major role for profitability of the companies, it also realized that companies formulated and use collection policies which also has positive relationship with profitability of the telecommunication companies in Garowe, Somalia. The respondents also agree that Penalty for late payment enhances customers commitment to loan repayment (Mean=3.92, Standard deviation=0.796).

Finally, they agreed that Credit committee's involvement in making decisions regarding loans are essential in reducing default/credit risk (Mean=3.87, Standard deviation=0. 931). The findings agree with Torban (2020) who noted that sound credit risk management is a crucial for a financial institutions' stability and continuing profitability, while declining credit quality, the most frequent cause of poor financial performance and condition. The study results further, revealed that all values of skewness and Kurtosis were less than +1 and above 0, indicating that skewness or kurtosis for the distribution is not outside the range of normality, so the distribution were considered normal distributed.

4.3.4 Descriptive Statistics Findings for Credit Terms

It was requested of the responders that they answer a series of questions pertaining to credit terms. The study results for credit terms are shown in Table 4.5.

Table 4.5: Descriptive Statistics Findings for Credit Terms

Statements	Mean	Std	Skewness	Kurtosis
1. SACCO's credit terms had very clear provision on loan size	4.09	.968	-1.818	3.712
2. SACCO's credit terms had very clear provision on fees and interest rate	3.80	1.117	-1.417	1.341
3. SACCO's credit terms had very clear provision on collateral requirements	3.84	1.105	-1.375	1.284
4. SACCO's credit terms had very clear provision on repayment schedule	3.76	1.092	-1.377	1.247
5. The SACCO educates the clients prior to issuing a loan	3.96	.928	-1.767	3.719
6. SACCO's credit terms had very clear provision on penalties information	3.84	1.035	-1.512	1.973
7. Customer are consulted on the formulation of credit terms	3.88	1.030	-1.611	2.439

Key: Research Data (2023)

The study results in Table 4.5 showed that majority of the respondents agreed that SACCO's credit terms had very clear provision on loan size (Mean=4.09, standard deviation=0. .968). The respondents also agreed with the statement SACCO's credit terms had very clear provision on fees and interest rate (Mean=3.80, standard deviation=0.1.117). The findings are in coherent with Ssekiziyivu, Bananuka, Nabeta and Tumwebaze (2018) whose results indicate that there is a significant relationship between credit terms and loan repayment performance among clients of MFIs unlike borrowers' characteristics.

The respondents also agreed that SACCO's credit terms had very clear provision on collateral requirements (Mean=3.84, standard deviation=1.105). They further agreed that SACCO's credit terms had very clear provision on repayment schedule (Mean=3.76, standard deviation=1.092). The findings concurred with Ronoh (2019)

who found that credit terms have a positive and significant effect on the performance of SACCOs in Kitale Town, customer appraisal has a positive and significant effect on the Performance of SACCOs, debt collection procedure has a positive and significant effect on the performance of SACCOs and internal control system has a positive and significant effect on the performance of SACCOs. Also, the respondents agreed that the SACCO educates the clients prior to issuing a loan (Mean=3.96, standard deviation=0.928).

The respondents further agreed that SACCO's credit terms had very clear provision on penalties information (Mean=3.92, standard deviation=0.497). The findings are in line with Gaitho (2010) whose findings revealed that majority of the SACCOs use credit risk management practices to mitigate risks as a basis for objective credit risk appraisal. Majority of the SACCOs relied heavily on the discretion and ability of portfolio managers for effective credit risk management practices as opposed to a system of that standardizes credit and credit risk decisions.

Also, they agreed that the SACCO educates the clients prior to issuing a loan (Mean=3.84, standard deviation=1.035). Furthermore, they agreed that SACCO's credit terms had very clear provision on penalties information (Mean=3.93, standard deviation=0.654). Finally, they agreed that SACCO's credit terms had very clear provision on penalties information (Mean=3.88 standard deviation=1.030). The findings agree with Gisemba (2010) who noted that SACCOs adopted credit risk management practices to counter credit risks they are exposed to. The study results further, revealed that all values of skewness and Kurtosis were less than +1 and above 0, indicating that skewness or kurtosis for the distribution is not outside the range of normality, so the distribution were considered normal distributed.

4.3.5 Descriptive Statistics Findings for Technological Innovation

Respondents were probed with questions about technological innovation. The study results for credit terms are shown in Table 4.6.

Table 4.6: Descriptive Statistics Findings for Technological Innovation

Statements	Mean	Std	Skewness	Kurtosis
1. Mobile banking withdrawal and deposit has improved the financial performance of SACCOs	4.00	.849	-1.487	3.288
2. Mobile banking has increased lending of loans by the SACCOs	3.53	1.139	-.976	.098
3. Mobile banking payment of bills has easy payments of bills and improve transaction in the SACCOs	4.06	.970	-1.436	2.132
4. ATMs has enhanced easy checking of balance by customers	3.86	.997	-1.340	1.664
5. SACCOs offer online banking platforms that allow customers to manage their accounts and conduct other SACCOs tasks using their computers or other devices.	3.89	1.028	-1.278	1.230
6. SACCOs offer contactless payment systems, that allow customers to make payments using their mobile devices or smartwatches.	3.63	.949	-1.680	2.118

Source: Research Data (2023)

Table 4.6 showed that Mobile banking withdrawal and deposit has improved the financial performance of SACCOs (Mean=4.00, standard deviation=0.849). The findings agree with Mikae and Mogwambo (2021 whose results revealed that value transacted using mobile banking positively and significantly affected the performance of SACCOs financially. They also agreed that Mobile banking has increased lending of loans by the SACCOs (Mean=3.53, standard deviation=1.139). The findings concur with Omar (2022) who found that the mobile money transfer, mobile account

management, mobile credit facilitation and mobile bill presentment had a positive significant relationship with the financial performance of selected SACCOs in Madera County.

Also, they agreed that Mobile banking payment of bills has easy payments of bills and improve transaction in the SACCOs (Mean=4.06, standard deviation=0.970).). The findings are in line with Mburu (2015) who found that SACCOs in Nairobi County had adopted mobile banking and were offering services such as requesting mini statements, checking account balance, cash withdrawals, buying airtime, loan repayments, paying Bills (Paybill), cash deposits, money transfer, loan applications services and buying SACCO shares, selling SACCO Shares, opening accounts and ATM Card Pin Change services on mobile banking platforms. The study also found that perceived benefits, external environmental factors, organization readiness and security perceptions effect the adoption of mobile banking positively and significantly.

Further, they agreed that ATMs has enhanced easy checking of balance by customers (Mean=3.86, standard deviation=0.997). The findings agree with Aliija and Muhangi (2017) who established that client appraisal is a viable strategy for mitigating credit risk. There was a strong relationship between credit performance of MFIs and client appraisal. Further, the respondents agreed that SACCOs offer online banking platforms that allow customers to manage their accounts and conduct other SACCOs tasks using their computers or other devices (Mean=3.89, standard deviation=1.028). The findings agree with Mugo (2022) who significant positive effect of mobile banking, internet banking and mobile communication services on performance of deposit-taking SACCOs in Kenya.

Finally, the respondents agreed that SACCOs offer online banking platforms that SACCOs offer contactless payment systems, that allow customers to make payments using their mobile devices or smartwatches (Mean=3.63, standard deviation=.949). The findings agree with Kibui and Moronge (2014) who found out that credit risk management help to improve the performance of SACCOs to a great extent. The study agrees with Aoko and Mose (2022) whose findings indicated that mobile wallet, mobile banking security, quality content service provided by the mobile financial service providers and access to account information contribute positively to payment performance of privately owned tea cooperatives. The study results further, revealed that all values of skewness and Kurtosis were less than +1 and above 0, indicating that skewness or kurtosis for the distribution is not outside the range of normality, so the distribution were considered normal distributed.

4.3.6 Descriptive Statistics Findings for Loan Performance

Respondents were probed with questions about loan performance. The study results for loan performance are shown in Table 4.7.

Table 4.7: Descriptive Statistics Findings for Loan Performance

Statements	Mean	Std	Skewness	Kurtosis
1. The SACCO managed to get full payment from loans	3.73	1.027	-1.267	1.069
2. The SACCO loan was repaid on scheduled time	3.64	1.017	-1.357	1.359
3. There was high return on equity of the SACCO	3.84	.817	-1.968	4.343
4. Repayment rate of loan was high in the SACCO	3.76	.987	-1.644	2.292
5. There were no bad debts (no loans were written off) in the SACCO	3.99	.926	-1.486	2.811
6. There was minimal loan recovery cost in the SACCO	3.86	.976	-1.313	1.636
7. Targeted beneficiary number was achieved in the SACCO	3.77	1.018	-1.095	.783

Key: Research Data (2023)

Table 4.7 showed that the respondents agreed with the statement that the SACCO managed to get full payment from loans (Mean=3.73, Standard deviation=1.027). Also, they agreed the SACCO loan was repaid on scheduled time (Mean=3.64, Standard deviation=1.017). Further, they agreed There was high return on equity of the SACCO (Mean=3.84, Standard deviation=0.817).

The respondents seem to agree that repayment rate of loan was high in the SACCO (Mean=3.76, Standard deviation=0.987). Further, the respondents agree There were no bad debts (no loans were written off) in the SACCO (Mean=3.99, Standard deviation=0.926). The respondents also agree that There was minimal loan recovery cost in the SACCO (Mean=3.86, Standard deviation=0.976). Finally, they agreed that Targeted beneficiary number was achieved in the SACCO (Mean=3.77, Standard deviation=1.018). The study results further, revealed that all values of skewness and

Kurtosis were less than +1 and above 0, indicating that skewness or kurtosis for the distribution is not outside the range of normality, so the distribution were considered normal distributed.

4.3.7 Combined descriptive Findings for Study Variables

The findings of combined descriptive for Study Variables are presented in Table 4.8.

Table 4.8: Combined Descriptive Findings for Study Variables

Statements	Mean	Std	Skewness	Kurtosis
Collection policy	4.020	1.072	-1.449	1.784
Client appraisal	3.964	0.993	-1.552	2.447
Credit risk control	3.896	0.880	-1.631	3.432
Credit terms	3.881	1.039	-1.554	2.245
Technological innovation	3.828	0.989	-1.366	1.755
Loan performance	3.799	0.967	-1.447	2.042

Key: Research Data (2023)

The study findings revealed that majority of respondents agreed that collection policy affect loan performance of registered deposit taking SACCOS in Kenya (Mean=4.020, Standard deviation=1.072). Client appraisal affect loan performance of registered deposit taking SACCOS in Kenya (Mean=3.964, Standard deviation=0.993). Credit risk control affect loan performance of registered deposit taking SACCOS in Kenya (Mean=3.896, Standard deviation=.880). Credit terms affect loan performance of registered deposit taking SACCOS in Kenya (Mean=3.881, Standard deviation=1.039). Technological innovation affect the relationship between credit risk management practices and loan performance of registered deposit taking SACCOS in Kenya (Mean=3.828, Standard deviation=0.989). The loan performance of registered deposit taking SACCOS in Kenya have improved (Mean=3.799, Standard deviation=0.967).

4.4 Factor Analysis Results

Before multiple regression analysis was performed factor analysis was done. Factor analysis was employed to help in identifying the actual number of factors that actually measured each construct as perceived by the respondents.

4.4.1 Factor Analysis for effect of collection policy on loan performance of registered deposit taking SACCOS in Kenya

Principle component analysis was conducted to verify item loadings through which redundant items were identified and omitted from analysis. Six indicators were proposed to measure effect of collection policy on loan performance of registered deposit taking SACCOS in Kenya. The KMO value of collection policy on loan performance of registered deposit taking SACCOS in Kenya was 0.727 indicating that sampling was adequate. The significant chi-square value for Bartlett's test of sphericity ($\chi^2 = 326.364$, $p<0.05$) confirmed that data collected for effect of collection policy on loan performance of registered deposit taking SACCOS in Kenya was adequate (Table 4.9).

Results show that component one (1) had an eigenvalue of 3.704 explaining variance of 53.085%. The second component in Table 4.10 indicated eigenvalue of 1.284, with a percentage variance of 18.404%. All the six indictors were retained, computed for further analysis. The items extracted loaded highly on two-dimension factors, with component one having four indicators, component two having two indicators.

Table 4.9 Kaiser-Meyer-Olkin and Variance Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.727
Bartlett's Test of Sphericity	Approx. Chi-Square	326.364
	df	15
	Sig.	.000

Items of factors extracted	**Eigen Values**	**% Variance**	**Total %**
Component 1	3.704	53.085	53.085
Component 2	1.284	18.404	71.489

Source: Research Data (2022)

Table 4.10: Rotated Component Matrix[a]

	Component	
	1	2
1. We have formulated collection policies for credit management	.937	
2. We have enforced of guarantee policies to provides for loan recovery in case of loan defaults	.940	
3. Regular reviews have been done on collection policies to improve state of credit management	.902	
4. A stringent policy is more effective in debt recovery than a lenient policy	.963	
5. Available collection policies have assisted towards effective credit management		.861
6. Staff incentives are effective in improving recovery of delinquent loans		.682

Extraction Method: Principal Component Analysis.
a. 2 components extracted.

4.4.2 Factor Analysis for Effect of client appraisal on loan performance of registered deposit taking SACCOS in Kenya

Principle component analysis was conducted to verify item loadings through which redundant items were identified and omitted from analysis. Five indicators were proposed to measure effect of client appraisal on loan performance of registered deposit taking SACCOS in Kenya. The KMO value of effect of client appraisal on loan performance of registered deposit taking SACCOS in Kenya was 0.809 indicating that sampling was adequate. The significant chi-square value for Bartlett's test of sphericity (χ^2 = 196.287, $p<0.05$) confirmed that data collected for effect of client appraisal on loan performance of registered deposit taking SACCOS in Kenya was adequate (Table 4.11). Results show that component one (1) had an eigenvalue of 2.614 explaining variance of 52.949. The second component in Table 4.12 indicated eigenvalue of .880, with a percentage variance of 17.830%. All the five indictors were retained, computed for further analysis. The items extracted loaded highly on two-dimension factors, with component one having four indicators, component two having one indicator.

Table 4.11: Kaiser-Meyer-Olkin and Variance Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			.809
Bartlett's Test of Sphericity Chi-Square			196.287
df			10
Significance			.000
Items of factors extracted	Eigen Values	% Variance	Total %
Component 1	2.614	52.949	52.949
Component 2	.880	17.830	70.779

Table 4.12: Rotated Component Matrix[a]

	Component	
	1	2
1. All required information on credit is gathered and applications are screened in the SACCO	.782	
2. Our SACCO has competent personnel for carrying out client appraisal	.778	
3. Client appraisal in our SACCO considers the character of the customers seeking credit facilities	.795	
4. Our SACCO considers aspects of collateral awhile appraising customers	.740	
5. SACCO has a proper credit monitoring system which ensure prompt corrective actions on credit defaulting		.765

Extraction Method: Principal Component Analysis.
a. 1 components extracted.

4.4.3 Factor Analysis for effect of credit risk control on loan performance of registered deposit taking SACCOS in Kenya

Principle component analysis was conducted to verify item loadings through which redundant items were identified and omitted from analysis. Seven indicators were proposed to measure effect of credit risk control on loan performance of registered deposit taking SACCOS in Kenya. The KMO value of effect of credit risk control on loan performance of registered deposit taking SACCOS in Kenya was 0.682 indicating that sampling was adequate. The significant chi-square value for Bartlett's test of sphericity (χ^2 = 333.602, $p<0.05$) confirmed that data collected for effect of credit risk control on loan performance of registered deposit taking SACCOS in Kenya was adequate (Table 4.13). Results show that component one (1) had an eigenvalue of 2.044 explaining variance of 37.482%. The second component in Table

4.14 indicated eigenvalue of 1.441, with a percentage variance of 26.428%. All the seven indictors were retained, computed for further analysis. The items extracted loaded highly on two-dimension factors, with component one having four indicators, component two having three indicators.

Table 4.13: Kaiser-Meyer-Olkin and Variance Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			.682
Bartlett's Test of Sphericity	Chi-Square		333.602
	df		21
	Significance		.000
Items of factors extracted		Eigen Values	% Variance	Total %
Component 1		2.044	37.482	37.482
Component 2		1.441	26.428	63.910

Table 4.14: Rotated Component Matrix[a]

	Component	
	1	2
1. The use of credit checks on regular basis enhances credit management	.842	
2. The SACCO thoroughly checks a new customer's credit record.	.856	
3. The use of customer credit application forms improves monitoring and credit management as well	.805	
4. The SACCO has developed a standard process for handling overdue accounts	.794	
5. Imposing loan size limits is a viable strategy in credit management		.850
6. Penalty for late payment enhances customers commitment to loan repayment		.863
7. Credit committee's involvement in making decisions regarding loans are essential in reducing default/credit risk		.773

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

4.4.4 Factor Analysis for Effect of credit terms on loan performance of registered deposit taking SACCOS in Kenya

Principle component analysis was conducted to verify item loadings through which redundant items were identified and omitted from analysis. Seven indicators were proposed to measure effect of credit terms on loan performance of registered deposit taking SACCOS in Kenya. The KMO value of effect of credit terms on loan performance of registered deposit taking SACCOS in Kenya was 0.787 indicating that sampling was adequate. The significant chi-square value for Bartlett's test of sphericity (χ^2 = 310.045, $p<0.05$) confirmed that data collected for effect of credit terms on loan performance of registered deposit taking SACCOS in Kenya was adequate (Table 4.15). Results show that component one (1) had an eigenvalue of 3.403 explaining variance of 44.840%. The second component in Table 4.16 indicated eigenvalue of 1.438, with a percentage variance of 18.943%. All the seven indictors were retained, computed for further analysis. The items extracted loaded highly on two-dimension factors, with component one having four indicators, component two having three indicators.

Table 4.15 Kaiser-Meyer-Olkin and Variance Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			.787
Bartlett's Test of Sphericity Chi-Square			310.045
df			21
Significance			.000
Items of factors extracted	Eigen Values	% Variance	Total %
Component 1	3.403	44.840	44.840
Component 2	1.438	18.943	63.783

Table 4.16: Rotated Component Matrix[a]

	Component	
	1	2
1. The use of credit checks on regular basis enhances credit management	.817	
2. The SACCO thoroughly checks a new customer's credit record.	.723	
3. The use of customer credit application forms improves monitoring and credit management as well	.797	
4. The SACCO has developed a standard process for handling overdue accounts	.802	
5. Imposing loan size limits is a viable strategy in credit management		.687
6. Penalty for late payment enhances customers commitment to loan repayment		.818
7. Credit committee's involvement in making decisions regarding loans are essential in reducing default/credit risk		.801

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

4.4.5 Factor Analysis for Technological innovation

Principle component analysis was conducted to verify item loadings through which redundant items were identified and omitted from analysis. Six indicators were proposed to measure technological innovation. The KMO value of incidences of technological innovation was 0.832 indicating that sampling was adequate. The significant chi-square value for Bartlett's test of sphericity (χ^2 = 527.110, $p<0.05$) confirmed that data collected for technological innovation was adequate (Table 4.17). Results show that component one (1) had an eigenvalue of 3.196 explaining variance of 54.056%. The second component in Table 4.18 indicated eigenvalue of 1.400, with a percentage variance of 23.684%. All the six indictors were retained, computed for further analysis. The items extracted loaded highly on two-dimension factors, with component one having four indicators, component two having two indicators.

Table 4.17: Kaiser-Meyer-Olkin and Variance Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			.832
Bartlett's Test of Sphericity	Chi-Square		527.110
df			15
Significance			.000
Items of factors extracted	Eigen Values	% Variance	Total %
Component 1	3.196	54.058	54.058
Component 2	1.400	23.684	77.742

Table 4.18: Rotated Component Matrix[a]

	Component 1	2
1. Mobile banking withdrawal and deposit has improved the financial performance of SACCOs	.877	
2. Mobile banking has increased lending of loans by the SACCOs		.952
3. Mobile banking payment of bills has easy payments of bills and improve transaction in the SACCOs	.919	
4. ATMs has enhanced easy checking of balance by customers	.912	
5. SACCOs offer online banking platforms that allow customers to manage their accounts and conduct other SACCOs tasks using their computers or other devices.	.917	
6. SACCOs offer contactless payment systems, that allow customers to make payments using their mobile devices or smartwatches.		.513

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

4.3.6 Factor Analysis for Loan Performance

Principle component analysis was conducted to verify item loadings through which redundant items were identified and omitted from analysis. Seven indicators were proposed to measure loan performance. The KMO value of incidences of loan performance was 0.690 indicating that sampling was adequate. The significant chi-square value for Bartlett's test of sphericity (χ^2 = 262.329, $p<0.05$) confirmed that data collected for loan performance was adequate (Table 4.19). Results show that

component one (1) had an eigenvalue of 2.409 explaining variance of 36.626%. The second component in Table 4.20 indicated eigenvalue of 1.464, with a percentage variance of 22.263%. All the seven indictors were retained, computed for further analysis. The items extracted loaded highly on two-dimension factors, with component one having four indicators, component two having two indicators.

Table 4.19: Kaiser-Meyer-Olkin and Variance Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			.690
Bartlett's Test of Sphericity Chi-Square			262.329
df			21
Significance			.000
Items of factors extracted	Eigen Values	% Variance	Total %
Component 1	2.409	36.626	36.626
Component 2	1.464	22.263	58.889

Table 4.20 Rotated Component Matrix[a]

	Component	
	1	2
1. The SACCO managed to get full payment from loans	.796	
2. The SACCO loan was repaid on scheduled time	.663	
3. There was high return on equity of the SACCO	.858	
4. Repayment rate of loan was high in the SACCO	.804	
5. There were no bad debts (no loans were written off) in the SACCO		.664
6. There was minimal loan recovery cost in the SACCO		.829
7. Targeted beneficiary number was achieved in the SACCO		.718

4.5 Multiple Regression Assumptions Test

4.5.1 Test of Linearity

The linearity of the data was examined by means of a correlation analysis. A linear relationship between the variables is inferred if there is a significant correlation

between the independent variables and the dependent variable. There is no linear relationship between the independent variables and the dependent variable if the correlation coefficient is not significantly different from zero. Table 4.21 displays the results of the linearity analysis.

Table 4.21: Test of Linearity

Variables	Pearson Correlation	Sig.
Collection policy	.761**	.000
Client appraisal	.492**	.000
Credit risk control	.632**	.000
Credit terms	.684**	.000

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

Results presented in Table 4.21 revealed collection policy had a correlation coefficient of 0.761. Client appraisal had a correlation coefficient of 0.492. Credit risk control had a correlation coefficient of 0.632. In terms of managing credit terms, the correlation coefficient was 0.684. These indicated that the linearity assumption was made due to the non-zero values of the correlation coefficients for the four research variables. Inferring linearity in the data used.

4.5.2 Homoscedasticity Assumption

The homoscedasticity assumption was tested using the Levenes test of equality of error variances. Table 4.22 displays the results of the assumed-true-positive tests.

Table 4.22: Homoscedasticity Assumption

Variable	Levene Statistic	df1	df2	Sig.
Collection policy	18.102	12	223	.186
Client appraisal	14.651	10	225	.159
Credit risk control	38.809	10	225	.262
Credit terms	17.469	8	227	.134

The study results in Table 4.22 indicated that the p-value in Levenes test for collection policy was 0.186. P-value in Levenes test for client appraisal was 0.159. P-value in Levenes test for credit risk control was 0. 262. P-value in Levenes test for Credit terms was 0. 134.All the P-values were above 0.05. Thus, the homoscedasticity assumption was made showing that data used had no heteroscedasticity.

4.5.3 Normality Assumption Test

The study employed the Shapiro-Wilk test to determine whether or not the data significantly deviated from the assumed normal distribution. If the significance value was less than 0.05, the data were considered to be normally distributed (Tabachnic, 2001).

Table 4.23: Normality Assumption Test

Variables	Shapiro-Wilk	df	Sig.
Collection policy	.864	4	.276
Client appraisal	.898	4	.419
Credit risk control	.832	10	.135
Credit terms	.533	18	.158

Research results showed that all Shapiro-Wilk values in Table 4.23 were statistically significant at the 0.05 level or lower. Since the significance values were smaller than 0.05, the data were assumed to have come from a normal distribution. The assumption

of normality in linear regression (Connor & ONeill, 2017). If the Kolmogorov-Smirnov value is less than 0.05, then the data is normally distributed, while if it is larger than 0.05, then the data considerably deviates from a normal distribution, as stated by Tabachnic and Fidell (2001).

4.5.4 Multicollinearity Assumption Test

Using VIFs (variance inflation factors) and tolerance, the research examined the validity of the multicollinearity assumption. Table 4.24 details the study's findings.

Table 4.24: Multicollinearity Assumption Test

Variables	Tolerance	VIF
Collection policy	.580	1.725
Client appraisal	.798	1.253
Credit risk control	.611	1.637
Credit terms	.556	1.798

To test for multicollinearity, we inflated the variances (VIF). Multicollinearity is present if the VIF value is greater than 10, as stated by Field (2009). Table 4.24 displays that the variation inflation factors for collection policies were 1.725, client appraisal were 1.253, credit risk controls were 1.637 and credit terms were 1.798. The study revealed that the VIF results were fewer than 10, hence there is no multicollinearity as defined by Field (2009). The data showed that the multicollinearity assumption was correct due to the high tolerance values for all variables (above 0.10).

4.6 Inferential Analysis

Correlation and multiple regression models were utilized for inferential analysis in this section. The interplay between the explanatory variables and the criterion variable was shown by means of correlation and multiple regression analysis.

4.6.1 Correlation Analysis

The degree and direction of the relationship between the dependent and independent variables was analyzed using Pearson's correlation. The outcomes are shown in Table 4.26.

Table 4.26 Correlation Analysis Results

	Loan Performance	**Collection policy**	**Client appraisal**	**Credit risk control**	**Credit terms**	**Technological innovation**
Loan Performance	1					
Collection policy	.761**	1				
Client appraisal	.492**	.377**	1			
Credit risk control	.632**	.508**	.398**	1		
Credit terms	.684**	.597**	.331**	.555**	1	
technological innovation	.630**	.531**	.446**	.421**	.481**	1
N	148	148	148	148	148	148

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

According to Table 4.26, the research found that collection policy was positively associated with loan performance (r=.761; p<0.01). The results show a favorable, statistically significant association between client appraisal and loan performance (r= 0. .492; p<0.01). Credit risk control was found to have a statistically significant (r=.632; p<0.01) favorable relationship with loan performance. Credit terms were positively related to loan performance (r=0.684; p<0.01 statistically). Technological

innovation were positively related to loan performance (r=0. 630**; p<0.01 statistically).

According to Orodho (2003), the presence of two or more variables with a high correlation indicates that these variables are connected to one another in a significant manner, whereas the presence of two or more variables with a low correlation indicates that these variables are not connected at all. When interpreting the results of an experiment, a value of 0.00 indicates that there is no association between the variables.

4.6.2 Results for Multiple Regression Analysis

The power of a link between the dependent variable and several predictor variables was established with multiple regression analysis, and the relative relevance of each predictor was determined, typically with the effect of other predictors eliminated statistically.

4.6.3 Model Summary

The coefficient of determination (R^2) and correlation coefficient (R) showed the degree of association between dependent and independent variables. The results are presented in Table 4.27.

Table 4.27: Interpretation of Multiple Regression Models

R	R Square	Adjusted R Square	Std. Error of the Estimate
.848[a]	.719	.711	.31497

Table 4.27 displays the regression findings, which showed an R^2 of 0.719 and an R-value of 0.848. The high linear correlation between the dependent and independent variables was indicated by the R-value of 0.848. According to the coefficient of

determination (R^2), the independent variables provided 0.719 of the total explanation. The regression model accounted for roughly 71.9% of the observed variation in the independent variable.

4.6.4 Regression Model Fitness Test

The model's fitness was checked to test if it provided the best possible fit for the data. Table 4.28 showed the outcomes of the investigation.

Table 4.28: Fitness of Regression Model

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Regression	36.327	4	9.082	91.544	.000[b]
Residual	14.187	143	.099		
Total	50.514	147			

Table 4.28 displayed an F-statistic of (F =91.544), which was statistically significant at the p=0.000 level, demonstrating that the model was accurate. This means that the data were well-fit by the multiple regression model. That is why it was important considering the independent variables while designing the system.

4.8.5 Regression Model Coefficients

Running a regression model yielded coefficients for use in the regression equation. Table 4.29 details the study's findings.

Table 4.29: Regression Model Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	.540	.205		2.641	.009
Collection policy	.427	.055	.449	7.706	.000
Client appraisal	.131	.041	.159	3.207	.002
Credit risk control	.170	.048	.202	3.556	.001
Credit terms	.208	.049	.251	4.232	.000

Table 4.29 showed that the collection policy had a positive linear effect on loan performance (β_1=0.427, p=0.000). This showed that a 0.427-unit improvement in loan performance can be attained by instituting a more stringent collection approach. Loan performance was also found to be positively correlated with client appraisal (β_2=0.131, p=0.002). Therefore, an increase in client appraisal results in a 0.131-unit increase in loan performance. There is a positive and statistically significant relationship between credit risk management and loan performance (β_3=0.170, p=0.001). The effect of credit terms on loan performance is favorable and statistically significant (β_4=0.208, p=0.000). This suggested that a change in credit terms would improve loan performance by 0.208 percentage points. The resulting regression equation is as follows:

$Y = 0.540 + 0.427X_1 + 0.131X_2 + 0.170X_3 + 0.208X_4$……. Equation 4.1

Y represent loan performance

X_1 collection policy

X_2 client appraisal

X_3 credit risk management

X_4 credit terms

4.7 Hierarchical Moderated Regression Analysis

In order to establish the interaction effect between independent variables and dependent variable, technological innovation was used as a moderating variable. The hierarchical linear regression analysis was used to test moderating effect (Baron & Kenny, 1986). The regression analysis was done for each independent variable and dependent variable to determine the individual moderating effect of each element on loan performance of SACCOs.

Table 4.30 Hierarchical Moderated Regression Analysis Summary

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
(Constant)	.540*(.205)	.410* (.201)	-.968* (.352)	-.840* (.349)	-.770* (.347)	-.749* (.343)
Collection policy	.427*(.055)	.376* (.056)	.969* (.138)	.982*(.136)	.983* (.134)	.973* (.133)
Client appraisal	.131*(.041)	.094* (.041)	.037(.040)	-.027(.047)	-.013 (.047)	-.011 (.046)
Credit risk control	.170* (.048)	.159* (.046)	.076 (.047)	.056 (.046)	.066 (.046)	.067 (.046)
Credit terms	.208*(.049)	.179* (.048)	.136*(.046)	.131* (.045)	.112* (.046)	.111* (.045)
Technological innovation		.163* (.048)	.772* (.139)	.748* (.137)	.802* (.138)	.762* (.137)
Technological innovation × Collection policy			-.166* (.036)	-.174*(.035)	-.175* (.035)	-.170* (.035)
Technological innovation × Client appraisal				.024* (.009)	.021* (.010)	.019*(.009)
Technological innovation × Credit risk control					-.016* (.008)	-.020* (.008)
Technological innovation × Credit terms						.014* (.006)
F statistic	91.544*	81.085*	80.824*	72.996*	65.761*	60.512*
R^2	.719*	.741*	.775*	.785*	.791*	.785*
R^2 change		.021*	0.034*	.010*	.006*	.007*

* . significant at the 0.05 level (2-tailed).

From Table 4.30 showed coefficient of determination $R^2 = 0.719$. The R^2 value was statistically significant at $p<0.05$ and indicating that the explanatory power of the independent variables was 0.719. This means that 71.9% of the variation in loan performance of SACCOs was explained by the four independent variables (collection policy, client appraisal, credit risk control and credit terms).

Further Table 4.30 provided the results of the R^2 change. The R^2 change from model 1 to model 2 was 0.021 which changed from 0.719 to 0.741 and statistically significant ($p<0.05$). This showed that adding technological innovation in the model increases the model predictive capacity of credit risk management practices in predicting loan performance of SACCOs by increasing presentable variable counted for by 2.1%.

The R^2 change from model 2 to model 3 was 0.034 which changed from 0.741 to 0.775 and statistically significant ($p<0.05$). This indicated that technological innovation moderates the effect of collection policy on loan performance of SACCOs by increasing presentable variable counted for by 3.4%.

The R^2 change from model 3 to model 4 was 0. 010 which changed from 0.775 to 0.785 and statistically significant ($p<0.05$). This indicated that technological innovation moderates the effect of collection policy and client appraisal on loan performance of SACCOs by increasing presentable variable counted for by 1.0%.

The R^2 change from model 4 to model 5 was 0.006 which changed from 0.785 to 0.791 and statistically significant ($p<0.05$). This implied that technological innovation moderates the effect of collection policy, client appraisal and credit risk control practices on loan performance of SACCOs by increasing presentable variable counted for by 0.6%.

The R^2 change from model 5 to model 6 was 0.007 which changed from 0.791 to 0.785 and statistically significant ($p<0.05$). This revealed that technological innovation moderates the effect of collection policy, client appraisal and credit risk control practices and credit terms practices on loan performance of SACCOs by increasing presentable variable counted for by 0.7%.

Table 4.30 provided the F test revealing the significance of the fitted regression model. An F statistic in model 1 produced the value of 91.544 indicated that the independent variables were predicators of dependent variable ($F=91.544$; $p<0.05$). This implies a good fit and therefore considering the regression fitted, credit risk management practices (collection policy, client appraisal, credit risk control and credit terms) had an effect on loan performance of SACCOs.

F-value of model 2 was 81.085 which is associated with an R^2 of .741. This implied that after moderation of collection policy there was still good fit of the model ($F=81.085$; $p< 0.05$).

F-test for model 3 had a F-value of 80.824 which is associated with an R^2 of .775 and R^2 change of 0.034. This implied that after moderation of client appraisal by technological innovation showed a good predictors of loan performance of SACCOs and that the overall model was significant as it was less than p- value 0.05 ($P< 0.05$).

F-test for model 4 had a F-value of 72.996 which is associated with an R^2 of .785 and R^2 change of 0.010. This implied that after moderation of collection policy and client appraisal practices separately by technological innovation showed a good predictors of loan performance of SACCOs and that the overall model was significant as it was less than p- value 0.05 ($P< 0.05$).

F-test for model 5 had a F-value of 65.761 which is associated with an R^2 of .791 and R^2 change of 0. 006. This implied that after moderation of collection policy, client appraisal and credit risk control practices separately by technological innovation showed a good predictors of loan performance of SACCOs and that the overall model was significant as it was less than p- value 0.05 ($P< 0.05$).

F-test for model 6 had a F-value of 60.512 which is associated with a R^2 of 0.785 and R^2 change of 0.007. This implied that after moderation of collection policy, client appraisal, credit risk control and credit terms practices separately by technological innovation showed a good predictors of loan performance of SACCOs and that the overall model was significant as it was less than p- value 0.05($P< 0.05$).

Regression coefficients results of model 1 in Table 4.30 showed that collection policy had a positive and significant effect on loan performance of SACCOs (β_1=0.427, p<.05). Client appraisal practice had a positive and significant effect on loan performance of SACCOs (β_2=0.131, p<.05). Credit risk control practice had a positive and significant effect on loan performance of SACCOs (β_3=0.170, p<.05). Credit terms had a positive and significant effect on loan performance of SACCOs (β_4=0.208, p<.05).

In model two a regression analysis was done to determine the moderation effect of technological innovation on the relationship between collection policy practice, credit risk control practice, preventive practice, credit terms practice and loan performance of SACCOs. The equation showed that the coefficient of technological innovation interaction was significant since it had a p-value of 0. 001 which was less than 0.05 as shown in Table 4.13 since the coefficient was significant. It implied that technological innovation had a moderating effect on the relationship between collection policy

practice, client appraisal, credit risk control practice, credit terms practice and loan performance of SACCOs.

In model three a regression analysis revealed that technological innovation has a moderating effect on the relationship between collection policy practice and loan performance of SACCOs (p=.000).

In model four a regression analysis revealed that technological innovation had a significant effect on the relationship between collection policy practice and loan performance of SACCOs (p=.000) and on the relationship between client appraisal practice and loan performance of SACCOs (p=.011).

In model five a regression analysis revealed that technological innovation had a positive and significant effect on the relationship between collection policy practice and loan performance of SACCOs (p=.000) and on the relationship between client appraisal practice and loan performance of SACCOs (p=.029). Technological innovation had a significant effect on the relationship between credit risk control practice and loan performance of SACCOs (p=.046).

In model six a regression analysis revealed that technological innovation had a positive and significant effect on the relationship between collection policy practice and loan performance of SACCOs (p=.000). The technological innovation had a positive and significant effect on the relationship between client appraisal practice and loan performance of SACCOs (p=.047). Technological innovation had a significant effect on the relationship between credit risk control practice and loan performance of SACCOs (p=.012). Technological innovation had a positive and significant effect on the relationship between credit terms and loan performance of SACCOs (p=.033).

$$\mathbf{Y= -0}.749 + 0.973\mathbf{X_1} - \mathbf{0}.011\mathbf{X_2} + 0.067\mathbf{X_3} + 0.111\mathbf{X_4} + \mathbf{0}.762\mathbf{Z} - 0.170\mathbf{Z*X_1} + 0.019\mathbf{Z*X_2} - \mathbf{0.}\ 020\mathbf{Z*X_3} + \mathbf{0.}014\mathbf{Z*X_4}$$

4.7 Hypotheses Testing

For each hypothesis, the regression equation was first obtained using the B coefficients on the line of best of fit. The decision rule was that if the p –value is less than conventional 0.05 the null hypothesis was rejected and when its above 0.05 we fail to reject the null hypothesis. Hypothesis was tested at 5% alpha level of significance.

4.7.1 Hypothesis Testing of effect of collection policy on loan performance

Hypothesis H_{01} stated that collection policy has no significant effect on loan performance of registered deposit taking SACCOS in Kenya was formulated for testing. Results showed that collection policy has a positive and significant effect on loan performance (β_1=0.427, p<0.05). Basing on the results the null hypothesis is rejected suggesting that collection policy had a significant positive effect on loan performance.

4.7.2 Hypothesis Testing of the effect of Client appraisal on Loan performance

Hypothesis H_{02} stated that client appraisal has no significant effect on loan performance of registered deposit taking SACCOS in Kenya was formulated for testing. Results showed that client appraisal has a positive and significant effect on the loan performance (β_2=0.131, p<.05). Basing on the results the null hypothesis is rejected suggesting that client appraisal had a significant effect on loan performance.

4.7.3 Hypothesis Testing of the Effect of Credit risk control on Loan performance

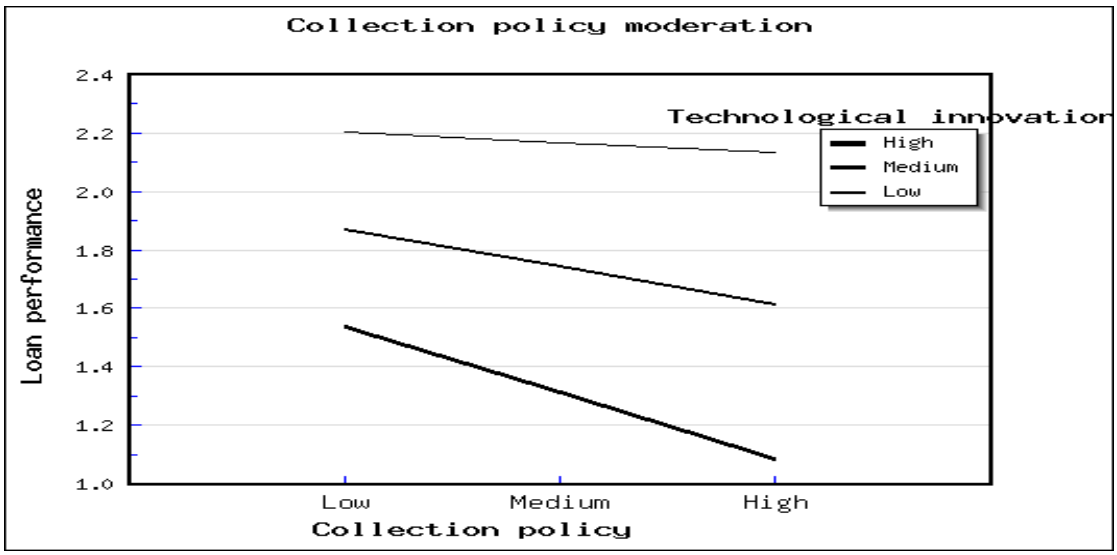
Hypothesis H_{03} stated that credit risk control has no significant effect on loan performance of registered deposit taking SACCOS in Kenya was formulated for testing. Results showed that credit risk control has a positive and significant effect on the loan performance (β_3=.170, $p<0.05$). Basing on the results the null hypothesis is rejected suggesting that credit risk control had a significant effect on loan performance.

4.7.4 Hypothesis Testing of the Effect of Credit terms on Loan performance

Hypothesis H_{04} stated that credit terms have no significant effect on loan performance of registered deposit taking SACCOS in Kenya was formulated for testing. Results showed that credit terms has a positive and significant effect on the loan performance (β_4=0.208, $p<0.05$). Basing on the results the null hypothesis is rejected suggesting that credit terms had a significant effect on loan performance.

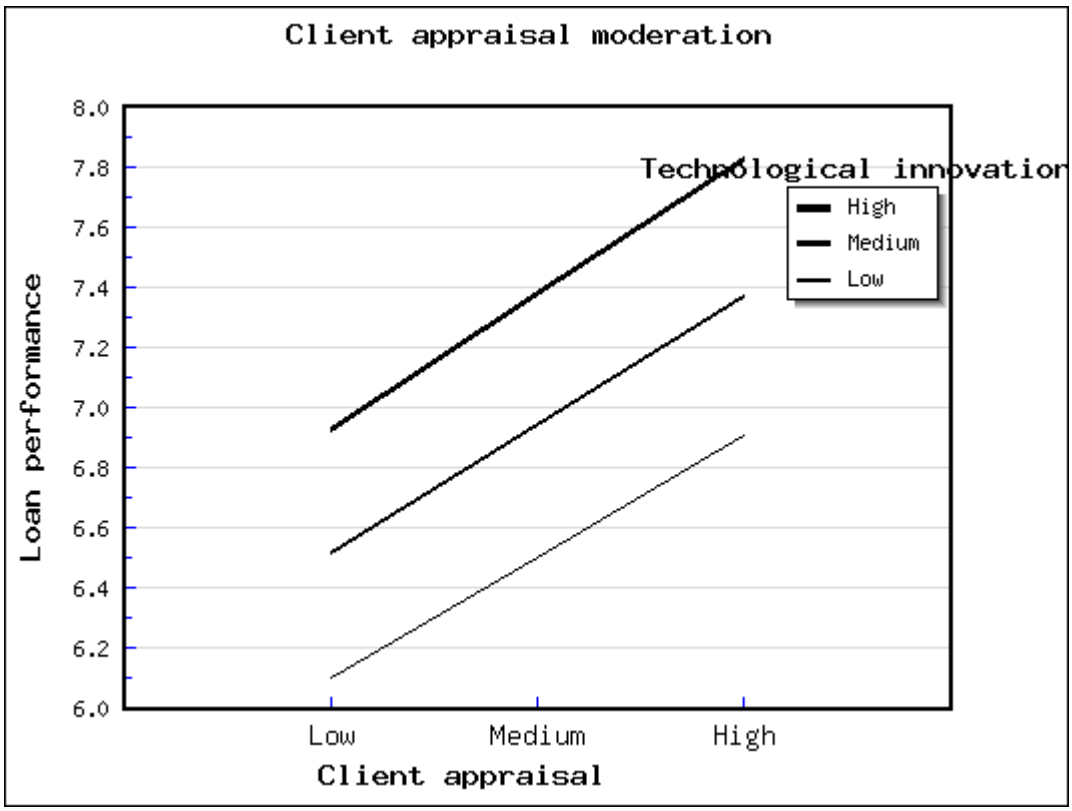
4.7.5 Hypothesis Testing of Technological innovation on the Relationship Between Collection policy and Loan performance

Hypothesis H_{05a} stated that technological innovation does not moderate the relationship between collection policy and loan performance of registered deposit taking SACCOS in Kenya was formulated for testing. Results showed that technological innovation has a negative significant moderating effect on the relationship between collection policy and loan performance (collection policy and technological innovation (β_{c1}=-.166, $p<0.05$). Basing on the results the null hypothesis was rejected suggesting that technological innovation has a negative significant moderating effect on relationship between collection policy and loan performance.



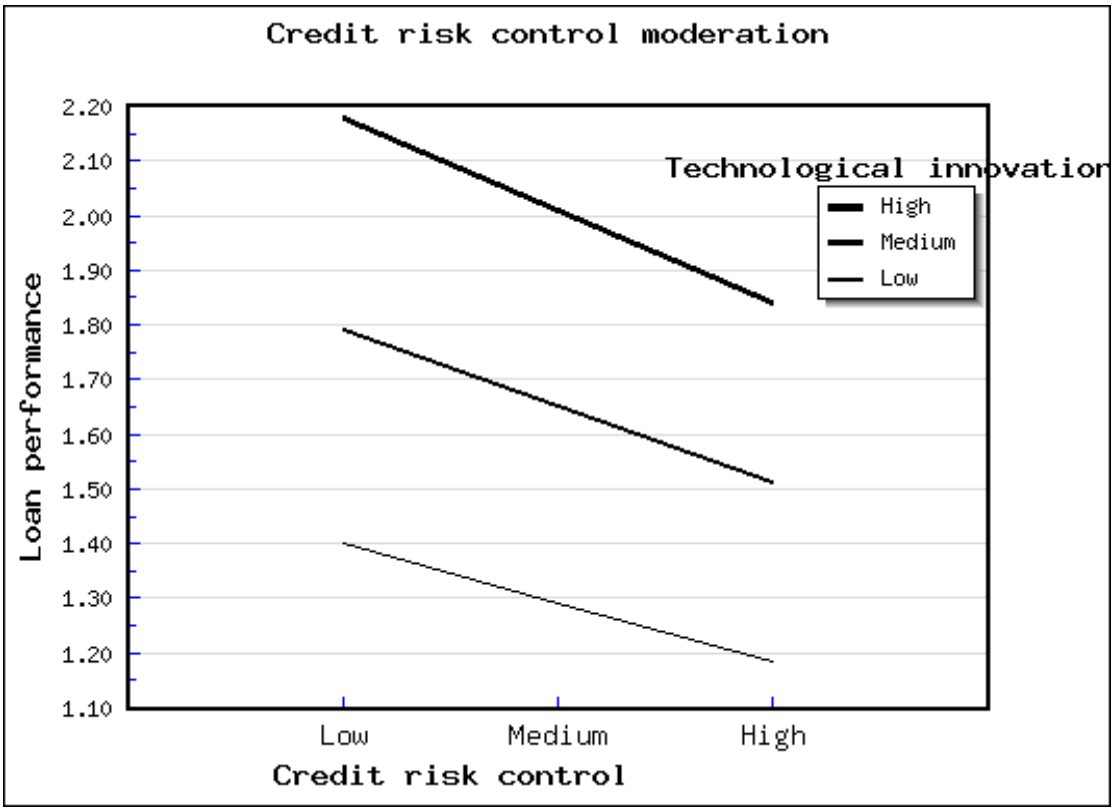
4.7.6 Hypothesis Testing of Technological innovation on the Relationship Between Client appraisal and Loan performance

Hypothesis H_{05b} stated that technological innovation does not moderate the relationship between client appraisal and loan performance of registered deposit taking SACCOS in Kenya was formulated for testing. Results showed that technological innovation has a positive significant moderating effect on the relationship between client appraisal and loan performance (Client appraisal and technological innovation β_{c2}=.024, $p<0.05$). Basing on the results the null hypothesis was rejected suggesting that technological innovation has a positive significant moderating effect on relationship between client appraisal and loan performance.



4.7.7 Hypothesis Testing of Technological innovation on the Relationship Between Credit risk control and Loan performance

Hypothesis H_{05c} stated that technological innovation does not moderate the relationship between credit risk control and loan performance of registered deposit taking SACCOS in Kenya was formulated for testing. Results showed that technological innovation has a negative and significant moderating effect on the relationship between credit risk control and loan performance (credit risk control and technological innovation (β_{c3}=-.016, $p<0.05$). Basing on the results the null hypothesis is rejected suggesting that technological innovation had a negative significant moderating effect on relationship between credit risk control and loan performance.



4.7.8 Hypothesis Testing of Technological innovation on the Relationship Between Credit terms and Loan performance

Hypothesis H_{05d} stated that technological innovation does not moderate the relationship between credit terms and loan performance among SACCOs in Kenya was formulated for testing. Results showed that technological innovation has a positive and significant moderating effect on the relationship between credit terms and loan performance (Credit terms and technological innovation (β_{d4}=0.014, $p<0.05$). Basing on the results the null hypothesis is rejected suggesting that technological innovation had a significant moderating effect on relationship between credit terms and loan performance.

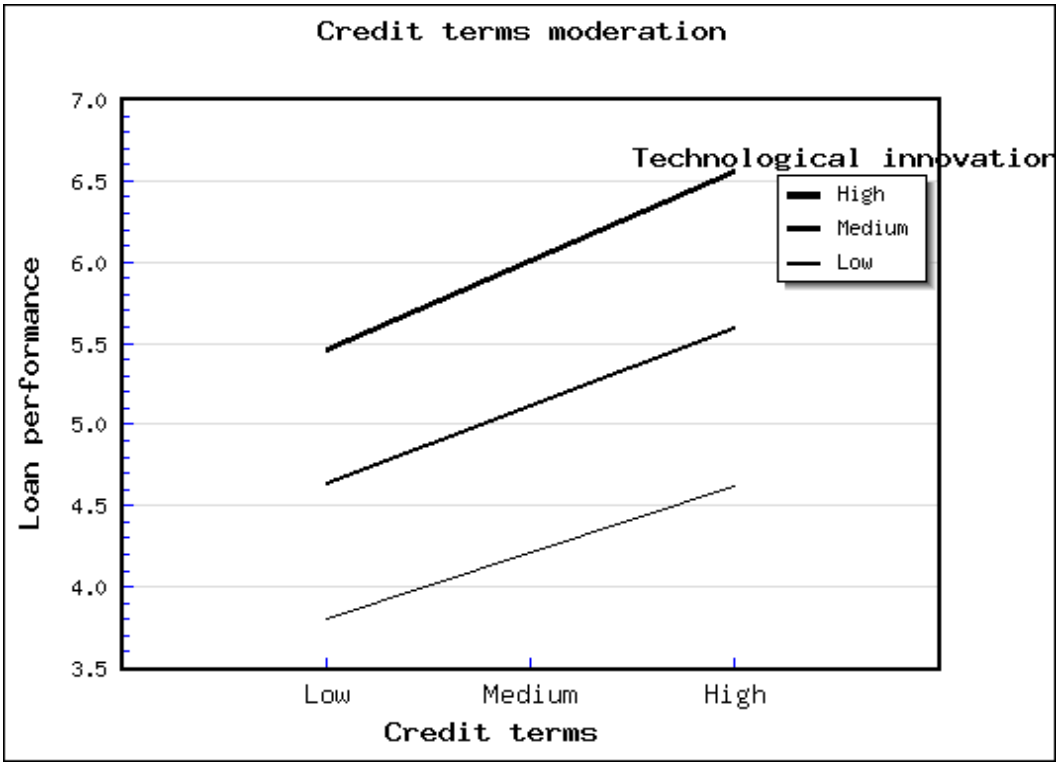

Credit terms moderation
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
Loan performance
Technological innovation
High
Medium
Low
Low
Medium
High
Credit terms

Table 4.31: Summary of Hypotheses Test Results

Hypotheses	β and P values	Decision rule(accept/reject)
H_{01}: Collection policy has no significant effect on loan performance of registered deposit taking SACCOS in Kenya	β_1=0.427, p=0.000<0.05	Rejected the null hypothesis
H_{02}: Client appraisal has no significant effect on loan performance of registered deposit taking SACCOS in Kenya	β_2=0.131, p=0.000<0.05	Rejected the null hypothesis
H_{03}: Credit risk control has no significant effect on loan performance of registered deposit taking SACCOS in Kenya	β_3=0.170, p=0.000<0.05	Rejected the null hypothesis
H_{04}: Credit terms have no significant effect on loan performance of registered deposit taking SACCOS in Kenya.	β_3=0.208, p=0.000<0.05	Rejected the null hypothesis
H_{05a}: Technological innovation does not moderate the relationship between collection policy and loan performance of registered deposit taking SACCOS in Kenya.	β=-0.170, p=0.035<0.05	Rejected the null hypothesis
H_{05b}: Technological innovation does not moderate the relationship between client appraisal and loan performance of registered deposit taking SACCOS in Kenya	β=0.019, p=0.009<0.05	Rejected the null hypothesis
H_{05c}: Technological innovation does not moderate the relationship between credit risk control and loan performance of registered deposit taking SACCOS in Kenya	β=-0.020, p=0.008<0.05	Rejected the null hypothesis
H_{05d}: Technological innovation does not moderate the relationship between credit terms and loan performance among SACCOs in Kenya.	β=0.014, p=0.006<0.05	Rejected the null hypothesis

4.8 Reliability of the Research Instruments

Reliability is a measure of consistency of the research instrument if and when administered to respondents drawn from different populations but exhibiting similar characteristics. The reliability results are as presented in Table 4.32.

Table 4.32: Reliability Test Results

Variables	N of Items	Cronbach's Alpha	Comments
Collection policy	6	.786	Reliable
Client appraisal	5	.768	Reliable
Credit risk control	7	.717	Reliable
Credit terms	7	.784	Reliable
Technological innovation	6	.783	Reliable
Loan performance of SACCOs	7	.721	Reliable

The findings in Table 4.32 indicated that collection policy had a Cronbach Alpha coefficient of 0.786. Client appraisal had a Cronbach Alpha coefficient of 0.768. Credit risk control had a Cronbach Alpha coefficient of 0.717. Credit terms had a Cronbach Alpha coefficient of 0.784. Technological innovation had a Cronbach Alpha coefficient of 0.783 and Loan performance of SACCOs had a Cronbach Alpha coefficient of 0.721. All variables depicted that the value of Cronbach's Alpha is above value of 0.7 thus the study was reliable (Ghazali, 2016). This indicates that scales used in this study are reliable enough to capture the variables.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This part contains a summary of the research, as well as its findings and conclusions, as well as some suggestions.

5.2 Summary of the Findings

This section provides a comprehensive summary of the research findings, highlighting the key insights and conclusions derived from the study. By analyzing the relationship between credit risk management practices, technological innovation, and loan performance among SACCOs in Kenya, the research sheds light on the crucial factors influencing the success and sustainability of these financial institutions. The findings contribute to the existing knowledge and understanding of SACCO operations, emphasizing the significance of adopting technological innovations, implementing effective credit risk management practices, and considering moderating factors to enhance loan performance and overall financial health.

5.2.1 Collection Policy

The first objective of the research was to examine how SACCOs in Kenya's loan performance is affected by their collecting policy. The descriptive findings showed that majority of respondents agreed that they have formulated collection policies for credit management. They have also enforced of guaranteed policies to provides for loan recovery in case of loan defaults. Regular reviews have been done on collection policies to improve state of credit management. A stringent policy is more effective in debt recovery than a lenient policy. Available collection policies have assisted towards effective credit management. Staff incentives are effective in improving

recovery of delinquent loans. The inferential statistics results revealed that collection policy was positively associated with loan performance

5.2.2 Client Appraisal

The second objective of the study was to examine the effect of client appraisal on loan performance of registered deposit taking SACCOS in Kenya. The descriptive results revealed that majority of the respondents agreed all required information on credit is gathered and applications are screened in the SACCO. The SACCO has competent personnel for carrying out client appraisal. Client appraisal in the SACCO considers the character of the customers seeking credit facilities. The SACCO considers aspects of collateral awhile appraising customers. The SACCO has a proper credit monitoring system which ensure prompt corrective actions on credit defaulting. Inferential results indicated that client appraisal has a positive and significant effect on loan performance.

5.2.3 Credit Risk Control

The third objective of the study was to establish the effect of credit risk control on loan performance of registered deposit taking SACCOS in Kenya. The descriptive statistics showed that majority of the respondents agreed that the use of credit checks on regular basis enhances credit management. The SACCO thoroughly checks a new customer's credit record. The use of customer credit application forms improves monitoring and credit management as well. The SACCO has developed a standard process for handling overdue accounts. Imposing loan size limits is a viable strategy in credit management. Penalty for late payment enhances customers commitment to loan repayment. Credit committee's involvement in making decisions regarding loans

are essential in reducing default/credit risk. The inferential statistics results revealed that credit risk control has a positive effect on loan performance.

5.2.4 Credit Terms

The fourth objective of the study was to analyze the effect of credit terms on loan performance of registered deposit taking SACCOS in Kenya. The descriptive results revealed that majority of the respondents agreed that SACCO's credit terms had very clear provision on loan size. SACCO's credit terms had very clear provision on fees and interest rate. SACCO's credit terms had very clear provision on collateral requirements. SACCO's credit terms had very clear provision on repayment schedule. The SACCO educates the clients prior to issuing a loan (Mean=3.96, standard deviation=0.928). SACCO's credit terms had very clear provision on penalties information. The SACCO educates the clients prior to issuing a loan. Furthermore, SACCO's credit terms had very clear provision on penalties information. SACCO's credit terms had very clear provision on penalties information. The inferential statistics revealed that credit terms were positively related to loan performance.

5.2.5 Technological Innovation

The descriptive results showed that mobile banking withdrawal and deposit has improved the financial performance of SACCOs. Mobile banking has increased lending of loans by the SACCOs. Mobile banking payment of bills has easy payments of bills and improve transaction in the SACCOs. ATMs has enhanced easy checking of balance by customers. SACCOs offer online banking platforms that allow customers to manage their accounts and conduct other SACCOs tasks using their computers or other devices. SACCOs offer online banking platforms that SACCOs offer contactless payment systems, that allow customers to make payments using their

mobile devices or smartwatches. Technological innovation had a moderating effect on the relationship between collection policy practice, client appraisal, credit risk control practice, credit terms practice and loan performance of SACCOs.

5.3 Conclusions of the Study

In conclusion, the implementation of an effective collection policy is vital for SACCOs to achieve optimal loan performance in Kenya. A well-structured collection policy can significantly reduce default rates and improve overall financial stability. By offering regular training sessions as well as continuous monitoring and feedback mechanisms, SACCOs can better understand their clients' unique needs while also promoting accountability within their organization. Prioritizing robust compliance procedures will help Sacco's avoid liquidity challenges which could lead to insolvency issues thereby negatively affecting both its members' savings deposits as well as its chances of survival.

Client appraisal plays a crucial role in determining loan performance within SACCOs in Kenya. SACCOs with effective and efficient client appraisal systems experience lower default rates compared to those with inadequate appraisal methods therefore it is important to conduct regular appraisals for clients seeking loans from SACCOs. Through the use of client appraisal SACCOs can minimize risk exposure while also ensuring they lend to reliable borrowers who are more likely to repay their loans.

The study concluded that credit risk control measures play a crucial role in the loan performance of registered deposit taking SACCOS in Kenya. Credit risk control strategies can help to mitigate risks and improve the overall performance of loans issued by SACCOs. The implementation of these measures has been shown to reduce non-performing loans and improve profitability for SACCOs.

The credit terms of Savings and Credit Cooperatives (SACCOs) in Kenya have a significant effect on loan performance. Appropriate credit policies, including interest rates, loan size, repayment period and grace periods, are critical to the success of SACCOs. Members tend to stay loyal to SACCOs that offer attractive loans with flexible repayment options. The credit policy implemented by SACCOs plays a pivotal role in their overall success or failure.

The study concluded that Technological innovation has a moderating effect on the relationship between credit risk management practices and loan performance of registered deposit taking SACCOS in Kenya. This means that the effectiveness of credit risk management practices is enhanced by the use of technology. Technology can help SACCOs to collect and analyze more data about their borrowers. This information can be used to better assess the risk of lending to a particular borrower, and to make more informed decisions about loan approvals. Technology can help SACCOs to automate their loan processing and monitoring systems. This can free up staff time to focus on other tasks, such as customer service and marketing. It can also help to reduce the risk of errors in loan processing, which can lead to loan defaults. Technology can help SACCOs to communicate more effectively with their borrowers. This can help to build trust and rapport with borrowers, and to ensure that they are aware of their loan obligations. It can also help to resolve loan issues more quickly and efficiently.

5.4 Recommendations of the Study

Policy Implications: - Policymakers and regulatory bodies should develop and enforce clear guidelines and regulations pertaining to credit risk management practices and technological innovation in the SACCO sector. Standardized and effective approaches

to managing credit risks should be encouraged. SACCOs should be incentivized to invest in research and development initiatives to foster innovation and continuously improve credit risk control measures.

Practical Implications: SACCOs in Kenya should constantly examine and update processes relating to collection policy, customer appraisal, credit risk control, and credit terms. Loan collection policies should be adhered to in order to ensure increased loan performance. SACCOs should prioritize the implementation of robust and comprehensive client appraisal mechanisms to improve loan performance. SACCO management teams should take advantage of readily available resources, including technology advancements, to improve credit risk control measures. SACCOs should adopt effective strategies aimed at retaining members by providing competitive financial services.

Theoretical Implications: Further research should be conducted to explore and expand upon existing theories of credit risk management, liquidity theory of credit, and innovation diffusion theory. This research would contribute to a deeper understanding of the relationship between credit risk management practices, technological innovation, and loan performance among SACCOs.

5.5 Limitations and Suggestions for Further Study

The study has a few limitations that should be acknowledged. First, the research focused solely on SACCOs in Kenya, which limits the generalizability of the findings to other countries or financial institutions. Additionally, the study primarily relied on self-reported data from operational managers, which may be subject to response biases or inaccuracies. The cross-sectional nature of the study also restricts the ability to establish causality between variables. Finally, the study did not explore the

potential effect of external factors, such as economic conditions or regulatory changes, on credit risk management practices and loan performance.

Based on the limitations identified, several directions for future research are proposed. Firstly, conducting comparative studies across different countries or financial institutions would provide a broader understanding of the relationship between credit risk control methods and loan performance. Additionally, future research should consider incorporating additional determinants of credit risk control to provide a more comprehensive analysis. Longitudinal studies would enable the examination of causal relationships and the impact of external factors on credit risk management practices and loan performance. Furthermore, investigating the effects of credit risk control and loan performance on deposit-accepting SACCOs and other types of financial institutions in Kenya would contribute to a more holistic understanding of the topic. By addressing these areas, future research can further enhance our knowledge and provide valuable insights for SACCOs and the wider financial industry.

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APPENDICES

Appendix I: Letter of Introduction

Nancy Jepkemboi

SBE/PGM/KTL/012/16

School of Business and Economics
Moi University.
P.O. Box 3900-30100
Eldoret

Dear Respondent,

RE: REQUEST FOR RESEARCH DATA

I am a post graduate student at the Moi University, School of Business and Economics. In partial fulfillment of the requirements for the award of degree in Management of Business Administration, I am required to conduct a study on the credit risk management practices, technological innovation and loan performance of registered deposit taking SACCOS in Kenya. The questionnaire consists of two parts thus should not take more than 20 minutes to fill. Please note there is no right or wrong answer, so feel free to give the answer you think is correct. Strict confidentiality will be maintained and all the information will collect through this questionnaire will remain confidential. The information you provide will not be will use for any other purpose apart from its intended academic use.

I thank you in advance for your co-operation.
Yours faithfully

Nancy Jepkemboi

MASTERS Student – Moi University

Appendix II: Research Questionnaire

INSTRUCTIONS:

This questionnaire consists of part A to F. Section A, B, C, D ,E and F is based on the objectives of research titled: credit risk management practices, technological innovation and loan performance of registered deposit taking SACCOS in Kenya**.**

Please Tick √ as appropriate

PART A: COLLECTION POLICY

Kindly rate following statements to the best level of your understanding on the extent you agreed or disagreed on collection policy. Kindly tick. Using this following key:

1.SD-Strongly disagreed, 2. D-Disagreed 3. N-Neutral, 4. A-agreed, and 5.SA-Strongly agreed

	Statements	SA	A	N	D	SD
DCP1	We have formulated collection policies for credit management					
DCP2	We have enforced of guarantee policies to provides for loan recovery in case of loan defaults					
DCP3	Regular reviews have been done on collection policies to improve state of credit management					
DCP4	A stringent policy is more effective in debt recovery than a lenient policy					
DCP5	Available collection policies have assisted towards effective credit management					
DCP6	Staff incentives are effective in improving recovery of delinquent loans					

PART B: CLIENT APPRAISAL

Kindly indicate to what extent you agree with the following statements on client appraisal. Using the following scale, please tick the one that best describes your opinion

(1=Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5=Strongly Agree)

	Statements	SA	A	N	D	SD
CA1	All required information on credit is gathered and applications are screened in the SACCO					
CA2	Our SACCO has competent personnel for carrying out client appraisal					
CA3	Client appraisal in our SACCO considers the character of the customers seeking credit facilities					
CA4	Our SACCO considers aspects of collateral awhile appraising customers					
CA5	SACCO has a proper credit monitoring system which ensure prompt corrective actions on credit defaulting					

PART C: CREDIT RISK CONTROL

Kindly indicate to what extent you agree with the following statements on credit risk control. Using the following scale, please tick the one that best describes your opinion

(1=Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5=Strongly Agree)

	Statements	SA	A	N	D	SD
CRC1	The use of credit checks on regular basis enhances credit management					
CRC2	The SACCO thoroughly checks a new customer's credit record.					
CRC3	The use of customer credit application forms improves monitoring and credit management as well					

CRC4	The SACCO has developed a standard process for handling overdue accounts					
CRC5	Imposing loan size limits is a viable strategy in credit management					
CRC6	Penalty for late payment enhances customers commitment to loan repayment					
CRC7	Credit committee's involvement in making decisions regarding loans are essential in reducing default/credit risk					

PART D: CREDIT TERMS

Kindly indicate to what extent you agree with the following statements on credit terms**.** Using the following scale, please tick the one that best describes your opinion

(1=Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5=Strongly Agree)

	Statements	**5**	**4**	**3**	**2**	**1**
CT1	SACCO's credit terms had very clear provision on loan size					
CT2.	SACCO's credit terms had very clear provision on fees and interest rate					
CT3.	SACCO's credit terms had very clear provision on collateral requirements					
CT4	SACCO's credit terms had very clear provision on repayment schedule					
CT5.	The SACCO educates the clients prior to issuing a loan					
CT6.	SACCO's credit terms had very clear provision on penalties information					
CT7.	Customer are consulted on the formulation of credit terms					

PART E: TECHNOLOGICAL INNOVATION

Kindly indicate to what extent you agree with the following statements on technological innovation**.** Using the following scale, please tick the one that best describes your opinion

(1=Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5=Strongly Agree)

	Statements	**5**	**4**	**3**	**2**	**1**
TI1.	Mobile banking withdrawal and deposit has improved the financial performance of SACCOs					
T12	Mobile banking has increased lending of loans by the SACCOs					
TI3	Mobile banking payment of bills has easy payments of bills and improve transaction in the SACCOs					
TI4	ATMs has enhanced easy checking of balance by customers					
TI5	SACCOs offer online banking platforms that allow customers to manage their accounts and conduct other SACCOs tasks using their computers or other devices.					
TI6	SACCOs offer contactless payment systems, that allow customers to make payments using their mobile devices or smartwatches.					

PART F: LOAN PERFORMANCE

Kindly indicate to what extent you agree with the following statements on performing loans. Using the following scale, please tick the one that best describes your opinion

(1=Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5=Strongly Agree)

	Statement	**5**	**4**	**3**	**2**	**1**
LP1	The SACCO managed to get full payment from loans					
LP2	The SACCO loan was repaid on scheduled time					
LP3	There was high return on equity of the SACCO					
LP4	Repayment rate of loan was high in the SACCO					
LP5	There were no bad debts (no loans were written off) in the SACCO					
LP6	There was minimal loan recovery cost in the SACCO					
LP7	Targeted beneficiary number was achieved in the SACCO					

Appendix III: University Letter

MOI UNIVERSITY
POSTGRADUATE OFFICE
SCHOOL OF BUSINESS AND ECONOMICS

Tel: 0722271134
0722685969
0715245347
Fax No: (053) 43047
Telex No. MOIVARSITY 35047

P.O. Box 3900
Eldoret.
Kenya

RE: MU/SBE/PGR/ACD/21B **DATE:** 20th January, 2023

TO WHOM IT MAY CONCERN:

RE: Nancy Jepkemboi –SBE/PGM/KTL/16

The above named is a bonafide student of Moi University School of Business and Economics, undertaking **Master of Business Administration** degree; specializing in Finance.

She has successfully completed the coursework, defended her proposal, and is proceeding to the field to collect data for her research titled: ***"Credit risk Management Practices, Technological Innovation and Loan Performance, A case Study of Saccos in Kenya."***

Any assistance accorded to her will be highly appreciated.

Yours faithfully,

SCHOOL OF BUSINESS & ECONOMICS
MOI UNIVERSITY
P. O. Box 3900 ELDORET-KENYA

DR. RONALD BONUKE
POSTGRADUATE CHAIR, SB&E

/vc

Appendix IV: NACOSTI Approval Letter

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: **538457**

Date of Issue: 1 /FEBRUARY/2023

RESEARCH LICENSE

This is to Certify that Ms.. NANCY JEPKEMBOI of Moi University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Uasin-Gishu on the topic: CREDIT RISK MANAGEMENT PRACTICES, TECHNOLOGICAL INNOVATION AND LOAN PERFORMANCE: A STUDY OF SACCOS IN KENYA for the period ending : 01/FEBRUARY/2023

License No: **NACOSTI/P/23/27203**

538457

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

Appendix V: List of SACCO in Kenya Governed by SASRA

1.2 NK SACCO Society Ltd
2. Acumen SACCO Society Ltd
3. Afya SACCO Society Ltd
4. Agro-Chem SACCO Society Ltd
5. Ainabkoi SACCO Society Ltd
6. Airports SACCO Society Ltd
7. Amica SACCO Society Ltd
8. Ammar SACCO Society Ltd
9. Ardhi SACCO Society Ltd
10. Asili SACCO Society Ltd
11. Azima SACCO Society Ltd
12. Bandari SACCO Society Ltd ¬
13. Baraka SACCO Society Ltd
14. Baraton University SACCO Society Ltd
15. Biashara SACCO Society Ltd
16. Biashara Tosha SACCO Society Ltd
17. Bi-High SACCO Society Ltd
18. Bingwa SACCO Society Ltd
19. Boresha SACCO Society Ltd
20. Capital SACCO Society Ltd
21. Centenary SACCO Society Ltd
22. Chai SACCO Society Ltd
23. Chuna SACCO Society Ltd
24. Comoco SACCO Society Ltd
25. Cosmopolitan SACCO Society Ltd
26. County SACCO Society Ltd
27. Daima SACCO Society Ltd
28. Dhabiti SACCO Society Ltd
29. Dimkes SACCO Society Ltd
30. Dumisha SACCO Society Ltd
31. Eco-Pillar SACCO Society Ltd
32. Egerton SACCO Society Ltd
33. Elimu SACCO Society Ltd
34. Enea SACCO Society Ltd
35. Faridi SACCO Society Ltd
36. Fariji SACCO Society Ltd
37. Fortitude SACCO Society Ltd
38. Fortune SACCO Society Ltd
39. Fundilima SACCO Society Ltd
40. GDC SACCO Society Ltd
41. Golden Pillar SACCO Society Ltd
42. Good Faith SACCO Society Ltd ¬
43. Goodhope SACCO Society Ltd
44. Goodway SACCO Society Ltd
45. Gusii Mwalimu SACCO Society Ltd
46. Harambee SACCO Society Ltd
47. Hazina SACCO Society Ltd
48. Ilkisonko SACCO Society Ltd

49. Imarika SACCO Society Ltd
50. Imarisha SACCO Society Ltd
51. Invest and Grow (IG) SACCO Society Ltd
52. Jacaranda SACCO Society Ltd
53. Jamii SACCO Society Ltd
54. Jitegemee SACCO Society Ltd
55. Joinas SACCO Society Ltd
56. Jumuika SACCO Society Ltd
57. Kencream SACCO Society Ltd
58. Kenpipe SACCO Society Ltd
59. Kenversity SACCO Society Ltd
60. Kenya Achievas SACCO Society Ltd
61. Kenya Bankers SACCO Society Ltd
62. Kenya Highlands SACCO Society Ltd
63. Kenya Midland SACCO Society Ltd
64. Kenya Police SACCO Society Ltd
65. Kimbilio Daima SACCO Society Ltd
66. Kimisitu SACCO Society Ltd
67. Kingdom SACCO Society Ltd
68. Kipsigis Edis SACCO Society Ltd
69. Kite SACCO Society Ltd
70. Kitui Teachers SACCO Society Ltd ¬
71. Kolenge Tea SACCO Society Ltd
72. Koru SACCO Society Ltd
73. K-Pillar SACCO Society Ltd
74. K -Unity SACCO Society Ltd
75. Kwetu SACCO Society Ltd
76. Lainisha SACCO Society Ltd
77. Lamu Teachers SACCO Society Ltd
78. Lengo SACCO Society Ltd
79. Mafanikio SACCO Society Ltd ¬
80. Magadi SACCO Society Ltd
81. Magereza SACCO Society Ltd
82. Maisha Bora SACCO Society Ltd
83. Mentor SACCO Society Ltd
84. Metropolitan National SACCO Society Ltd
85. MMH SACCO Society Ltd
86. Mombasa Port SACCO Society Ltd
87. Mudete Factory Tea Growers SACCO Society Ltd
88. Muki SACCO Society Ltd 89. Mwalimu National SACCO Society Ltd
90. Mwietheri SACCO Society Ltd 91. Mwito SACCO Society Ltd
92. Nacico SACCO Society Ltd 93. Nafaka SACCO Society Ltd
94. Nandi Farmers SACCO
95. Nanyuki Equator SACCO Society Ltd
96. Nation SACCO Society Ltd
97. Nawiri SACCO Society Ltd
98. Ndege Chai SACCO Society Ltd ¬
99. Ndosha SACCO Society Ltd
100. New Forties SACCO Society Ltd
101. Nexus SACCO Society Ltd

102. Ng'arisha SACCO Society Ltd
103. Noble SACCO Society Ltd
104. NRS SACCO Society Ltd
105. NSSF SACCO Society Ltd
106. Nufaika SACCO Society Ltd
107. Nyala Vision SACCO Society Ltd
108. Nyambene Arimi SACCO Society Ltd
109. Nyamira Tea Farmers SACCO Society Ltd
110. Nyati SACCO Society Ltd
111. Ollin SACCO Society Ltd
112. Orient SACCO Society Ltd
113. Patnas SACCO Society Ltd
114. Prime Time SACCO
115. PUAN SACCO Society Ltd
116. Qwetu SACCO Society Ltd
117. Rachuonyo Teachers SACCO Society Ltd
118. Safaricom SACCO Society Ltd
119. Sheria SACCO Society Ltd
120. Shirika Deposit Taking SACCO Society Ltd
121. Shoppers SACCO Society Ltd
122. Simba Chai SACCO Society Ltd
123. Siraji SACCO Society Ltd
124. Skyline SACCO Society Ltd
125. Smart Champions SACCO Society Ltd
126. Smart - Life SACCO Society Ltd
127. Solution SACCO Society Ltd
128. Sotico SACCO Society Ltd
129. Southern Star SACCO Society Ltd
130. Stake Kenya SACCO Society Ltd
131. Stawisha SACCO Society Ltd
132. Stima SACCO Society Ltd
133. Suluhu SACCO Society Ltd
134. Supa SACCO Society Ltd
135. Tabasamu SACCO Society Ltd
136. Tabasuri SACCO Society Ltd
137. Tai SACCO Society Ltd
138. Taifa SACCO Society Ltd
139. Taqwa SACCO Society Ltd
140. Taraji SACCO Society Ltd
141. Telepost SACCO Society Ltd
142. Tembo SACCO Society Ltd
143. Tenhos SACCO Society Ltd
144. Thamani SACCO Society Ltd
145. The Apple SACCO Society Ltd
146. Times-U SACCO Society Ltd
147. Tower SACCO Society Ltd
148. Trans-Elite County SACCO Society Ltd
149. Trans Nation SACCO Society Ltd
150. Trans-Counties SACCO Society Ltd
151. Trans-National Times SACCO Society Ltd

152. Uchongaji SACCO Society Ltd
153. Ufanisi SACCO Society Ltd
154. Ukristo na Ufanisi wa Anglican SACCO Society Ltd ¬
155. Ukulima SACCO Society Ltd
156. Unaitas SACCO Society Ltd
157. Uni-County SACCO Society Ltd
158. Unison SACCO Society Ltd
159. United Nations SACCO Society Ltd
160. Universal Traders SACCO Society Ltd
161. Ushuru SACCO Society Ltd
162. Vihiga County Farmers SACCO Society Ltd
163. Viktas SACCO Society Ltd
164. Vision Africa SACCO Society Ltd
165. Vision Point SACCO Society Ltd
166. Wakenya Pamoja SACCO Society Ltd¬
167. Wakulima Commercial SACCO Society Ltd
168. Wana-anga SACCO Society Ltd 169. Wananchi SACCO Society Ltd
170. Wanandege SACCO Society Ltd
171. Washa SACCO Society Ltd 172. Waumini SACCO Society Ltd
173. Wevarsity SACCO Society Ltd
174. Winas SACCO Society Ltd

Appendix VI: Data

Correlations							
		Y	X1	X2	X3	X4	M
Y	Pearson Correlation	1	.761**	.492**	.632**	.684**	.630**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	148	148	148	148	148	148
X1	Pearson Correlation	.761**	1	.377**	.508**	.597**	.531**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	148	148	148	148	148	148
X2	Pearson Correlation	.492**	.377**	1	.398**	.331**	.446**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	148	148	148	148	148	148
X3	Pearson Correlation	.632**	.508**	.398**	1	.555**	.421**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	148	148	148	148	148	148
X4	Pearson Correlation	.684**	.597**	.331**	.555**	1	.481**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	148	148	148	148	148	148
M	Pearson Correlation	.630**	.531**	.446**	.421**	.481**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	148	148	148	148	148	148
**. Correlation is significant at the 0.01 level (2-tailed).							

Regression

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.848[a]	.719	.711	.31497
2	.861[b]	.741	.731	.30377
3	.880[c]	.775	.765	.28408
4	.886[d]	.785	.774	.27856

5	.889[e]	.791	.779	.27559	
6	.893[f]	.798	.785	.27203	

a. Predictors: (Constant), X4, X2, X3, X1

b. Predictors: (Constant), X4, X2, X3, X1, M

c. Predictors: (Constant), X4, X2, X3, X1, M, MX1

d. Predictors: (Constant), X4, X2, X3, X1, M, MX1, MX2

e. Predictors: (Constant), X4, X2, X3, X1, M, MX1, MX2, MX3

f. Predictors: (Constant), X4, X2, X3, X1, M, MX1, MX2, MX3, MX4

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.327	4	9.082	91.544	.000[b]
	Residual	14.187	143	.099		
	Total	50.514	147			
2	Regression	37.411	5	7.482	81.085	.000[c]
	Residual	13.103	142	.092		
	Total	50.514	147			
3	Regression	39.135	6	6.523	80.824	.000[d]
	Residual	11.379	141	.081		
	Total	50.514	147			
4	Regression	39.650	7	5.664	72.996	.000[e]
	Residual	10.864	140	.078		
	Total	50.514	147			
5	Regression	39.957	8	4.995	65.761	.000[f]
	Residual	10.557	139	.076		
	Total	50.514	147			
6	Regression	40.302	9	4.478	60.512	.000[g]
	Residual	10.212	138	.074		
	Total	50.514	147			

a. Dependent Variable: Y

b. Predictors: (Constant), X4, X2, X3, X1

c. Predictors: (Constant), X4, X2, X3, X1, M

d. Predictors: (Constant), X4, X2, X3, X1, M, MX1

e. Predictors: (Constant), X4, X2, X3, X1, M, MX1, MX2

f. Predictors: (Constant), X4, X2, X3, X1, M, MX1, MX2, MX3

g. Predictors: (Constant), X4, X2, X3, X1, M, MX1, MX2, MX3, MX4

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.540	.205		2.641	.009
	X1	.427	.055	.449	7.706	.000
	X2	.131	.041	.159	3.207	.002
	X3	.170	.048	.202	3.556	.001
	X4	.208	.049	.251	4.232	.000
2	(Constant)	.410	.201		2.040	.043
	X1	.376	.056	.394	6.761	.000
	X2	.094	.041	.113	2.279	.024
	X3	.159	.046	.188	3.434	.001
	X4	.179	.048	.217	3.723	.000
	M	.163	.048	.187	3.427	.001
3	(Constant)	-.968	.352		-2.747	.007
	X1	.969	.138	1.016	7.000	.000
	X2	.037	.040	.045	.913	.363
	X3	.076	.047	.090	1.617	.108
	X4	.136	.046	.165	2.970	.003
	M	.772	.139	.882	5.553	.000
	MX1	-.166	.036	-1.062	-4.623	.000
4	(Constant)	-.840	.349		-2.406	.017
	X1	.982	.136	1.031	7.233	.000
	X2	-.027	.047	-.033	-.579	.563
	X3	.056	.046	.067	1.206	.230
	X4	.131	.045	.159	2.910	.004
	M	.748	.137	.854	5.472	.000
	MX1	-.174	.035	-1.114	-4.928	.000
	MX2	.024	.009	.171	2.576	.011
5	(Constant)	-.770	.347		-2.220	.028
	X1	.983	.134	1.032	7.318	.000
	X2	-.013	.047	-.016	-.275	.784
	X3	.066	.046	.079	1.431	.155
	X4	.112	.046	.136	2.466	.015

	M	.802	.138	.916	5.815	.000
	MX1	-.175	.035	-1.120	-5.007	.000
	MX2	.021	.010	.147	2.201	.029
	MX3	-.016	.008	-.092	-2.009	.046
6	(Constant)	-.749	.343		-2.185	.031
	X1	.973	.133	1.022	7.336	.000
	X2	-.011	.046	-.013	-.240	.811
	X3	.067	.046	.080	1.473	.143
	X4	.111	.045	.134	2.464	.015
	M	.762	.137	.870	5.545	.000
	MX1	-.170	.035	-1.089	-4.917	.000
	MX2	.019	.009	.133	2.008	.047
	MX3	-.020	.008	-.120	-2.555	.012
	MX4	.014	.006	.098	2.159	.033
a. Dependent Variable: Y						

Appendix VII: Plagiarism Report

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CERM-ESA Project Leader Date: 15/09/2023