EFFECT OF CREDIT RISK MANAGEMENT ON EFFICIENCY OF DEPOSIT TAKING SAVINGS AND CREDIT COOPERATIVES IN KENYA

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DECLARATION

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

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

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DEDICATION

This project is dedicated to my entire family for their encouragement and support both financially and morally, special thanks to my parents Mr. Patrick Mutua and Mrs. Emma Ndunge for the encouragement in actualizing my education dreams. Thank you all and may God bless you always.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
CEDF	County Enterprise Development Fund
CRM	Credit Risk Management
DEA	Data Envelopment Analysis
DT-SACCOs	Deposit Taking Savings and Credit Cooperative Societies
FOSA	Front Office Service Activity
NIM	Net Interest Margin
NPL	Non- Performing Loans
NSE	Nairobi Securities Exchange
ROA	Return on Assets
ROE	Return on Equity
ROS	Return on Sales
SACCOs	Savings and Credit Cooperative Societies
SASRA	SACCO Society Regulatory Authority
SPSS	Statistical Package for Social Sciences
VIF	Variance Inflation Factors

ABSTRACT

For financial institutions, credit risk is a significant and expensive risk. The impact caused by this risk is significant when compared to other forms of risk in the financial sector because it can render the firm insolvent. To avoid this scenario, financial institutions have to consistently conduct credit risk management. The main aim of this study was to determine the effect of credit risk management on efficiency of deposit-taking SACCOs in Kenya. The independent variables for the research were delinquency rate, value at risk and distance to default. Liquidity and SACCO size were the control variables while the dependent variable was efficiency measured as the ratio of outputs to inputs. The study was guided by financial intermediation theory, information asymmetry theory and Merton default risk theory. Descriptive research design was utilized in this research. The 175 DT-SACCOs in Kenya as at December 2020 served as target population while the sample size was the 43 DT-SACCOs in Nairobi County. The study collected secondary data for five years (2016-2020) on an annual basis from SASRA and individual DT-SACCOs annual reports. Descriptive, correlation as well as regression analysis were undertaken and outcomes offered in tables followed by pertinent interpretation and discussion. The research conclusions yielded a 0.2501 R square value implying that 25.01% of changes in Kenyan DT-SACCOs efficiency can be described by the five variables chosen for this research. The multivariate regression analysis further revealed that individually, both delinquency rate and value at risk have a negative effect on efficiency of DT-SACCOs as shown by (β=-0.052, p=0.021) and (β=-0.556, p=0.006) respectively. Distance to default displayed a positive but not statistically significant influence on efficiency (β=0.005, p=0.559). The control variables which were liquidity and firm size exhibited a positive and significant influence on efficiency as shown by (β=0.146, p=0.000) and (β=0.038, p=0.002) respectively. The study recommends that DT-SACCOs should implement effective measures of managing credit risk. Specifically, the DT-SACCOs should work at reducing their value at risk and delinquency rate as these two adversely affects efficiency. Future research ought to focus on other SACCOs in Kenya to corroborate or refute the conclusions of this research, according to the report.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Credit risk management (CRM), among financial institutions is a major factor. SACCOS should make sure that their exposure to risks is lowered because they influence their main goal which is to lend give credit and enable owners to save funds efficiently (Kariuki, 2017). Credit risk significantly affects SACCOS efficiency because the institutions generate gross revenue from issuing loans to customers who incur interest. According to Bhattarai, (2016) this implies that management of credit risk is crucial. Non-Performing Loans (NPLs) is used as a credit risk proxy therefore it threatens the credit system of a financial institution hence affecting its efficiency (Kagoyire & Shukla, 2016).

Guiding this research was; financial intermediation theory, information asymmetry theory as well as Merton's default risk theory. Financial intermediation theory by Diamond (1984) is the anchor theory as it aids in addressing SACCO efficiency because they consider a lot of risk measures using technology advancements in the field of credit management by obtaining private information, treating, screening and effective monitoring of borrowers. The theory links CRM and efficiency. The theory of information asymmetry by Akerlof (1970) is fundamental in understanding the need for disclosure in issuing loans. Credit risk is caused by unpredicted factors in the market that influence efficiency. Merton's default risk theory by Merton (1970) is used in determining ability of debtors to repay loans hence is useful to credit analysts in determining an institution's credit default risk.

The study focused on DT SACCOs in Kenya; this is because the level of NPLs in these institutions was the major concern for 95% of SACCOs in Kenya (SASRA, 2018). Additionally, Moody's 2019 report stated that increasing Kenyan NPLs reflected weak financial sector health (Waithanji, 2016). The NPLs level for most SACCOs has increased but focus has mostly been on the banks. It would be necessary to also investigate CRM practices among DT SACCOs in Kenya as they play a key role in financial intermediation and inclusion. A study of how CRM impacts efficiency of DT-SACCOs in Kenya is hence required.

1.1.1 Credit Risk Management

This refers to the systems, controls and measures, formulated by companies to make sure there is efficiency in the collection of payments from clients thus reducing the risk of non-payment (Kalui & Kiawa, 2015). CRM denotes to mitigations as well as strategies implemented by businesses with the goal of decreasing or eliminating credit risk (Tanui, Wanyoike, & Ngahu ,2015). CRM is a critical issue that concerns many institutions. Raad (2015) defines CRM as a procedure involving the recognition, quantification, reduction, tracking and controlling of all exposures to credit risk.

Kipyego and Wandera (2013) stated that banks are crucial to the economy. They are intermediaries who mobilize deposits from units with surplus funds and lend them out to those with deficit at a cost. This lending process is one of the central roles of banks and other institutions. Owing to the nature of the lending process, credit risk management is a crucial part of the loan process in the business of banking (Ogboi & Unuafe, 2013). Marshal and Onyekachi (2014) argued that with this form of business

activity, banks are exposed to huge credit risk that might cause financial distress such as bankruptcy if not controlled.

Credit risk management has been operationalized differently by different researchers. Raad (2015) operationalized credit risk management as the process of risk mitigation. Going by this operationalization, CRM is measured in relation to risk identification, analysis, monitoring as well as control (Thomas et al., 2017). Stanga, Vlahu and Haan (2018) operationalized credit risk management into three components namely; delinquency rate, value at risk and distance to default. Delinquency rate is obtained by diving total loan installments past due divided by total loan advances, value at risk is measured as total loans to total assets while distance to default is measured as net operating income divided by total debt service. The current study operationalized CRM in terms of delinquency rate, value at risk and distance to default.

1.1.2 Firm Efficiency

This refers to a firm's ability to lower waste while maximizing resource capabilities to give customers goods and services of high quality as per Kalluru and Bhat, 2009. It is resources as well as procedures identification that have an impact on a company's productivity and profitability. It involves new processes designing which will have positively impact productivity (Darrab & Khan, 2010). It is also the maximum weighted ratio of outputs to inputs (Cooper & Rhodes, 1978).

Efficiency takes a number of forms. Institutional efficiency describes the relation between organizational goal achievement and resource utilization. It is the magnitude

by which output of an entity for specific inputs is different from that of the best company in the specific sector (Kuosmanen & Johnson, 2017). Technical efficiency measures the magnitude by which firms produce selected outputs like such as revenue from specified inputs like costs. It requires adopting technologically efficient processes that will increase outputs from chosen inputs (Arunkumar & Kotreshwar, 2012). Allocative efficiency in turn refers to the degree by which firms use inputs using a number of ratios while considering the latest technology and prices. It can be understood as the maximization of outputs using select technically efficient combinations of inputs. Combining technical and allocative efficiency yields economic or productive efficiency (Hackman, 2018).

Several ratios are utilized in measuring efficiency. The ratios include total asset turnover ratio (net sales/average total assets) which is a evaluate how a firm generates sales using its total assets. Another ratio is the fixed-asset turnover (net sales/average net fixed assets) which has similarities to the total asset turnover ratio although it only uses fixed assets. A third ratio used in the measurement of firm efficiency is revenue turnover which shows a company's ability to spend from investments that generate income. It is the proportion of the sum of all outputs to inputs. This ratio indicates the efficiency with which a firm manages inputs which will influence its efficiency (Arunkumar & Kotreshwar, 2012). Data Envelopment Analysis (DEA) and free disposal hull are forms of non-parametric frontier approaches used in the measurement of efficiency which rely on technical efficiency (Rao & Lakew, 2012). The current study used DEA to measure efficiency.

1.1.3 Credit Risk Management and Firm Efficiency

For financial institutions, credit risk is a significant as well as costly risk. The impact caused by this risk is significant when compared to other forms of risk in the banking sector because it can render the firm insolvent (Sufi & Qaisar, 2015). Loans given by lenders are threatened by default risk but this does not limit the lending process since lenders understand that borrowers will repay the loans without defaulting and the loans will not become non-performing (Bhattarai, 2016). NPLs significantly reduce profits of banks. This can imply that banks have not instituted good measures for managing this risk (Afriyie & Akotey, 2012).

Credit risk in the financial sector is the result of moral hazards and adverse selection owing to asymmetric information. Financial institutions' profitability is influenced by the firm's credit risk because most of their revenue is from loans which attract interest. Nonetheless, credit risk has an effect on the institutions' efficiency. As a result, the risk must be effectively controlled (Bhattarai, 2016). From prior studies, CRM is a financial institutions' efficiency predictor in finance. For example NPL which is a proxy for credit risk can destabilize a bank's general system of credit lowering its value (Afriyie & Akotey, 2012).

The stakeholder theory gives a broader perspective on the feasible rationale for managing risks like bad debt. Indirect evidence is provided by a financial distress hypothesis. According to the adverse selection theory, agency costs is incurred by principals in order to minimize dispute. These are the monitoring costs shareholders incur in supervising managers and lowering the divergent activities of agents,

connection costs used for optimum contracts as security that their actions shall not contradict principal's interests as well as loss costs from the agent decisions disagreement and those that will maximize the principal's interests (Judge, 2006).

1.1.4 Savings and Credit Cooperatives in Kenya

Government of Kenya (2018) defined DTS as SACCOs carrying out the business of accepting savings and in turn offers credit facilities to her members. The DTS also accepts to undertake business of depositing and withdrawing monies on daily basis like what banks do. Non-Deposit taking SACCOs normally operate at the back office only and have not obtained licensing from SASRA to have operations at a front office. FOSAs are one of the major profit centers for SACCOs, and they offer valuable services to their members (Wambua, 2015). By introducing FOSAs, there has been positive performance of SACCOs through improvement in profitability thereby leading to high members dividend rates declaration (IFSB, 2015).

According to Mudibo (2015), deposit taking SACCOs highly impact Kenya's economy. This institutions are responsible for approximately 45% of Kenya's GDP (Mudibo, 2015). This is in spite of the fact that they had not been formally recognized into the financial system. In 2010, the SACCO Societies Act No.14 of 2008 was enacted where these institutions have registered tremendous growth. The SASRA Annual report (September, 2019) at the end of 2018 stated that they had grown to 175 from 110 DTS in 2011 a growth of 59%. In 2018, these institutions' total assets under their management totaled over 393 billion, up from 167 billion in 2011, a 135 percent increase in seven years.

Availing members with credit is a crucial SACCO activity hence it is important to manage credit risk. The main cause of failures in SACCOs is poor management of credit risk (Mugo et al., 2019). The returns from making investments in a business is the reward for risk taken by business owners. Proper credit risk management practices can assist SACCOs in lowering their general exposures to finance risks. This will ensure they can compete in the sector (Odhiambo, 2019).

1.2 Research Problem

The efficiency of SACCOs is influenced by factors like credit risk, size of entity, capital adequacy, liquidity management, and age (Li& Zou, 2014). In regards to SACCOs, credit risk is the result of minimal institutional capacity, volatile rates of interest, poor credit policy, weak management, insufficient capital, liquidity, unfavorable laws, direct loaning, poor underwriting, increased bank licensing, moral hazards and an adverse selection caused by information asymmetries. Credit risk massively impacts the efficiency of SACCOs since a significant revenue portion is derived from interest attracting loans issued. Because of this, it is important to manage credit risk (Bhattarai, 2016). Earlier studies show that, management of credit risks shows the efficiency of the SACCO in the management of finance which subsequently impacts firm efficiency. NPLs which are an indicator of credit risk can destabilize credit systems of SACCOs lowering their efficiency (Afriyie & Akotey, 2012).

DT-SACCOs play a role in financial intermediation which has included 6.3% Kenyans and approximately 60% of Kenyans are dependent on them (FinAccess, 2016). Despite this, 30% lack prudent credit management practices which is the result

of unremitted deductions by employer institutions or borrowers' default and unskilled staff (SASRA, 2018). This renders them susceptible to de-licensing for having financial vulnerabilities thereby, putting the funds of 341 billion members at risk (FSD, 2017). Even with the government's investment in a regulatory authority to ensure that DT-SACCOs follow regulations and are financially viable, this remains an issue. This is because members can lose value for their hard-earned money because their deposits lack protection. This can in turn cause panic and minimal confidence in the subsector making it financially unsustainable leading to de-licensing (SASRA, 2018).

A lot of empirical evidence exists on how CRM impacts financial performance of institutions like banks but very few if any have focused on CRM and efficiency. The studies have also produced varied results. Adebayo (2017) examined the relation between CRM and performance of Nigerian banks. Conclusions depicted that asset quality substantially and negatively affected performance. Sujeewa (2015) examined how CRM impacts performance finding that, the NPLs and their provisions negatively impact bank profitability in Sri Lanka. This study operationalized CRM as just credit risk yet CRM is wider than that. Alshati (2015) examined how CRM affects performance of Jordanian banks. It was concluded that the indicators were important in improving bank performance. These researches were performed in a diverse context. In addition, the studies focused on financial performance which is a different concept from efficiency.

Locallt, Mamet (2018) examined how CRM impacted the SACCO performance in Uasin-Gishu. Findings showed that: credit policy, interest rate management, financial assessment as well as debt repossession had a profound impact on the SACCOs. A study by Kimani (2018) examined how CRM and performance of DT-SACCOs in Nairobi relate. Findings showed a substantial positive relation between credit risk scoring and performance whereas credit monitoring did not substantially impact performance. Orang'i (2018) examined how CRM impacted the performance of Kenyan banks. The examination showed that risk identification is insignificant to performance while risk monitoring is positive and significant to performance. Nyabicha (2017) examined CRM impact on NSE listed banks in Kenya. The outcomes obtained by the researcher exhibited the existence of a negative impact on the variables that measured credit risk and performance of the banks.

This research was motivated by the fact that despite the existence of prior studies shows that there exists contextual, conceptual and methodological gaps that needed to be filled. Conceptually, prior studies have operationalized CRM differently hence findings depend on the operationalized method. Further, almost all prior researches have investigated the effect of CRM on financial performance leaving a gap on efficiency. Contextually, prior studies have mostly focused on commercial banks whose operations are different from those of SACCOs. Methodologically, the research methodologies adopted have not been uniform hence explaining variance in results. The current study was based on these gaps and attempts to answer the research question; how does CRM influence efficiency of deposit-taking SACCOs in Kenya?

1.3 Research Objective

The objective was to determine the effect of CRM on efficiency of DT SACCOs in Kenya.

1.4 Value of the Study

This research's results will immensely contribute to the prevailing theoretical and empirical literature on CRM and efficiency of commercial banks. The findings will also help in theory development as they will offer insights on the shortcomings and relevance of the current theories to the variables of the study. Subsequent studies may also be carried out based on the recommendation and suggestions for further research.

The research findings may be relevant to the government as well as the regulator SASRA in developing regulations for the population under investigation. The findings of the research will be useful to investors who are considering investing in the population under investigation, as they will disclose information on the risk-reward tradeoffs that exist in such institutions as well as their impact on efficiency.

The findings are intended to benefit managers responsible for managing of deposit taking SACCOs as the study will give important data as well as suggestions that will be valuable in better decisions making that will maximize efficiency. As a result, they will be in a better position to develop suitable credit risk management policies as well as strategies for their institutions, allowing them to effectively manage credit risk.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter explains the theories on which credit risk management and efficiency is based. It additionally confers the previous empirical studies, knowledge gaps identified and summarizes with a conceptual framework and hypotheses showing the expected relationship among the study variables.

2.2 Theoretical Framework

This segment examines the theories that underpin the study of credit risk management and financial. Covered theoretical reviews are financial intermediation theory, information asymmetry theory and Merton’s default risk theory.

2.2.1 Financial Intermediation Theory

Diamond's (1984) theory serves a vital role in the financial intermediation process predominantly among banks to mitigate information asymmetry that lies between borrowers and lenders, hence their constant interaction assists lenders in producing credit worthy information to borrowers. Information that is provided gives creditors and loan officers a strong incentive in assessing and appraising credit to those that require it. Modern theories state that the business of financial intermediation is pegged on economic imperfections from 1970s with limited contributions (Jappelli & Pagano, 2006). The existence of the intermediaries is based on their ability to lower transaction and information costs from asymmetries (Tripe, 2003).

The biggest criticism of the financial intermediation theory is its inability to give recognition to the role of lenders in the process of risk management (Levine et al., 2000). Scholtens & Van Wensveen (2000) stated that they do not recognize CRM as an important factor in the financial industry and emphasizing the participation costs concept. They suggested future developments in the financial intermediation theory to understand challenges in the financial sector.

The theory was useful in examining the performance of SACCOs as they take a number of risk measurements using modern technology in credit which involves the efficient collection of private details, treating, screening and monitoring borrowers (Jappelli & Pagano, 2006). Financial intermediaries are useful in lowering transactional costs brought about by information asymmetry. They hence play a central role in effective functioning of financial markets. The theory was useful in understanding how CRM and efficiency relate.

2.2.2 Information Asymmetry Theory

Akerlof (1970) proposed this theory, which states that when borrowers and lenders interact, there is an information asymmetry. The assumption arises from borrowers who request for loans with no information on the possible risks associate with investment options on which the loan will be used. The lender on the other hand has no prior information on the investment by the borrower (Edward & Turnbull, 2013). Because none of them is privy to such information, adverse selection is generated thereby creating moral hazard issues (Horne, 2012).

Horne (2012) criticizes the theory stating two main reasons: signals influence information asymmetry which is not correct and investors that are heavily impacted upon by information asymmetry problems are ambiguously identified or misidentified. Stiglitz (1970) state that financial institutions write loan contractual terms seeking to attract borrowers to agree to their terms and to attract low risk credit borrowers. The effect of this is the setting of rates of interest for which loan demand exceeds loan supply. The credit amount and the collateral amount also have an impact on credit-seeker character and distribution of the credit issued, and returns to lenders (Moti et al., 2012).

This theory is crucial in creating an understanding on the need to disclose information upon issuing loans in the sector. Increase in credit risk in the market is attributed to undisclosed factors that impact bank efficiency. The study hence seeks to examine how SACCOs can make better appraisals of such determinants to lower the amount of losses and improve bank efficiency by maintaining good loans that are not declared delinquent. The theory was useful in explaining competitive market behavior. It has been utilized in many scenarios thereby confirming its credibility.

2.2.3 Merton's Default Risk Theory

The Merton (1970) proposed the theory. It has been applied extensively in assessing default among cooperative firms. The model makes the assumption that credit analysts are necessary in appraisal of financial institutions, over the debt period (Jorion, 2014). In establishing debtors' capability of repaying their obligations it has been applicable and can be useful by credit analysts in establishing credit risk of an

institution. The basis of the theory was on the assumption concerning the capital structure of a firm (Merton, 1970). In instances where there is a default and the market value of a firm's assets as compared to its liabilities falls below the standard limit, the firm is considered to be at default. A primary reason for this is credit risk which is common to financial institutions (Jorion, 2014).

Jones (1984) criticized the theory, claiming that the model's default risk is so low that investment pricing is comparable to that of a pure model without default risk. In a study, Afik et al. (2016) discovered the models' simple applications are far greater as compared to more complicated and arithmetic intensive models thereby recommended using simpler models.

The significance of the theory in this research is that it intends to evaluate CRM among financial institutions which are critical in this investigation. The model explains that analysts should appraise a society's ability to maintain liquidity in an examining period which indicates the financial stability of the firm. The theory remains useful to this study since it confirms the importance of the ability of credit analysts to determine a borrower's ability to repay debts hence establishing the credit risk of an institution.

2.3 Determinants of Firm Efficiency

There are various firm efficiency determinants; these factors are found either within or outside the firm. Internal factors are firm-specific and can be manipulated internally. They are credit risk management, asset base, and credit portfolio, interest rate, capital

adequacy, ownership and liquidity. Factors outside a firm that influence efficiency includes; inflation, GDP, political stability and interest (Athanasoglou et al., 2005).

2.3.1 Credit Risk Management

This indicates a bank's asset risk and stability. It estimates the asset quality magnitude among the characteristics that impact banks' health. The value of assets under the control of a SACCO is heavily dependent on credit risk, and the quality of the assets owned by the SACCO heavily relies on specific risks, level of NPLs, and debtors cost to the SACCO. This ratio should be at the lowest level. If lending is susceptible to risk in a well-functioning bank, the indicator in this case would be the applied interest margins. A low ratio shows an insufficient risk cover by the margins (Athanasoglou et al., 2009).

A Sacco's assets primarily consist of a loan portfolio, current as well as fixed assets, and other investments. The quality of assets mostly improves with the age and bank size (Athanasoglou et al., 2005). The primary assets that generate income for Saccos' are loans. The loan portfolio quality hence determines bank performance. Good quality assets reduce losses arising from NPLs, and this subsequently impacts performance (Dang, 2011).

2.3.2 SACCO Size

Firm size determines by how much legal as well as financial elements affect a SACCO. Since large companies collect cheap capital and produce huge income, SACCO size is closely linked to capital adequacy (Amato & Burson, 2007). The book value of the bank's total assets is usually used to determine its size. Additionally ROA

is positively associated with bank size showing that large banks can accumulate economies of scale hence reducing operational costs while increasing loan volumes (Amato & Burson, 2007). SACCO size is related to capital rations, according to Magweva and Marime (2016), and profitability rises with size.

Amato and Burson (2007), mentioned that a firm's size is dependent on the assets owned by the organization. It can be argued that the more the assets owned by a SACCO the more the investments it can make which generate bigger returns compared to smaller firms with less assets. Additionally, a larger firm can have more collateral which can be used as security for more credit facilities compared to smaller ones (Njoroge, 2014). Lee (2009) argued that the assets being controlled by an entity impacts profitability level of the firm from one period to another.

2.3.3 SACCO Liquidity

Liquidity is used to denote the capability of a firm in this case a SACCO to settle its debt obligations that are incurred within twelve months by the use of cash and short-lived assets that are rapidly convertible into cash. It hence occurs as a result of the ability to settle financial demands owed to creditors without liquefying their other assets (Adam & Buckle, 2013).

Liargovas and Skandalis (2008) argued that sufficient proportions of liquid assets assist firms to finance their activities and to invest in cases where they cannot obtain external funds. Firms with that high liquidity can meet unforeseen liabilities and obligations that need to be settled. Almajali et al. (2012) argued that a bank's liquidity can significantly affect the amounts it can afford to lend out to clients; thus saccos

should hold more liquid assets and lower short term obligations. Jovanovic (1982) noted that an increase in SACCO liquidity may harm the firms.

2.3.4 Capital Adequacy

Also called the ratio of bank capitalization, the adequacy ratio shows how equity and total assets are related. It shows the ability of a bank to remain solvent by regulating risks. Berger and DeYoung (1997) in an investigation showed a negative relation between capital adequacy and performance in imperfect capital markets, banks with sufficient capital ought to reduce borrowing to back a specific asset class, hence lowering the predicted bankruptcy costs hence incur less financing costs. A bank with sufficient capital signals the market a superior performance is to be anticipated. The results of Athanasoglou et al. (2005) revealed that capital holdings have a positive association to bank profitability, indicating that Greek banks are in a stable financial position. Berger et al. (1987) discovered a positive correlation between capital contributions and profitability.

2.4 Empirical Review

Local as well as global research have determined the relation between CRM and efficiency, the objectives, methodology and conclusions of these prior researches have been discussed in this segement.

2.4.1 Global Studies

Alshati (2015) investigated how CRM impacts FP of Jordanian banks. The study was done from 2005 to 2013. 13 commercial banks made up the target population of the research. Results of the research explained that the effect between the two was

positive, whereby financial performance was measured using ROE and ROA. The study concluded that CRM indicators were crucial in improving performance of the banks. The investigation was in a diverse context whose social and economic status is different and hence general application of findings in the current context would be misplaced. Further, the current study focuses on efficiency instead of FP.

Sujeewa (2015) conducted a research on the manner in which CRM impacted FP of Sri Lankan banks. Data from primary as well as secondary sources are used. Interviews were used in gathering primary data, whereas the annual bank financials offered secondary data. The study targeted 24 banks from which a sample of 8 was selected. The study period was from 2009 to 2013. In establishing how credit risk impacts profitability, regression analysis was performed. In analyzing data, Panel data analysis was used. Credit risk had a negative relation to bank profitability. This research focused on FP whereas the current research focuses on efficiency.

Adebayo (2017) investigated the relation between CRM and FP of Nigerian money deposit banks. The study considered the twenty one banking institutions in the country. Secondary data was used which was extracted from annual audited financials from 2011-2015. Descriptive as well as Inferential Analyses were performed using SPSS 22 and e-View. From the regression, asset quality negatively impacted performance while credit risk management positively and significantly affected performance. The measures of CRM adopted in that study are different from the current study. Further, the current study focuses on efficiency instead of FP.

Mogga et al. (2018) examined how CRM utilized by banks in Sudan influenced performance. The context of the study was in Juba on a total of six. The investigation involved the uses of questionnaires in collecting data which was further analyzed via descriptive statistics as well as linear regression. The conclusion was that many of the banks identified with risk identification as a CRM process that impacted performance, risk identification has had a minimal impact on performance, while risk analysis and appraisal did not significantly impact bank performance, risk monitoring significantly affected financial showed a substantial effect on performance, and credit approval was also a substantial factor. This research operationalized CRM in terms of the stages of risk management while the current study focuses on measures of CRM namely distance to default, delinquency rate and value at risk.

Gadzo et al. (2019) did an examination of how credit and operational risk impact the performance of Ghanaian banks. Data was obtained from 24 universal banks with no missing variables. Findings depicted credit risk and performance have negative association compared to prior studies following the information asymmetry assumption of lemon theory. Additionally, operational risk had a negative relation to performance of the banks. In other findings, bank specific factors (asset quality, bank leverage, cost to income ratio and liquidity) were positively and substantially related to credit risk, operational risk and performance. Although the study took into account credit risk, how the risk was managed and its effect on efficiency was not investigated.

2.4.2 Local Studies

Nyabicha (2017) examined CRM impact on financial performance of NSE listed Kenya banks. 44 commercial banks made up the targeted population by the researcher, whereby 10 of the commercial banks were the sampled population. In obtaining the information, secondary data from the financials of the respective banks was collected. Panel regression analyzed the secondary data collected. The research design used was longitudinal design. The research adopted a hypothesis of 5% to test on significance. The results obtained by the researcher showed the existence of a negative impact on the variables that measured credit risk and performance of the banks. This study considered banks in Kenya while the current study will consider deposit-taking SACCOs in Kenya. Further, the study focused on FP while the current study focuses on efficiency.

Orang'i (2018) examined how CRM impacted the performance of banks using a descriptive research design. The study utilized all banks operating between 2013 and 2017. Analysis of the data was done using descriptive statistics, correlation and regression since they are universally approved in descriptive studies. The examination showed that risk identification is insignificant to performance while risk monitoring is positive and significant to performance. This study utilized interval scale due to the nature of its independent variable operationalized while the current study will utilize ratio scale. Further, the current study focuses on efficiency instead of FP.

Mamet (2018) examined how CRM impacted the performance of Uasin-Gishu registered SACCOs. He utilized a descriptive survey to study one official from the

320 registered SACCOs with 9 additional from the CEDF board. The study combined both primary and secondary which were collected using questionnaires and interviews. Data was then processed using inferential and descriptive statistics. Findings showed that: credit policy, management of rates of interest, financial review and debt recovery had a profound impact on SACCO performance. This study operationalized CRM differently and relied on primary data as a result of the measures used while this study will use secondary data. Efficiency was also not considered.

Irusa (2018) studied the influence of CRM policy on FP of Kenyan banks. A descriptive was adopted in collecting data. The research investigated all the banks operating in Kenya. Secondary data was collected from the individual bank statements and publications from the central bank. Descriptive and regression was then used to analyzed the data. Findings showed credit risk increases lowered performance. Further, asset quality and bank size which were used as control variables positively impacted performance. The operationalization of CRM differs from the one adopted in the current study. Further, the current study focuses on efficiency instead of FP.

Kiyai (2018) examined CRM impacted performance of banks quoted under the NSE of Kenya. Cross sectional descriptive survey was used with secondary data being taken from published financial statements. From the model, the study established that there were credit risk management variables that impacted NSE listed banks namely; interest rates, capital adequacy and liquidity. They affected it positively. The study further established that the six independent variables that were studied which included leverage, inflation rate, firm size, liquidity, capital adequacy and interest rate explain

13.0% of variability on fiscal performance of NSE listed banks. It was concluded that CRM affects the performance of the banks quoted at the NSE. The study focused on commercial banks whose operations differ from that of DT SACCOs which is the current focus. Further, the current study focuses on efficiency instead of FP.

2.5 Summary of the Literature Review and Research Gaps

The theoretical reviews showed the predicted relation between CRM and the efficiency of financial institutions. Major influencers of efficiency have been discussed. From the reviewed studies, there is a knowledge gap that needs to be filled. From the studies reviewed, there are varied conclusions regarding the relation between CRM and performance. The differences from the studies can be explained on the basis of different operationalization of CRM by different researchers thereby indicating that findings are dependent on operationalization model. Further, the prior researches have focused on CRM influence on FP leaving a gap on efficiency the focus of the current research.

Additionally, many studies done employed different designs for which some relied on empirical review to conclude while others relied on existing literature in measuring how the variables relate. Researchers showed varied inconclusive conclusions and failed to indicate the exact correlation that credit risk management as measured by delinquency rate, value at risk and distance to default has on efficiency. This shows the need for more research in future studies to close the gap by conceptualizing the effect of CRM on efficiency.

2.6 Conceptual Framework

Figure 2.1 shows the predicted relation between the variables. The predictor variable is CRM given by delinquency rate, value at risk and distance to default. The control variables are liquidity shown by liquid assets to total assets and SACCO size by natural log of total assets. Efficiency was the response variable given by the ratio of outputs to inputs.

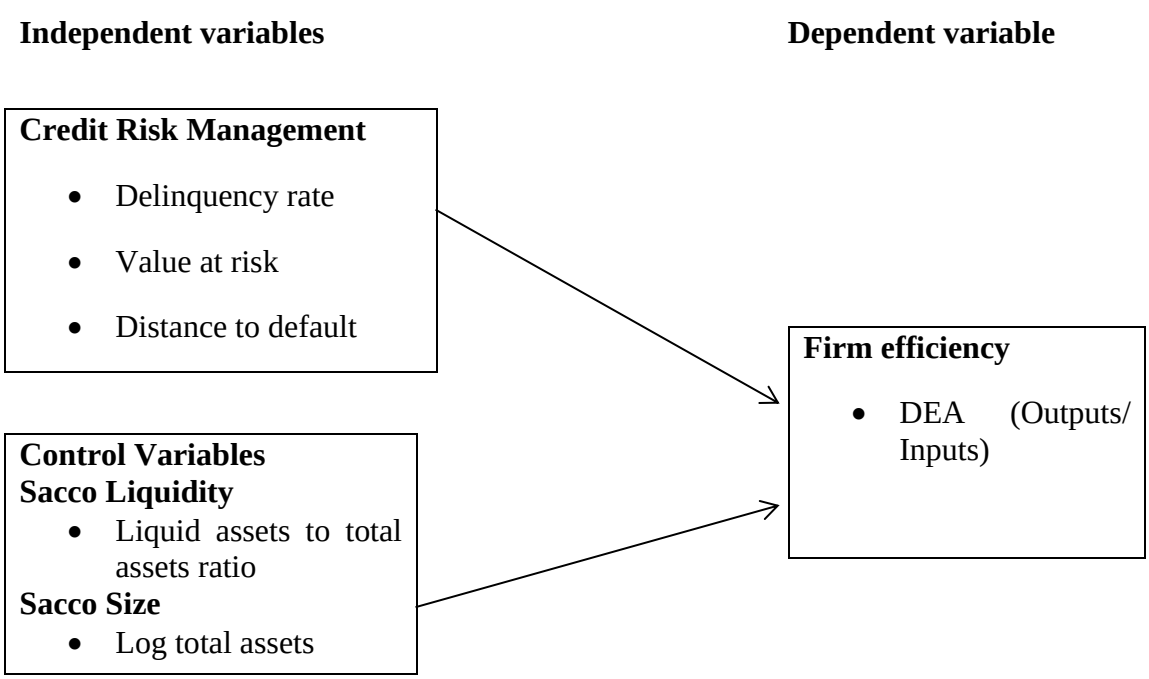

Figure 2.1: The Conceptual Model

Source: Researcher (2021)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The chapter describes the approaches utilized in accomplishing the study objective which was to determine how CRM affects efficiency of DT SACCOs. In particular, the study highlights the; the design, data collection, and analysis.

3.2 Research Design

A descriptive design was adopted to determine how CRM and efficiency of DT SACCOs relate. This design was appropriate since the nature of the phenomena is of key interest to the researcher (Khan, 2008). It is also sufficient in defining the interrelationships of the phenomena. This design also validly and accurately represented the variables thereby giving sufficient responses to the study queries (Cooper & Schindler, 2008).

3.3 Population and Sample

A population is all observations from a collection of interest like events specified in an investigation (Burns & Burns, 2008). The study selected the 175 licensed DT SACCOs in Kenya as at December 2020. The 43 DT SACCOs in Nairobi as at 31st December 2020 (see appendix I) were the research sample. The choice of Nairobi County was informed by the fact that the County is home to different types of SACCOs offering a good context to study the effect of CRM on efficiency.

3.4 Data Collection

Secondary data was relied on in this investigation and was extracted from annual

published financials of the DT SACCOs from 2016 to 2020 and captured in data collection forms. The reports were extracted from the SASRA financial publications of the specific DT-SACCOs. The specific data collected included members deposits and borrowings, interest/dividends on members deposits, staff costs, other operating expenses, loans to members, interest income, other incomes, total loan installments past due, gross outstanding loans, total loans, total assets, net operating income, total debt and liquid assets.

3.5 Diagnostic Tests

To ascertain the model viability, a number of diagnostic tests were done, like normality, stationarity, multicolinearity, homogeneity and autocorrelation. The assumption of normality was that the dependent variable's residual was normally distributed and closer to the mean. This was accomplished by use of the Shapiro-wilk test. In instances where one of the variables had no normal distribution, panels corrected standard errors (PCSEs) model was used. Stationarity test was utilized in determining if the statistical characteristics such as variance, mean, as well as autocorrelation change with the passage of time. This property was ascertained via the Levin-Lin Chu unit root test. In the event the data did not meet this property, PCSE model was used (Khan, 2008).

Autocorrelation is a measure of how similar one time series was when compared to its lagged value across successive timings. The measure of this test was done using the Wooldridge test and in the event that the presumption was breached the robust standard errors were used in the model. Multicollinearity exists when a perfect or near

perfect linear relation exist between a number of independent variables. Variance Inflation Factors (VIF) as well as tolerance levels were utilized. Heteroskedasticity confirms if the errors variance in a regression lies among the independent variables. This was tested using the Breuch Pagan test and if data did not meet the homogeneity of variances assumption, PCSEs model was employed as it provides better regression coefficients when outliers exist in the data (Burns & Burns, 2008).

3.6 Data Analysis

In data analysis, STATA software was used. Tables and graphs presented the findings quantitatively. Descriptive statistics was employed in the calculation of central tendency as well as dispersion measures and combined with standard deviation for every variable. Inferential statistics relied on correlation as well as regression. The magnitude of the relation between the study variables established the correlation and a regression determined cause and effect among variables. A multivariate regression linearly determined the relation between dependent and independent variables.

3.6.1 Analytical Model

The following equation was applicable:

$$Y= \beta_0 + \beta_1X_1+ \beta_2X_2+ \beta_3X_3 + \beta_4X_4+ \beta_5X_5 + \beta_6X_6 +\varepsilon$$

Where: Y = Efficiency given by outputs to inputs on a yearly basis ratio

The outputs to inputs ratio to be used in this study will be in line with a study done by Mwangi (2014). The inputs will be member deposits and borrowings; interest/dividend on member deposits; borrowings cost; employee costs; as well as other operating costs. Outputs will be members loans as well as other

earning assets; interest income; and other income.

β_0 =regression equation y intercept.

β_1, β_2, β_3, β_4, β_5, β_6 =are the regression coefficients

X_1 = Delinquency rate as measured by the ratio of past due loans to total loans outstanding on an annual basis

X_2 = Value at risk as measured by the ratio of total loans outstanding to total assets on an annual basis

X_3 = Distance to default as measured by the ratio of net operating income to total debt service on an annual basis

X_4 = SACCO liquidity as measured by liquid assets to total assets proportion

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

ε =error term

3.6.2 Tests of Significance

Parametric tests were used to establish the general model and variable's significance. The F-test determined the model's relevance and this was achieved via ANOVA while a t-test established the relevance of every variable.

CHAPTER FOUR: DATA ANALYSIS RESULTS AND FINDINGS

4.1 Introduction

This chapter deals with the analysis of data. The objective of the research was to establish the correlation between credit risk management and efficiency among deposit-taking SACCOs in Kenya. Patterns were studied by descriptive and inferential analysis, that were then analyzed and conclusions drawn on them, in accordance with the specific objectives.

4.2 Descriptive Statistics

The study sought to describe the data in terms of their mean and standard deviations. The descriptive analysis was necessary as it helps in understanding the characteristics of the collected data before conducting inferential analysis. Table 4.1 summarizes the findings.

Table 4.1: Descriptive Results

	N	Minimum	Maximum	Mean	Std. Deviation
Efficiency	215	.0015	.3650	.112517	.0866131
Delinquency rate	215	.0032	.6700	.179441	.2353011
Value at risk	215	.0246	1.4193	.502143	.2486335
Distance to default	215	.3431	11.6481	2.415105	1.5828715
Liquidity	215	.0074	3.2957	1.095325	.5507502
Firm size	215	6.0724	8.7303	7.772521	.5761002
Valid N (listwise)	215				

Source: Research Findings (2021)

Table 4.1 shows the descriptive analysis, which included 215 observations for each variable based on the product of the number of cross-sectional units as well as the

target number of periods (43*5 =215). The dependent variable was efficiency whereas the independent variable was credit risk management (delinquency rate, value at risk and distance to default). Eventually, liquidity and company size were used as control variables.

4.3 Diagnostic Tests

To ascertain the model viability, a number of diagnostic tests were done, like normality, stationarity, Multicollinearity test, homogeneity of variance and autocorrelation.

4.3.1 Normality Test

To test whether the collected data assumed a normal distribution, normality test was conducted using the Shapiro-Wilk Test. The threshold was that the data assumed a normal distribution if the p value was above 0.05.

Table 4.2: Shapiro-Wilk Test

	Obs	W	V	z	Prob>z
Y	215	0.983	3.925	3.219	0.061
X_1	215	0.973	6.015	4.225	0.047
X_2	215	0.928	16.183	6.555	0.05
X_3	215	0.445	125.183	11.372	0.082
X_4	215	0.943	12.835	6.009	0.124
X_5	215	0.861	31.396	8.116	0.073

X_1=Delinquency rate, X_2= Value at risk, X_3= Distance to default, X_4= Liquidity, X_5= Firm size and Y= Efficiency

Source: Research Findings (2021)

Because the p value was below 0.05, the data in Table 4.2 show that value at risk was not normally distributed. However, all the other variables were normally distributed.

The fact that value at risk is not normally distributed implies that the OLS assumption of normality was not met. The study therefore considered other models as classical OLS was not suitable. Panels corrected standard errors (PCSEs) model was therefore adopted.

4.3.2 Multicollinearity Test

Multicollinearity exists when a perfect or near perfect linear relation exist between a number of independent variables. Variance Inflation Factors (VIF) as well as tolerance levels were utilized. The outcomes are shown in Table 4.3.

Table 4.3: Multicollinearity Test

Variable	VIF	1/VIF
x3	1.42	0.705390
x5	1.41	0.707279
x4	1.41	0.709303
x2	1.18	0.847882
x1	1.12	0.895928
Mean VIF	1.31	

X_1=Delinquency rate, X_2= Value at risk, X_3= Distance to default, X_4= Liquidity, X_5= Firm size and Y= Efficiency

Source: Research Findings (2021)

The conclusions in Table 4.3 indicate that all the variables possessed a VIF values <10 as well as tolerance values >0.2 suggesting that Multicollinearity did not exist. Therefore, OLS would be appropriate as the assumption of Multicollinearity has not been violated. However, due to violation of other assumptions such as normality, PCSE was adopted.

4.3.3 Heteroskedasticity Test

The Breusch-Pagan test is used to examine for heteroskedasticity. The null hypothesis was that error term variance is constant. Heteroskedasticity Test outcomes are shown in Table 4.4.

Table 4.4: Heteroskedasticity Results

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of y

         chi2(1)      =    72.17
         Prob > chi2  =   0.0000
```

Source: Research Findings (2021)

The outcomes in Table 4.4 specify the p value was less than 0.05 at 0.000 and therefore the null hypothesis of Homoskedastic error terms is rejected. This means that there was a substantial difference between the variance of the population with that of the sample. Due to the violation of this OLS assumption, PCSE model was adopted.

4.3.4 Autocorrelation Test

Wooldridge test was adopted to measure if serial correlation exists in the panel data. Autocorrelation is a measure of how similar one time series was when compared to its lagged value across successive timings. The results are as shown in Table 4.5

Table 4.5: Test of Autocorrelation

Wooldridge test for autocorrelation in panel data **H0: no first-order autocorrelation**
F(1, 214) = 0.3139 Prob> F = 0.0081

From the results of Table 4.5, the null hypothesis of no serial correlation is rejected provided the p-value is not significant (p-value = 0.0081). The study therefore adopted PCSEs for parameter estimates.

4.3.5 Stationarity Test

Stationarity test was utilized in determining if the statistical characteristics such as variance, mean, as well as autocorrelation change with the passage of time. Table 4.6 shows Levin-Lin Chu unit root test results.

Table 4.6: Levin-Lin Chu unit-root test

Levin-Lin Chu unit-root test			
Variable	**Hypothesis**	**p value**	**Verdict**
Efficiency	Ho: Panels contain unit roots	0.0000	Reject Ho
Delinquency rate	Ho: Panels contain unit roots	0.0000	Reject Ho
Value at risk	Ho: Panels contain unit roots	0.0000	Reject Ho
Distance to default	Ho: Panels contain unit roots	0.0001	Reject Ho
Liquidity	Ho: Panels contain unit roots	0.0000	Reject Ho
Firm size	Ho: Panels contain unit roots	0.0000	Reject Ho

Source: Research Findings (2021)

The null hypotheses that: Panels contain unit roots were rejected for all variables since the p values were below 0.05, on the basis of the outcomes in Table 4.6. This meant that all of the variables' panel data were stationary.

4.4 Correlation Results

Correlation analysis was performed to establish the strength and direction of association between each predictor variable and the response variable. Summary of the findings are in Table 4.7.

Table 4.7: Correlation Results

		Efficiency	Delinquency rate	Value at risk	Distance to default	Liquidity	Firm size
Efficiency	Pearson Correlation	1					
	Sig. (2-tailed)						
Delinquency rate	Pearson Correlation	-.3174*	1				
	Sig. (2-tailed)	.000					
Value at risk	Pearson Correlation	-.3231*	.2442*	1			
	Sig. (2-tailed)	.000	.000				
Distance to default	Pearson Correlation	.0345	-.3620*	-.4598*	1		
	Sig. (2-tailed)	.535	.000	.000			
Liquidity	Pearson Correlation	.1740*	-.2001*	-.0604	.4135	1	
	Sig. (2-tailed)	.019	.003	.347	.000		
Firm size	Pearson Correlation	.2832*	-.2305*	-.1040	.1180	.3210*	1
	Sig. (2-tailed)	.000	.001	.056	.084	.000	

Source: Research Findings (2021)

The conclusions in Table 4.7 show the nature of correlation between the research variables in terms of magnitude and direction. The outcomes disclose that delinquency rate and efficiency have a negative as well as significant correlation (r=-0.3174*) at 5 % significance level. The relationship between value at risk and efficiency was also negative and significant (r=-0.3231*) at 5 % significance level. The results also reveal that distance to default and efficiency are positively but not significantly correlated (r=0.0345) at 5% significance level. Both liquidity and size had positive as well as significant relation with efficiency as depicted by p values below 0.05.

4.5 Regression Results

Multivariate regression analysis was performed to determine the degree to which efficiency was explained by the five selected independent variables namely delinquency rate, value at risk, distance to default, liquidity and size. The regression results were presented in Table 4.8.

Table 4.8: Panel Correlated Standard Errors Model

Linear regression, correlated panels corrected standard errors (PCSEs)			
Group variable:	Id	Number of obs =	215
Time variable:	Year	Number of groups =	43
Panels:	correlated (balanced)	Obs per group:	
Autocorrelation:	no autocorrelation	Min =	5
		Avg =	5
		Max =	5
Estimated covariance's = 2080		R-square =	0.2501
Estimated autocorrelations = 0		Wald chi2(5) =	34.97
Estimated coefficients = 6		Prob > chi2 =	0.0000

Panel-corrected

Y	coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Xl	-.0518443	.0224148	-2.31	0.021	-.0079121	-.0957765
x2	-.5560758	.2028704	-2.74	0.006	-.1584571	-.9536945
x3	.0050662	.0086657	0.58	0.559	-.0ll9l83	.0220507
x4	.l45654l	.0376679	3.87	0.000	.2lS48l9	.07l8264
x5	.0379439	.0122546	3.10	0.002	.0135253	.0619625
cons	-1.615634	.4ll5947	-3.S3	0.000	-2.422344	-.8089228

Source: Research Findings (2021)

Results in Table 4.8 indicate that delinquency rate and value at risk have a significant negative influence on efficiency of DT-SACCOs in Kenya as depicted by p values

below 0.05 and negative coefficients. Distance to default has a positive effect on efficiency though the impact is lacks statistical significance. Both liquidity and firm size have a significant positive effect on efficiency. The resulting model is as shown

Efficiency= -1.616- 0.052 Delinquency rate - 0.556 Value at risk + 0.146 Liquidity + 0.038 Firm size

4.6 Discussion of Research Findings

The objective of this research was to establish the effect of CRM on efficiency of DT-SACCOs in Kenya. The study utilized a descriptive design while population was the 175 DT-SACCOs in Kenya. Data was obtained from all the 43 DT-SACCOs in Nairobi County and which were considered adequate for regression analysis. The research utilized secondary data which was gotten from SASRA and individual DT-SACCOs annual reports. The specific attributes of CRM considered were; delinquency rate, value at risk and distance to default. The control variables were firm size and liquidity. Both descriptive as well as inferential statistics were used to analyze the data. The results are discussed in this section.

Multivariate regression results revealed that the R square was 0.2501 implying 25.01% of changes in efficiency of DT-SACCOs are due to five variables alterations selected for this study. This means that variables not considered explain 74.99% of changes in efficiency. The overall model was also statistically significant as the p value was 0.000 which is less than the significance level of 0.05. This implies that the overall model had the required goodness of fit.

The multivariate regression analysis further revealed that individually, both delinquency rate and value at risk have a negative effect on efficiency of DT-SACCOs as shown by (β=-0.052, p=0.021) and (β=-0.556, p=0.006) respectively. Distance to default exhibited a positive but not statistically significant influence on efficiency (β=0.005, p=0.559). The control variables which were liquidity and firm size exhibited a positive and significant efficiency influence as shown by (β=0.146, p=0.000) and (β=0.038, p=0.002) respectively.

These findings agree with those of Nyabicha (2017) who examined CRM impact on financial performance of NSE listed Kenya banks. 44 commercial banks made up the targeted population by the researcher, whereby 10 of the commercial banks were the sampled population. In obtaining the information, secondary data from the financials of the respective banks was collected. Panel regression analyzed the secondary data collected. The research design used was longitudinal design. The research adopted a hypothesis of 5% to test on significance. The results obtained by the researcher showed the existence of a negative impact on the variables that measured credit risk and performance of the banks.

The research findings also concur with Irusa (2018) who studied the influence of CRM policy on FP of Kenyan banks. In collecting data, a descriptive research design was made use of. The study investigated all the banks operating in Kenya. Secondary data being gathered from the individual bank statements and publications from the central bank. Descriptive and regression was then used to analyzed the data. Findings

showed credit risk increases lowered performance. Further, asset quality and bank size which were used as control variables positively impacted performance.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the findings from the preceding chapter, as well as the conclusions and limitations discovered during the research. Moreover, it provides recommendation for policy makers and offers suggestions on areas requiring further research.

5.2 Summary of Findings

The objective of this research was to assess how CRM influence efficiency of DT-SACCOs in Kenya. The selected variables for investigation included delinquency rate, value at risk, distance to default, liquidity and firm size. A descriptive research design was selected to complete the research. Secondary data was gathered from SASRA and an analysis made using Stata. Yearly data for 43 DT-SACCOs for five years from 2016 to 2020 was obtained from their annual reports.

The first objective was to establish the effect of delinquency rate on efficiency among DT-SACCOs in Kenya. The correlation results at 5 % significance level show that delinquency rate had a negative association correlation with efficiency. Implying a rise in delinquency rate would lead to decrease in efficiency. Regression results (β=-0.052, p=0.021) show that there was a negative and significant impact of delinquency rate on efficiency among DT-SACCOs in Kenya.

The second objective was to assess the effect of value at risk on efficiency among DT-SACCOs in Kenya. The correlation results at 5 % significance level show that value at risk had a negative correlation with efficiency. This implies that increase in value at risk would lead to decrease in efficiency. Regression results (β=-0.556, p=0.006) show that there was a negative and significant effect of value at risk on efficiency among DT-SACCOs in Kenya.

The third objective was to examine the distance effect to default on efficiency among DT-SACCOs, Kenya. The correlation results at 5% significance level show that distance to default had a positive association with efficiency. The affiliation was however not statistically significant. Regression results (β=0.005, p=0.559) depict presence of a positive but not significant effect of distance to default on efficiency among DT-SACCOs in Kenya.

The fourth objective was to examine the effect of liquidity on efficiency among DT-SACCOs in Kenya. The correlation results at 5% significance level show that liquidity had a positive correlation with efficiency. The correlation was also statistically significant. Regression results (β=0.146, p=0.000) show that there was a positive and significant effect of liquidity on efficiency among DT-SACCOs in Kenya.

The fifth objective was to examine firm size effect on efficiency amongst DT-SACCOs in Kenya. The correlation results at 5% significance level show that firm size possessed a positive link with efficiency. This implies that improvement in firm size might yield a rise in efficiency. Regression results (β=0.038, p=0.002) show

presence of a positive as well as significant effect of firm size on efficiency among DT-SACCOs, Kenya.

5.3 Conclusions

The study intention of the research was to find out the correlation between credit risk management and efficiency. The findings indicated that delinquency rate had a negative as well as significant impact on efficiency. This may imply that DT-SACCOs with high delinquency rate have low levels of efficiency.

Additionally, the outcomes revealed that value at risk has a significant negative effect on efficiency. This implies that firms with high levels of loans compared to their assets end up having a lower efficiency. This can be explained by the default rates associated with increase in loan levels. Further, the study revealed that distance to default has a positive effect on efficiency although not substantial impact.

The study conclusions revealed that liquidity had a positive as well as significant effect on efficiency. This may mean that the DT-SACCOs that have adequate liquidity are able to meet their obligations when they fall due and are also able to take advantage of investment opportunities that might arise in the course of doing business and therefore high levels of efficiency compared with firms that has less liquidity.

The research outcomes further depicted that firm size possessed a positive as well as significant effect on efficiency which might mean that an increase in asset base of a DT-SACCO leads to enhanced efficiency. This can be explained by the fact that bigger DT-SACCOs are likely to have developed structures to monitor the internal

operations of a firm leading to better efficiency. Bigger DT-SACCOs are also likely to have better governance structure which can also explain the high efficiency associated with firm size.

5.4 Recommendations for Policy and Practice

The research findings reveal that delinquency rate had a negative as well as significant impact on efficiency. The research therefore commends that the administrators of DT-SACCOs should work on reducing the level of past due loans. This can be achieved by coming with effective credit scoring models that will enable the SACCO distinguish between good and bad borrowers.

Further, value at risk was discovered to possess a significant and positive impact on efficiency. The research therefore commends that management of DT-SACCOs in Kenya should ensure that they do not over commit their assets by giving excess loans as this will likely lead to reduced efficiency. Regulators should ensure that the SACCOs do not led beyond a certain set limit of their asset base.

From the study findings, liquidity was found to enhance efficiency of DT-SACCOs, this study recommends that DT-SACCOs should keep adequate liquidity levels to sustain their obligations when they fall due whereas simultaneously time enjoying short term investment chances which may arise. The policy makers should set a limit of the liquidity level that SACCOs should have as too much liquidity is also disadvantageous as it comes with opportunity costs.

5.5 Limitations of the Study

The focus was on various factors which are imagined to influence efficiency of Kenyan DT-SACCOs. The research focused on five explanatory variables in particular. However, in certainty, there is presence of other variables probable to influence efficiency of firms including internal like corporate governance attributes and management efficiency whereas others are beyond the control of the firm like interest rates as well as political stability.

The study was quantitative in nature and therefore did not take into account qualitative information that might clarify other factors influencing the link between CRM and efficiency of DT-SACCOs in Kenya. Qualitative methods like focus groups, open-ended surveys, and interviews can aid in the development of more definite outcomes.

The research focused on a five-year period (2016 to 2020). It's unclear if the conclusions will last for a longer period of time. It's also uncertain if identical results will be achieved after 2020. The research ought to have been conducted over a longer period of time to account for key economic events.

A multivariate regression model was utilized in the study to analyze the data. owing to the limitations of employing regression models, like erroneous and misleading results which cause the value of the variable to change, it was not possible to generalize the research outcome with accuracy. Furthermore, if more data was included in the regression, the outcome could be varied. As a result, the model constituted still another constraint.

5.6 Suggestions for Further Research

This study focused on DT-SACCOs in Kenya and focused on Nairobi County. Further studies can focus on a wide scope by covering other SACCOs in Kenya to back or criticize the results of the current study. Further, this study focused on three CRM measures namely; delinquency rate, value at risk, and distance to default. Future studies should focus on other CRM measures that were not considered in this study.

Due to the readily available data, the focus of this research was drawn to the last five years. prior research may span a longer time period, such as ten or twenty years, and might have a significant impact on this research by either complementing or contradicting its conclusions. A longer research has the benefit of allowing the researcher to detect the effects of business cycles like booms and recessions.

Lastly, this research relied on a regression model, that has its own set of limitations, such as errors and misleading results when a variable is changed. Future academics should investigate the many relationships between CRM and efficiency using models like the Vector Error Correction Model (VECM).

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APPENDICES

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

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

42. WANANDEGE SACCO SOCIETY LTD
43. WAUMINI SACCO SOCIETY LTD
Source: SASRA (2020)

Appendix II: Research Data

DT-SACCO	Year	Efficiency	Delinquency rate	Value at risk	Distance to default	Liquidity	Firm size
1	2016	0.083	0.160	0.513	3.970	0.753	8.216
1	2017	0.114	0.060	0.456	3.951	0.779	8.218
1	2018	0.147	0.150	0.676	3.932	0.900	8.251
1	2019	0.195	0.040	0.745	3.912	1.219	8.269
1	2020	0.174	0.050	0.723	3.892	0.781	8.317
2	2016	0.241	0.140	0.274	3.912	1.535	8.338
2	2017	0.159	0.150	0.325	3.892	1.254	8.424
2	2018	0.064	0.120	0.289	3.871	1.855	8.414
2	2019	0.060	0.090	0.295	3.850	1.632	8.456
2	2020	0.031	0.110	0.275	3.829	3.296	8.486
3	2016	0.028	0.010	0.643	4.394	0.621	8.207
3	2017	0.025	0.020	0.666	4.382	0.612	8.288
3	2018	0.014	0.020	0.664	4.369	1.114	8.377
3	2019	0.002	0.040	0.653	4.357	1.036	8.425
3	2020	0.105	0.060	0.637	4.344	1.537	8.452
4	2016	0.084	0.130	0.116	3.178	1.493	7.558
4	2017	0.133	0.120	0.132	3.135	1.101	7.620
4	2018	0.171	0.130	0.166	3.091	0.751	7.588
4	2019	0.057	0.170	0.147	3.045	0.879	7.565

DT-SACCO	Year	Efficiency	Delinquency rate	Value at risk	Distance to default	Liquidity	Firm size
4	2020	0.123	0.220	0.127	2.996	1.135	7.541
5	2016	0.089	0.040	0.701	2.079	0.590	8.058
5	2017	0.094	0.050	0.691	1.946	0.620	8.124
5	2018	0.099	0.010	0.702	1.792	0.599	8.166
5	2019	0.100	0.010	0.650	1.609	0.708	8.229
5	2020	0.151	0.070	0.538	1.386	0.524	8.329
6	2016	0.061	0.100	0.733	3.584	1.824	8.577
6	2017	0.297	0.080	0.661	3.555	1.577	8.628
6	2018	0.232	0.020	0.595	3.526	1.112	8.651
6	2019	0.230	0.390	0.608	3.497	1.275	8.699
6	2020	0.166	0.060	0.550	3.466	1.344	8.730
7	2016	0.011	0.040	0.383	3.970	0.983	8.002
7	2017	0.057	0.150	0.355	3.951	1.062	8.051
7	2018	0.013	0.310	0.403	3.932	1.740	8.049
7	2019	0.091	0.020	0.573	3.912	1.201	8.143
7	2020	0.019	0.110	0.561	3.892	0.941	8.160
8	2016	0.186	0.350	0.289	3.912	1.321	7.982
8	2017	0.095	0.180	0.551	3.892	0.760	8.026
8	2018	0.153	0.390	0.431	3.871	0.688	8.077
8	2019	0.107	0.190	0.765	3.850	0.992	8.189
8	2020	0.010	0.050	0.580	3.829	1.070	8.282
9	2016	0.018	0.100	0.248	4.394	0.268	8.020
9	2017	0.004	0.110	0.241	4.382	0.349	8.044

DT-SACCO	Year	Efficiency	Delinquency rate	Value at risk	Distance to default	Liquidity	Firm size
9	2018	0.142	0.120	0.358	4.369	0.332	7.973
9	2019	0.155	0.040	0.228	4.357	0.266	7.974
9	2020	0.168	0.050	0.221	4.344	0.312	7.995
10	2016	0.030	0.020	0.514	3.178	1.118	8.188
10	2017	0.038	0.020	0.530	3.135	1.110	8.236
10	2018	0.042	0.190	0.587	3.091	0.990	8.271
10	2019	0.028	0.020	0.693	3.045	0.850	8.329
10	2020	0.057	0.030	0.607	2.996	1.061	8.351
11	2016	0.040	0.090	0.535	2.079	0.853	8.390
11	2017	0.042	0.090	0.592	1.946	0.936	8.480
11	2018	0.230	0.100	0.508	1.792	0.141	8.528
11	2019	0.214	0.040	0.693	1.609	0.104	8.572
11	2020	0.161	0.020	0.763	1.386	1.153	8.626
12	2016	0.144	0.020	0.795	2.357	0.262	7.206
12	2017	0.122	0.020	0.785	2.297	0.223	7.199
12	2018	0.096	0.030	0.697	2.681	0.248	7.224
12	2019	0.279	0.040	0.668	2.348	0.287	7.319
12	2020	0.279	0.030	0.683	2.620	0.280	7.355
13	2016	0.110	0.060	1.307	1.316	0.853	7.723
13	2017	0.059	0.190	1.229	1.196	0.936	7.677
13	2018	0.244	0.190	1.033	1.174	1.153	7.537
13	2019	0.124	0.020	0.810	1.206	0.599	7.499
13	2020	0.126	0.040	0.746	1.228	0.833	7.479

DT-SACCO	Year	Efficiency	Delinquency rate	Value at risk	Distance to default	Liquidity	Firm size
14	2016	0.117	0.300	0.156	1.056	0.912	7.687
14	2017	0.087	0.240	0.174	1.096	1.041	7.724
14	2018	0.085	0.200	0.336	1.112	0.697	7.561
14	2019	0.077	0.170	0.322	1.160	1.042	7.625
14	2020	0.062	0.140	0.377	1.123	0.905	7.619
15	2016	0.067	0.000	0.393	4.511	0.593	8.216
15	2017	0.052	0.200	0.444	6.296	1.153	8.218
15	2018	0.023	0.010	0.384	10.089	0.694	8.251
15	2019	0.023	0.020	0.328	4.258	0.715	8.269
15	2020	0.284	0.120	0.270	8.843	0.576	8.317
16	2016	0.002	0.020	0.142	1.107	1.174	7.392
16	2017	0.034	0.030	0.104	1.146	0.983	7.391
16	2018	0.140	0.130	0.090	1.382	1.327	7.427
16	2019	0.082	0.380	0.188	1.536	1.191	7.495
16	2020	0.306	0.010	0.295	1.464	1.296	7.609
17	2016	0.169	0.050	0.582	1.283	2.606	7.709
17	2017	0.292	0.050	0.529	1.168	1.987	7.793
17	2018	0.214	0.070	0.569	1.305	1.757	7.796
17	2019	0.004	0.050	0.462	1.197	1.574	7.809
17	2020	0.004	0.050	0.507	1.161	1.555	7.739
18	2016	0.118	0.070	0.437	1.585	1.307	8.142
18	2017	0.262	0.060	0.465	0.946	1.222	8.216
18	2018	0.103	0.050	0.486	1.085	2.680	8.248

DT-SACCO	Year	Efficiency	Delinquency rate	Value at risk	Distance to default	Liquidity	Firm size
18	2019	0.134	0.040	0.495	1.024	2.262	8.287
18	2020	0.092	0.030	0.615	1.469	0.631	8.293
19	2016	0.005	0.210	1.006	0.984	1.251	7.027
19	2017	0.053	0.050	0.797	1.334	1.057	7.000
19	2018	0.054	0.050	0.966	1.540	1.244	6.977
19	2019	0.074	0.080	0.366	1.259	0.942	6.937
19	2020	0.020	0.030	0.446	1.115	1.048	6.934
20	2016	0.048	0.570	1.419	4.144	1.013	6.858
20	2017	0.088	0.530	0.867	7.954	1.156	6.861
20	2018	0.124	0.080	0.520	8.475	1.596	6.961
20	2019	0.018	0.060	0.475	3.345	1.315	7.039
20	2020	0.018	0.000	0.466	0.951	1.081	7.118
21	2016	0.161	0.060	0.381	1.097	1.153	8.338
21	2017	0.107	0.070	0.383	1.422	0.784	8.424
21	2018	0.005	0.060	0.394	1.486	1.019	8.414
21	2019	0.023	0.040	0.471	1.736	0.853	8.456
21	2020	0.040	0.120	0.279	1.237	0.936	8.486
22	2016	0.040	0.130	0.285	0.950	1.116	8.338
22	2017	0.042	0.160	0.295	0.935	0.007	8.424
22	2018	0.119	0.200	0.266	0.968	1.299	6.761
22	2019	0.047	0.230	0.280	1.224	1.110	6.794
22	2020	0.066	0.020	0.277	1.643	0.801	8.288
23	2016	0.111	0.060	0.240	1.032	0.987	8.207

DT-SACCO	Year	Efficiency	Delinquency rate	Value at risk	Distance to default	Liquidity	Firm size
23	2017	0.080	0.060	0.261	0.923	0.748	8.288
23	2018	0.047	0.100	0.240	0.897	0.757	8.377
23	2019	0.076	0.080	0.216	1.157	0.702	8.425
23	2020	0.228	0.120	0.820	0.502	0.698	8.452
24	2016	0.221	0.160	0.888	0.465	0.677	8.486
24	2017	0.365	0.140	0.801	0.563	0.992	8.338
24	2018	0.056	0.110	0.855	1.400	0.856	8.424
24	2019	0.017	0.110	0.868	1.063	0.321	6.072
24	2020	0.124	0.170	0.078	0.624	1.153	6.505
25	2016	0.115	0.050	0.091	0.740	2.576	7.511
25	2017	0.136	0.010	0.148	0.693	2.284	7.538
25	2018	0.040	0.090	0.191	0.563	0.254	7.508
25	2019	0.020	0.100	0.239	0.636	0.226	7.640
25	2020	0.011	0.030	0.265	2.205	0.206	7.651
26	2016	0.287	0.050	0.221	2.524	0.853	8.390
26	2017	0.027	0.010	0.229	3.374	0.936	8.480
26	2018	0.004	0.090	0.253	2.833	0.753	8.528
26	2019	0.160	0.030	0.303	3.020	2.074	8.572
26	2020	0.160	0.050	0.294	4.402	0.853	8.626
27	2016	0.197	0.010	0.280	2.328	1.327	7.673
27	2017	0.263	0.070	0.284	1.771	1.191	7.797
27	2018	0.032	0.090	0.382	1.895	1.296	7.617
27	2019	0.071	0.070	0.283	2.131	2.606	7.675

DT-SACCO	Year	Efficiency	Delinquency rate	Value at risk	Distance to default	Liquidity	Firm size
27	2020	0.104	0.080	0.271	0.955	1.987	7.686
28	2016	0.100	0.010	0.267	1.219	1.757	7.125
28	2017	0.077	0.000	0.236	1.156	1.153	7.092
28	2018	0.072	0.080	0.241	1.116	1.146	7.102
28	2019	0.075	0.070	1.139	1.078	1.306	7.169
28	2020	0.037	0.250	0.939	1.524	1.568	7.165
29	2016	0.064	0.140	0.728	1.488	1.642	7.469
29	2017	0.028	0.160	0.673	1.277	1.486	7.421
29	2018	0.088	0.000	0.587	1.300	0.912	7.434
29	2019	0.033	0.010	0.476	1.100	0.796	7.441
29	2020	0.033	0.000	0.437	0.630	0.619	7.458
30	2016	0.228	0.030	0.388	1.595	1.049	7.102
30	2017	0.327	0.010	0.347	1.487	0.796	7.097
30	2018	0.223	0.030	0.346	1.285	0.650	7.090
30	2019	0.221	0.040	0.348	1.410	0.685	7.118
30	2020	0.228	0.030	0.347	0.343	0.827	7.125
31	2016	0.218	0.020	0.310	0.672	0.621	7.198
31	2017	0.272	0.040	0.357	0.705	1.249	7.279
31	2018	0.284	0.060	0.369	1.098	0.998	7.338
31	2019	0.246	0.230	0.683	1.086	1.424	7.416
31	2020	0.269	0.030	0.679	2.369	1.520	7.426
32	2016	0.319	0.030	0.594	2.271	0.553	6.505
32	2017	0.328	0.100	0.763	1.838	0.735	7.511

DT-SACCO	Year	Efficiency	Delinquency rate	Value at risk	Distance to default	Liquidity	Firm size
32	2018	0.313	0.030	0.754	2.358	0.548	7.538
32	2019	0.060	0.040	1.087	2.522	0.832	7.508
32	2020	0.064	0.040	1.053	1.310	1.234	7.640
33	2016	0.038	0.100	1.011	1.175	0.853	7.651
33	2017	0.041	0.000	0.906	1.170	0.936	8.390
33	2018	0.105	0.030	0.889	1.167	0.704	8.480
33	2019	0.125	0.080	0.530	1.138	1.576	8.528
33	2020	0.120	0.030	0.526	0.448	1.539	8.572
34	2016	0.236	0.000	0.537	1.042	2.212	8.626
34	2017	0.187	0.000	0.452	1.059	2.227	7.673
34	2018	0.160	0.110	0.403	1.112	2.267	7.797
34	2019	0.125	0.100	0.046	1.125	3.011	7.617
34	2020	0.137	0.090	0.075	1.061	1.263	7.675
35	2016	0.066	0.160	0.075	1.159	1.153	7.686
35	2017	0.076	0.190	0.084	1.144	1.068	7.125
35	2018	0.072	0.230	0.364	1.145	0.722	7.092
35	2019	0.080	0.190	0.560	1.094	0.520	7.102
35	2020	0.080	0.260	0.524	1.033	1.152	7.169
36	2016	0.087	0.270	0.526	1.271	0.998	7.165
36	2017	0.094	0.230	0.555	1.278	0.828	7.469
36	2018	0.022	0.220	0.025	1.172	0.831	7.421
36	2019	0.096	0.060	0.718	1.166	0.625	7.434
36	2020	0.056	0.230	0.710	1.533	0.904	7.441

DT-SACCO	Year	Efficiency	Delinquency rate	Value at risk	Distance to default	Liquidity	Firm size
37	2016	0.081	0.120	0.636	1.623	0.695	7.458
37	2017	0.091	0.050	0.567	1.638	0.759	7.102
37	2018	0.051	0.060	0.491	1.605	1.151	7.097
37	2019	0.074	0.050	0.492	1.505	0.499	7.090
37	2020	0.058	0.090	0.448	1.265	0.616	7.118
38	2016	0.065	0.130	0.423	1.287	0.918	7.125
38	2017	0.054	0.170	0.437	1.278	1.343	7.198
38	2018	0.047	0.120	0.486	1.222	1.610	7.279
38	2019	0.014	0.040	0.392	1.169	1.804	7.338
38	2020	0.014	0.030	0.280	1.125	1.646	7.416
39	2016	0.348	0.040	0.530	1.100	1.357	7.426
39	2017	0.254	0.050	0.468	1.042	0.588	8.216
39	2018	0.083	0.039	0.450	1.240	1.054	8.248
39	2019	0.085	0.039	0.442	2.262	1.592	8.287
39	2020	0.099	0.036	0.341	2.933	2.182	8.293
40	2016	0.221	0.028	0.283	3.534	1.610	7.027
40	2017	0.365	0.050	0.400	2.500	1.804	7.000
40	2018	0.056	0.039	0.318	3.145	0.853	6.977
40	2019	0.017	0.039	0.399	2.506	0.936	6.937
40	2020	0.124	0.036	0.400	2.500	1.111	6.934
41	2016	0.091	0.028	0.335	2.985	1.424	6.858
41	2017	0.138	0.045	0.326	3.067	1.520	6.861
41	2018	0.111	0.045	0.338	2.959	0.553	6.961

DT-SACCO	Year	Efficiency	Delinquency rate	Value at risk	Distance to default	Liquidity	Firm size
41	2019	0.078	0.047	0.376	2.660	0.735	7.039
41	2020	0.067	0.028	0.337	2.967	0.548	7.118
42	2016	0.066	0.037	0.460	2.174	0.832	8.338
42	2017	0.066	0.042	0.679	1.473	1.234	8.424
42	2018	0.067	0.041	0.414	2.415	0.853	8.414
42	2019	0.055	0.043	0.737	1.357	0.936	8.456
42	2020	0.055	0.039	0.546	1.832	0.704	8.486
43	2016	0.042	0.036	0.390	2.564	1.576	8.338
43	2017	0.294	0.014	0.440	2.941	1.539	8.424
43	2018	0.113	0.007	0.420	2.381	2.212	6.761
43	2019	0.188	0.010	0.380	2.632	2.227	6.794
43	2020	0.205	0.001	0.230	4.348	2.267	8.288