EFFECT OF FINANCIAL RISK ON EFFICIENCY OF DEPOSIT TAKING SAVINGS AND CREDIT COOPERATIVES IN NAIROBI COUNTY, KENYA

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A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION, FACULTY OF BUSINESS AND MANAGEMENT SCIENCES, UNIVERSITY OF NAIROBI

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DECLARATION

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

Signed:  Date: 09/11/2021

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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 research project is dedicated to my family for their love, support and encouragement.

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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
FP	Financial Performance
MFI	Micro Finance Institution
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

Financial risk can lead to failure of SACCOs in their quest to realize expected level of efficiency. This is due to uncertainties that make it difficult to execute financial plans effectively. Equally the existence of possible defaults on credit commitments, volatile interest rates, liquidity problems and variations in foreign exchange rates negatively affect use of the available assets and hence efficiency. The main aim of this study was to determine the effect of financial risk on efficiency of deposit-taking SACCOs in Nairobi County, Kenya. The independent variables for the research were credit risk, and liquidity risk. Operating risk, capital adequacy 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 stakeholder theory. Descriptive research design was utilized in this research. The 43 DT-SACCOs in Nairobi County, Kenya as at December 2020 served as target population. 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 0.703 R square value implying that 70.3% of changes in DT-SACCOs efficiency can be described by the five variables chosen for this research. The multivariate regression analysis further revealed that individually, both credit risk and liquidity risk have a negative effect on efficiency of DT-SACCOs as shown by (β=-229, p=0.014) and (β=-0.328, p=0.000) respectively. Operating risk displayed a positive but not statistically significant influence on efficiency (β=0.006, p=0.691). Capital adequacy and firm size exhibited a positive and significant influence on efficiency as shown by (β=0.179, p=0.017) and (β=0.777, p=0.000) respectively. The study recommends that DT-SACCOs should implement effective measures of managing financial risk. Specifically, the DT-SACCOs should work at reducing their liquidity risk and credit risk 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.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Financial risk is a major factor among financial institutions. Savings and Credit Cooperatives (SACCOs) should make sure that their exposure to risks is lowered because they influence their main goal which is to lend credit and enable owners to save funds efficiently (Kariuki, 2017). Mohammed (2017) posits that financial risks determine the capability a company to realize high efficiency which leads to superior performance and sustainability of a firm. The basis is that in order to diversify business and to enhance efficiency, companies should be knowledgeable of risks involved that significantly impact on their day to day operations (Naz & Naqvi, 2016).

Guiding the research was; financial intermediation theory, information asymmetry theory and stakeholder 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 financial risk 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. Stakeholder theory by Freeman (1984) is used in ensuring that the needs of all stakeholders' are taken into account. It therefore provides a holistic view of the firm.

The study focused on DT SACCOs in Kenya; this is because the level of financial risk and specifically credit and in these institutions was the major concern for 95% of SACCOs in Kenya (SASRA, 2018). Additionally, Moody's 2019 report stated that increasing Non-performing loans (NPLs) among banks and SACCOs in Kenya

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 financial risk among DT SACCOs in Kenya as they play a key role in financial intermediation and inclusion. A study of how financial risk impacts efficiency of DT-SACCOs in Kenya was hence required.

1.1.1 Financial Risk

Financial risk refers to the unforeseen or unexpected changes in financial transactions and it is normally caused by loan defaults, illiquidity, risks arising from operations and movements in rates of interest (Sufi & Qaisar, 2015). Bhattarai (2016) defined financial risk as any occurrence that results in a financial loss to either all the parties involved or just one of the parties. The risk is caused by factors such as exchange rate movements, interest rate movements, financial shocks, loan defaults, illiquidity among others. Raad (2015) identifies the main financial risk components as liquidity, operating and credit risk.

Financial risk is an important aspect among financial institutions as it is the factor that informs financial decisions (Shukla, 2016). Without risks, financial transactions would be simplified but this would also imply low returns on investments as higher risk is associated with better proceeds. Financial institutions are however mandated to control financial risks as failure to monitor them would lead to collapse of the institutions and this would have a multiplying effect on the entire economy. The future of financial institutions and financial transactions is therefore dependent on stringent and effective management of financial risks (Ahmed, 2015).

Financial risk has been operationalized differently by different researchers. Raad (2015) operationalized financial risk in terms of credit risk, liquidity risk, operating risk and

interest rate risk. Noor and Abdalla (2014) operationalized financial risk into three components namely; credit risk, liquidity risk and operating risk. Credit risk is obtained by diving NPLs by total loan advances, liquidity risk is measured as total assets to liquid assets while operating risk is assessed as operating expenses divided by operating profit. The current study operationalized financial risk in terms of credit risk and liquidity risk.

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 (Kalluru & Bhat, 2009). It is the identification of resources and processes that impact productivity and profitability of companies. It involves the design of new processes 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 measure of 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 except that 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 Financial Risk and Firm Efficiency

The efficiency of financial firms is influenced by factors like credit risk, size of entity, capital adequacy, liquidity management, interest rate risk, operating risk and age (Li & Zou, 2014). Financial risk is the result of minimal institutional capacity, volatile rates of interest, poor credit policy, weak management, insufficient capital, liquidity, unfavorable laws, direct lending, poor loan underwriting, massive bank licensing, moral hazards as well as adverse selection caused by information asymmetries. Financial risk massively impacts the efficiency of these firms. Because of this, it is important to manage financial risk (Bhattarai, 2016). Earlier studies show that financial risk management enhances efficiency of a firm (Afriyie & Akotey, 2012).

Financial 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 financial risk because most of their revenue is from loans which attract interest. Nonetheless, financial risk has an effect on the institutions' efficiency. As a result, the risk must be effectively controlled (Bhattarai, 2016). From prior studies, risk 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, principals incur agency costs in order to reduce 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 divergence of decisions of agents and those that will maximize the principal's interests (Shukla, 2016).

1.1.4 Deposit Taking Savings and Credit Cooperative Societies in Nairobi

Government of Kenya (2018) defined deposit-taking SACCOs as 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. These institutions are responsible for approximately 45% of Kenya's GDP. 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, 2021) at the end of 2020 stated that they had grown to 175 from 110 DTS in 2011 a growth of 59%. In 2020, these institutions' total assets under their management totaled over 393 billion, up from 167 billion in 2011, a 135 percent increase in ten years.

Availing members with credit and availing saving products are the main goals of SACCOs and these are threatened by financial risk hence the need to manage them. The main cause of failures in SACCOs is poor management of financial risk (Mugo et al., 2019). The rewards for taking a risk by investing in a firm are the returns on that risk. Proper financial 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

Financial risk can lead to failure of SACCOs in their quest to realize expected level of efficiency. This is due to uncertainties that make it difficult to execute financial plans effectively. Equally the existence of possible defaults on credit commitments, volatile interest rates, liquidity problems and variations in foreign exchange rates negatively affect use of the available assets and hence efficiency (Sadgrove, 2016). Mohammed (2017) posits that financial risks determine the capability a company to realize high and sustainable efficiency. The basis is that in order to diversify business and to escalate

returns, companies should be knowledgeable of risks involved that significantly impact on measures of performance (Naz & Naqvi, 2016).

DT-SACCOs play a role in financial intermediation which has included 6.3% Kenyans and approximately 60% of Kenyans are dependent on them (FinAccess, 2019). Despite this, 30% lack prudent financial risk management practices as evidenced by 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 341 billion shillings member funds 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 reduced confidence in the subsector (SASRA, 2018).

Empirical evidence exists on how financial risks impacts financial performance of institutions like banks but very few if any have focused on financial risk and efficiency. The studies have also produced varied results. Adebayo (2017) studied the relation between risk management and performance of Nigerian banks. Results showed that asset quality substantially and negatively affected performance. Sujeewa (2015) examined how financial risk impacts performance finding that, the NPLs and their provisions negatively impact bank profitability in Sri Lanka. Alshati (2015) examined how risk management affects performance of Jordanian banks. It was concluded that the indicators were important in improving bank performance. These studies were carried out in a diverse context. In addition, the researches focused on financial performance which is a different concept from efficiency.

Locally, Gitau (2021) investigated how financial risk impacts performance of Dairy cooperatives in Kisii, Nyamira, Bomet as well as Kericho Counties, Kenya. From the findings, it was noted that financial risk has a substantial impact on performance of dairy cooperatives. Bwire and Omagwa (2019) examined the link between credit risk and performance of SACCOs in Nairobi. Findings showed a substantial positive relation between credit monitoring, appraisal and control on performance. Otanga, Mule and Momanyi (2020) examined how credit risk impacts performance of DT-SACCOs in Western Kenya and found out that credit risk has a significant negative impact on performance. Kimoi, Auma and Kirui (2016) studied the effects that credit risk management has on efficiency and performance of SACCOs within Eldoret Town and concluded that CRM has a positive substantial relation with both efficiency and financial performance.

Motivation of the research was the reality that despite the existence of prior studies shows that there exists contextual, conceptual and methodological gaps that need to be filled. Conceptually, prior studies have operationalized financial risk differently hence findings depend on the operationalized method. Further, almost all prior research investigated financial risk impact on financial performance leaving a gap on efficiency. Contextually, prior studies have mostly focused on commercial banks whereby they operate differently compared to SACCOs. Methodologically, the research methodologies adopted have not been uniform hence explaining variance in results. The current research was based on these gaps and attempts to answering the research question; how does financial risk influence efficiency of deposit-taking SACCOs in Kenya?

1.3 Research Objective

The objective of this study was to determine the effect of financial risk on efficiency of deposit-taking SACCOs in Kenya.

1.4 Value of the Study

This study's results will contribute to the existing theoretical and empirical literature on financial risk and efficiency. 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 findings of the research might be relevant to the government and the regulator SASRA in developing regulations for the population under investigation. The study's findings will help investors who are considering investing in the population under investigation by providing information on the risk-return tradeoffs that exist in such organizations and their impact on efficiency.

The conclusions will aid investors as well as practitioners understand the relationship between the two variables, that is important for ensuring strong management team with diverse viewpoints and competences streamlining operations as well as managing financial risk, as well as for building confidence among corporate stakeholders, which will ultimately optimize efficiency.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter explains the theories on which financial risk and efficiency is based. It further discusses 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 financial risk and efficiency. The study reviewed the financial intermediation theory, information asymmetry theory and stakeholder theory.

2.2.1 Financial Intermediation Theory

Diamond's (1984) theory plays a central role in the financial intermediation process particularly 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). As per Scholtens and Van Wensveen (2000) stated that they do not recognize

credit risk 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 is 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 is useful in understanding how financial risk and efficiency relate.

2.2.2 Information Asymmetry Theory

Akerlof (1970) proposed this theory, that states that when borrowers as well as 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 is useful in explaining competitive market behavior. It has been utilized in many scenarios thereby confirming its credibility.

2.2.3 Stakeholder Theory

Freeman (1984) proposed the theory with the intention of being utilized as a management tool. However, since then it has progressed into a firm theory with a lot of explanatory power. The stakeholder theory is a methodological framework for organizational ethics and management that focuses on ethical as well as moral ideologies in the management of public and private organizations. Stakeholder theory stresses the importance of maintaining a balance of stakeholders' interests as the primary determinant of organizational strategy.

The single-valued objective supposition, according to which advantages go to a firm's stakeholders, is a source of criticism for this theory. According to Jensen (2016), there are additional ways to assess an organization's performance apart from the benefits stakeholders receive. The factors comprise flow of information from top administration to lower-level employees, the work conditions, and interpersonal relationships inside the company.

Stakeholder theory is applicable to this research since it provides support for agency theory, which failed to capture all other important stakeholders who depend on financial results to make economic decisions, such as regulators, creditors, staff, financial analysts, and potential investors, among others. It lays a theoretical basis for understanding how various individuals and entities both within and outside of a firm need accurate information, which can be ensured by adhering to the corporate governance code and other regulatory directives strictly. As a result, the theory is supposed to include theoretical reasons for all of the practical objectives so that, if the board of directors and management have all stakeholders' interests at heart, they can assess financial risk effectively and ensure results provided to stakeholders are correct, relevant, and represent the true situation of the firm.

2.3 Determinants of Firm Efficiency

There are several firm efficiency determinants of a firm; these factors are found either within or outside the firm. Internal factors are firm-specific and can be manipulated internally. They are credit risk, liquidity risk, operating risk, asset base and capital adequacy. Factors outside a firm that influence efficiency includes; inflation, GDP, political stability and interest (Athanasoglou et al., 2005).

2.3.1 Credit Risk

This indicates a SACCO’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 Liquidity Risk

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).

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 (Liargovas & Skandalis, 2008). 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.

2.3.3 Operating Risk

The operating risks facing a firm influence its efficiency. An increase in operating risk which is often measured as operating expenses to income proportion implies a decline

in efficiency as more expenses are being incurred relative to the revenues generated. Management of operating risk is a critical requirement in all firms as failure to address this might lead to bankruptcy as uncontrolled expenses might exceed the revenues generated (Ongore & Kusa, 2013).

Operating risk need to be effectively managed for a firm to achieve the desired level of efficiency as there is a significant negative influence of the risk on efficiency of firms (Athanasoglou, Sophocles & Matthaois, 2009). Failure to manage operating risk leads to a reduction in gross profit margin which essentially leads to losses. These losses are attributed to low efficiency in converting inputs to outputs (Ongore & Kusa, 2013).

2.3.4 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 (Njoroge, 2014). Lee (2009) argued that

the assets being controlled by an entity impacts profitability level of the firm from one period to another.

2.3.5 Capital Adequacy

Also called the capitalization ratio, 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, institutions 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 financial institution with sufficient capital signals the market that a superior performance is to be expected. The results of Magweva and Marime (2016) revealed that capital holdings are positively related to bank profitability, indicating that Greek banks are in a stable financial position. Also, Amato and Burson (2007) showed a positive causality between capital contributions and profitability.

2.4 Empirical Review

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

2.4.1 Global Studies

Rasika, Hewage and Thennakoon (2016) investigated determinants of financial performance among Sri Lanka banks. The investigation was conducted among 2 state banks as well as four private local banks. The period designated for the study was from 2005 to 2014. Secondary data from the financials of the banks was collected. Analysis was done using panel data analysis methodology. Results showed a negative relation between credit risk, capital adequacy ratio and performance as measured by return on

equity while bank size and liquidity demonstrated a positive relationship. This study was conducted in a different context whose social and economic setting is different from Kenya and therefore the findings cannot be generalized.

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 credit risk management process that impacted performance, risk identification has had a minimal influence on performance, while risk analysis as well as appraisal did not significantly affect bank performance, risk monitoring significantly affected financial showed a substantial impact on performance, and credit approval was also a significant factor.

Dayasagar (2019) examined credit risk practices impact on performance of mahila cooperative banks in Kalaburagi district, India. The objectives were establishing how credit risk identification, analysis, monitoring and reduction impacted the performance of women cooperative banks. Based on the results, credit analysis, mitigation and identification had substantial positive impact on performance. It was hence recommended that women cooperative banks should implement stricter credit analysis techniques and adopt credit-monitoring practices. The study was conducted in India whose economic and social cultural environment is different from Kenya where the current study will be conducted.

Gadzo et al. (2019) did an examination of in what manner credit as well as operational risk impact Ghanaian banks performance. Data was obtained from 24 universal banks with no missing variables. Findings showing credit risk is negatively related to

performance 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 significantly 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.

Orichom and Omeke (2020) examined how capital adequacy, efficiency, CRM and performance of microfinance institutions (MFIs) in Uganda were related with a focus on the agency theory. A cross–sectional was used in examining 64 MFIs in the country. Correlation and multiple regression were employed in the analysis of the data. Findings showed that CRM improves performance. Second, capital adequacy and efficiency were not significant to performance. Hence, credit risk appraisal, monitoring and mitigation were crucial in the achievement of performance of the institutions. It was however noted that capital adequacy did not substantially impact performance. The recommendation was that managers should institute risk preventive and control methods to lower credit risks and achieve positive performance among MFIs.

2.4.2 Local Studies

Kiyai (2018) sought to find credit risk impact on efficiency and Eldoret Town SACCOs performance. The researchers used a descriptive survey design and obtained primary data using a 5 point likert scale structured questionnaire. A census design was used to sample the employees in the credit department of each SACCO. Descriptive statistics was employed in analysis of the data that was displayed in frequency distribution tables as well as percentages. Multiple regressions being utilized in determining the relation

between credit risk, efficiency and performance. The results indicate that credit risk has a positive substantial relation with both efficiency and performance.

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 via descriptive statistics, correlation as well as regression since they are universally permitted 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 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 being processed via inferential as well as descriptive statistics. Findings showed: credit policy, interest rate management, financial review as well as 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.

Bwire and Omagwa (2019) examined the link between credit risk and FP of Nairobi DT SACCOs. The study followed a descriptive design in which data was obtained from 40 deposit taking SACCOs. The researchers administered Questionnaires to 120 respondents in Nairobi City County using purposive sampling. Credit monitoring had a substantial influence on SACCOs FP. Moreover, it was determined that credit

appraisal and credit risk control had a substantial impact on performance. Hence, the conclusion was that credit risk management is critical in the FP of DT SACCOs in Nairobi.

Gitau (2021) investigated the influence that financial risk had on FP of Dairy cooperatives in Kenya. The research utilized a descriptive panel design in which secondary data was utilized. Census sampling was chosen as a method of obtaining a sample and secondary data from a period spanning ten years from 2009 to2018 obtained. A secondary data collection sheet was used in collecting data which was analyzed using multiple panel regression models. Results indicated that credit management significantly impacted the return on investment, which measured performance of dairy marketing cooperatives tests for significance also indicated that the variables were statistically significant.

2.5 Summary of the Literature Review and Research Gaps

The theoretical reviews showed the predicted relation between financial risk 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 financial risk and performance. The differences from the studies can be explained on the basis of different operationalization of credit risk by different researchers thereby indicating that findings are dependent on operationalization model. Further, the prior studies have focused on the influence of financial risk on FP leaving a gap on efficiency which is the current research focus.

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 findings and failed to indicate the exact relationship that financial risk as measured by liquidity risk, operating risk and credit risk has on efficiency. This highlights the need for additional study in future research to bridge the gap through conceptualizing the impact of credit risk on efficiency.

2.6 Conceptual Framework

Displayed in figure 2.1 is the predicted relation between the variables. The predictor variable was financial risk given by credit risk and liquidity risk. The control variables were operating risk given by operating expenses to operating income ratio, SACCO size given by total assets natural log and capital adequacy by core capital to risk weighted assets. The outputs to inputs proportion served as the response variable for efficiency.

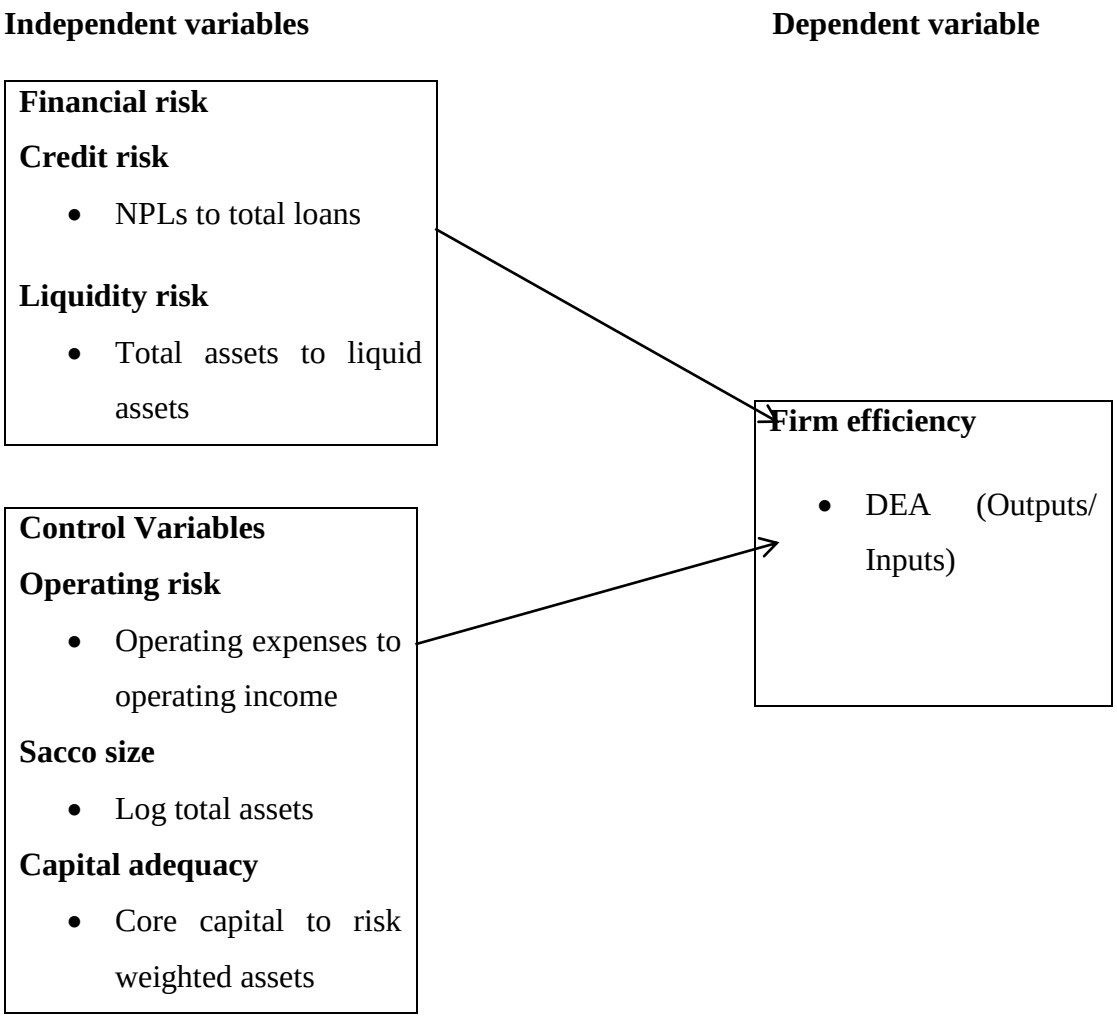

Figure 2.1: The Conceptual Model

Source: Researcher (2021)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The chapter describes the approaches utilized in accomplishing the research objective that was establishing how financial risk affects DT SACCOs efficiency. In particular, the study highlights the; the design, data collection, as well as analysis.

3.2 Research Design

A descriptive design was adopted to determine how financial risk and efficiency of DT SACCOs relate. This design was appropriate since the nature of the phenomena was of key interest to the researcher (Khan, 2008). It was 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.

3.3 Population

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

3.4 Data Collection

Secondary data was relied on in this investigation which 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, core capital, 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, liquid assets, interest/dividends on members deposits, risk weighted 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 a variable 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.

3.6 Data Analysis

SPSS was utilized in analyzing the data. Tables and graphs presented the conclusions quantitatively. Descriptive statistics were employed in the calculation of measures of central tendency and dispersion and combined with standard deviation for every variable. Inferential statistics relied on correlation as well as regression. Correlation determined the magnitude of the link between the research variables and a regression determined cause and effect among variables. A multivariate regression linearly determined the relation dependent and independent variables.

3.6.1 Analytical Model

The following equation was applicable:

$$Y= \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \varepsilon$$

Where: Y = Efficiency defined by the outputs to inputs ratio on yearly basis

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

β_0 =regression equation y intercept.

β_1 to β_5 =are the regression coefficients

X_1 = Credit risk as measured by the ratio of NPLs to total loans outstanding

X_2 = Liquidity risk as measured by the ratio of total assets to liquid assets

X_3 = Operating risk as measured by the ratio of operating expenses to operating income

X_4 = Capital adequacy as assessed by total core capital to risk weighted assets

ratio

X_5 = SACCO size as measured as log total assets

ε =error term

3.6.2 Tests of Significance

Parametric tests determined the general model and variable's significance. The F-test determined the model's relevance and this was achieved via ANOVA whereas 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 DT-SACCOs in Nairobi. 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 (Ratio)	215	.025	1.139	.45599	.214874
Credit risk (Ratio)	215	.002	.570	.08953	.089840
Liquidity risk (Ratio)	215	1.024	10.089	2.37153	1.450252
Operating risk (Ratio)	215	.007	3.296	1.09529	.550741
Capital adequacy (Ratio)	215	.023	1.962	.26200	.251624
Firm size (Ratio)	215	6.072	8.730	7.77254	.576136
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 financial risk (credit risk, liquidity risk and operating risk). Eventually, capital adequacy 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	0.094
X_1	215	0.973	6.015	4.225	0.073
X_2	215	0.928	16.183	6.555	0.68
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=Credit risk, X_2= Liquidity risk, X_3= Operating risk, X_4= Capital adequacy, X_5= Firm size and Y= Efficiency

Source: Research Findings (2021)

Because the p value for all the variables was above 0.05, the data in Table 4.2 show that the research variables being normally distributed. This implies that the OLS assumption of normality has been met.

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=Credit risk, X_2= Liquidity risk, X_3= Operating risk, X_4= Capital adequacy, 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.

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

Modified Wald test for group wise heteroskedasticity in regression model
H0: sigma(i)^2 = sigma^2 for all i
chi2 (215) = 294.72
Prob>chi2 = 0.1418

Source: Research Findings (2021)

The outcomes in Table 4.4 specify the p value was more than 0.05 at 0.1418 and therefore the null hypothesis is not rejected. This means that there was no substantial difference between the variance of the population with that of the sample. Regression analysis can thus be conducted on the collected data.

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) = 0.4867
Prob> F = 0.2435

Source: Research Findings (2021)

From the results of Table 4.5, the null hypothesis of no serial correlation is not rejected as the p-value is significant (p-value = 0.2435). The data can therefore be used in regression analysis.

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
Credit risk	Ho: Panels contain unit roots	0.0000	Reject Ho
Liquidity risk	Ho: Panels contain unit roots	0.0000	Reject Ho
Operating risk	Ho: Panels contain unit roots	0.0001	Reject Ho
Capital adequacy	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 determine the strength and direction of link between each predictor variable and the response variable. Summary of the findings are in Table 4.7.

Table 4.7: Correlation Results

		Efficiency	Credit risk	Liquidity risk	Operating risk	Capital adequacy	Firm size
Efficiency	Pearson Correlation	1					
	Sig. (2-tailed)						
Credit risk	Pearson Correlation	-.348**	1				
	Sig. (2-tailed)	.000					
Liquidity risk	Pearson Correlation	-.337**	.242**	1			
	Sig. (2-tailed)	.000	.000				
Operating risk	Pearson Correlation	.065	-.362**	-.459**	1		
	Sig. (2-tailed)	.535	.000	.000			
Capital adequacy	Pearson Correlation	.118*	-.201**	-.060	.413	1	
	Sig. (2-tailed)	.010	.003	.347	.000		
Firm size	Pearson Correlation	.283**	-.231**	-.104	.108	.321**	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 as well as direction. The outcomes disclose that credit risk and efficiency have a negative as well as significant correlation (r=-0.348) at 5 % significance level. The link between liquidity risk and efficiency was also negative and

significant (r=-0.337) at 5 % significance level. The results also reveal that operating risk and efficiency are positively but not significantly correlated (r=0.065) at 5% significance level. Both capital adequacy and size had positive as well as significant relation with efficiency as depicted by p values below 0.05.

4.5 Regression Results

Regression analysis being performed to determine the extent to which ROA is influenced by the variables selected. The regression results were presented in Table 4.8 to 4.10.

Table 4.8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.838[a]	.703	.696	.118566

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

Source: Research Findings (2021)

From the conclusions as represented by the adjusted R^2, the studied independent variables explained variations of 70.3% in efficiency among DT-SACCOs. This therefore means the five variables contributed 70.3% of the variations in efficiency among DT-SACCOs whereas other factors not researched contribute 29.7%.

Table 4.9: ANOVA Analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.942	5	1.388	98.769	.000[b]
	Residual	2.938	209	.014		
	Total	9.881	214			

a. Dependent Variable: Efficiency

b. Predictors: (Constant), Firm size, Capital adequacy, Operating risk, Credit risk, Liquidity risk

Source: Research Findings (2021)

ANOVA statistics in Table 4.9 show that the data had a 0.000 significance level hence this indicates that the model is perfect for drawing conclusions on the variables.

Table 4.9: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.636	.129		-12.710	.000
	Credit risk	-.229	.092	-.096	-2.484	.014
	Liquidity risk	-.328	.006	-.188	-4.461	.000
	Operating risk	.006	.015	.015	.397	.691
	Capital adequacy	.179	.033	.092	2.396	.017
	Firm size	.777	.016	.742	17.663	.000

a. Dependent Variable: Efficiency

Source: Research Findings (2021)

The coefficient of regression model was as below;

$$\mathbf{Y = 1.636 - 0.229X_1 - 0.028X_2 + 0.079X_3 + 0.277X_4}$$

Where:

Y = Efficiency X_1 = Credit risk; X_2=Liquidity risk X_3= Capital adequacy; X_4 = Firm size

4.6 Discussion of Research Findings

The research objective was establishing the financial risk effect on efficiency of DT-SACCOs. The study utilized a descriptive design while population being the 43 Nairobi based DT-SACCOs. 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 financial risk considered were; credit risk and liquidity risk. The control variables were operating risk, firm size and capital adequacy.

Both descriptive as well as inferential statistics being utilized in analyzing the data. The results are discussed in this section.

Multivariate regression results revealed that the R square was 0.703 implying 70.3% of changes in efficiency of DT-SACCOs are due to five variables alterations selected for this study. This means that variables not considered explain 29.7% of changes in efficiency. The overall model was also statistically significant as the p value was 0.000 which is below 0.05 significance level. This implies that the overall model had the required goodness of fit.

The multivariate regression analysis further revealed that individually, both credit risk and liquidity risk have a negative effect on efficiency of DT-SACCOs as shown by (β=-0.229, p=0.014) and (β=-0.328, p=0.000) respectively. Operating risk exhibited a positive though not statistically significant impact on efficiency (β=0.006, p=0.691). Capital adequacy and firm size exhibited a positive as well as significant efficiency influence as shown by (β=0.179, p=0.017) and (β=0.777, p=0.000) respectively.

These findings agree with those of Gitau (2021) who investigated the influence that financial risk had on FP of Dairy cooperatives in Kenya. The research assumed a descriptive panel design in which secondary data was utilized. Census sampling was chosen as a method of obtaining a sample and secondary data from a period spanning ten years from 2009 to2018 obtained. A secondary data collection sheet was used in collecting data which was analyzed using multiple panel regression models. Results indicated that credit management significantly impacted the return on investment, which measured performance of dairy marketing cooperatives tests for significance too indicated that the variables were statistically significant.

The research findings also concur with Gadzo et al. (2019) who 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 showed that credit risk is negatively related to performance 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 were positively and significantly related to credit risk, operational risk and 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 financial risk influence efficiency of DT-SACCOs. The selected variables for investigation included credit risk, liquidity risk, operating risk, capital adequacy and firm size. A descriptive research design was chosen in completing the research. Secondary data was gathered from SASRA and an analysis done via SPSS. Yearly data for 43 DT-SACCOs for five years from 2016 to 2020 was gathered from their annual reports.

The first objective was to establish the effect of credit risk on efficiency among DT-SACCOs in Kenya. The correlation results at 5 % significance level show that credit risk had a negative association correlation with efficiency. Implying a rise in credit risk would lead to decrease in efficiency. Regression results (β=-0.229, p=0.014) show that there was a negative and significant impact of credit risk on efficiency among DT-SACCOs in Kenya.

The second objective was to assess liquidity risk effect on efficiency among DT-SACCOs in Kenya. The correlation results at 5 % significance level show that liquidity risk had a negative correlation with efficiency. This implies that increase in liquidity risk would lead to decrease in efficiency. Regression results (β=-0.328, p=0.000) show

that there was a negative and significant effect of liquidity risk on efficiency among DT-SACCOs in Kenya.

The third objective was to examine the effect of operational risk on efficiency among DT-SACCOs, Kenya. The correlation results at 5% significance level show that operating risk had a positive association with efficiency. The affiliation was though not significant statistically .Regression results (β=0.006, p=0.691) depict presence of a positive but not significant effect of operating risk on efficiency among DT-SACCOs in Kenya.

The fourth objective was to examine the effect of capital adequacy on efficiency among DT-SACCOs in Kenya. The correlation results at 5% significance level show that capital adequacy had a positive link with efficiency. The correlation was also statistically significant. Regression results (β=0.179, p=0.017) show that there was a positive and significant effect of capital adequacy 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=0.777, p=0.000) 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 financial risk and efficiency. The conclusions indicating that credit risk had a negative as well as significant impact on efficiency. This may imply that DT-SACCOs with high credit risk have low levels of efficiency.

Additionally, the outcomes revealing liquidity risk has a significant negative effect on efficiency. This implies that firms with low levels of liquid assets compared to their assets end up having a lower efficiency. This can be explained by the inability of illiquid firms to take advantage of investment opportunities when they arise. Additionally, the research revealing operating risk has a positive effect on efficiency although not substantial impact.

The study conclusions revealing capital adequacy had a positive as well as significant effect on efficiency. This may mean that the DT-SACCOs that have adequate capital are able in meeting 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 capital adequacy.

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 credit risk 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 non-performing loans. This can be

achieved by coming with effective credit scoring models that will enable the SACCO distinguish between good and bad borrowers.

Further, liquidity 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, capital adequacy was found to enhance efficiency of DT-SACCOs, this study recommends that DT-SACCOs should keep adequate capital 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 capital adequacy level that SACCOs should have as too much capital adequacy is also disadvantageous as it comes with opportunity costs.

5.5 Limitations of the Study

The focus was on various factors which are thought 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 financial risk 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 research focus was on DT-SACCOs in Nairobi County. More research 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 two measures namely; credit risk, and liquidity risk. Future studies should focus on other financial risk 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. Future 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 business cycles impact like booms as well as recessions.

Lastly, this research relied on a regression model, that has its own set of drawbacks, like errors and deceptive outcomes when a variable is changed. Future academics ought

to investigate the many relationships between financial risk and efficiency using other models.

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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 (Ratio)	Credit risk (Ratio)	Liquidity risk (Ratio)	Operating risk (Ratio)	Capital adequacy (Ratio)	Firm size
1	2016	0.513	0.160	3.970	0.753	0.172	8.216
1	2017	0.456	0.060	3.951	0.779	0.165	8.218
1	2018	0.676	0.150	3.932	0.900	0.153	8.251
1	2019	0.745	0.040	3.912	1.219	0.156	8.269
1	2020	0.723	0.050	3.892	0.781	0.184	8.317
2	2016	0.274	0.140	3.912	1.535	0.159	8.338
2	2017	0.325	0.150	3.892	1.254	0.164	8.424
2	2018	0.289	0.120	3.871	1.855	0.162	8.414
2	2019	0.295	0.090	3.850	1.632	0.158	8.456
2	2020	0.275	0.110	3.829	3.296	0.160	8.486
3	2016	0.643	0.010	4.394	0.621	1.880	8.207
3	2017	0.666	0.020	4.382	0.612	1.962	8.288
3	2018	0.664	0.020	4.369	1.114	0.305	8.377
3	2019	0.653	0.040	4.357	1.036	0.323	8.425
3	2020	0.637	0.060	4.344	1.537	0.347	8.452
4	2016	0.116	0.130	3.178	1.493	0.160	7.558
4	2017	0.132	0.120	3.135	1.101	0.184	7.620
4	2018	0.166	0.130	3.091	0.751	0.179	7.588
4	2019	0.147	0.170	3.045	0.879	0.180	7.565
4	2020	0.127	0.220	2.996	1.135	0.164	7.541

DT-SACCO	Year	Efficiency (Ratio)	Credit risk (Ratio)	Liquidity risk (Ratio)	Operating risk (Ratio)	Capital adequacy (Ratio)	Firm size
5	2016	0.701	0.040	2.079	0.590	0.394	8.058
5	2017	0.691	0.050	1.946	0.620	0.423	8.124
5	2018	0.702	0.010	1.792	0.599	0.457	8.166
5	2019	0.650	0.010	1.609	0.708	0.540	8.229
5	2020	0.538	0.070	1.386	0.524	0.439	8.329
6	2016	0.733	0.100	3.584	1.824	0.273	8.577
6	2017	0.661	0.080	3.555	1.577	0.283	8.628
6	2018	0.595	0.020	3.526	1.112	0.264	8.651
6	2019	0.608	0.390	3.497	1.275	0.256	8.699
6	2020	0.550	0.060	3.466	1.344	0.276	8.730
7	2016	0.383	0.040	3.970	0.983	0.179	8.002
7	2017	0.355	0.150	3.951	1.062	0.179	8.051
7	2018	0.403	0.310	3.932	1.740	0.185	8.049
7	2019	0.573	0.020	3.912	1.201	0.173	8.143
7	2020	0.561	0.110	3.892	0.941	0.157	8.160
8	2016	0.289	0.350	3.912	1.321	0.110	7.982
8	2017	0.551	0.180	3.892	0.760	0.094	8.026
8	2018	0.431	0.390	3.871	0.688	0.079	8.077
8	2019	0.765	0.190	3.850	0.992	0.051	8.189
8	2020	0.580	0.050	3.829	1.070	0.028	8.282
9	2016	0.248	0.100	4.394	0.268	0.188	8.020
9	2017	0.241	0.110	4.382	0.349	0.155	8.044

DT-SACCO	Year	Efficiency (Ratio)	Credit risk (Ratio)	Liquidity risk (Ratio)	Operating risk (Ratio)	Capital adequacy (Ratio)	Firm size
9	2018	0.358	0.120	4.369	0.332	0.229	7.973
9	2019	0.228	0.040	4.357	0.266	0.148	7.974
9	2020	0.221	0.050	4.344	0.312	0.145	7.995
10	2016	0.514	0.020	3.178	1.118	0.217	8.188
10	2017	0.530	0.020	3.135	1.110	0.213	8.236
10	2018	0.587	0.190	3.091	0.990	0.228	8.271
10	2019	0.693	0.020	3.045	0.850	0.023	8.329
10	2020	0.607	0.030	2.996	1.061	0.162	8.351
11	2016	0.535	0.090	2.079	0.853	0.235	8.390
11	2017	0.592	0.090	1.946	0.936	0.244	8.480
11	2018	0.508	0.100	1.792	0.141	0.251	8.528
11	2019	0.693	0.040	1.609	0.104	0.236	8.572
11	2020	0.763	0.020	1.386	1.153	0.246	8.626
12	2016	0.795	0.020	2.357	0.262	0.229	7.206
12	2017	0.785	0.020	2.297	0.223	0.146	7.199
12	2018	0.697	0.030	2.681	0.248	0.185	7.224
12	2019	0.668	0.040	2.348	0.287	0.190	7.319
12	2020	0.683	0.030	2.620	0.280	0.211	7.355
13	2016	0.307	0.060	1.316	0.853	0.423	7.723
13	2017	0.229	0.190	1.196	0.936	0.457	7.677
13	2018	0.033	0.190	1.174	1.153	0.540	7.537
13	2019	0.810	0.020	1.206	0.599	0.701	7.499

DT-SACCO	Year	Efficiency (Ratio)	Credit risk (Ratio)	Liquidity risk (Ratio)	Operating risk (Ratio)	Capital adequacy (Ratio)	Firm size
13	2020	0.746	0.040	1.228	0.833	0.299	7.479
14	2016	0.156	0.300	1.056	0.912	0.318	7.687
14	2017	0.174	0.240	1.096	1.041	0.250	7.724
14	2018	0.336	0.200	1.112	0.697	0.194	7.561
14	2019	0.322	0.170	1.160	1.042	0.160	7.625
14	2020	0.377	0.140	1.123	0.905	0.166	7.619
15	2016	0.393	0.000	4.511	0.593	0.212	8.216
15	2017	0.444	0.200	6.296	1.153	0.202	8.218
15	2018	0.384	0.010	10.089	0.694	0.197	8.251
15	2019	0.328	0.020	4.258	0.715	0.204	8.269
15	2020	0.270	0.120	8.843	0.576	0.204	8.317
16	2016	0.142	0.020	1.107	1.174	0.269	7.392
16	2017	0.104	0.030	1.146	0.983	0.144	7.391
16	2018	0.090	0.130	1.382	1.327	0.208	7.427
16	2019	0.188	0.380	1.536	1.191	0.199	7.495
16	2020	0.295	0.010	1.464	1.296	0.195	7.609
17	2016	0.582	0.050	1.283	2.606	0.113	7.709
17	2017	0.529	0.050	1.168	1.987	0.115	7.793
17	2018	0.569	0.070	1.305	1.757	0.140	7.796
17	2019	0.462	0.050	1.197	1.574	0.153	7.809
17	2020	0.507	0.050	1.161	1.555	0.091	7.739
18	2016	0.437	0.070	1.585	1.307	0.234	8.142

DT-SACCO	Year	Efficiency (Ratio)	Credit risk (Ratio)	Liquidity risk (Ratio)	Operating risk (Ratio)	Capital adequacy (Ratio)	Firm size
18	2017	0.465	0.060	1.946	1.222	0.265	8.216
18	2018	0.486	0.050	1.085	2.680	0.255	8.248
18	2019	0.495	0.040	1.024	2.262	0.239	8.287
18	2020	0.615	0.030	1.469	0.631	0.260	8.293
19	2016	1.006	0.210	1.984	1.251	0.171	7.027
19	2017	0.797	0.050	1.334	1.057	0.176	7.000
19	2018	0.966	0.050	1.540	1.244	0.190	6.977
19	2019	0.366	0.080	1.259	0.942	0.202	6.937
19	2020	0.446	0.030	1.115	1.048	0.228	6.934
20	2016	0.419	0.570	4.144	1.013	0.135	6.858
20	2017	0.867	0.530	7.954	1.156	0.158	6.861
20	2018	0.520	0.080	8.475	1.596	0.187	6.961
20	2019	0.475	0.060	3.345	1.315	0.162	7.039
20	2020	0.466	0.000	1.951	1.081	0.187	7.118
21	2016	0.381	0.060	1.097	1.153	0.202	8.338
21	2017	0.383	0.070	1.422	0.784	0.321	8.424
21	2018	0.394	0.060	1.486	1.019	0.391	8.414
21	2019	0.471	0.040	1.736	0.853	0.170	8.456
21	2020	0.279	0.120	1.237	0.936	0.153	8.486
22	2016	0.285	0.130	1.950	1.116	0.391	8.338
22	2017	0.295	0.160	1.935	0.007	0.181	8.424
22	2018	0.266	0.200	1.968	1.299	0.177	6.761

DT-SACCO	Year	Efficiency (Ratio)	Credit risk (Ratio)	Liquidity risk (Ratio)	Operating risk (Ratio)	Capital adequacy (Ratio)	Firm size
22	2019	0.280	0.230	1.224	1.110	0.170	6.794
22	2020	0.277	0.020	1.643	0.801	0.153	8.288
23	2016	0.240	0.060	1.032	0.987	0.189	8.207
23	2017	0.261	0.060	1.923	0.748	0.202	8.288
23	2018	0.240	0.100	1.897	0.757	0.182	8.377
23	2019	0.216	0.080	1.157	0.702	0.186	8.425
23	2020	0.820	0.120	1.502	0.698	0.179	8.452
24	2016	0.888	0.160	1.465	0.677	0.261	8.486
24	2017	0.801	0.140	1.563	0.992	0.163	8.338
24	2018	0.855	0.110	1.400	0.856	0.201	8.424
24	2019	0.868	0.110	1.063	0.321	0.193	6.072
24	2020	0.078	0.170	1.624	1.153	0.192	6.505
25	2016	0.091	0.050	1.740	2.576	0.210	7.511
25	2017	0.148	0.010	4.394	2.284	0.154	7.538
25	2018	0.191	0.090	4.382	0.254	0.180	7.508
25	2019	0.239	0.100	4.369	0.226	0.166	7.640
25	2020	0.265	0.030	2.205	0.206	0.196	7.651
26	2016	0.221	0.050	2.524	0.853	0.195	8.390
26	2017	0.229	0.010	3.374	0.936	0.427	8.480
26	2018	0.253	0.090	2.833	0.753	0.393	8.528
26	2019	0.303	0.030	3.020	2.074	0.571	8.572
26	2020	0.294	0.050	4.402	0.853	0.449	8.626

DT-SACCO	Year	Efficiency (Ratio)	Credit risk (Ratio)	Liquidity risk (Ratio)	Operating risk (Ratio)	Capital adequacy (Ratio)	Firm size
27	2016	0.280	0.010	2.328	1.327	0.458	7.673
27	2017	0.284	0.070	1.771	1.191	0.350	7.797
27	2018	0.382	0.090	1.895	1.296	0.387	7.617
27	2019	0.283	0.070	2.131	2.606	0.332	7.675
27	2020	0.271	0.080	1.955	1.987	0.309	7.686
28	2016	0.267	0.010	1.219	1.757	0.139	7.125
28	2017	0.236	0.000	1.156	1.153	0.140	7.092
28	2018	0.241	0.080	1.116	1.146	0.072	7.102
28	2019	1.139	0.070	1.078	1.306	0.054	7.169
28	2020	0.939	0.250	1.524	1.568	0.037	7.165
29	2016	0.728	0.140	1.488	1.642	0.210	7.469
29	2017	0.673	0.160	1.277	1.486	0.206	7.421
29	2018	0.587	0.000	1.300	0.912	0.230	7.434
29	2019	0.476	0.010	1.100	0.796	0.223	7.441
29	2020	0.437	0.000	1.630	0.619	0.187	7.458
30	2016	0.388	0.030	1.595	1.049	0.255	7.102
30	2017	0.347	0.010	1.487	0.796	0.241	7.097
30	2018	0.346	0.030	1.285	0.650	0.274	7.090
30	2019	0.348	0.040	1.410	0.685	0.295	7.118
30	2020	0.347	0.030	1.078	0.827	0.285	7.125
31	2016	0.310	0.020	1.524	0.621	0.168	7.198
31	2017	0.357	0.040	1.488	1.249	0.173	7.279

DT-SACCO	Year	Efficiency (Ratio)	Credit risk (Ratio)	Liquidity risk (Ratio)	Operating risk (Ratio)	Capital adequacy (Ratio)	Firm size
31	2018	0.369	0.060	1.098	0.998	0.222	7.338
31	2019	0.683	0.230	1.086	1.424	0.225	7.416
31	2020	0.679	0.030	2.369	1.520	0.373	7.426
32	2016	0.594	0.030	2.271	0.553	0.206	6.505
32	2017	0.763	0.100	1.838	0.735	0.247	7.511
32	2018	0.754	0.030	2.358	0.548	0.233	7.538
32	2019	0.369	0.040	2.522	0.832	0.165	7.508
32	2020	0.683	0.040	1.310	1.234	0.144	7.640
33	2016	0.679	0.100	1.175	0.853	0.172	7.651
33	2017	0.906	0.000	1.170	0.936	0.187	8.390
33	2018	0.889	0.030	1.167	0.704	0.181	8.480
33	2019	0.530	0.080	1.138	1.576	0.168	8.528
33	2020	0.526	0.030	2.564	1.539	0.172	8.572
34	2016	0.537	0.000	1.042	2.212	0.198	8.626
34	2017	0.452	0.000	1.059	2.227	0.212	7.673
34	2018	0.403	0.110	1.112	2.267	0.209	7.797
34	2019	0.046	0.100	1.125	3.011	0.185	7.617
34	2020	0.075	0.090	1.061	1.263	0.195	7.675
35	2016	0.075	0.160	1.159	1.153	0.107	7.686
35	2017	0.084	0.190	1.144	1.068	0.175	7.125
35	2018	0.364	0.230	1.145	0.722	0.163	7.092
35	2019	0.560	0.190	1.094	0.520	0.127	7.102

DT-SACCO	Year	Efficiency (Ratio)	Credit risk (Ratio)	Liquidity risk (Ratio)	Operating risk (Ratio)	Capital adequacy (Ratio)	Firm size
35	2020	0.524	0.260	1.033	1.152	0.220	7.169
36	2016	0.526	0.270	1.271	0.998	0.277	7.165
36	2017	0.555	0.230	1.278	0.828	0.216	7.469
36	2018	0.025	0.220	1.172	0.831	0.223	7.421
36	2019	0.718	0.060	1.166	0.625	0.291	7.434
36	2020	0.710	0.230	1.533	0.904	0.211	7.441
37	2016	0.636	0.120	1.623	0.695	0.586	7.458
37	2017	0.567	0.050	1.638	0.759	0.238	7.102
37	2018	0.491	0.060	1.605	1.151	0.387	7.097
37	2019	0.492	0.050	1.505	0.499	0.388	7.090
37	2020	0.448	0.090	1.265	0.616	0.332	7.118
38	2016	0.423	0.130	1.287	0.918	0.291	7.125
38	2017	0.437	0.170	1.278	1.343	0.172	7.198
38	2018	0.486	0.120	1.222	1.610	0.255	7.279
38	2019	0.392	0.040	1.169	1.804	0.227	7.338
38	2020	0.280	0.030	1.125	1.646	0.211	7.416
39	2016	0.530	0.040	1.100	1.357	0.159	7.426
39	2017	0.468	0.050	1.042	0.588	0.164	8.216
39	2018	0.450	0.039	1.240	1.054	0.162	8.248
39	2019	0.442	0.039	2.262	1.592	0.158	8.287
39	2020	0.341	0.036	2.933	2.182	0.160	8.293
40	2016	0.283	0.028	3.534	1.610	1.880	7.027

DT-SACCO	Year	Efficiency (Ratio)	Credit risk (Ratio)	Liquidity risk (Ratio)	Operating risk (Ratio)	Capital adequacy (Ratio)	Firm size
40	2017	0.400	0.050	2.500	1.804	1.962	7.000
40	2018	0.318	0.039	3.145	0.853	0.305	6.977
40	2019	0.399	0.039	2.506	0.936	0.323	6.937
40	2020	0.400	0.036	2.500	1.111	0.347	6.934
41	2016	0.335	0.028	2.985	1.424	0.160	6.858
41	2017	0.326	0.045	3.067	1.520	0.184	6.861
41	2018	0.338	0.045	2.959	0.553	0.179	6.961
41	2019	0.376	0.047	2.660	0.735	0.180	7.039
41	2020	0.337	0.028	2.967	0.548	0.164	7.118
42	2016	0.460	0.037	2.174	0.832	0.394	8.338
42	2017	0.679	0.042	1.473	1.234	0.423	8.424
42	2018	0.414	0.041	2.415	0.853	0.457	8.414
42	2019	0.737	0.043	1.357	0.936	0.540	8.456
42	2020	0.546	0.039	1.832	0.704	0.439	8.486
43	2016	0.390	0.036	2.564	1.576	0.273	8.338
43	2017	0.440	0.014	2.941	1.539	0.283	8.424
43	2018	0.420	0.007	2.381	2.212	0.264	6.761
43	2019	0.380	0.010	2.632	2.227	0.256	6.794
43	2020	0.230	0.001	4.348	2.267	0.276	8.288