THE INFLUENCE OF MEMBERS' INCOME AND CONDUCT OF SACCOS IN THE RELATIONSHIP BETWEEN CHARACTERISTICS AND EFFICIENCY OF SACCOS IN KENYA

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DECLARATION

I hereby declare that the work contained in this proposal is my original work, and has not previously in part or in its entirety been presented at any other university towards the award of a degree. All materials referred to have been duly acknowledged.

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I however bear personal responsibility for errors, if any, and shortcomings of this thesis.

DEDICATION

This PhD Thesis is dedicated to three parties:

My parents:	Wanjiku and Mwangi.
The founders of Starehe Boys' Centre:	Dr. Griffin, Mr. Geturo and Mr. Gikubu.
My immediate family:	Njeri, Mwangi, Wanjiku and Muchiri.

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ABBREVIATIONS

CBK	-	Central Bank of Kenya
CFI	-	Cooperative Financial Institution
CU	-	Credit Union
DEA	-	Data Envelopment Analysis
DFA	-	Deterministic Frontier Analysis
DMU	-	Decision Making Unit
DTM	-	Deposit Taking Micro-Finance Institution
FDH	-	Free Disposal Hull
FOSA	-	Front Office Services Activity
ICA	-	International Co-operatives Alliance
ICT	-	Information, Communication and Technology
IFAC	-	International Federation of Accountants
KERUSSU	-	Kenya Rural Savings and Credit Co-operative Societies Union
KUSCCO	-	Kenya Union of Savings and Credit Co-operative Society
MOCDM	-	Ministry of Cooperative Development and Marketing
OECD	-	Organization for Economic Co-operation and Development
OSDEA	-	Open Source DEA
SACCO	-	Savings and Credit Co-operative Society
SASRA	-	SACCO Societies Regulatory Authority
SFA	-	Stochastic Frontier Approach
KShs	-	Kenya Shillings
SPSS	-	Statistical Package for Social Sciences

TFA	-	Thick Frontier Approach
UK	-	United Kingdom
USD	-	United States Dollars
WOCCU	-	World Council of Credit Unions

ABSTRACT

Efficiency of SACCOs is affected by various characteristics such as size, age, bond of association, adoption of technology and managerial competency. The relationship can be influenced by appropriate moderating and intervening variables. This study therefore sought to establish how members' income and conduct of SACCOs affects the relationship between characteristics and efficiency of SACCOs in Kenya. The specific objectives were to determine the relationship between SACCO characteristics and efficiency; establish the moderating influence of the income of members in the relationship between characteristics and efficiency; and determine the intervening influence of conduct in the relationship between characteristics and efficiency. The study targeted all SACCOs that are regulated by SASRA for the period 2009 - 2013. DEA was used to compute efficiency with inputs being member deposits and borrowings; interest/dividend on member deposits and cost of borrowings; staff costs; and other operating expenses (such as rent payable, communication costs, office consumables). Outputs were loans to members and other earning assets (such as interest yielding bank deposits, treasury bills and bonds; investment in rental property; and shares); interest income; and other income (includes interest from bank deposits, treasury bills and bonds; rent from investment property; dividends from shares; money transfer and withdrawal charges). Multiple regression analysis between efficiency, characteristics and conduct was carried out. The study findings were that characteristics (specifically size and age) have a significant positive effect on efficiency of SACCOs and this relationship (for size only) is moderated by the income of members. Increase in size results in improved efficiency and, the older the SACCO the higher the efficiency. The higher the income of members, the stronger the relationship between size and efficiency. Efficiency was negatively related to strength of bond of association, possibly because weakening of the bond would be associated with increase in size, which contributes to increased efficiency. Adoption of technology had a negative relationship with efficiency, with a probable reason being low levels of computerisation of the SACCOs. Managerial competency was not significantly related to efficiency. This might be due to that SACCOs are not very complex entities and therefore the cost of additional competency may not yield payoffs that are greater than the extra expense. The main academic contribution of the study is the finding that income of members moderates the characteristics-efficiency relationship. This means that the results of empirical investigations of the relationship between size and efficiency are improved if the analysis is carried out separately for entities falling in different member income strata. Stratification would not improve the relationship between efficiency and age, bond of association, managerial competency and adoption of technology. Conduct of SACCO was found not to be a significant intervening variable between characteristics and efficiency. The study recommends policy interventions geared towards nurturing existing SACCOs with a view to increasing their size. This can be through setting a minimum size threshold that would necessitate existing SACCOs to merge and making it difficult for new ones to be established. Members and managers should on their own volition also pursue the increase in size strategy, through recruitment of more members or even merging with other SACCOs.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Co-operatives are autonomous associations of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through jointly owned and democratically controlled enterprises (Birchall, 2004). Co-operatives are thus firms whose products and services are meant for the consumption of their members. Co-operatives differ in the type of products and services they provide to their members and these could include financial services, and processing and marketing of products. Co-operatives are guided by the co-operative principles, namely voluntary and open membership; democratic member control; member economic participation; autonomy and independence; education, training and information; co-operation among co-operatives; and concern for community (International Co-operatives Alliance, ICA, 1995).

A credit union (CU) is a co-operative that is member-owned, member-patronised and member-managed non-profit financial institution that serves specified members (Wilcox, 2006). McKillop et al., (2007) defined financial co-operatives as those that provide basic financial services to individuals. Different countries use different terms to refer to credit unions. In Kenya, CUs are referred to as savings and credit co-operative societies (SACCOs).

1.1.1 Efficiency of SACCOs

Fried et al. (1993) explained that SACCOs differ from commercial banks in two key respects. The first is with regard to their objectives whereby that of SACCOs is availing primarily savings and credit to owners; while for commercial banks the overriding objective is shareholder returns. The second is the owner-customer relationship, whereby for SACCOs the owners are the customers, while for commercial banks the customers are predominantly non-owners. Due to this, the performance measurement approaches for the two types of institutions are different- predominantly return on assets and equity for commercial banks; and efficiency for SACCOs. Due to the fact that SACCOs' primary objective is the maximization of member-owner benefits, their performance assessment has favoured efficiency approaches, such as data envelopment analysis (DEA).

Institutional efficiency refers to the relationship between attainment of organizational objectives and the resources utilised. It is a measure of the extent to which a specific entity's quantity of outputs for given inputs differs from the outputs to inputs of the best performing entity in the industry or cluster being considered. Technical efficiency refers to the extent to which an organization produces a quantity of outputs such as revenues from some specified inputs such as various costs. It is the adoption of the most technologically efficient manner so as to maximize the outputs from some given inputs. Allocative efficiency refers to the degree in which a firm utilizes the inputs in various ratios while taking into account available technology and prices. It is maximizing outputs by selecting different technically efficient combinations of inputs. Technical and

allocative efficiency when considered together yield economic efficiency, also called productive efficiency (Farrell, 1957; Worthington, 2009).

Several methods are used in order to measure efficiency. Data envelopment analysis (DEA) and free disposal hull (FDH) are two such measures that are non-parametric frontier approaches. They are based on technical efficiency. When efficiency of firms or branches within a firm is benchmarked to the best performers in order to isolate aspects of output underproduction or input overuse in the entities it is referred to as frontier analysis. This is because the objective is to identify the location of the entities in relation to the most efficient frontier derived from the pool under consideration. Hence, efficiency from the frontier perspective is a concept of relativity (Berger and Humphrey, 1997).

1.1.2 SACCO Characteristics

SACCO characteristics are the internal factors of the organisation that may be expected to have an effect on its efficiency. These include bond of association among SACCO members, size of SACCO, managerial competency, adoption of technology and age of SACCO. Common bond in SACCOs refers to issues such as same employer, close residential geography, similar religious belief, or belonging to one social organisation. A strong bond is expected to make members feel greater social pressure to repay loans. A stronger common bond entity would have more accurate information of loan applicants and more interaction of members reduces the monitoring cost of a borrower (Esho, 2001).

As organizations grow, the fixed costs are spread over larger business volumes. Further, additional efficiencies may accrue from labour specialization that may take place in bigger firms. Consequently, efficiency is expected to rise with increase in firm size. For young firms, increase in age results in increase in size and hence a rise in efficiency (Ward and Mckillop, 2005; Gual and Clemente, 1999). The resource based view of organizations posits that performance is influenced by a firm's core resources and competencies. Key among these is managerial competency (Carmeli, 2001). Managerial competency includes the knowledge and experience of organizational managers. Firms, including SACCOs, with greater managerial competency would be expected to have better performance.

Kozak (2005) and Hancock at al. (1999) noted that the information, communication and technology (ICT) revolution has resulted in significant cost reductions as it has assisted systematise operations that were previously being carried out manually. Increased adoption of ICT improves the methods of communication and transaction processing procedures employed by financial institutions. The increased use of ICT enables financial institutions provide services at faster speeds, lower costs and results in them being more efficient.

1.1.3 Income of Members

Members with high income levels would tend to engage in large transactions. This would in turn reduce the unit cost of processing their transactions. Consequently, the higher the

level of income of the members of SACCOs, the lower the relative inefficiency of the institutions (Ward and Mckillop, 2005; Zohir and Matin, 2004). The link between member income and firm performance may also be viewed from the effect of transaction size on the relationships between efficiency and other factors.

Improvement in transaction processing technology yields more benefits to firms with many small transactions than those with few large transactions as their labour and operating expenses per unit are higher (Ekata, 2012). Therefore firms whose members have less income and hence engage in smaller transactions gain more labour productivity and efficiency from additional technology deployment. Higher income level of members (larger transaction size) would have a positive effect on the size-efficiency and managerial competence-efficiency relationships. Member income would have no effect on the bond of association -efficiency and age-efficiency relationships. Hirtle and Stiroh (2007) argue that retail and corporate commercial banks performance is affected differently by their respective characteristics. It is this distinction in commercial banking, represented by income levels of SACCO members, that informed the choice of the characteristic to designate as the moderating variable. The retail commercial banks with relatively lower transaction sizes have higher unit costs than the corporate banks. Similarly, SACCOs whose members have higher incomes would be more efficient than those whose members have lower incomes.

1.1.4 Conduct of SACCOs

The way that organisations carry out their various activities in the fulfillment of their mission is also referred as their conduct (International Federation of Accountants, IFAC 2007). The relationship between different aspects of conduct of SACCOs (such as how they charge interest to borrowers or offer interest to savers; process transactions; introduce new products or innovate; offer various services; or manage loan defaults) and their performance has been investigated by various researchers. Conduct of SACCO hence refers to the interim effect of SACCO characteristics before the final outcome, efficiency. For example, having more qualified management results in them being more innovative in their actions which in turn would lead to increased efficiency of the SACCO. The other SACCO conduct aspects are member loan guarantee costs, economies of scope, speed of processing transactions and saver-borrower domination, respectively corresponding to the SACCO characteristic of bond of association among SACCO members, size of SACCO, adoption of technology and age of SACCO (Bressan et al., 2012 and Goddard et al., 2008.). The link between the respective variables is briefly discussed.

In the event of a borrower from a SACCO defaulting, the loss is borne by the members who had guaranteed the loan or the SACCO itself. Member loan guarantee costs are influenced by the strength of bond of association among the members. A stronger bond of association among the members of a lending entity would tend to reduce costs associated with dealing with challenges of information asymmetry such as borrower monitoring

costs. Stronger bond lenders may be more efficient since they make fewer bad loans, spend less time and effort processing loan applications and monitoring loans. Consequently, the stronger the bond of association among the members of the lender, the lower the loan default rate and consequently the higher the relative efficiency (Ward and Mckillop, 2005; Brown et al., 1999).

Firms avail to themselves economies of scope when they add new products or services as the marginal costs of these additions are lower than the increase in revenues since they will utilize already existing infrastructure. Indeed, in organizations there may exist slack in the processes that deliver existing products and services. In such instances, adding more products and services to utilize such slack or even to piggy-back on existing infrastructure may result in increased efficiencies with rise in economies of scope. Increase in size would be directly related to increase in a firms' economies of scope (Goddard et al., 2008; Murray and White, 1983).

Innovation of management refers to how they influence the organization in order for it to adapt, for example in introducing new products and services, in order to satisfy member needs (Tether, 2003). Innovation of management is influenced by managerial competency whereby the higher the competency the more the innovation, which in turn leads to firms' improved performance (Basterretxea and Martinez, 2012).

The SACCO interacts with its members through it processing their various transactions such as receiving and crediting their accounts with their savings; loan application handling; receiving and applying funds to their loan accounts. These transactions are processed by employees using various work tools. Transactions processing is affected by the adoption of technology. Increased automation leads to more transactions being processed by an equal number of employees or same number of employees serving more members and hence firms availing services at a greater efficiency. Technology coupled with financial innovation enables financial institutions offer new products and services or offer existing ones at lower costs (Chowdhury, 2003).

Saver-borrower domination refers to the extent to which the savers in a SACCO receive more benefits than the borrowers. Saver-borrower domination is affected by the age of the SACCO. Co-operators initially form SACCOs in order to deal with challenges of accessing credit from traditional sources such as commercial banks. Younger SACCOs may therefore be more borrower oriented. As the SACCOs grow older, and the members too, these co-operators appetite for credit may diminish and be replaced by a desire to earn high returns on savings – which at this time are also relatively high. Hence, the older the SACCO, the more likely it is to be saver dominated (Bressan et al., 2012).

1.1.5 SACCOS in Kenya

The economic role of SACCOs in Kenya is capital accumulation through mobilisation of savings. Some of these savings are then channelled to investments which generate

economic growth and ultimately economic development. The key functions of a SACCO are mobilisation of savings and extending of credit to members. The total savings in SACCOs in Kenya as at December 2012 were KShs 213 billion, while loans were KShs 221 billion. Some of the SACCOs also offer training to members and to a small extent seek funds from non-members in addition to investing in various financial instruments (Cheruiyot et al., 2012; SASRA, 2012).

The co-operative sector in Kenya was first regulated by the Co-operative Societies Act, Cap. 490 of 1966 (Republic of Kenya, 1966). This was then replaced by the Co-operative Societies Act Chapter 12 of 1997 (Republic of Kenya, 1997). This was then amended to give rise to the Co-operative Societies (Amendment) Act of 2004 (Republic of Kenya, 2004).

In the year 2008, a specific legislation for the SACCO sector, The SACCO Societies Act of 2008 (Republic of Kenya, 2008), was enacted. The Act provides for the licensing, regulation, supervision and promotion of savings and credit co-operatives by the SACCO Societies Regulatory Authority (SASRA). Thus, this Act provides for the establishment of the SACCO Societies Regulatory Authority whose functions include licensing SACCOs to carry out deposit-taking business as well as regulating and supervising SACCOs. With regard to licensing, a SACCO would require to have registered as a co-operative under the Co-operative Societies Act, 1997. Thereafter, the SACCO would obtain a license from SASRA to carry out deposit-taking business (known as Front Office

Services Activity (FOSA) after fulfilling a raft of conditions, which include meeting the minimum capital requirement. Upon being licensed, the SACCO is required to engage only in the business prescribed by SASRA.

Active SACCOs in Kenya are estimated to be about 1,700. Some key statistics for the year 2012 at the SACCO level, with comparators for commercial banks are shown in Table 1.1.

Table 1.1: Selected Performance Comparative Statistics

Performance item	**Deposit taking SACCOs**	**Other SACCOs**	**All SACCOs**	**Commercial banks**
Members/Customers	2,544,001	425,566	2,969,567	15,861,417
Total net assets (KShs millions)	223,535	70,292	293,827	2,330,335
Average members/customers per entity	11,833	289	1,758	368,870
Average total net assets per entity (KShs millions)	1,040	48	174	54,194
Average net assets per member/customer (KShs)	87,867	165,173	98,946	146,918

(Sources: SASRA, 2012; and Central Bank of Kenya, CBK, 2012)

The average size of the SACCO is relatively small at an average membership of less than 2,000, that is about 200 times smaller on the same measure to commercial banks in

Kenya. The total net assets at KShs 174 million, the average SACCO is about 300 times smaller than the average commercial bank. Within the SACCOs, the disparities are equally substantial. The larger SACCOs are, by average number of members, 40 times bigger than the smaller ones (which in number are 7 times the larger ones). The bulk of the SACCOs, which are small, have average assets of only KShs 48 million, compared with KShs 1,040 million for the larger ones. With such performance differences among the SACCOs, it would be useful to critically evaluate not just the performance but also what contributes to performance.

For a perspective on the global situation, some statistics are included as Appendix 1. As can be noted there are more than 50,000 CUs worldwide, with assets of about US$ 1.7 trillion. Based on assets, Kenya is 12th globally. It is however first in Africa, while Senegal is second. Statistics for Tanzania, Uganda, South Africa and Britain are included for perspective purposes as the total assets and the penetration rates (credit union members/economically active population, that is 15-64 years of age) in those respective countries are significantly lower than those of Kenya.

The relatively small size of SACCOs, among other characteristics, makes these entities encounter several challenges. The roles of the board and employees is not clearly delineated and in many instances the boards get too heavily involved in administrative matters. This hinders the ability of employees to be effective. The elected officials may also not be technically competent to effectively execute operational matters. They may

also not have the capacity to effectively oversee the employees. The level of business process automation remains very low and this hinders productivity and efficiency. Due to the generally small size, the SACCOs have significant resource constraints for investment in suitably qualified personnel and other business inputs (SACCO Societies Regulatory Authority, SASRA, 2012; Owen 2007).

1.2 Research Problem

SACCOs in Kenya number about 1,700 and provide financial services, especially savings mobilization and loan creation to about 3 million people (SASRA, 2012. Their continued existence is therefore critical. Further, in these entities encounter significant challenges some of which relate to their relatively small sizes, including low resource base; elected boards not being technically competent and who also carry out operational functions; lowly qualified employees; and inadequate information processing systems (SACCO Societies Regulatory Authority, SASRA, 2012; Owen 2007). From a global perspective, SACCOs are an important component of the financial system with assets of 1.7 trillion dollars in December, 2012 (WOCCU, 2012). From both a Kenyan and global perspective, it is therefore important to assess the performance of these organizations especially with a view to isolating those factors that contribute to good performance.

The efficiency of SACCOs is theoretically expected to be related to various factors such as strength of the bond of association among the members, size of entity, managerial competency, degree of adoption of technology and age of the SACCO. Some of the

studies carried out on the performance of SACCOs and their characteristics have yielded either conflicting results or results not in line with theoretically expected relationships. Theoretically the relationship between efficiency and size is a positive one in that due to harnessing economies of scale, larger SACCOs would be more efficient than smaller ones. A positive relationship between efficiency and size was found by Ward and Mckillop (2005) who studied the link between performance of UK credit unions and size, age, income of members. Gual and Clemente (1999) in a study of relationship between efficiency and size of Spanish co-operative banks also found a positive effect. Worthington (1998a) in an assessment of effect of size among other determinants on efficiency of Australian CUs found a positive relationship. Esho (2001) in a study between efficiency, size and other determinants of Australian CUs found a negative relationship. Similarly Crapp (1983) found a negative efficiency-size relationship for US CUs. Fried et al. (1993) found no relationship between size and efficiency for US CUs.. Consequently, due to the mixed nature of empirical results there exists a research gap to continue empirically testing the hypothesized efficiency-characteristic relationships until the matter is settled.

The existing empirical studies have modeled efficiency as a dependent variable and characteristics as independent variables. That is useful and informative. However, the power of an independent variable to predict a dependent variable is improved if an appropriate moderating variable is introduced. Therefore although income of members can be related to SACCO performance, its effect can also be assessed with regard to how

it moderates the relationship between the other factors and SACCO efficiency. The effect of the independent variable on the dependent variable is through intervening factors. Specifically, the SACCO characteristic effect on efficiency is through respective intervening variables of member loan guarantee costs, economies of scope, innovation of management, volume of transactions processed and saver-borrower domination. Research gaps numbers two and three can therefore be identified. Research gap number two is the empirical investigation of the role of a selected moderating variable such as member income on the efficiency-characteristic relationship. The third research gap is the investigation of existence of suitable intervening variables between characteristics and efficiency.

The local studies focussing on Kenya such as Njoroge (2008) (who assessed the relationship between financial performance and selected determinants); Kilonzi (2012) (who determined the impact of SASRA regulations on financial performance); Njenga (2012) (who assessed the relationship between agency cost and financial performance); Karanja (2013) (who assessed the relationship between size and performance); Njagi et al (2013) (who assessed the effect of a SACCO operating a FOSA on financial performance) and Nyambere (2013) (who established the effect of credit risk management on financial performance); used financial performance as the dependent variable. Financial performance is not an appropriate measure for SACCOs since the objectives of the organisations is not profit maximisation. Therefore these studies did not address the three identified empirical research gaps.

The three research gaps therefore are the need to investigate further the relationship between efficiency and SACCO characteristics, such as size, bond of association, managerial competency, adoption of technology and age. The second is the determination of how characteristics-efficiency relationships are moderated by other factors such as income level of members. The third gap is how the characteristics-efficiency relationships are intervened by other factors such as conduct of SACCO. Further empirical work therefore requires to be carried out in order to fill these research gaps. This study was therefore carried out with a view to answering the question: does the income of members and conduct of SACCOs influence the relationship between characteristics and efficiency of SACCOs in Kenya?

1.3 Research Questions

The specific questions are:

i. Is there a significant relationship between efficiency of SACCOs and SACCO characteristics?
ii. Does the income of members of the SACCO significantly affect the relationship between SACCO characteristics and efficiency of SACCOs?
iii. Does the SACCO conduct significantly influence the relationship between SACCO characteristics and efficiency of SACCOs?
iv. Do SACCO characteristics, income of members and SACCO conduct jointly significantly affect the efficiency of SACCOs?

1.4 Research Objectives

The main objective of the study is to establish how the characteristics – efficiency relationship of SACCOs in Kenya is affected by SACCO members' income and conduct of SACCOs. The specific objectives are to:

i. Determine the relationship between SACCO characteristics and efficiency of SACCOs in Kenya.
ii. Establish the moderating effect of the income of members on the relationship between SACCO characteristics and the efficiency of SACCOs.
iii. Determine the intervening influence of conduct of SACCOs on the relationship between SACCO characteristics and the efficiency of SACCOs.
iv. Establish the joint effect of SACCO characteristics, income of members and SACCO conduct on the efficiency of SACCOs.

1.5 Value of the Study

A key contribution of the study is methodological. Firstly, it established whether the income levels of SACCO members have a moderating effect on the efficiency-characteristics relationships. Secondly, it examined if the intervening variable of conduct of SACCOs had an influence on the efficiency-characteristics relationships. While efficiency-characteristics have been studied, the intermediate step has not been modeled. Thirdly, the evidence regarding the relationships between efficiency and characteristics of SACCOs is yet to be conclusive. Further, the joint effect of SACCO characteristics, income of members and SACCO conduct on the efficiency of SACCOs, which has

previously not been studied, was determined. This study contributed empirically to the efficiency-factors debate and especially since it was conducted in an environment that is different from where the bulk of the other studies have been undertaken.

One strand of the theory of financial intermediation as to the role of financial institutions is that they reduce adverse selection and moral hazard risks inherent in financial transactions. Another is that financial institutions reduce transaction costs. This study assessed whether those arguments are valid by modeling bond of association (expected to reduce cost of dealing with adverse selection and moral hazard risks) against efficiency. Further, it provided evidence relating to the transaction cost argument by relating characteristics (size, managerial competency and adoption of technology) expected to lower costs to efficiency.

Some of the key stakeholders of SACCOs include the policy makers/regulators, members and management. The main interest of the policy makers is to have the role of SACCOs in economic development enhanced. They would achieve this by policy intervention that targets characteristics of SACCOs, which in turn would be expected to improve performance of these organisations. Consequently, in order to do this, policy makers would require to know the characteristics of the 'good' performing SACCOs so as to decide on the appropriate policy interventions that would result in the enhanced performance of these economic actors. One of the key results from the study is clear identification of the characteristics of not only the 'good' but also the 'poor' performers.

For example if size is significantly related to performance, then a policy geared towards encouraging consolidation could be adopted. The results can also inform government policy by indicating effects of proposed aspects of regulation on performance of SACCOS.

Not all the characteristics that may be found to have a positive effect on efficiency of SACCO can be influenced through policy intervention. Some would require the actions of members and managers. The study findings would be expected to assist members and managers improve organisational performance by identifying factors that contribute significantly to efficiency. For example, if adoption of technology is positively related to efficiency, managers could endeavour to increase the level of computerisation of the SACCO. Existing SACCO members would also influence the performance of their institution by asking their elected officials to adopt strategies that could yield a more beneficial characteristic, such as a merger, if size is positively related to efficiency.

1.6 Organisation of the Thesis

Chapter one is the introduction and contains the background to the study; explains what the research problem is; the research questions that the study seeks to answer; objectives of the study; value of the study and how the thesis is organized. Chapter two discusses the principles that guide the relationships among members of SACCOs. Three theories, theory of financial intermediation, agency theory and asymmetrical information paradigm are reviewed in order to further inform expected relationships among study variables.

Several firm performance measures are discussed, that is parametric (stochastic frontier approach, deterministic frontier analysis, and thick frontier approach) and non-parametric ones (data envelopment analysis and free disposal hull). Selected empirical studies are then reviewed with an aim of isolating the research gap. The conceptual model that guides the study is included. The chapter ends with the three main research hypotheses and their respective sub-hypotheses.

Chapter three discusses the research philosophy that guided the study; the research design; the population and sample of the study; how the variables were operationalised and measured; sources and collection of data; data validity and reliability considerations; and an explanation of how the data was analysed. Chapter four covers the study response rate and then provides the descriptive statistics of the study variables (bond of association among SACCO members, size of SACCO, managerial competency, adoption of technology, age of SACCO, member loan guarantee costs, economies of scope, innovation of management, transactions processing, saver-borrower domination, and income level of members of SACCOs) by way of frequency tables, frequency histograms or pie-charts. It also contains the DEA study results of efficiency of SACCOs.

Chapter five focuses on testing of the research hypotheses. It contains the results of correlation analysis where inter-relationships among twelve study variables were examined. Included are then results of regression analysis for assessing the relationship between efficiency of SACCO and SACCO characteristics; moderating effect of the

income of SACCO members and the intervening effect of the conduct of SACCOs. The research findings are then discussed. Chapter six contains the summary of findings with regard to the research hypotheses. The conclusions, that is the meaning of the research finding for each of the objectives of the study are discussed. The chapter highlights various contributions to knowledge and recommendations for policy and practice. The study has several limitations, and these are explained. Finally, some areas for further research are suggested.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the principles that guide the relationships among members of SACCOs. Three theories, theory of financial intermediation, agency theory and asymmetrical information paradigm are reviewed in order to further inform expected relationships among study variables. Several firm performance measures are discussed, that is parametric (stochastic frontier approach, deterministic frontier analysis, and thick frontier approach) and non-parametric ones (data envelopment analysis and free disposal hull). Selected empirical studies are then reviewed with an aim of further indicating the research gap. The conceptual model that guided the study is included. The chapter ends with the three main research hypotheses and their respective sub-hypotheses.

2.2 Principles of SACCOs

The economies of the world can be divided into three: the centrally managed planned economy or public sector; the market economy underpinned by the market forces of supply and demand; and the social economy that is the user-oriented economic system. The social economy includes economic entities that are characterized by that they are private; their members join voluntarily; they embody collective aims (social objectives, jobs, members' welfare, continuity of the organization, etc); have different priorities over profit; the interaction between members is not hierarchical; there is a predominance of the human element; their overall objective is the satisfaction of members' needs; their

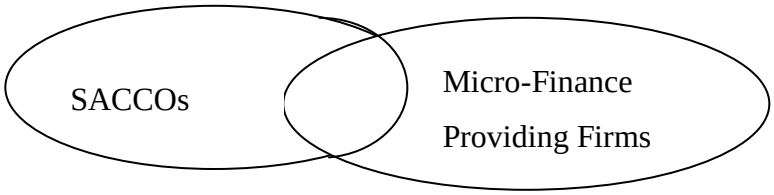
institutional principle is democratic, that is one member one vote. This makes the social economy organizations radically different from the state and capitalist sectors (Guadano, 2006; Chaddad and Cook, 2004; and Carpi, 1997). Co-operatives belong to the third economic system (Ahlander, 2001; Anheir and Avner, 1997). Co-operatives existence arose as a reaction to the harsh conditions dictated by capitalism (Campos, 1997).

The public and market economies are by and large assumed to be inhabited by rational economic value maximizing entities. In the social economy, significant value is placed on social interactions of the people, such as belonging to families, clans, tribes, friendships, neighbourhood communities, work groups, peer groups, alumni networks, clubs and societies, religious congregations. The key driving forces of the social economy entities are personal relations, ethics and trust, in contrast to maximisation of political power and money, the key driving forces of the political and market economies respectively (Carpi, 1997; Chaddad and Cook, 2004). The members of these groups gain by belonging to the social economy through accessing benefits of interdependence. The standard economic models may therefore not be completely applicable in analyzing the social economy (Ash, 2000). The main reason for this is that the organizations in the social economy, such as co-operatives, may in addition to the standard economic objectives (where organizations owned by capitalists aim to maximize profits for the firms and maximize wealth for the investors) seek to fulfill social objectives (Bartlett et al., 1992).

McKillop et al. (2007) defined financial co-operatives as those co-operatives that provide basic financial services to individuals of modest means. The goal of a financial co-operative is to act on behalf of a unified group as a traditional banking institution. These institutions attempt to differentiate themselves by offering above-average service along with competitive rates in the areas of insurance, lending and investment dealings. Credit unions are member-owned, member-patronised and member-managed non-profit financial institutions that serve specified members as co-operatives (Wilcox, 2006; Boldin et al., 1998). Bickle and Wilkins (2000) stated that credit unions are organizations that are guided by co-operative principles.

It is useful to distinguish between SACCOs and micro-finance institutions. As brought out by Aduda (2009), micro-finance in Kenya is provided by many types of institutions, including SACCOs. Many of the firms that provide micro-finance services and products are commercial enterprises (for example commercial banks), Non-Governmental Organizations (NGOs) and other types of organizations that do not subscribe or adhere to the co-operative principles. Some SACCOs do cater for the more affluent members of society and provide their customers with non micro-finance products. Therefore there is an intersection between SACCOs in Kenya and organizations that provide micro-finance products and services, as shown in Figure 2.1.

Figure 2.1: Relationship Between SACCOs and Micro-Finance Providing Firms



Source: Illustration by the Author

Different countries use different terms to refer to Cooperative Financial Institutions (CFIs), for example ‘‘Caisses populaires’’ in West and Central Africa; ‘‘Cooperativas de ahorro y credito’’ in Latin America; credit unions in UK, USA, Canada, Australia. In Kenya, CFIs are referred to as savings and credit co-operative societies (SACCOs) (Cuevas and Fischer, 2006; Desrochers and Fischer, 2005).

One of the principles that guide co-operatives and therefore also SACCOs is voluntary and open membership. Credit unions do not discriminate among those who wish to be members on the basis of gender, social, racial, political or political considerations. They welcome all that seek their services so long as they are willing to abide by the membership conditions (Nilsson, 1996). The tendency of SACCOS to draw members from a pool with a common-bond appears not to fully be in line with this principle. Further, this may restrict the size of the SACCO and thereby reduce the potential benefit of economies of scale emanating from growth in size.

ICA (1995) explains that SACCOs are controlled by their members through democratic processes. The members elect representatives, who are accountable to them, to manage

and oversee the institution on their behalf. Generally, the voting principle is one member, one vote. The one-member one-vote principle effectively reduces the potential for the existence of an anchor or dominant party based on “shareholding”. This could potentially reduce the oversight by the members of the elected representatives. Further, the need to have the board of directors elected from members reduces the potential pool for the SACCO to draw talent from. This could lead to less than optimal governance of the SACCO, especially if the SACCO members are drawn from a pool of persons who are not properly exposed on how to lead organizations.

Members are supposed to participate economically in the operations of the SACCO. Members are expected to contribute to the institutional capital of the organisation equitably, usually with no return accruing to these resources. The earnings from these funds are retained in the institution for the benefit of current and future members. Members engage in economic transactions with the organization by patronizing the various services and products on offer. Any surpluses to the institution emanating from these transactions are retained or otherwise utilized, for example in offering training, for the benefit of all members. They may also be distributed to members using a ratio of the volume of transactions between the institution and the member (Nilsson, 1996). In a company, shareholders can transfer their shares to another investor through sale of shares. The price reflects the current and future potential of the firm. In SACCOs a member withdrawing only obtains a refund of their shares. The cumulative surplus is not allocated

to the members and hence leaves value in the SACCO. This represents an intergenerational transfer of wealth for free.

SACCOs are autonomous, independent and endevour to avoid control by other institutions, including governments, in their transactions. They attempt to remain under the democratic control of their members (ICA, 1995). While this principle aims at protecting co-operatives from interference, in practice governments do interfere. For example in Kenya, co-operatives' employees and directors are treated as public officials for purposes of application of the Public Officers Ethics Act.

SACCOs believe in education, training and information sharing. SACCOs train their members and employees to increase their ability to participate in the development of the institution. The principle aims at increasing the enlightenment of its members. An issue that this may bring up is the equity of using SACCO funds to finance education of members who are less enlightened while the more enlightened may not consume the training (ICA, 1995; and Nilsson, 1996).

Co-operatives recognize the value of co-operation among themselves. SACCOs enhance their value to their members when they collaborate with one another in local, national, regional and international arrangements. This principle appears to generally apply. However, the degree of co-operation varies and some SACCOs are in severe competition with one another (ICA, 1995; and Owen, 2007).

SACCOs subscribe to the principle of showing concern for community. In undertaking their activities, the SACCOs need to take cognizance of the sustainability of the communities in which they operate. This principle is aimed at promoting corporate social responsibility (CSR). To the extent that CSR is beneficial to the institution in the long run, it is a noble principle (Nilsson, 1996). However, some SACCOs' capacity to undertake CSR is limited by financial resources.

2.3 Theoretical Framework

In order to firm up the expected relationships among variables of the study, it is necessary to review some theories. Three theories, the theory of financial intermediation, agency theory and asymmetrical information paradigm are briefly reviewed.

2.3.1 Theory of Financial Intermediation

Financial intermediation refers to the transfer of funds from economic entities with surplus to others with deficit. The institutions that facilitate this are referred to as financial intermediaries as they mediate between the providers and users of funds. The theory of financial intermediation puts forth various arguments for the existence of financial institutions. The theory explains the existence of financial intermediaries based on the existence of information asymmetry, high transaction costs and how regulation is carried out (Allen and Santomero, 1997).

The theory of financial intermediation argues that informational asymmetry between economic entities with surplus and deficit funds generates imperfections in the market. Financial institutions, through screening, help reduce adverse selection. They further put in place debtor monitoring mechanisms in order to deal with the moral hazard aspect of information asymmetry. The second strand of the theory of financial intermediation is based on the argument of transaction costs. Financial institutions, by exploiting economies of scale, are able to reduce the aggregate transaction costs that would be incurred if economic entities were to transact directly with one another. These costs include those that would be incurred in parties searching for one another, selection and monitoring, asset maturity transformation, provision of liquidity, and asset diversification. The third argument hinges on the method of regulation adopted to govern saving and financing in the economy. Regulation reduces the degrees of freedom of financial institutions with regard to what they can or cannot do. For example there may be regulations requiring the financial intermediaries to maintain liquidity levels exceeding specified thresholds and not exceed prescribed deposit to capital ratios (Andries and Cuza, 2009).

The theory of financial intermediation aids in the understanding of the relationship between efficiency and characteristics of financial institutions, including SACCOs. The information asymmetry aspect of the theory would suggest that a stronger bond of association among SACCO members would be accompanied by lower costs of dealing with both adverse selection and moral hazard and this would lead to lower bad debt costs

and hence higher efficiency. The transaction cost strand would imply that increase in size, more adoption of technology and higher managerial competency would all lead to higher efficiency of SACCOs.

2.3.2 Agency Theory

Jensen and Meckling (1976) developed the agency theory framework to highlight the costs associated with the separation of the ownership and control of the firm. The conflict between shareholders and managers can be resolved through the principals monitoring the agents or offering them incentives in order for them to work in the best interest of the principals. A key issue with the theory is that monitoring can be difficult to practically execute and costs associated with the exercise can be non-trivial. Academicians, such as Macho-Staedler and Perez-Castrillo (1997) have suggested that it might be less costly to seek goal congruence between owners and managers. Attaining goal congruence between owners and managers is also difficult especially due to that self-interest may make managers not fully disclose to the owners their true goals. Agency theory is of general application to economic entities but does not focus on the reason for existence of financial institutions.

In proprietary ownership firms, the owners, managers and customers are three distinct parties with checks and balances to reduce the likelihood of managers pursuing their interests at the expense of the shareholders. In SACCOs, the owners are the customers

and also the managers. The checks and balances are thus less and this could lead to a greater likelihood of opportunistic behavior by the managers (Ashton and Letza, 2003).

Managerial competency to SACCO efficiency relationship, one of the issues covered by this study, is guided by agency theory. Because the managers of the SACCO are also members, their goal congruence would be high. Therefore the managers and members would benefit when the SACCO is more efficient. Managerial competence enables the agent make good organizational decisions that would lead to better performance of the SACCO. Agency theory further informs the relationships between managerial decision outcomes or firm conduct and efficiency as the SACCO characteristics effect on performance is through actions of the entity, which are effected through the managers.

2.3.3 Asymmetrical Information Paradigm

The central proposition of this paradigm is that markets are imperfect and economic entities desirous of entering into financial contracts have insufficient information to conclude transactions by themselves. Financial intermediaries would then act as "middlemen" between investors and savers, eliminating the need for information symmetry between those economic entities. The theory is premised on the financial intermediaries' ability to reduce information asymmetry emanating from adverse selection and moral hazard (Scholtens and Wensveen, 2003). Therefore, the reason why financial institutions would exist is because they specialize in screening counter parties to financial transactions and also are adept at monitoring the actions of borrowers to ensure

that the loan agreements are complied with. However, financial intermediaries appear to carry out other functions other than just reduction of information asymmetry associated costs. These functions include risk management, savings aggregation to create big loan. The theory does not therefore fully explain the reason for existence of financial intermediaries as there are other factors besides information asymmetry that motivate existence SACCO.

The asymmetric information theory informs the bond of association to member loan guarantee costs relationship and also these two variables' effect on efficiency. SACCOs intermediate between savers and borrowers. The savers and borrowers are drawn from people generally who share a common bond. This could tend to reduce the level of information asymmetry between the member managed SACCO as compared to commercial banks that draw their borrowers from the wider market.

2.4 Performance Measurement of Organisations

SACCOs are owned and managed by their members in order to offer services to their members. One of their key objectives is to maximise the range of services they avail to their members. The other is to optimise the benefits to members, for example by charging a relatively lower rate of interest as compared to other financial institutions. Consequently, the objective of SACCOs is not to maximise the wealth of their owners. This implies that profit maximisation is not an appropriate organisational objective since there are no significant non-members to exploit. Further, the objectives of borrowers (low

interest rates) and those of savers (high interest rates) will be in conflict and therefore there will not be unanimity of goals between the two categories of key stakeholders. The traditional financial accounting performance measures are used to assess the performance of for profit corporate organisations. Because SACCOs and for profit corporate firms pursue different organisational objectives, the performance measures used for the latter may not be appropriate for the former (Fried et al., 1993; Yeh, 1996).

The performance measures that are in line with the SACCO objectives are efficiency or inefficiency assessments, essentially measuring how well the SACCO maximises benefits to members, for example availing adequate credit at low rates of interest. Inefficiency refers to the extent to which outputs are not maximized for given inputs or inputs are not minimized for specified outputs. This performance measurement is carried out using frontier analysis. Frontier analysis is divided into two categories, parametric and non-parametric. Frontier analysis is a method that benchmarks performance of decision making units (DMUs). The key requirement to use frontier analysis is a specification of the inputs and the outputs in the production process (Berger and Mester, 1997)

2.4.1 Parametric Approaches to Performance Measurement of Firms

There are three key parametric (also referred to as econometric) analysis methods, namely the stochastic frontier approach (SFA), the deterministic frontier analysis (DFA) and the thick frontier approach (TFA). SFA specifies a cost, profit or production function among the inputs, outputs and environmental variables. Actual input data is then used to predict

expected output. The difference between the model predicted output and the actual output is made up of random error (which is assumed to be normally distributed) and production inefficiencies (assumed to be half-normally distributed as they cannot be negative). A key challenge of this approach is the requirement to specify a production function. Further, it is difficult to separate inefficiency from random error (Berger and Humphrey, 1997).

The deterministic frontier analysis also specifies the production function between inputs and outputs. Expected output is then predicted by employing the function with actual input data. The difference, when positive, between the predicted output and the actual output using the production function represents the inefficiency. DFA does not, unlike SFA, make assumptions about the split between model error and inefficiencies. Indeed it assumes that over time model error is zero and hence the deviation between actual output and model predicted output therefore represents inefficiency. Inefficiencies can follow any distribution so long as they are non-negative. DFA faces the same challenge as SFA of the requirement to specify a production function (Worthington, 2009).

The thick frontier approach specifies the production function between inputs and outputs. Expected output is then predicted by employing the function with actual input data for the highest and lowest performance quartiles (stratified by size). The within class deviations of the predicted performance, for the two classes, are assumed to represent random error. The difference between the predicted performance of the highest and lowest quartile is assumed to be inefficiency. No distribution assumptions are made for either the random

error or inefficiency. TFA faces the same challenges as the SFA and DFA of the requirement to specify a production function. It also does not provide efficiency or inefficiency estimates for individual entities, but rather an overall general indication (Berger and Humphrey, 1997).

2.4.2 Non-Parametric Approaches to Performance Measurement of Firms

There are two main non-parametric (also referred to as mathematical programming) frontier approaches, namely the data envelopment analysis (DEA) and the free disposal hull (FDH) methods. DEA is a linear programming methodology that calculates the level of efficiency of a given unit relative to the performance of other units producing the same goods or services. DEA derives a relative ratio consisting of total weighted outputs to total weighted inputs for each institution. The most efficient units then become the relative frontier and the degree of inefficiency of the other units compared to the efficient frontier are then determined. There are no specific rules about what should be designated the input and what should be termed the output. However, the application of DEA requires identification of inputs and outputs that is meaningful within the framework of the DMUs being compared. DEA further requires that the number of DMUs for evaluation should be significantly larger than the sum of the number of inputs and outputs (Berger and Humphrey, 1997; Worthington, 2009).

DEA is used to determine the relative performance amidst multiple inputs and outputs. The DEA method determines the relative efficiency measure for a decision- making unit

by maximizing the ratio of weighted outputs to inputs subject to the condition that ratios for each and every decision-making unit not exceed one. The result is a set of efficiency scores between zero and one for each DMU. This approach is known as output-oriented method as its efficiency score is determined by holding inputs constant and assessing to what extent outputs could potentially be improved. The input-oriented DEA is identical to the output-oriented method except that the objective is to minimize the ratio of weighted inputs to outputs subject to the condition that ratios for every decision-making unit not go lower than one (Berger and Mester, 1997; Berger and Humphrey, 1997).

FDH is similar and a more general version of the DEA approach. While the DEA assumes economic convexity, the FDH does not. It however, requires more data in order for the results of the analysis to be significant and informative. Compared to DEA, FDH generates larger estimates of efficiency. Both approaches are frontier methodologies that determine the uppermost technical efficiency of DMUs and then assesses the relative position or inefficiency of the others (Berger and Humphrey, 1997; Worthington, 2009).

2.4.3 Parametric Versus Non-Parametric Approaches

Non–parametric approaches generally show higher inefficiency levels than the parametric ones (Gual and Clemente, 1999). This is due to the fact that for each output/input combination, a DMU is compared with the best in the sample. The non-parametric approaches seek to assess efficiency of a DMU relative to other firms in the same industry. It is therefore not a requirement to define a production function. All deviations

from the efficient frontier are assumed to be the result of inefficiency. However, the non-parametric approaches ignore that some of the deviations from the efficient frontier could be the result of model misspecification, or measurement error or environment factors. This may result in misstatement of inefficiency. A key advantage of the parametric approach is that little industry knowledge is required in order to determine good performers from the others, or vice versa (Berger and Humphrey, 1997; Worthington, 2009).

The parametric approaches specify a production function that relates expected outputs to various inputs. The difference between the actual outputs and the model predicted outputs are attributed to model error or inefficiency. The greatest challenge to using the parametric approach is the need to define a production function for the units being analysed. It is difficult to determine the optimal combinations of inputs that are required to produce given outputs in an industry (Worthington, 2009).

2.5 Review of Empirical Studies

Effect of size, adoption of technology and branch network on efficiency of CUs in Canada was assessed by Murray and White (1980). The study first determined efficiency using Cobb-Douglas production function and then related this to CU characteristics using linear regression. The study covered the years 1972 to 1975 for 152 CUs. The conclusion was that efficiency increased with size and for the large CUs with adoption of technology. For the smaller CUs, however, efficiency decreased with adoption of technology. Further,

multi-office credit unions were more efficient than single-office credit unions. Technology was measured by use of a nominal scale, whereby the CUs were divided into three classes - manual, users of electronic business machines, and users of computers. All credit unions in one class were assumed to be utilising technology to the same extent – an oversimplification.

Crapp (1983) carried out a survey to determine the effect of size and adoption of technology on efficiency of CUs in New South Wales, Australia. The study covered the period 1979 and 1980, with the observations being 287 and 283 for the two respective years. The study utilized a general cost function for efficiency assessment. The results were that efficiency increased with rise in adoption of technology but decreased with increase in size. The study specified a cost function between inputs and outputs. The technical relationship between the inputs and outputs had not been established and hence results obtained are susceptible to model specification or misspecification.

A study by Brown and O'Connor (1995) assessed the efficiency – size relationship for CUs in the Victorian state of Australia. The study employed a parametric cost equation for efficiency derivation and the data was at 1983, 1986, 1990 and 1993 with the number of firms being 127, 108, 100 and 76. The results were that efficiency decreased with size for small industrial credit unions while for other categories, efficiency did not vary with size. Since the specified cost function between inputs and outputs was not determined

using a rigorous technical evaluation, the results obtained are susceptible to model misspecification.

Gual and Clemente (1999) carried out a study on efficiency and size in the Spanish co-operative banking between 1988 and 1996. The number of institutions were 697 during the study period. The study employed the stochastic cost frontier methodology. The input variables were labour price; physical capital price; and deposits price. Outputs were total loans; securities, bank loans and overdrafts; and off-balance-sheet items. The results were that there existed economies of scale, that is large co-operative banks were less inefficient than the smaller ones. The results would tend to support the theoretically expected position of the existence of economies of scale. Since the study specified a cost function between inputs and outputs without a technical relationship being established, the results obtained are susceptible to model specification or misspecification.

The relationship between efficiency and bond of association in CUs was studied by Brown et al. (1999). The study was carried out in the Victoria state of Australia, it employed DEA and used data for the period 1992-1995. The study sample was subdivided into three groups, community, industrial and parish corresponding to different bond types. Efficiency across the three subgroups was computed and differences examined. The conclusion was that the stronger the bond of association the higher the efficiency. As indicated, bond of association was measured by use of a nominal scale, whereby all credit unions in one class were assumed to be the same with regard to this

independent variable. The study would have been improved if it measured bond of association using a higher scale – ordinal, interval or ratio.

Ralston et al. (2001) carried out a study to assess the differences in efficiency between merged and non-merged CUs in Australia. The period covered was 1993 to 1998. The study covered all the mergers (31) and all the CUs during the period (352 in 1993 and 254 in 1998). The study employed a two-stage approach. First DEA was used to determine efficiencies of the CUs. The inputs were labour, physical capital, and deposits interest. Call deposits; fixed term deposits; personal loans; housing and real estate loans; and commercial loans were the output variables used. The obtained efficiencies were then regressed against size for merged and non-merged CUs. The results were that mergers did not produce increases in efficiency greater than those obtained from internally generated growth. The study did not offer an explanation as to why the firms with internally generated growth, which is expected to be more controlled, did not have higher efficiency. The study should also have compared the efficiency of CUs pre and post – merger.

A study by Chowdhury (2003) assessed the impact of Information, Communication and Technology (ICT) on efficiency of commercial banks in emerging economies. They used Cobb-Douglas production function whereby firm output was a function of ICT capital and expenses, among other determinants. Firm output was represented by total loans plus total deposits or Return on Equity (ROE), or Return on Assets (ROA). The sample was 327

commercial banks in Australia, Hong Kong, Japan, Malaysia, New Zealand, Singapore, South Korea, Taiwan and Thailand. Data was for 1999. The results were that investments in ICT had a significant and positive relationship with efficiency. Since the specified cost function between inputs and outputs was not determined using a rigorous technical evaluation, the results obtained are susceptible to model misspecification.

Machauer and Schiereck (2004) studied the church based credit co-operatives in Germany with regard to strength of bond, size (total assets, employees and members), asset/liability structure and profitability. The study used ratios for 15 institutions for the year 1997 and compared these with industry averages. The results of the study showed that church based credit co-operatives appeared to be larger, had only 27% of assets in loans (industry average 60%) and 47% in bonds (industry average 21%). The church based credit co-operatives were more profitable, mobilized only 34% of liabilities from customer savings (industry average 47%) and 53% from time deposits (industry average 33%). The main reason why these institutions function better than conventional co-operatives arrangements might be essentially sociological, that is the role of church focused community in sustaining non-opportunistic behavior among members. The study could have been improved if it had used a statistically robust model.

The determinants of merger and acquisition transactions in Australian cooperative deposit – taking institutions were studied by Worthington (2004). The study considered the period 1992/1993 - 1994/1995. DEA was used to obtain efficiency scores for all the CUs.

The DEA input variables were physical capital, call deposits, notice–of-withdrawal deposits, fixed term deposits, interest expenses, and non-interest expenses. Outputs were personal loans, commercial loans, residential loans, investments, interest income, and non-interest income. Subsequently a logit model was used to predict the likelihood of a CU being acquired or acquiring another. Efficiency and other variables being managerial, regulatory and financial factors were used as the influencing variables. The key findings were that efficiency was significantly positively related to the likelihood of a CU acquiring another. An aspect that would have improved the study is if it considered how the acquisition affected the performance of the acquirer.

Goddard and Wilson (2005) carried out an analysis of the growth versus size and growth versus age of US CUs for the period 1992-2001 using a sample of 9,564. Quadratic functions were utilized for the analysis. The key findings were that growth rate is significantly positively related to size. Single bond CUs grew faster than multiple bond ones. Growth rate was significantly negatively related to age. The size-growth relationship was not in line which the theoretically expected relationship. Growth on its own is not indicative of attainment of the objective of the credit union. Consequently, the study would have been improved if in addition to growth, it investigated the relationship between size, age and efficiency (or any other measure that tracks attainment of the credit union objective).

A study to assess the relationship between financial performance and selected determinants of SACCOs in Nairobi, Kenya was carried out by Njoroge (2008). Sample size used was 30 for the period 2002 – 2007. Financial performance was measured using return on assets (ROA) and return on equity (ROE). Factors used for regression against ROA and ROE were size of SACCO, loans to total assets, non-interest bearing assets to total assets, capital to total assets, operating expenses to total assets, liquidity to total assets, and growth rate of loans. Size, loans to total assets, liquidity, growth rate of loans were positively correlated to financial performance. Operating expense ratio was negatively related to performance. Capital ratio was positively related to ROA and no relationship with ROE. The objective of SACCOs in not to maximize either ROA or ROE. Rebates or interest paid to members, the largest ‘‘expenses’’ item are arrived at largely by taking interest from member loans and deducting operating expenses. Consequently ROA and ROE are inappropriate measures of financial performance of SACCOs. Relationship between profit before tax and operating expenses is mathematically inverse and hence there is no real value in including the latter in an ROA, ROE regression.

Mcalevey et al. (2010) investigated whether there were differences in efficiency between CUs in New Zealand that acquired (14 in number) others and those that did not (42 in number). The study obtained data at two periods 1996 and 2001. The study employed DEA with input variables being number of members, administrative costs, and reserves. Outputs were shares/deposits by members, loans, investments, and non–interest income.

The findings were that those CUs that acquired others had a significant improvement in efficiency from 1996 to 2001. CUs that remained unchanged did not have a significant change in efficiency levels. The study would have been more informative if it had assessed the causes of the observed differences in efficiency between the two groups of CUs.

Kilonzi (2012) carried out a study to establish the impact of SASRA regulations on the financial performance of SACCOs in Kenya. Sample size used was 30 for the period 2008 – 2011. Financial performance was measured using ROA and ROE. Factors used for regression against ROA and ROE were capital to total assets ratio, liquidity (net loans/deposits and short term borrowing) and management efficiency (earning assets/total assets). Regressions were run for 2008-2009, 2010-2011 and coefficients compared for differences which may have been caused by the regulations being applicable from 2010. The findings were that ROE, capital ratio, liquidity and management efficiency improved in the second period compared to the first. There was no difference in ROA in the two periods. ROA and ROE are inappropriate measures of financial performance of SACCOs as the objective of the institutions is not to maximize these outcomes.

The relationship between agency costs and financial performance of SACCOs was assessed in a study by Njenga (2012). SACCOs used in the study were the three with FOSA in Githunguri district, Kenya during the five year period 2007 – 2011. Financial performance, ROA was regressed against agency costs (total directors' expenses/total

expenses), marketing expenses and size (measured by two variables loan and total members' funds). The results were that ROA was weakly positively related to agency costs, positively related to marketing expenditure and weakly negatively related to size. ROA was not an appropriate measure of financial performance. There was no justification for selecting marketing as a control variable as employee costs would be a greater expense item. The two measures of size are likely to be highly correlated and that was not assessed.

Karanja (2013) carried out a study to determine the relationship between size and cost efficiency of SACCOs with FOSAs. The sample size was 43 SACCOs in Kenya for the five year period 2008 – 2012. Efficiency ratio (operationalized as the ratio between non-interest expense and the sum of non-interest income and net interest income) was regressed against total assets, capital adequacy, management quality (salaries plus benefits to average assets), ROE and liquidity. Less efficient SACCOs had higher management quality and liquidity. More efficient SACCOs were larger, had more capital and higher ROE. In two identical SACCOs, interest/dividends can be different as it is discretionally. Consequently, including interest/dividends in measurement of efficiency results in misstatement of that variable.

Njagi et al (2013) studied the effect of a SACCO operating a FOSA on financial performance. They used three SACCOs in Tharaka Nithi County, Kenya for the period 1995 – 2003. Financial performance, using ROE, was compared for three years before

and three years after commencement of FOSA operations. The performance improved after introduction of FOSA. ROE is an inappropriate measure of financial performance of SACCOs as the objective of the institutions is not to maximize profits. Further, the sample at only three was too small for the results to be generalized.

In a study to establish the effect of credit risk management on the financial performance of deposit-taking SACCOs, Nyambere (2013), used a sample size of 30 SACCOs in Kenya for the three year period 2010 – 2012. Financial performance ROE was regressed against capital adequacy, asset quality, management efficiency, earnings and liquidity. The results were that ROE was positively related to all the variables. ROE is an inappropriate measure of financial performance of SACCOs as the objective of the institutions is not to maximize profits.

Karagu and Okibo (2014) carried out a study to establish the effect on SACCO financial performance of fund misappropriation, investment decisions, loan defaulting and membership withdrawals. The sample size was 34 SACCOs with FOSA in Nairobi County, Kenya for 2013. The study was an opinion survey of employees of the SACCOs. The results were that the employees held the view that each of the factors adversely affected financial performance. Financial performance and the independent variables were not measured.

In a study to assess the effect of operating costs on the financial performance of SACCOs, Kiaritha et al (2014) used simple linear regression for six years. Operating costs were negatively related to financial performance, that is the higher the costs, the lower the performance. The six year period was not specified. Further, how financial performance and operating costs were measured was not specified.

Fried et al. (1993) carried out a study to evaluate the performance of US CUs in relation to member income and other factors. The study reviewed data of 8,947 CUs for the year 1990. The study employed FDH to measure efficiency. The input variables being labour; and other operating expenses. Outputs were total number of outstanding loans; net interest income/outstanding loans; loan variety; total number of share and deposit accounts; net interest paid/value of share and deposit accounts; and savings variety. Efficiency was then regressed against determinants, income of CU members (measured by average loan and savings per member), size of CU (total assets and number of members), common bond type, sponsorship, members to potential members, type of charter (state or federal), age of CU, branches, geographical location, asset size group, delinquency, investment ratio, real estate. The study results were that there existed significant (20%) degrees of inefficiency. Member income was found not to be related to efficiency. Some of the factors found to be positively related to performance were strength of bond of association; sponsorship; high ratio of members to potential members; having no branch offices; having a high investment-to-loan ratio. There was no relationship between efficiency and size. Most of the independent variables were

measured on the nominal scale, which ignores, for example quantification of the extent of sponsorship received by the credit union. The results of the study would have been improved if data was in the ratio scale.

In a study to isolate the determinants of efficiency, including income of members, in Australian CUs in New South Wales State, Esho (2001) used data for the period 1985-1993. The study employed a translog cost function to determine the efficiencies. The efficiency scores were then regressed on explanatory variables, income of members (as measured by deposit per member and average loan size), size, age, bond type, loan rate spread, loan arrears rates, deposit rate spread and capital ratio. The results were that efficiency was positively correlated to member income, capital ratio, age and deposit rate spread. Efficiency was negatively correlated to total assets, arrears/loans and loan rate spread. City based credit unions were more efficient than country and regional based credit unions. Industrial based credit unions were more efficient than community based credit unions. Some of the independent variables would be expected to be correlated, such as average loan size and average deposits per member and could reduce the reported degree of explanation of the dependent variable by the independent variables.

Ward and Mckillop (2005) carried out a study to primarily investigate the link between on one hand income of CU members plus other characteristics and on the other their efficiency and payout ratio. The study comprised all 566 credit unions in the United Kingdom (UK) for the year 2000. The study employed multivariate regression analysis.

The dependent variables, that is measures of performance, were: operational efficiency (administration expenses/interest income plus entrance fees) and payout ratio (dividends/earnings). The independent variables were income of members (proxied by poverty of where CU draws its member from), size (total assets), age (years), trade association affiliation (one group of associations encourages growth and adoption of modern management practices while the other encourages CUs to be community based small entities), and common bond type (residential, occupational, and others). The findings were that a significant positive relationship exists between the efficiency of a CU and the income of its members and also its size. Further, occupational credit unions and those that belonged to trade associations that encourage growth and adoption of professional business approaches performed better. The study used only one year and used a measure of performance (dividends/earnings) not entirely in congruence with the objectives of the credit unions.

In a study of size and scope versus efficiency of credit unions in Canada, Murray and White (1983) considered 61 computerised credit CUs for the years 1976 and 1977. A system of cost equations was estimated in order to identify and measure any economies of scale and economies of scope present in the production technology of British Columbia CUs. A translog cost function was employed. The major conclusions of the study were that increased scope led to higher efficiency. Size was also positively related to efficiency. Determination of whether a credit union was to be included in the study was made on the basis of whether the researchers considered it computerised on not. The

study would have been richer if degree of computerisation had been modelled as a variable and measured using the ratio scale.

McKillop and Ferguson (1998) investigated the relationship between on one hand borrower-orientation and on the other age and size of 283 UK CUs for the year 1994. They also assessed size versus efficiency. Borrower-orientation was computed for different types (characterized by varying ages). Operational efficiency was calculated for CUs of varying size groups. The results were that older CUs had less borrower-orientation. Bigger CUs were more efficient than smaller ones. The study conclusions would have been more robust if instead of using data for only one year, several years' averages were used in order to obtain a better estimate of each entity's performance.

A study of the determinants of non-bank financial institution efficiency by Worthington (1998a) used 150 Australian CUs for the year 1995. The study used a two stage approach – first an estimate of the efficiency of each CU was derived using an econometric cost function which was then regressed against firm-specific variables. The inputs for efficiency derivations were physical capital; price of deposits; and price of labour. Outputs were personal loans and consumer credit facilities; property and real estate loans; commercial loans; deposits with other financial institutions; and other securities. The explanatory variables were: total fee and commission income (for economies of scope), total assets (depicting size), capital/asset ratio, level of commercial loans, number of branches, number of agencies, type of bond (industrial or community), where in Australia

the CU was established. Key results were that efficiency was negatively related to scope of operations, number of branches, number of agencies, and was positively related to size and capital/asset ratio. The study imposed a specific structural model which was not based on a technical determination of the optimal relationship between inputs and outputs. Therefore, the study could have been improved by employing a non-parametric measure of efficiency, like DEA, which does not impose a specified input to output relationship.

As assessment of the diversification and financial performance of US CUs for the period 1993 to 2004 using 5,784 CUs was carried out by Goddard et al. (2008). They regressed return on assets (and also return on equity) against some variables with key ones being scope (non-interest income/operating income) and extent of penetration (actual members to potential members of the common bond). The findings of the study were that performance is positively related to increase in diversification for large CUs. The relationship was however negative for smaller CUs. There was no discernible relationship between performance and degree of penetration. ROA and ROE were not the most appropriate measures of financial performance since the objectives of CUs is not profit maximization.

Flamini et al. (2009) studied the determinants of commercial bank profitability in Sub-Sahara Africa (SSA). The study was carried out with respect to the years 1998 - 2006. A linear model with return on assets being regressed against determinants was used and the

data was based on an unbalanced panel of 389 banks for a total of 1,924 observations. Annual bank and macroeconomic data for 41 SSA countries over the period was used. The key findings were that returns were positively related to scope of operations, size and ownership. As financial performance is heavily dependent on both the lending rates and rates paid to depositors, it would have improved the study if these had been modelled.

Several research gaps can be identified from the empirical studies reviewed and summarised in Table 2.1. The first key research gap is that many studies assessed the relationship between efficiency and size in addition to one or two other variables. There would be need to consider many factors in the same study. The proposed study, in addition to size, will also model other SACCO characteristics, that is strength of bond of association among members, managerial competence, adoption of technology and age of SACCO. The second main research gap emanating from the empirical studies reviewed is that they modelled efficiency against determinants for all the units without an attempt to improve the predictive power of the results by introducing an appropriate moderator variable. In the proposed study, characteristics to efficiency relationships will be considered in various member income strata, that is it will be modelled as a moderating variable.

The third key gap is that the studies assessed the relationship between efficiency or other measures of performance and various factors. The relationships, for example between adoption of technology and the intervening variable of increased transactions processed

per employee which then leads to increased efficiency were not determined. This study proposes to introduce appropriate intervening variables, styled SACCO conduct, for each of the characteristics, that is member loan guarantee costs, economies of scope, innovation of management, volume of transactions processed and saver-borrower domination for the respective variables of bond of association among SACCO members, size of SACCO, managerial competency, technology and age of SACCO. The local studies assessed performance of the SACCOs using accounting ratios. This is not an appropriate measure since the objectives of the organisations is not profit maximisation. The current study will measure performance using frontier efficiency.

Table 2.1: Summary of Empirical Literature Review

Author of Study	Country Study Based	Period of the Study	Study Objective	Major Study Findings	Research/Knowledge Gap
Studies Relating Efficiency to Characteristics					
Murray and White (1980)	Canada	1972-1975 (4 years)	Establish relationship between efficiency and size, adoption of technology and branch network of credit unions in Canada	Efficiency increased with size and adoption of technology (for large CUs, but for small CUs technology relationship was negative). Multi-office CUs had lower per unit cost than single-office CUs.	Relationship between efficiency and other determinants, bond of association among members, managerial competency and age of CU.
Crapp (1983)	United States of America	1979 and 1980	To determine effect of size and adoption of technology on efficiency of credit unions	Efficiency decreased with size. Significant cost advantages by CUs with more technology.	The effects on efficiency of other factors such as bond of association among members, managerial competency and age of CU.
Brown and O'Connor (1995)	Australia	1983, 1986, 1990 & 1993	To establish existence of economies of scale among credit unions	Small industrial CUs face significant diseconomies of scale while other categories of CUs face constant returns to scale	Whether CUs have economies or diseconomies of scale. What the determinants of economies of scale of CUs are.
Gual and Clemente (1999)	Spain	1988-1996 (9 years)	To determine existence of economies of scale among Spanish co-operative banks	Economies of scale were present. Large co-operative banks were less inefficient than the smaller ones.	What the determinants of economies of scale of CUs are.

Author of Study	Country Study Based	Period of the Study	Study Objective	Major Study Findings	Research/Knowledge Gap
Brown et al. (1999)	Australia	1992-1995 (four years)	Establish relationship between efficiency and bond of association in credit unions.	The stronger the bond of association the higher the efficiency.	Relationship between efficiency and determinants, such as size, scope, income of members, and adoption of technology.
Ralston et al. (2001)	Australia.	1993 to 1998	Assessed efficiency of credit unions that merged and those that did not.	Mergers did not produce increases in efficiency greater than those obtained from internally generated growth.	Nature of relationship between determinants and efficiency.
Chowdhury (2003)	*	1999	Whether investment in ICT is related to efficiency.	Investment in ICT had a significant and positive relationship with efficiency.	What the other determinants of efficiency are and the nature of relationships.
Machauer and Schiereck (2004)	Germany	1997	Establish relationship between bond of association and performance of credit co-operatives in Germany	Credit co-operatives with stronger bonds among members such as church based ones perform better than ones with weaker bonds.	Relationship between performance and determinants such as managerial competency and age.
Worthington (2004)	Australia	1992/1993 - 1994/1995 (3 years)	To establish determinants of merger and acquisition activity in co-operative deposit-taking institutions.	Efficiency was significantly positively related to the likelihood of a CU acquiring another.	How efficiency is affected by determinants.

Author of Study	Country Study Based	Period of the Study	Study Objective	Major Study Findings	Research/Knowledge Gap
Goddard and Wilson (2005)	United States of America	1992-2001 (10 years)	Investigated the relationships between size, age and growth of credit unions.	Growth rate was significantly positively related to size. Single bond CUs grew faster than multiple bond ones. Growth rate was significantly negatively related to age.	How growth is related to factors such as income of members and adoption of technology.
Njoroge (2008)	Kenya	2002-2007 (5 years)	Establish the relationship between financial performance and selected determinants of SACCOs.	Size, loans to total assets, liquidity, growth rate of loans were positively correlated to financial performance. Operating expense ratio was negatively related to performance. Capital ratio was positively related to ROA and no relationship with ROE.	Using a more suitable measure of performance other than ROA, ROE. Assessing effect of income level of members on the relationships.
Mcalevey et al. (2010)	New Zealand	1996 and 2001	Assessed efficiency of credit unions that merged and those that did not.	Acquirer CUs had a significant improvement in efficiency from 1996 to 2001, while the others did not.	How efficiency is influenced by various factors.
Kilonzi (2012)	Kenya	2008 – 2011(4 years)	Determine the impact of SASRA regulations on the financial performance of SACCOs.	ROE, capital ratio, liquidity and management efficiency improved post SASRA regulations. There was no difference in ROA in the two periods.	Using a more suitable measure of performance other than ROA, ROE. Assessing effect of income level of members on the relationships.
Njenga (2012)	Kenya	2007 – 2011 (5 years)	Determine the relationship between agency costs and financial performance of SACCOs.	ROA was weakly positively related to agency costs, positively related to marketing expenditure and weakly negatively related to size.	Using a more suitable measure of performance other than ROA. Assessing effect of income level of members on the relationships.

Author of Study	Country Study Based	Period of the Study	Study Objective	Major Study Findings	Research/Knowledge Gap
Karanja (2013)	Kenya	2008 – 2012 (5 years)	Establish the relationship between size and cost efficiency of SACCOs with FOSAs.	Less efficient SACCOs had higher management quality and liquidity. More efficient SACCOs were larger, had more capital and higher ROE.	How the relationships would be affected by income of members.
Njagi et al (2013)	Kenya	1995 – 2003 (6 years for each)	Ascertain effect of a SACCO operating a FOSA on financial performance.	Financial performance improved after introduction of FOSA.	Sample size too small. Using a more suitable measure of performance other than ROE.
Nyambere (2013)	Kenya	2008 – 2012 (3 years)	Determine the effect of credit risk management on the financial performance of deposit-taking SACCOs.	ROE was positively related to all the variables.	Using a more suitable measure of performance other than ROA, ROE. Assessing effect of income level of members on the relationships.
Karagu and Okibo (2014)	Kenya	2013	Establish the effect of fund misappropriation, investment decisions, loan defaulting and membership withdrawals on financial performance of SACCOs.	Each of the factors adversely affected financial performance.	Financial performance and the independent variables were not measured. The study was an opinion survey of SACCO employees.
Kiaritha et al (2014)	Kenya	Six years	Assess the effect of operating costs on the financial performance of SACCOs.	Operating costs were negatively related to financial performance.	The six year period was not specified. Further, how financial performance and operating costs were measured was not specified.

Author of Study	Country Study Based	Period of the Study	Study Objective	Major Study Findings	Research/Knowledge Gap
Studies Incorporating Member Income					
Fried et al. (1993)	United States of America	1990	Establish relationship between efficiency and various determinants, including member income, for credit unions.	Some of the determinants found to be positively related to performance were: strength of bond of association; sponsorship; high ratio of members to potential members; having no branch offices; having a high investment-to-loan ratio. Member income not significant determinant of efficiency.	The relationship between efficiency and age, adoption of technology and managerial competency.
Esho (2001)	Australia	1985-1993 (9 years)	Establishing effect of determinants on efficiency in co-operative financial institutions	Efficiency was positively correlated to income of members, capital ratio, age and deposit rate spread; and negatively correlated to total assets, arrears/loans and loan rate spread.	Relationship between efficiency and scope, managerial competency and adoption of technology.
Ward and Mckillop (2005)	United Kingdom	1994-2000 (6 years)	Did an investigation into the link between income of members, other characteristics of UK credit unions and their performance	The wealthier the members the higher the efficiency. Positive relationship between performance of CUs and their size.	Relationship between performance and other determinants such as scope of CU, bond of association, adoption of technology.
Studies Incorporating Conduct of SACCOs					
Murray and White (1983)	British Columbia	1976-1977 (2 years)	Studied the economies of scope and scale economies of in credit unions	Increased scope and size were positively related to higher efficiency.	The relationship between efficiency and bond of association of members, age of CU, managerial competency and adoption of technology.

Author of Study	Country Study Based	Period of the Study	Study Objective	Major Study Findings	Research/Knowledge Gap
Mckillop and Ferguson (1998)	United Kingdom	1994	Investigation hand link between borrower-orientation and age and size of credit unions; and size versus efficiency.	Older CUs had less borrower-orientation. Bigger CUs were more efficient than smaller ones.	The study used only one year and other factors such as innovation of management and economies of scope were not modeled.
Worthington (1998a)	Australia	1995	Assess relationship between credit union efficiency and determinants.	Efficiency was negatively related to scope of operations, number of branches, number of agencies, and was positively related to size, capital/asset ratio.	Relationship between efficiency and other possible CU conduct aspects such as member loan guarantee costs, innovation of management, volume of transactions processed and saver-borrower domination.
Goddard et al. (2008)	United States of America	1993-2004 (11 years)	Establish the relationship between financial performance and diversification of credit unions.	Performance is positively related to increase in diversification for large CUs. The relationship was however negative for smaller CUs. No discernible relationship between performance and degree of penetration	Relationship between performance and determinants such as member loan guarantee costs, innovation of management, volume of transactions processed and saver-borrower domination.
Flamini et al. (2009)	Sub-Sahara Africa	1998-2006 (8 years)	Assessed the determinants of commercial bank profitability in sub-Sahara Africa.	The key findings were that returns were positively related to size, scope of operations and ownership.	Other possible determinants, such as innovation of management and adoption of technology.

* - Australia, Hong Kong, Japan, Malaysia, New Zealand, Singapore, South Korea, Taiwan and Thailand.

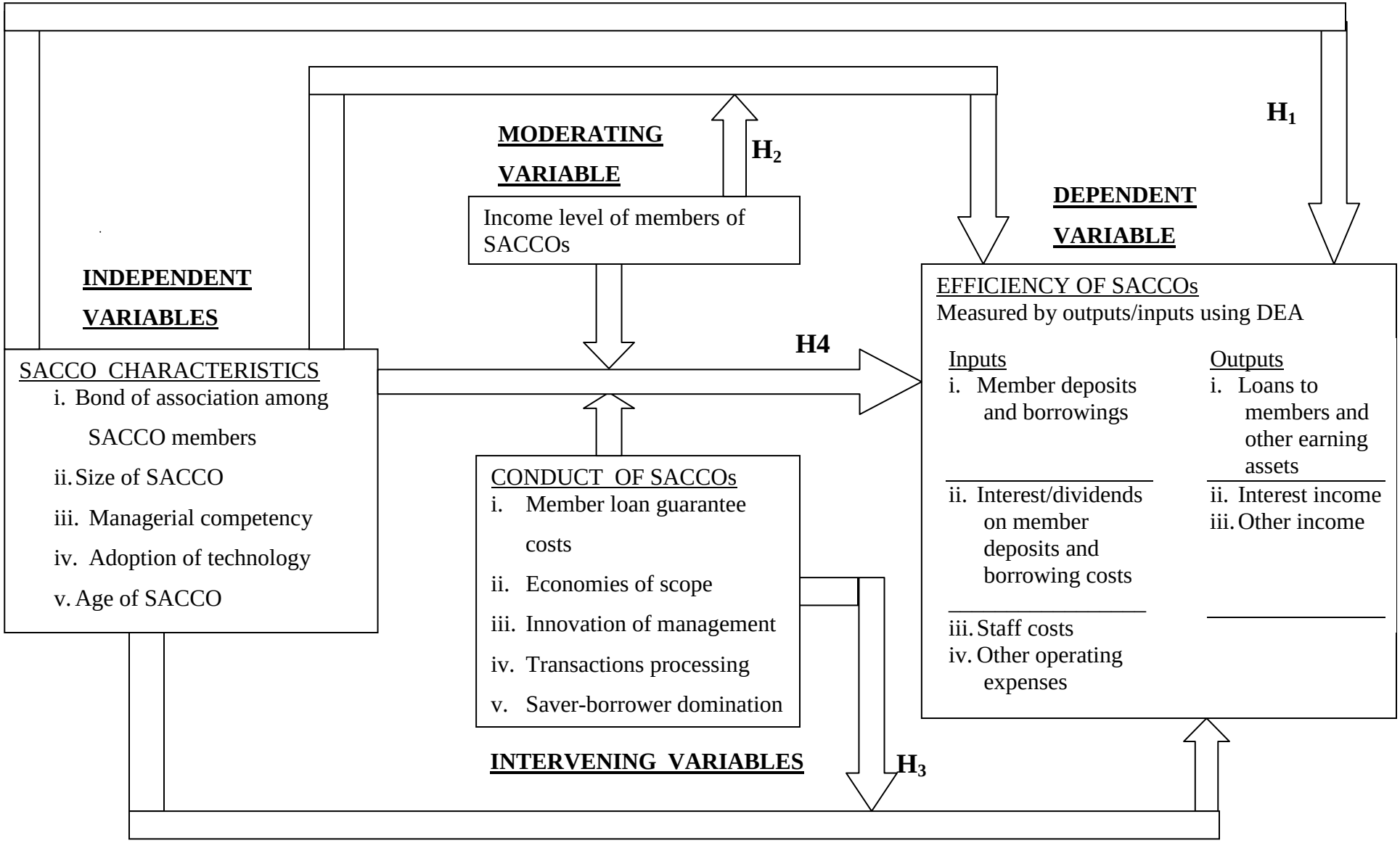
2.5 Conceptual Framework

The conceptual framework is depicted in Figure 2.2 with the inter-relationships among the variables envisaged to be as follows. It is expected that SACCO characteristics which are the independent variables such as bond of association among SACCO members, size of the SACCO, managerial competency, adoption of information technology and age of the SACCO have an effect on the performance of the SACCO. Specifically, it is expected that higher SACCO efficiencies are associated with a stronger bond of association among SACCO members, larger sizes, greater managerial competency, more degree of adoption of technology and higher ages. This is shown as route H_1, and shows the link between the independent and dependent variables.

The independent-dependent variables relationship will be influenced by the moderating variable, loop H_2. For example the expected relationship between efficiency and size is that the larger the SACCO, the more efficient it is. However, the strength of the relationship is such that if SACCOs are stratified by income of members, then the relationship between efficiency and size would be stronger for those SACCOs whose member incomes are higher than for those whose incomes are lower. It is also expected that the higher the income of members, the stronger the relationship between efficiency and managerial competency. The benefit of adoption of technology is such that it is expected to contribute more to efficiency for SACCOs whose transaction sizes are smaller, that is members whose incomes are lower. Hence H_2 depicts the moderating variable effect on the independent-dependent variable relationship.

The effect of the independent variable on the dependent variable is not direct, but through the intervening variable. The stronger the bond of association among SACCO members, the lower the loan guarantee costs (for example a loan guarantor forfeiting his pledged shares in the event that the borrower defaults); the bigger the size of the SACCO, the higher the economies of scope (range of products and services); managerial competency leads to more managerial innovation; adoption of information technology will result in fewer employees processing the same number of member transactions which will result in lower staff costs and hence SACCO will be more efficient; increase in age of the SACCO leads to it being more saver-dominated. The role of the intervening variables (SACCO conduct) in the SACCO characteristics to efficiency relationship is shown as loop H_3. Loop H_4 shows the SACCO characteristics, income of members and SACCO conduct joint effect on the efficiency of SACCOs.

Figure 2.2: Conceptual Model of Relationships Among Income of Members, SACCO Characteristics, Conduct of SACCOs and Efficiency of SACCOs



2.6 Research Hypotheses

Following on from the research objectives, the null hypotheses to be tested are shown below and the sub-hypotheses in Table 2.2.

H_1 There is no significant relationship between SACCO characteristics and efficiency of SACCOs.

H_2 The income of SACCO members does not have a significant moderating influence on the relationship between SACCO characteristics and efficiency of SACCOs.

H_3 The conduct of SACCOs has no significant intervening effect on the relationship between SACCO characteristics and efficiency of SACCOs.

H_4 SACCO characteristics, income of members and SACCO conduct have no significant joint effect on the efficiency of SACCOs.

Table 2.2:Study Hypotheses by SACCO Characteristics, Moderating, Intervening and Joint Effects

Variables	**Hypothesis**	**Hypothesis as moderated by income of members H_2**	**Hypothesis as intervened by conduct of SACCO H_3**
Bond of association among SACCO members versus Efficiency	**H_{1i} and H_{4i}** The stronger the bond of association among SACCO members, the higher the degree of efficiency	Income of members has no effect on the strength of relationship between bond of association and efficiency of SACCO	The higher the member loan guarantee costs, the lower the degree of efficiency **(H_{4vi})**
			The stronger the bond of association among SACCO members, the lower the member loan guarantee costs
			When loan guarantee costs are introduced in the model, the strength of relationship in H_{1i} reduces
Size of SACCO versus Efficiency	**H_{1ii} and H_{4ii}** The larger the SACCO, the higher the degree of efficiency	The higher the income of members, the stronger the relationship between size of SACCO and efficiency	The higher the economies of scope, the higher the degree of efficiency **(H_{4vii})**
			The larger the SACCO, the higher the economies of scope
			Strength of relationship in H_{1ii} reduces when economies of scope is introduced
Managerial competency versus Efficiency	**H_{1iii} and H_{4iii}** The higher the level of managerial competency, the higher the degree of efficiency	The higher the income of members, the stronger the relationship between level of managerial competency and efficiency	The higher the innovation of management, the higher the degree of efficiency **(H_{4viii})**
			The higher the level of managerial competency, the more the innovation of management
			When innovation of management is introduced in the model, the strength of relationship in H_{1iii} reduces

Variables	**Hypothesis**	**Hypothesis as moderated by income of members H_2**	**Hypothesis as intervened by conduct of SACCO H_3**
Adoption of technology versus Efficiency	**H_{1iv} and H_{4iv}** The higher the deployment of technology, the higher the degree of efficiency	The lower the income of members, the stronger the relationship between deployment of technology and degree of efficiency	The higher the number of transactions processed per employee, the higher the degree of efficiency **(H_{4ix})**
			The more the deployment of technology, the higher the number of transactions processed per employee
			Strength of relationship in H_{1iv} reduces when the number of transactions processed per employee, is introduced
Age versus Efficiency	**H_{1v} and H_{4v}** The older the SACCO, the higher the degree of efficiency	Income of members has no effect on the strength of relationship between age and efficiency of SACCO	The more the saver domination, the higher the degree of efficiency **(H_{4x})**
			The older the SACCO, the more the level of saver domination
			When the degree of saver-borrower domination is introduced in the model, the strength of relationship in H_{1v} reduces

Note: H_{4xi} :The higher the income of members, the higher the degree of efficiency

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Chapter three discusses the research philosophy that guided the study; the research design; the population and sample of the study; how the variables were operationalised and measured; sources and collection of data; data validity and reliability considerations; and an explanation of how the data was analysed.

3.2 Research Philosophy

Research philosophy is the underlying fundamental belief that underpins the choices that require to be made in staking a research position. The philosophy will have implications on what, how, and why research will be carried out (Carson et al., 2001).

Perry et al. (1999) explains the relationship among the researcher, the techniques that he employs and the truth or reality that he seeks. That which the researcher seeks to discover is called ontology and is essentially the reality. Epistemology is the link between the reality and the research or a way of learning or knowing. Methodology is the technique employed by the researcher in an effort to find out the reality.

Positivism is an ontology that assumes that individuals have a direct unmediated access to the real world and that it is possible to obtain objective knowledge about this single external reality. Epistemology under the positivism ontology is based on the assumption

or belief that the researcher is independent and value-free. The researcher maintains a clear distinction between facts and value judgments and uses a consistently rational and logical approach to the research. Positivists use mathematical techniques for quantitative data processing in trying to measure and discover reality that is assumed to exist based on natural laws and mechanisms (Carson et al., 2001).

Phenomenology or interpretivism is an ontology that assumes that individuals do not have a direct access to the real world and that their knowledge about this perceived world is meaningful in its own terms. Epistemology under the phenomenological ontology is based on the assumption or belief that the researcher is part of the reality and is thus not independent or value-free. The focus of the research is on understanding what is happening in a specific context. It considers multiple realities and different researcher perspectives (Carson et al., 2001). The main features of the two alternatives, positivism and phenomenology, are shown in Table 3.1.

Table 3.1: Features of Positivism and Phenomenology

Aspect	**Positivism**	**Phenomenology**
Beliefs	Science is value-free.	Science is influenced by human interests.
	Researcher is independent.	Researcher is part of what is being studied.
	Objective measures to be used for researching social reality	Researcher may introduce bias in measuring reality.
	Single external reality.	No single external reality

Aspect	Positivism	Phenomenology
Research objectives	Empirical testing of theories.	Understanding actions of human beings.
	Focus on generalization and abstraction.	Focus on specific and concrete issue.
	Concentrates on description and explanation.	Concentrates on understanding and interpretation.
Research methods	Sample surveys.	Case study.
	Uses questionnaires.	Observations, interviews.
	Uses statistical models for data analysis.	Uses non-quantitative data analysis techniques.
Researcher's role	Detached external observer.	Researcher want to experience what they are studying.
	Clear distinction between reason and feeling.	Allows feelings and reason to govern actions.
	Uses rational, consistent, logical approach.	Uses rational, consistent, logical approach.
	Distinguishes between the research and personal experience.	Accepts influence from both personal and scientific experience.
Respondent's role	Provide information required by the researcher.	Explain their experiences and concepts of the world.

(Adapted from Easterby-Smith et al., 2002; Silverman, 2002; and Carson et al., 2001)

The selection of the research philosophy was a choice between positivism and phenomenology. The study was based on the positivism philosophy. This is primarily because the study was a survey, utilized statistical data analysis techniques, was based on existing theory and hypotheses had been formulated. Further, the researcher was

independent, did not introduce personal feelings and the study utilized secondary factual data.

3.3 Research Design

Research design is the blueprint used to guide a research study to ensure that it addresses the research problem. It provides a framework that guides the determination of the data to be collected, how it will be collected and analysed. There are three broad types of research designs, namely exploratory research design; descriptive research design; and causal research design. These can further be divided to yield more sub-categories such as experimental (mainly used in pure scientific research); explanatory (often used when the objective is to explain relationships between variables by use of quantitative analysis); grounded theory (where the theory is generated as part of the study instead of being selected before the study); modelling (where the focus of the research is to develop a model); case studies (the focus is detailed understanding of social phenomena regarding relatively few objects) (Williams, 2007; Leedy and Ormrod, 2001; Miles and Huberman, 1994).

Where the variables are measured at a single point in time or over a relatively short period of time, the study is a cross-sectional one. In non-experimental studies, like in social sciences, such a study cannot be used to determine cause-effect relationships. In longitudinal studies, the unit of analysis study variables are measured over a long period of time. This tends to be expensive but is used for cause-effect relationship determination

and especially in social sciences where variable manipulation in an experimental study design is not possible (Sekaran, 2006; and Williams, 2007).

The study sought to determine the relationship between efficiency of SACCOs and various factors. The study therefore employed a descriptive, cross-sectional research design. A descriptive, cross-sectional research design involves collecting and analyzing study units data at a point in time or over short to medium-term time horizon in order to assess strength of relationships among variables. However, the design does not possess the ability to establish which factor, between two variables that are related, causes which.

3.4 Population and Sample

The population of the study is the SACCOs in Kenya that are under SASRA regulation. These are 215 in number and their names are included as Appendix 2. A census was carried out because the population was relatively small. The study used cross-sectional data for 2013. However, mainly for financial data, five year averages (or a lesser duration for SACCOs not in existence for five years) were used.

3.5 Operationalisation and Measurement of Variables

The DEA model inputs were member deposits and borrowings; interest/dividend on member deposits and cost of borrowings; staff costs; and other operating costs (such as rent payable, communication costs, office consumables). Outputs were loans to members and other earning assets such as treasury bills and bonds; interest income; and other

income that includes rent from investment property, dividends from shares, money transfer and withdrawal charges. The variables selection was informed by previous studies reviewed in section 2.5. The variables in the relationship between efficiency and various factors were as shown in Table 3.2.

Table 3.2: Study Variables

Variable	**Indicator**	**Instrument Reference**
Independent variables		
Bond of association among SACCO members	Number of employers where members are drawn from	F18
Size of SACCO	Log of total assets	F3
Management competency	Education, experience of board and senior employees	F19 F20
Adoption of technology	Hardware and/or software at the end of each year plus expensed software costs in the year	F15 F16
Age of SACCO	Number of years since inception	Q2
Intervening variables		
Member loan guarantee costs	Guarantor member deposits forfeited/size	F17 F3
Economies of scope	Total number of current products/size	F12, F13 F14, F3
Innovation by management	Number of new products introduced by SACCO during last five years	F21
Transaction processing	Number of SACCO members per employee ratio	F10 F11
Saver-borrower domination	Differential benefits rate between SACCO savers and borrowers	F1, F4 F8a, F9a

Variable	Indicator	Instrument Reference
Moderating variable		
Income of members	Average deposit size per member (Deposits/ number of members)	F8a F10
Dependent variable		
Inputs		
Member deposits and borrowings	Average annual amount	F8a, F8b
Interest/dividends on member deposits and costs of borrowing	Average annual amount	F9a, F9b
Staff costs	Average annual amount	F6
Other operating expenses (such as rent payable, communication costs, office consumables).	Average annual amount	F7
Outputs		
Loans to members and other earning assets (such as interest yielding bank deposits, treasury bills and bonds; investment in rental property; and shares)	Average annual amount	F1 F2
Interest income	Average annual amount	F4
Other income (includes interest from bank deposits, treasury bills and bonds; rent from investment property; dividends from shares; money transfer and withdrawal charges)	Average annual amount	F5

3.6 Sources and Collection of Data

The data for the study was secondary and was extracted from audited annual financial statements and other records of the SACCOs. Secondary data was considered sufficient to provide measures of the variables that enabled the attainment of the study objectives. The data collection form is included as Appendix 3. In the first instance data was obtained from SASRA. Where there were gaps, data was obtained from the SACCOs. The data was collected in the months of April and May 2013.

Five research assistants were deployed. All were business graduates, three from the University of Nairobi and two from Dedan Kimathi University. Two were pursuing MSc Finance degrees, one in the University of Nairobi and one in Jomo Kenyatta University of Agriculture and Technology. The assistants were personally trained by the researcher, whereby the purpose of the research was explained in detail after which they were then taken through each of the items in the data collection tool. They worked under the close supervision of the researcher.

3.7 Data Validity and Reliability

Validity can be divided into content validity, criterion-related validity and construct validity. Content validity is concerned with inclusion of a sufficient number of study items and dimensions to capture the concept being studied. Criterion-related validity is comprised of concurrent and predictive validity. If concurrent validity holds, items known to be different should have dissimilar scores. Predictive validity refers to how well the

results of using the measure can discriminate in a future criterion. Construct validity refers to how well the results of using the measure fit in to the theory which informed the study (Sekaran, 2006).

Prior theoretical and empirical research in the area informed the selection of study variables and how they were measured. A pilot study involving three SACCOs was carried out to test the data collection tool. The results were used to refine the data collection instrument. Data validity was achieved through ensuring that the data collection instrument was simple, unambiguous and contained variables for which data about the SACCOs was available. To increase likelihood of external validity, the study was a census. To increase reliability, the secondary data was collected by the researcher, with the aid of assistants who were specifically trained for the tasks assigned to them and closely supervised. The study utilized secondary data and hence no primary data reliability tests were conducted

3.8 Data Analysis

The data was analysed in three steps. In the preliminary stage various descriptive statistics were computed and interpreted. The second stage involved applying DEA model to measure the efficiency of SACCOs. In the final step, the study objectives were addressed, that is relating efficiency of SACCOs to characteristics and then testing moderating, intervening and joint effects. The three stages are explained in sections 3.8.1, 3.8.2 and 3.8.3.

3.8.1 Descriptive Statistics

In order to enhance the understanding of the data collected, various descriptive statistics were computed, including arithmetic mean, standard deviation and coefficient of variation with regard to, for example number of members, total assets, each of the profit and loss and balance sheets items. Essentially all measures of SACCO characteristics, conduct of SACCO, member income and efficiency. The statistics are a summary of the sample data. They also provide an indication of how the SACCOs are distributed along different variables.

3.8.2 Measurement of Efficiency of the SACCOs

The DEA Input – Output model as specified by Charnes et al, (1978) was utilized with input and output variables as specified in section 3.5. The results were data points for each of the sampled SACCOs having values ranging from 0 to 1, given by:

$$E_i = \text{Maximise} \frac{\sum_{k=1}^{m} u_k y_{ki}}{\sum_{j=1}^{n} v_j x_{ji}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.1$$

Subject to

$$\frac{\sum_{k=1}^{m} u_k y_{ki}}{\sum_{j=1}^{n} v_j x_{ji}} =< 1, \text{ for it}=1, \ldots N \text{ and } u_k \text{ and } v_j >= 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.2$$

m = number of outputs for each SACCO using n different inputs

n = number of inputs used by each SACCO to produce m different outputs

y_{ki} = is the amount of the k^{th} output for the i^{th} SACCO

x_{ji} = is the amount of the j^{th} input used by the i^{th} SACCO

u_k = is the output weight

v_j = is the input weight

The inputs were member deposits and borrowings; interest/dividend on member deposits and cost of borrowings; staff costs; and other operating costs (such as rent payable, communication costs, office consumables). Outputs were loans to members and other earning assets (such as interest yielding bank deposits, treasury bills and bonds; investment in rental property; and shares); interest income; and other income (that includes interest from bank deposits, treasury bills and bonds; rent from investment property; dividends from shares; money transfer and withdrawal charges).

The study recognised weaknesses of DEA. These include, that DEA does not compute absolute efficiency but of the best performers in the sample; inputs, outputs are researcher dependent; measurement error and exclusion of variables affects results (Smith, 1997). To address these issues, the study targeted the entire population, choice of inputs and outputs and their measurement was informed by an extensive review of literature.

3.8.3 Data Analysis Techniques

Regression analysis was used to determine the strength of the relationships between dependent and independent variables; and the moderating effect and intervening influence. Various statistics were extracted and interpreted with respect to the regressions. The specific models are specified in line with the research objectives.

The first research objective was to determine the relationship between SACCO characteristics and efficiency of SACCOs in Kenya.

Dependent - independent variables relationship model is:

$E_i=\alpha_1+\beta_{b1}B_i+\beta_{s1}S_i+\beta_{c1}C_i+\beta_{h1}H_i+\beta_{a1}A_i+\varepsilon_1$ ……..3.3

(Adapted from Fried et al., 1993)

Where,

E_i = Efficiency of SACCO i (Where, $0<= E_i <=1$)

α_1 = Intercept, a sample-wide constant

B_i = Strength of bond of association among members of SACCO i

S_i = Log T_i = natural logarithm of total assets of SACCO i

C_i = Managerial competency of SACCO i

H_i = Degree of adoption of technology (as measured by sum of value of hardware/software and expensed software costs in period standardized by size) by SACCO i

A_i = Age of SACCO i

ε_1 = error term

β_{b1}, β_{s1}, β_{c1}, β_{h1}, β_{a1} = coefficients for the respective determinants.

Research objective number two was to establish the moderating effect of the income of members on the relationship between SACCO characteristics and the efficiency of SACCOs.

(This was carried out using the two steps methodology as in Stone-Romero & Liakhovitski, 2002)

Step 1

$E_i = \alpha_{21}+\beta_{b21}B_i +\beta_{s21}S_i+\beta_{c2}C_i + \beta_{h21}H_i +\beta_{a21}A_i +\beta_{m21}M_i + \varepsilon_{21}$……..3.4

Where,

E_i, B_i, S_i, C_i, H_i, A_i = as defined in equation 3.3.

α_{21} = Intercept, a sample-wide constant

M_i = Average income of members (measured by average deposits/member) of SACCO i

ε_{21} = error term

β_{b21}, β_{s21}, $\beta_{c21,}$ $\beta_{h21,}$ $\beta_{a21,}$ β_{m21}= coefficients for the respective determinants.

In equation 3.4, the overall model should be significant in addition to M and at least one of the predictor variables.

Step 2

$E_i = \alpha_{22}+\beta_{b22}B_i+\beta_{s22}S_i+\beta_{c22}C_i + \beta_{h22}H_i +\beta_{a22}A_i +\beta_{m22}M_i + \beta_{bm}(B_iM_i) +\beta_{sm}(S_iM_i)+\beta_{cm}(C_iM_i)$

$+\beta_{hm}(H_iM_i)+\beta_{am}(A_iM_i)+\varepsilon_{22}$……...3.5

Where,

E_i, B_i, S_i, C_i, H_i, A_i = as defined in equation 3.3.

α_{22} = Intercept, a sample-wide constant

M_i = Average income of members (measured by average deposits/member) of SACCO i

ε_{21} = error term

β_{b22}, β_{s22}, $\beta_{c22,}$ $\beta_{h22,}$ $\beta_{a22,}$ β_{m22}= coefficients for the respective determinants.

β_{bm}, β_{sm}, $\beta_{cm,}$ $\beta_{hm,}$ β_{am}= coefficients that indicate moderation.

The third research objective was to determine the intervening influence of conduct of SACCOs on the relationship between SACCO characteristics and the efficiency of SACCOs.

(This was carried out using the three steps methodology as in MacKinnon, et al. 2002)

Step 1

In equation 3.3, only the variables whose coefficients ($\beta_{b1,}$ $\beta_{s1,}$ $\beta_{c1,}$ β_{h1} and β_{a1}) are significant are considered further.

Step 2

$G_i = \alpha_g + \beta_{bg}B_i + \varepsilon_g$……..……..……..……....3.6

$N_i = \alpha_n + \beta_{sn}S_i + \varepsilon_n$……..……...……3.7

$V_i = \alpha_v + \beta_{cv}C_i + \varepsilon v$……..…..…….……..…..…..3.8

$P_i = \alpha_p + \beta_{hp}H_i + \varepsilon_p$……..…….……3.9

$D_i = \alpha_d + \beta_{ad}A_i + \varepsilon_d$…….…….……3.10

Only the variables whose coefficients ($\beta_{bg,}$ $\beta_{sn,}$ $\beta_{cv,}$ β_{hp} and β_{ad}) are significant are considered further.

Step 3

$E_i=\alpha_{31}+\beta_{b31}B_i+\beta_{s31}S_i+\beta_{c31}C_i+\beta_{h31}H_i+\beta_{a31}A_i+\beta_{g31}G_i+\beta_{n31}N_i+\beta_{v31}V_i+\beta_{p31}P_i+\beta_{d31}D_i+\varepsilon_{31....}$ 3.11

For a variable to be intervening, its coefficient (β_{g31}, β_{n31}, β_{v31}, β_{p31} and β_{d31}) must be significant and the coefficient of the characteristic being mediated must be insignificant or significantly less when the mediator is included ($\beta_{b31}< \beta_{b1}$, $\beta_{s31}< \beta_{s1}$, $\beta_{c31}< \beta_{c1,}$ $\beta_{h31}< \beta_{h1}$ and $\beta_{a31}< \beta_{a1}$)

Where,

E_i = Efficiency of SACCO i during period t (Where, $0<= E_i <=1$)

α_{31} = Intercept, a sample-wide constant

G_i = Member loan guarantee costs for SACCO i

N_i = Sum of number of savings, loan and off-balance sheet products of SACCO i

V_i = Innovation of management of SACCO i

P_i = Average number of members per employee for SACCO i

D_i = (Benefits to savers/average savings – rates on similar savings products) - (Costs to borrowers/average loans – rates on similar loan products) for SACCO i

ε_{31} = error term

β_{b31}, β_{s31}, $\beta_{c31,}$ $\beta_{h31,}$ $\beta_{a31,}$ β_{g31}, β_{n31}, β_{v31}, β_{p31} and β_{d31} = coefficients for the respective determinants.

The fourth research objective was to establish the joint effect of SACCO characteristics, income of members and SACCO conduct on the efficiency of SACCOs in Kenya.

The model is:

$$E_i = \alpha_4+\beta_{b4}B_i+\beta_{s4}S_i+\beta_{c4}C_i+\beta_{h4}H_i+\beta_{a4}A_i+\beta_{g4}G_i+\beta_{n4}N_i+\beta_{v4}V_i+\beta_{p4}P_i+\beta_{d4}D_i+\beta_{m4}M_i+\varepsilon_4 \ldots . 3.12$$

Where,

E_i, B_i, S_i, C_i, H_i, A_i = as defined in equation 3.3.

G_i, N_i, V_i, P_i and D_i = as defined in equation 3.11.

M_i = as defined in equation 3.4.

α_4 = Intercept, a sample-wide constant

ε_{314} = error term

β_{b4}, β_{s4}, β_{c4}, β_{h4}, β_{a4}, β_{g4}, β_{n4}, β_{v4}, β_{p4}, β_{d4} and β_{m4} = coefficients for the respective determinants.

F- test was used to assess the significance of the regression equations. Coefficient of multiple determination, R^2, and R (coefficient of multiple correlation) was computed to assess the strength of fit. The degrees of freedom were k and n-k-1, where:

k = number of predictor variables

n = number of predictor observations.

If calculated F exceeds critical F, the null hypothesis of no relationship is rejected, and consequently it will be concluded that a relationship exists. The respective slope coefficients were also tested individually for their statistical significance using the t-test. The statistical packages used were Open Source Data Envelopment Analysis (OSDEA) and Statistical Package for Social Sciences (SPSS).

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1 Introduction

Chapter four covers the study response rate and then provides the descriptive statistics of the study variables (bond of association among SACCO members, size of SACCO, managerial competency, adoption of technology, age of SACCO, member loan guarantee costs, economies of scope, innovation of management, transactions processing, saver-borrower domination, and in come level of members of SACCOs) by way of frequency tables, frequency histograms or pie-charts. It also contains the Data Envelopment Analysis (DEA) study results of efficiency of SACCOs.

Sturge's rule provides a guide with regard to the optimal number of classes in a frequency distribution. The number is given by $k = 1 + 3.322(\text{Log}_{10}\, n)$, where k is the number of classes and n is the number of units of analysis. However, a researcher is advised to consider the data being summarised and if necessary vary the number of classes (Scott, 2009). In this study, the number of classes in the frequency distributions were arrived at using primarily Sturge's rule. At n=144, k=8.

4.2 Response Rate

Out of 215 SACCOs that the study targeted, data was available for 144, representing a success rate of 67%, which was considered acceptable. For example Munjuri (2013) in a study of commercial banks and insurance underwriters in Kenya obtained a success rate

of 61% (54 out of 88), Machuki (2011) obtained 43.3% (23 out of 53) in a study of listed firms in Kenya.

4.3 Bond of Association

Bond of association was measured by considering the commonality of employers as suggested by Esho (2001). SACCOs whose members are drawn from more employers have a lower bond and were therefore assigned a lower score. SACCOs obtaining members from more than ten employers or non-employer based were assigned a score of 2, 7 to 10 employers a score of 4, 4 to 6 employers a score of 6, 2 and 3 employers 8 and from 1 employer a score of 10. The inverse relationship is due to that the average bond of association among SACCO members reduces with increase in the number of employers from whom these members are drawn. Table 4.1 shows the results. Most SACCOs (85%) had their members drawn from over 10 employers or the members were not in formal employment. The mean bond of association score was 2.8.

Table 4.1: Bond of Association

Class	Range/Statistic	Frequency/Value
1	One employer	1 (1%)
2	Two and three employers	12 (8%)
3	Four to six employers	8 (5%)
4	Seven to ten employers	1 (1%)
5	Over ten employers or non-employer based	122 (85%)
	Total number of SACCOs	144 (100%)

Class	Range/Statistic	Frequency/Value
	Arithmetic mean (score from 0 to 10)	2.791
	Standard deviation (score from 0 to 10)	1.933
	Coefficient of variation (ratio)	0.692
	Lowest (score from 0 to 10)	2.000
	Highest (score from 0 to 10)	10.000

Source: Research Data

4.4 Size of SACCO

The size of the SACCOs was measured using the log of total assets. Goddard and Wilson (2005) used the same measure. The data on log of total assets is presented in Table 4.2. The lowest was 6.78, highest 10.26 and a mean of 8.55. Sixty seven percent (68%) of the SACCOs had a log of total assets of up to 9. Only 6% of the SACCOs had a log of total assets of over 9.5.

Table 4.2: Size of SACCO

Class	Range/Statistic	Frequency/Value
1	Up to 7.00	1 (1%)
2	Over 7.00 – up to 7.50	11 (8%)
3	Over 7.50 – up to 8.00	21 (15%)
4	Over 8.00 – up to 8.50	35 (24%)
5	Over 8.50 – up to 9.00	29 (20%)
6	Over 9.00 – up to 9.50	37 (26%)
7	Over 9.50 – up to 10.00	8 (5%)
8	Over 10.00	2 (1%)

Class	Range/Statistic	Frequency/Value
	Total number of SACCOs	144 (100%)
	Arithmetic mean (log)	8.552
	Standard deviation (log)	0.698
	Coefficient of variation (ratio)	0.082
	Lowest (log)	6.779
	Highest (log)	10.264

Source: Research Data

4.5 Managerial Competency

Managerial competency comprises of knowledge, skills, personal traits, and attitudes of mangers. Measurement of personal traits and attitudes is problematic and studies tend to measure knowledge and skills (Ssekakubo et al, 2014; Cetin, 2010; and Ahmad, 2003). The study assessed managerial competency using knowledge (level of education) and skills (duration of experience in SACCO management), a similar approach to that employed by Ssekakubo et al, (2014). Managerial competence thus considered directors' qualifications, directors' experience, employee qualifications and employee experience. For each person, scores were assigned for highest level of education attained as follows: masters degree and above – 10, first degree – 8, diploma – 6, high school – 4, primary school – 2, and none – 0. Similarly, for number of years in SACCO management, scores were: 10 years and above – 10, 6 years and less than 10 years – 8, 3 years and less than 6 years – 6, one year and less than 3 years – 4, and less than one year – 2. The mean for

each person for skills and experience was determined and then the same was carried out for the SACCO. The results for managerial competency are shown in Table 4.3.

Table 4.3: Managerial Competency

Class	**Range/Statistic**	**Frequency/Value**
1	Up to 6.00	6 (4%)
2	Over 6.00 – up to 6.40	11 (8%)
3	Over 6.40 – up to 6.80	30 (21%)
4	Over 6.8 – up to 7.20	42 (29%)
5	Over 7.20 – up to 7.60	38 (26%)
6	Over 7.60 – up to 8.00	14 (10%)
7	Over 8.00 – up to 8.40	2 (1%)
8	Over 8.40	1 (1%)
	Total number of SACCOs	144 (100%)
	Directors' overall arithmetic mean (score from 0 to 10)	7.12
	Employees' overall arithmetic mean (score from 0 to 10)	6.92
	Managerial competency arithmetic mean (score from 0 to	7.02
	Standard deviation (score from 0 to 10)	0.52
	Coefficient of variation (ratio)	0.07
	Lowest (score from 0 to 10)	5.33
	Highest (score from 0 to 10)	8.46

Source: Research Data

Only 2% of the SACCOs had a competency level of over 8 meaning that for these SACCOs, the average director and employee had at least a first degree and six years and

above of experience in SACCO management. The directors and employees had an average education level of a diploma or a first degree. Both of these groups had an average of about seven years experience in SACCO management.

4.6 Degree of Adoption of Technology

The degree of adoption of technology was measured as the ratio of capitalized and expensed hardware and software over total assets. Crapp (1983) employed a similar measure, expenditure on computer and computer associated costs, for assessing adoption of technology. Table 4.4 presents the degree of adoption of technology by the SACCOs. Sixty percent (60%) of the SACCOs' degree of adoption of technology was up to 2%. Twenty one percent (21%) of the SACCOs had a degree of adoption of technology of above 3.5%.

Table 4.4: Adoption of Technology

Class	Range/Statistic	Frequency/Value
1	Up to 0.50%	10 (7%)
2	Over 0.50% – up to 1.00%	27 (19%)
3	Over 1.00% – up to 1.50%	35 (24%)
4	Over 1.50% – up to 2.00%	14 (10%)
5	Over 2.00% – up to 2.50%	12 (8%)
6	Over 2.50% – up to 3.00%	13 (9%)
7	Over 3.00% – up to 3.50%	3 (2%)
8	Over 3.50%	30 (21%)
	Total number of SACCOs	144 (100%)

Class	Range/Statistic	Frequency/Value
	Arithmetic mean (%)	2.33
	Standard deviation (%)	2.35
	Coefficient of variation (ratio	1.01
	Lowest (%)	0.01
	Highest (%)	17.90

Source: Research Data

4.7 Age of SACCO

Age was measured by the number of years since incorporation as was also done by Goddard and Wilson (2005). The average number of years the SACCOs had been in operation ranged from a minimum of 2 years to a maximum of 42 years. Table 4.5 captures the distribution. Seventeen percent (17%) of the SACCOs had been in existence for up to 12 years. SACCOs which had been in operation for over 30 years comprised 44%. The oldest SACCO was 21 times older than the youngest.

Table 4.5: Age of SACCOs

Class	Range/Statistic	Frequency/Value
1	Up to 6 years	4 (3%)
2	Over 6 years – up to 12 years	20 (14%)
3	Over 12 years – up to 18 years	27 (19%)
4	Over 18 years – up to 24 years	22 (15%)
5	Over 24 years – up to 30 years	8 (6%)
6	Over 30 years – up to 36 years	44 (31%)
7	Over 36 years – up to 42 years	19 (13%)

Class	Range/Statistic	Frequency/Value
8	Over 42 years	0 (0%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (years)	25
	Standard deviation (years)	11
	Coefficient of variation (ratio)	0.43
	Lowest (years)	2
	Highest (years)	42

Source: Research Data

4.8 Member Deposits

Member deposits are shown in Table 4.6. Fifty nine percent (59%) of the SACCOs had member deposits of up to KShs 400 million. Those exceeding KShs 1.4 billion comprised only 13%. The largest SACCO was 4,186 times larger than the smallest.

Table 4.6: Member Deposits

Class	Range/Statistic	Frequency/Value
1	Up to KShs 200 million	64 (44%)
2	Over KShs 200 million – up to KShs 400 million	21 (15%)
3	Over KShs 400 million – up to KShs 600 million	6 (4%)
4	Over KShs 600 million – up to KShs 800 million	14 (10%)
5	Over KShs 800 million – up to KShs 1,000 million	8 (6%)
6	Over KShs 1,000 million – up to KShs 1,200 million	7 (5%)

Class	Range/Statistic	Frequency/Value
7	Over KShs 1,200 million – up to KShs 1,400 million	5 (3%)
8	Over KShs 1,400 million	19 (13%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (KShs)	775,717,576
	Standard deviation (KShs)	1,573
	Coefficient of variation (ratio)	2.03
	Lowest (KShs)	3,351,854
	Highest (KShs)	14,032,699,996

Source: Research Data

4.9 Number of SACCO Members

The number of members in the SACCOs are shown in Table 4.7. Fifty six percent (56%) of the SACCOs had up to 6,000 members. SACCOs which had 15,000 and above members constituted 21%. The SACCO with the highest number of members had 602 times more members than the one with the least and 10 times the mean. The mean number of members in a SACCO was 11,633.

Table 4.7: Number of SACCO Members

Class	Range/Statistic	Frequency/Value
1	Up to 3,000	57 (40%)
2	Over 3,000 – up to 6,000	23 (16%)
3	Over 6,000 – up to 9,000	16 (11%)
4	Over 9,000 – up to 12,000	14 (10%)
5	Over 12,000 – up to 15,000	4 (3%)
6	Over 15,000 – up to 18,000	6 (4%)
7	Over 18,000 – up to 21,000	3 (2%)
8	Over 21,000	21 (15%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (number)	11,633
	Standard deviation (number)	18,644
	Coefficient of variation (ratio)	1.60
	Lowest (number)	196
	Highest (number)	118,066

Source: Research Data

4.10 Income of Members

Income of members was measured using the ratio of average deposits per member. This ratio was utilized by Esho (2001). The distribution was as shown in Table 4.8. Forty five percent (45%) of the SACCOs had income of members of up to KShs 50,000. SACCOs which had income of members of KShs 150,000 and above constituted 23%. The SACCOs with the highest income of members was 679 times the one with the least amount.

Table 4.8: Income of Members

Class	Range/Statistic	Frequency/Value
1	Up to KShs 25,000	48 (33%)
2	Over KShs 25,000 – up to KShs 50,000	17 (12%)
3	Over KShs 50,000 – up to KShs 75,000	9 (6%)
4	Over KShs 75,000 – up to KShs 100,000	14 (10%)
5	Over KShs 100,000 – up to KShs 125,000	10 (7%)
6	Over KShs 125,000 – up to KShs 150,000	12 (8%)
7	Over KShs 150,000 – up to KShs 175,000	12 (8%)
8	Over KShs 175,000	22 (15%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (KShs)	100,622
	Standard deviation (KShs)	129,852
	Coefficient of variation (ratio)	1.29
	Lowest (KShs)	1,714
	Highest (KShs)	1,164,029

Source: Research Data

4.11 Member Loan Guarantee Costs

Member loan guarantee costs for the SACCOs was computed as the annual amount of loans default that was recovered from guarantors (deposits set-off or treated as loan to guarantors) divided by total loans. This is a similar approach to that suggested by Esho (2001) of using bad loans, which are then standardized by total loans. The distribution is captured in Table 4.9. Fifty five percent (55%) of the SACCOs had member loan guarantee costs of up to 1%. SACCOs with member loan guarantee costs of over 1.5%

constituted 11% of the analyzed SACCOs. The mean member loan guarantee costs were 1.02%.

Table 4.9: Member Loan Guarantee Costs

Class	Range/Statistic	Frequency/Value
1	Up to 0.25%	2 (1%)
2	Over 0.25% – up to 0.50%	11 (8%)
3	Over 0.50% – up to 0.75%	31 (22%)
4	Over 0.75% – up to 1.00%	35 (24%)
5	Over 1.00% – up to 1.25%	25 (17%)
6	Over 1.25% – up to 1.50%	24 (17%)
7	Over 1.50% – up to 1.75%	5 (3%)
8	Over 1.75%	11 (8%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (%)	1.02
	Standard deviation (%)	0.47
	Coefficient of variation (ratio)	0.46
	Lowest (%)	0
	Highest (%)	2.73

Source: Research Data

4.12 Economies of Scope

Economies of scope of the SACCOs was measured based on the number of current products in line with Murray and white (1983). The products for the SACCOs ranged from a minimum of 10 products to a maximum of 32 products as shown in Table 4.10. The types of products are shown in Appendix 4. Forty three percent (43%) of the SACCOs had current products of up to 14. SACCOs with current products of 21 and above constituted 20%.

Table 4.10: Economies of Scope

Class	Range/Statistic	Frequency/Value
1	Up to 12 products	21 (15%)
2	13 and 14 products	40 (28%)
3	15 and 16 products	14 (10%)
4	17 and 18 products	20 (14%)
5	19 and 20 products	20 (14%)
6	21 and 22 products	19 (13%)
7	23 and 24 products	3 (2%)
8	Over 24 products	7 (5%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (number)	16.8
	Standard deviation (number)	4.3

Class	Range/Statistic	Frequency/Value
	Coefficient of variation (ratio)	0.26
	Lowest (number)	10
	Highest (number)	32

Source: Research Data

4.13 Innovation of Management

Innovation of the SACCOs' management was measured using the number of products introduced in the latest five years to the time the study was carried out. The measure that was adopted is in line with Organisation for Economic Co-operation and Development (OECD) (2005) which indicates that one way of measuring innovation at the firm level is by the number of new products or services introduced. Table 4.11 presents the information on innovation of management of the SACCOs. The results showed the minimum number of products introduced by a SACCO in the last five years were 3 and the maximum products were 17. Fourty percent (40%) of the SACCOs had introduced up to five products in the preceding five years. SACCOs which had introduced over nine products comprised 7%.

Table 4.11: Products Introduced in the Last Five Years

Class	Range/Statistic	Frequency/Value
1	Up to 3 products	9 (6%)
2	4 products	34 (24%)
3	5 products	14 (10%)

Class	Range/Statistic	Frequency/Value
4	6 products	25 (17%)
5	7 products	27 (19%)
6	8 products	14 (10%)
7	9 products	11 (8%)
8	Over 9 products	10 (7%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (number)	6.3
	Standard deviation (number)	2.5
	Coefficient of variation (ratio)	0.40
	Lowest (number)	3
	Highest (number)	17

Source: Research Data

4.14 Transactions Processing

One way for gains from increased adoption of technology to be realized is by employees processing more transactions per employee (Koellinger, 2006). Since most of the savings and loans interactions between members and SACCOs take place monthly, the number of members is directly proportional to the number of transactions. Therefore, transactions processing was measured using the number of members per employee. The results are shown in Table 4.12. Transactions processing across the SACCOs ranged from a minimum of 40 to a maximum of 1,313. Sixty five percent (65%) of the SACCOs had

members per employee of up to 300. SACCOs which had members per employee exceeding 700 constituted 6%. The highest number of members per employee in a SACCO were 32 times the least members per employee.

Table 4.12: Transactions Processing

Class	Range/Statistic	Frequency/Value
1	Up to 100	9 (6%)
2	Over 100 – up to 200	35 (24%)
3	Over 200 – up to 300	50 (35%)
4	Over 300 – up to 400	15 (10%)
5	Over 400 – up to 500	11 (8%)
6	Over 500 – up to 600	12 (8%)
7	Over 600 – up to 700	3 (2%)
8	Over 700	9 (6%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (number)	315
	Standard deviation (number)	227
	Coefficient of variation (ratio)	0.72
	Lowest (number)	40
	Highest (number)	1,313

Source: Research Data

4.15 Saver - Borrower Domination

Saver – borrower domination for each SACCO was determined by: (interest/dividends on member deposits divided by average member deposits less average commercial bank

deposit rates) - (interest income from member loans divided by average member loans less average commercial bank loan rates). This approach was as used by Bressan et al (2012). The per annum saver-borrower domination for the SACCOs ranged from a low of -12% to a high of 10.7%. The data on saver-borrower domination is presented in Table 4.13. Thirty eight percent (38%) of the SACCOs had saver-borrower domination of 0% and below, meaning that they were borrower dominated. Sixty two percent (62%) of the SACCOs had saver-borrower domination in excess of 0%, meaning that they were saver dominated.

Table 4.13: Saver-Borrower Domination

Class	**Range/Statistic**	**Frequency/Value**
1	Up to -6.00%	14(10%)
2	Over -6.00% – up to -4.00%	13 (9%)
3	Over -4.00% – up to -2.00%	9 (6%)
4	Over -2.00% – up to 0.00%	18 (13%)
5	Over 0.00% – up to 2.00%	23 (16%)
6	Over 2.00% – up to 4.00%	27 (19%)
7	Over 4.00% – up to 6.00%	27 (19%)
8	Over 6.00%	13 (9%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (%)	0.7

Class	Range/Statistic	Frequency/Value
	Standard deviation (%)	4.8
	Coefficient of variation (ratio)	6.4
	Lowest (%)	-12.0
	Highest (%)	10.7

Source: Research Data

4.16 Member Deposits and Borrowings

Member deposits and borrowings are shown in Table 4.14. Fifty nine percent (56%) of the SACCOs had average member deposits of up to KShs 400 million. Those exceeding KShs 1.4 billion comprised only 15%. The largest SACCO was 4,287 times larger than the smallest.

Table 4.14: Member Deposits and Borrowing

Class	Range/Statistic	Frequency/Value
1	Up to KShs 200 million	62 (43%)
2	Over KShs 200 million – up to KShs 400 million	19 (13%)
3	Over KShs 400 million – up to KShs 600 million	7 (5%)
4	Over KShs 600 million – up to KShs 800 million	12 (8%)
5	Over KShs 800 million – up to KShs 1,000 million	9 (6%)
6	Over KShs 1,000 million – up to KShs 1,200 million	5 (3%)
7	Over KShs 1,200 million – up to KShs 1,400 million	8 (6%)

Class	Range/Statistic	Frequency/Value
8	Over KShs 1,400 million	22 (15%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (KShs)	869,631,043
	Standard deviation	1,675
	Coefficient of variation (ratio)	1.93
	Lowest (KShs)	3,351,854
	Highest (KShs)	14,371,311,107

Source: Research Data

4.17 Interest, Dividends and Borrowing Costs

Annual interest, dividends and borrowing costs are shown in Table 4.15. Sixty six percent (66%) of the SACCOs had annual interest, dividends and borrowing costs of up to KShs 40 million, while twenty one percent (21%) had costs above KShs 100 million. The SACCO with the highest interest, dividends and borrowing costs had 19 times more than the mean entity.

Table 4.15: Interest, Dividends and Borrowing Costs

Class	Range/Statistic	Frequency/Value
1	Up to KShs 20 million	78 (54%)
2	Over KShs 20 million – up to KShs 40 million	17 (12%)
3	Over KShs 40 million – up to KShs 60 million	6 (4%)
4	Over KShs 60 million – up to KShs 80 million	6 (4%)
5	Over KShs 80 million – up to KShs 100 million	6 (4%)
6	Over KShs 100 million – up to KShs 120 million	5 (3%)
7	Over KShs 120 million – up to KShs 140 million	4 (3%)
8	Over KShs 140 million	22 (15%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (KShs)	77,452,277
	Standard deviation (KShs)	169,767,239
	Coefficient of variation (ratio)	2.19
	Lowest (KShs)	0
	Highest (KShs)	1,516,418,064

Source: Research Data

4.18 Staff Costs

Staff costs represents mainly salaries and other allowances to employees of the SACCO. The staff costs for the SACCOs ranged from a low of KShs 66,480 to a high of KShs

374,317,439 per annum, with a mean of KShs 25,448,979. The staff costs were as captured in Table 4.16.

Table 4.16: Staff Costs

Class	Range/Statistic	Frequency/Value
1	Up to KShs 7 million	58 (40%)
2	Over KShs 7 million – up KShs 14 million	25 (17%)
3	Over KShs 14 million – up KShs 21 million	10 (7%)
4	Over KShs 21 million – up KShs 28 million	14 (10%)
5	Over KShs 28 million – up KShs 35 million	7 (5%)
6	Over KShs 35 million – up KShs 42 million	6 (4%)
7	Over KShs 42 million – up KShs 49 million	4 (3%)
8	Over KShs 49 million	20 (14%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (KShs)	25,448,979
	Standard deviation (KShs)	44,971,765
	Coefficient of variation (ratio)	1.767
	Lowest (KShs)	66,480
	Highest (KShs)	374,317,439

Source: Research Data

Fifty seven percent (57%) of the SACCOs had annual staff costs of up to KShs 14 million. SACCOs with staff costs of KShs 49 million and above per annum constituted

14%. The highest annual staff costs was 5,630 times that of the SACCO with the lowest costs and 14 times the mean.

4.19 Other Operating Expenses

Other operating expenses represents expenditure by the SACCO such as rent payable, communication costs, office consumables, but specifically excludes interest/dividends on member deposits and staff costs. The other operating expenses for the SACCOs are captured in Table 4.17.

Table 4.17: Other Operating Expenses

Class	Range/Statistic	Frequency/Value
1	Up to KShs 10 million	41 (28%)
2	Over KShs 10 million – up to KShs 20 million	33 (23%)
3	Over KShs 20 million – up to KShs 30 million	11 (8%)
4	Over KShs 30 million – up to KShs 40 million	12 (8%)
5	Over KShs 40 million – up to KShs 50 million	11 (8%)
6	Over KShs 50 million – up to KShs 60 million	6 (4%)
7	Over KShs 60 million – up to KShs 70 million	6 (4%)
8	Over KShs 70 million	24 (17%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (KShs)	39,350,933
	Standard deviation	52,484,634

Class	Range/Statistic	Frequency/Value
	Coefficient of variation (ratio)	1.33
	Lowest (KShs)	544,367
	Highest (KShs)	315,262,169

Source: Research Data

Fifty one percent (51%) of the SACCOs had other operating expenses of up to KShs 20 million per annum. SACCOs having annual other operating expenses of over KShs 50 million constituted 25%. The highest amount for other operating expenses was 579 times that of the SACCO with the lowest costs and 8 times the mean.

4.20 Loans and Other Earning Assets

The outstanding loans to members and other earning assets (such as interest earning bank deposits, treasury bills and bonds, investment in rental property, and shares) of the SACCOs are captured in Table 4.18.

Table 4.18: Loans and Other Earning Assets

Class	Range/Statistic	Frequency/Value
1	Up to KShs 200 million	68 (47%)
2	Over KShs 200 million – up to KShs 400 million	14 (10%)
3	Over KShs 400 million – up to KShs 600 million	10 (7%)
4	Over KShs 600 million – up to KShs 800 million	11 (8%)
5	Over KShs 800 million – up to KShs 1,000 million	8 (6%)
6	Over KShs 1,000 million – up to KShs 1,200 million	6 (4%)
7	Over KShs 1,200 million – up to KShs 1,400 million	6 (4%)

Class	Range/Statistic	Frequency/Value
8	Over KShs 1,400 million	21 (15%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (KShs)	815,353,502
	Standard deviation (KShs)	1,689,658,920
	Coefficient of variation (ratio)	2.07
	Lowest (KShs)	4,563,017
	Highest (KShs)	15,416,735,423

Source: Research Data

Fifty seven percent (57%) of the SACCOs had loans and other earning assets of up to KShs 400 million. SACCOs with loans and other earning assets in excess of one billion shillings constituted 23%. The highest amount of loans and other earning assets at KShs 15 billion was 3,378 times that of the SACCO with the lowest (KShs 4.5 million) and 18 times the mean.

4.21 Interest Income

The annual interest income for the SACCOs were as depicted in Table 4.19. Fifty seven percent (57%) of the SACCOs had annual interest income of up to KShs 60 million. SACCOs with annual interest income of over KShs 150 million comprised 25%. The highest amount of annual interest income was 4,341 times that of the SACCO with the lowest and 18 times the mean.

Table 4.19: Interest Income

Class	Range/Statistic	Frequency/Value
1	Up to KShs 30 million	62 (43%)
2	Over KShs 30 million – up to KShs 60 million	20 (14%)
3	Over KShs 60 million – up to KShs 90 million	9 (6%)
4	Over KShs 90 million – up to KShs 120 million	12 (8%)
5	Over KShs 120 million – up to KShs 150 million	6 (4%)
6	Over KShs 150 million – up to KShs 180 million	7 (5%)
7	Over KShs 180 million – up to KShs 210 million	4 (3%)
8	Over KShs 210 million	24 (17%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (KShs)	130,664,498
	Standard deviation	267,279,952
	Coefficient of variation (ratio)	2.046
	Lowest (KShs)	557,331
	Highest (KShs)	2,419,592,348

Source: Research Data

4.22 Other Income

Other income represents SACCO earnings other than interest income from member loans and includes items such as interest from bank deposits and treasury bills and bonds; rent

from investment property; dividends from shares; money transfer and withdrawal charges. The SACCOs annual income from these sources ranged from a low of KKShs 284,455 to a high of KKShs 393,148,604. These incomes are shown in Table 4.20. Eighty percent (80%) of the SACCOs had annual other income of up to KShs 40 million. The highest annual amount of income from these sources was 1,382 times that of the SACCO with the lowest costs and 12 times the mean.

Table 4.20: Other Income

Class	**Range/Statistic**	**Frequency/Value**
1	Up to KShs 80 million	57 (40%)
2	Over KShs 8 million – up to KShs 16 million	12 (8%)
3	Over KShs 16 million – up to KShs 24 million	26(18%)
4	Over KShs 24 million – up to KShs 32 million	8 (6%)
5	Over KShs 32 million – up to KShs 40 million	12 (8%)
6	Over KShs 40 million – up to KShs 48 million	3 (2%)
7	Over KShs 48 million – up to KShs 56 million	5 (3%)
8	Over KShs 56 million	21 (15%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean (KShs)	31,531,366
	Standard deviation	
	Coefficient of variation (ratio)	
	Lowest (KShs)	284,455
	Highest (KShs)	393,148,604

Source: Research Data

4.23 Efficiency of SACCOs

The study sought to estimate the technical efficiency of SACCOs in Kenya. Data envelopment analysis (DEA) technique using Open Source DEA (OSDEA), which assumes constant returns to scale, was used. DEA is a non-parametric technique which assigns an efficiency score ranging from 0 to 1 to the decision making units. The inputs used were member deposits and borrowings; interest/dividend on member deposits and cost of borrowings; staff costs; and other operating expenses (such as rent payable, communication costs, office consumables). The outputs were loans to members and other earning assets (such as interest yielding bank deposits, treasury bills and bonds; investment in rental property; and shares); interest income; and other income (includes interest from bank deposits, treasury bills and bonds; rent from investment property; dividends from shares; money transfer and withdrawal charges).

The efficiency value was measured on a scale of 0 to 1. The observations are captured in Table 4.21. Eighty eight percent (88%) of the SACCOs had an efficiency of 0.9 and below. On average, a SACCO could potentially increase its outputs by 22.5% while maintaining its level of inputs. The highest efficiency was 1 and the lowest was 0.557.

Table 4.21: Efficiency of SACCOs

Class	Range/Statistic	Frequency/Value
1	Up to 0.60	3 (2%)
2	Over 0.60 – up to 0.65	4 (3%)
3	Over 0.65 – up to 0.70	24 (17%)

Class	Range/Statistic	Frequency/Value
4	Over 0.70 – up to 0.75	38 (26%)
5	Over 0.75 – up to 0.80	25 (17%)
6	Over 0.80 – up to 0.85	17 (12%)
7	Over 0.85 – up to 0.90	16 (11%)
8	Over 0.90	17 (12%)
	Total number of SACCOs	144 (100%)
	Arithmetic mean	0.775
	Standard deviation	0.095
	Coefficient of variation (ratio)	0.123
	Lowest	0.557
	Highest	1

Source: Research Data

4.24 Summary of Descriptive Statistics

The summary of the descriptive statistics, mean, standard deviation, coefficient of variation, lowest and highest values are shown in Appendix 5. Considering the variables that are correlates of size, such as total member deposits, number of SACCO members, inputs and outputs in the efficiency computation, it appears that majority of the SACCOs are relatively small while a few are comparatively large. The coefficient of variation for these variables ranged from 1.33 to 2.19.

The characteristic variables of bond of association, size (measured using log of total assets) managerial competency, adoption of technology and age appear relatively normally distributed. Also relatively normally distributed are the conduct of SACCO variables of member loan guarantee costs, economies of scope, innovation of management, transactions processing and saver-borrower domination. The age of SACCOs ranged from two to 42 years with a mean of 25 years. Mean of member deposits per SACCO was KShs 776 million, lowest KShs 3 million and highest KShs 14.033 billion. The number of members in a SACCO were a low of 196, high of 118,066 and a mean of 11,622. The mean efficiency of SACCOs was 0.775, highest was 1 and lowest was 0.557.

CHAPTER FIVE

DATA ANALYSIS – TESTS OF HYPOTHESES

5.1 Introduction

Chapter five focuses on testing of the research hypotheses. It contains the results of correlation analysis where inter-relationships among twelve study variables were examined. Included are the results of regression analysis for assessing the relationship between efficiency of SACCO and SACCO characteristics; moderating effect of the income of SACCO members on the relationship between SACCO characteristics and efficiency of SACCOs; and intervening effect of the conduct of SACCOs on the relationship between SACCO characteristics and efficiency of SACCOs. The research findings are then discussed.

5.2 Correlation Analysis

The relationship between both the direction (positive or negative) and strength of the relationship between the variables was investigated using Pearson product-moment correlation coefficient. This was important in order to assess whether any relationship exists between the variables before carrying out further analysis. The classification employed is strong (0.7 and over), moderate (0.4 and less than 0.7) and weak (0 to less than 0.4). Correlation analysis was also used to determine the existence of multicollinearity between the independent variables. Multicollinearity exists when

independent variables are highly correlated (r>=0.9), and tends to lead to a poor regression model (Dancey and Reidy, 2011).

As shown in Table 5.1, there is a strong positive correlation between efficiency and size of SACCO (r = 0.845) and economies of scope (r = 0.742). The correlation between efficiency of SACCO and innovation of management (r = 0.647), managerial competency (r = 0.601), age of SACCO (r = 0.526), income of members (r = 0.458) was moderate and positive. Saver – borrower domination (r = 0.323) and transactions processing (r = 0.128) are positively weakly correlated to efficiency of SACCO. Efficiency of SACCO is moderately negatively correlated to member loan guarantee costs (r = -0.490), and adoption of technology (r = -0.404). There is a weak negative correlation between efficiency of SACCO and bond of association (r=-0.035). All the correlations, except transactions processing and bond of association, were significant at 5%. The relationships between efficiency of SACCO and size of SACCO, managerial competency, age of SACCO, income of members, member loan guarantee costs, economies of scope, innovation of management, transactions processing and saver-borrower domination were in the same direction as hypothesised in this study. Bond of association and transactions processing were not significantly correlated to efficiency of SACCO against expected positive correlations. Efficiency of SACCO was significantly negatively correlated to adoption of technology against an expected positive correlation. These three variables were further assessed using regression analysis as shown in section 5.3

Bond of association and member loan guarantee costs are moderately negatively correlated (r = -0.396). Strongly positively correlated are size of SACCO versus economies of scope (r = 0.841) and managerial competency versus innovation of management (r = 0.801). Adoption of technology and transactions processing were not significantly correlated while age of SACCO and saver – borrower domination were weakly positively correlated (r = 0.241). Correlations were significant at 5%.

Table 5.1: Pearson Product-Moment Correlations Among the Dependent, Independent, Moderating and Intervening Variables

Scale	1	2	3	4	5	6	7	8	9	10	11	12
1. Efficiency of SACCO	1	-.035	.845**	.601**	-.404**	.526**	.458**	-.490**	.742**	.647**	.128	.323**
2. Bond of association		1	-.133	.149	-.178*	.093	.433**	-.396**	.169*	.211*	-.144	.195*
3. Size of SACCO			1	.726**	-.352**	.513**	.451**	-.612**	.841**	.729**	.204*	.286**
4. Managerial competency				1	-.297**	.359**	.421**	-.482**	.662**	.801**	.081	.205*
5. Adoption of technology					1	-.317**	-.342**	.366**	-.301**	-.289**	.096	-.287**
6. Age of SACCO						1	.376**	-.352**	.470**	.366**	-.077	.241**
7. Income of members							1	-.417**	.575**	.524**	-.290**	.405**
8. Member loan guarantee costs								1	-.565**	-.518**	-.030	-.311**
9. Economies of scope									1	.848**	.134	.385**
10. Innovation of management										1	.070	.303**
11. Transactions processing											1	-.223**
12. Saver - borrower domination												1

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
Source: Research Data

5.3 Hypotheses Testing Using Regression Analysis

The study was based on the null hypothesis that there is no relationship between SACCO characteristics and efficiency of SACCOs. In addition, the study hypothesized that income of SACCO members would have a moderating effect on the relationship between characteristics and efficiency of SACCOs while conduct of SACCOs would have an intervening effect on the relationship between characteristics and efficiency of SACCOs. To establish the statistical significance of the tests of the respective hypotheses, multiple regression analysis was conducted at 95% confidence level. This level of significance has been used in prior studies such as Magutu (2013) and Muchemi (2013).

5.3.1 Relationship Between Efficiency of SACCO and SACCO Characteristics

Objective number one was to determine the relationship between SACCO efficiency and SACCO characteristics. The study predicted a significant relationship between SACCO efficiency and SACCO characteristics. Multiple regression analysis was used to assess if the relationship was statistically significant. The following null hypothesis was tested:

Hypothesis 1: There is no significant relationship between SACCO characteristics and efficiency of SACCOs.

The goodness of fit results of standard linear multiple regression with SACCO efficiency as the dependent variable and SACCO characteristics as predictors are reported in Table 5.2 (a). The model summary is in Table 5.2 (b). The model reveals a statistically

significant relationship between SACCO efficiency and SACCO characteristics (Sig.=< 0.05). The multiple regression model had an Adjusted R^2 = .734, F (5, 138) = 79.859, and a standard error of 0.040. This level of standard error indicates that the mean deviation of efficiency of SACCO predicted by the model is about 5% (0.04/0.78). SACCO characteristics accounted for 73.4% of the variance in efficiency of SACCO.

Table 5.2: Regression Results for Efficiency of SACCO as Dependent Variable and SACCO Characteristics as Predictors

a) Goodness of Fit

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.653	5	.131	79.859	.000(a)
	Residual	.226	138	.002		
	Total	.879	143			

a Predictors: (Constant), Age of SACCO, Bond of association, Adoption of technology, Managerial competency, Size of SACCO
b Dependent Variable: Efficiency of SACCO

b) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.862(a)	.743	.734	.040

a Predictors: (Constant), Age of SACCO, Bond of association, Adoption of technology, Managerial competency, Size of SACCO

c) Regression Coefficients

Model		Unstandardized Coefficients			
		B	Std. Error	t	Sig.
1	(Constant)	.062	.053	1.176	.241
	Bond of association	-.004	.002	-2.025	.045
	Size of SACCO	.084	.008	10.827	.000
	Managerial competency	-.001	.010	-.135	.892
	Adoption of technology	-.004	.002	-2.571	.011
	Age of SACCO	.001	.000	2.191	.030

a Dependent Variable: Efficiency of SACCO

The model coefficients are shown in Table 5.2 (c). The findings indicate that the significant predictors of efficiency were bond of association (β = -0.004, p=<0.05), size of SACCO (β = 0.084, p=<0.05), adoption of technology (β = -0.004, p=<0.05) and age of SACCO (β = 0.001, p=<0.05). Managerial competency was not a significant predictor of efficiency of SACCO (β = -0.001, p>0.05).

Hypothesis one (H_1) explored the relationship between SACCO efficiency and SACCO characteristics by suggesting that there is a statistically significant relationship between efficiency of SACCO and SACCO characteristics. Results of this study indicate that the relationship between efficiency of SACCO and SACCO characteristics is statistically significant (p=<0.05) for all the predictor variables, except managerial competency. The null hypothesis was rejected and therefore the alternate one was accepted, meaning that

there is a significant relationship between SACCO characteristics and efficiency of SACCOs.

The analytical model which was: $E_i = \alpha_1 + \beta_{b1} B_{it} + \beta_{s1} S_{it} + \beta_{c1} C_{it} + \beta_{h1} H_{it} + \beta_{a1} A_{it} + \varepsilon_1$, is therefore specified as:

$E_i = 0.062 - 0.004B_i + 0.084S_i - 0.001C_i - 0.004H_i + 0.001A_i$,

where E_i is efficiency of SACCO i, α_1 is intercept, B_i is strength of bond of association among members of SACCO i, S_i is size of SACCO i. H_i is the degree of adoption of technology, C_i is managerial competency of SACCO i, A_i is the age of SACCO i and ε_1 is error term.

Since the regression coefficients of managerial competency and the constant ($p>0.05$) are not statistically significant and therefore their beta regression coefficients were not different from zero, the regression model can then be simplified to:

$E_i = -0.004B_i + 0.084S_i - 0.004H_i + 0.001A_i$

5.3.2 Moderating Effect of the Income of SACCO Members in the Relationship Between SACCO Characteristics and Efficiency of SACCOs

The study set out to establish the moderating effect of the income of SACCO members on the relationship between SACCO characteristics and efficiency of SACCOs. The following null hypothesis was assessed:

Hypothesis 2: The income of SACCO members does not have a significant moderating influence on the relationship between SACCO characteristics and efficiency of SACCOs.

The moderating effect was assessed using the method proposed by Stone-Romero and Liakhovitski (2002). This involved testing the effects on the dependent variable (efficiency of SACCOs) of SACCO characteristics, moderator variable (income of SACCO members) and the respective interaction between SACCO characteristics and income of SACCO members (B_iM_i, S_iM_i, C_iM_i, H_iM_i and A_iM_i). The interaction terms were created using centred measures.

The goodness of fit results of standard linear multiple regression with SACCO efficiency as the dependent variable, SACCO characteristics and moderator variable (income of members of SACCO) as predictors are reported in Table 5.3 (a). The model summary is in Table 5.3 (b), and the coefficients are in Table 5.3 (c). The moderating variable, income of members, was introduced in the characteristics to efficiency of SACCOs relationship. The new model is: $E_i = \alpha_{21} + \beta_{b21}B_i + \beta_{s21}S_i + \beta_{c21}C_i + \beta_{h21}H_i + \beta_{a21}A_i + \beta_{m21}M_i + \varepsilon_{21}$ where M_i = income of members of SACCO i. The model is a good predictor of the efficiency of SACCOs (Sig. =< 0.05). The six variables now account for 74.2% (up from 73.4% for the five characteristic variables).

Table 5.3: Regression Results for Efficiency of SACCO as Dependent Variable and SACCO Characteristics, Income of Members as Predictors

a) Goodness of Fit

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.661	6	.1070	64.562	.000(a)
	Residual	.218	137	.002		
	Total	.879	143			

a Predictors: (Constant), Income of members, Adoption of technology, Age of SACCO, Bond of association, Managerial competency, Size of SACCO
b Dependent Variable: Efficiency of SACCO

b) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.866(a)	.752	.742	.040

a Predictors: (Constant), Income of members, Adoption of technology, Age of SACCO, Bond of association, Managerial competency, Size of SACCO

c) Regression Coefficients

Model		Unstandardized Coefficients B	Std. Error	t	Sig.
1	(Constant)	.043	.056	1.003	.245
	Bond of association	-.006	.002	-2.514	.031
	Size of SACCO	.082	.008	10.117	.000
	Managerial competency	-.001	.010	-.212	.817
	Adoption of technology	-.004	.002	-2.298	.023
	Age of SACCO	.001	.000	1.873	.046
	Income of members	.085	.045	1.912	.038

a Dependent Variable: Efficiency of SACCO

With respect to the specific independent variables, bond of association, size of SACCO, adoption of technology and age of SACCO remain significant (p=< 0.05). Managerial competency remains insignificant. Income of members is also a significant predictor of efficiency of SACCO (p=<0.05).

The goodness of fit results of standard linear multiple regression with SACCO efficiency as the dependent variable, SACCO characteristics, moderator variable (income of members of SACCO) and interaction terms as predictors are reported in Table 5.4 (a). The model summary is in Table 5.4 (b), and the coefficients are in Table 5.4 (c).

Table 5.4: Regression Results for Efficiency of SACCO as Dependent Variable and SACCO Characteristics, Income of Members and Interaction Terms as Predictors

a) Goodness of Fit

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.699	11	.064	46.511	.000(a)
	Residual	.180	132	.001		
	Total	.879	143			

a Predictors: (Constant), v12, Adoption of technology, Bond of association, Managerial competency, Age of SACCO, v10, v8, Size of SACCO, Income of members, v9, v11
b Dependent Variable: Efficiency of SACCO

b) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.892(a)	.795	.778	.037

a Predictors: (Constant), v12, Adoption of technology, Bond of association, Managerial competency, Age of SACCO, v10, v8, Size of SACCO, Income of members, v9, v11

c) Regression Coefficients

Model		Unstandardized Coefficients B	Std. Error	t	Sig.
1	(Constant)	-.028	.061	-.457	.649
	Bond of association	-.003	.002	-1.375	.172
	Size of SACCO	.085	.008	10.404	.000
	Managerial competency	.011	.010	1.166	.246
	Adoption of technology	-.003	.004	-.703	.484
	Age of SACCO	.001	.000	1.590	.114
	Income of members	-.075	.075	-1.005	.317
	v8	-.009	.012	-.756	.451
	v9	.330	.078	4.242	.000
	v10	-.138	.090	-1.528	.129
	v11	.027	.047	.568	.571
	v12	-.001	.005	-.282	.779

a Dependent Variable: Efficiency of SACCO

Where the interaction terms are:

v8 = B_tM_i (Bond of association and income of members)

v9 = S_iM_i (Size of SACCO and income of members)

v10 = C_iM_i (Managerial competency and income of members)

v11 = H_iM_i (Adoption of technology and income of members)

v12 = A_iM_i (Age of SACCO and income of members)

The interaction between income of members and SACCO characteristics accounted for a change in variance (Δ Adjusted R^2) of 3.6%. The eleven independent variables are significant predictors of efficiency (Sig.=<0.05). The interaction term between income of members and size is a significant (p=<0.05) predictor of efficiency. Size remains a significant predictor (p=<0.05), while income of members has become insignificant. Therefore income of members has moderated the relationship between size and efficiency of SACCO. Bond of association, adoption of technology, and age of SACCO have now become insignificant predictors of efficiency of SACCO (p>0.05). Managerial competency remains insignificant.

Hypothesis two (H_2) predicted that the income of SACCO members has a significant moderating influence on the relationship between SACCO characteristics and efficiency of SACCOs. Results of this study indicate that the relationship between efficiency of SACCO, SACCO characteristics, income of members and interaction terms is statistically significant (p=<0.05). The interaction term between size of SACCO and income of members in addition to size itself are also both significant (p=<0.05). The null hypothesis was rejected and consequently the alternate one was accepted. Consequently, it is concluded that the income of SACCO members has a significant moderating influence on the relationship between SACCO characteristics (specifically size) and efficiency of SACCOs.

The prediction model, $E_i = \alpha_{22}+\beta_{b22}B_i+\beta_{s22}S_i+\beta_{c22}C_i+\beta_{h22}H_i+\beta_{a22}A_i+\beta_{m22}M_i+\beta_{bm}(B_iM_i)+\beta_{sm}(S_iM_i)+\beta_{cm}(C_iM_i)+\beta_{hm}(H_iM_i)+\beta_{am}(A_iM_i)+\varepsilon_{22}$, can then be written as:

$E_i=-0.028-0.03B_i+0.085S_i+0.011C_i-0.03H_i+0.01A_i-0.075M_i-0.009(B_iM_i)+0.330(S_iM_i)-0.138(C_iM_i)+0.027(H_iM_i)-0.01(A_iM_i)$.

The model specification when omitting the variables that are not statistically different from zero becomes $E_i= 0.085S_i+ 0.330S_iM_i$. The results of the assessment of whether income of members moderates the relationship between efficiency of SACCO and SACCO characteristics are summarized in Table 5.5

Table 5.5: Summary of the Results of Moderation of Income of Members Between Efficiency of SACCO and SACCO Characteristics

Independent variable	Does income of members moderate relationship between predictor and efficiency of SACCO?
Bond of association	No
Size of SACCO	Yes
Managerial competency	No
Adoption of technology	No
Age of SACCO	No

5.3.3 Intervening Effect of the Conduct of SACCOs in the Relationship Between SACCO Characteristics and Efficiency of SACCOs

The study set out to determine the intervening effect of the conduct of SACCOs on the relationship between SACCO characteristics and efficiency of SACCOs. The following is the null hypothesis:

Hypothesis 3: The conduct of SACCOs has no significant intervening effect on the relationship between SACCO characteristics and efficiency of SACCOs.

In order to test intervening effect, first it was necessary to assess the relationship between the dependent variable (efficiency of SACCO) and the predictor variables (SACCO characteristics), ignoring the mediators (step 1). This is identical to performing the regressions under hypothesis number one in section 5.3.1. The model should be significant ($p=<0.05$). Secondly regression analysis between independent variables (SACCO characteristics) and the intervening variables (conduct of SACCOs) is performed while ignoring the dependent variable (efficiency of SACCO). The independent and intervening variables should be related ($p=<0.05$) if one is to proceed to the next step. In step 3, regression analysis is performed with efficiency of SACCO as dependent variable and both the SACCO characteristics and conduct of SACCOs as independent variables.

The model in step one was: $E_i = \alpha_1 + \beta_{b1} B_i + \beta_{s1} S_i + \beta_{c1} C_i + \beta_{h1} H_i + \beta_{a1} A_i + \varepsilon_1$. This was significant and was specified as: $E_i = 0.062-0.004B_i+0.084S_i-0.001C_i-0.004H_i+0.001A_i$, where E_i is efficiency of SACCO i, α_1 is intercept, B_i is strength of bond of association among members of SACCO i, S_i is size of SACCO i. H_i is the degree of adoption of technology, C_i is managerial competency of SACCO i, A_i is the age of SACCO i and ε_1 is error term. It is now necessary to proceed to step two. The regressions involving the

respective SACCO characteristic and the related SACCO conduct aspect are in Tables 5.6 – 5.10.

Table 5.6: Regression Results with Member Loan Guarantee Costs as Dependent Variable and Bond of Association as Predictor

a) Goodness of Fit

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.968	1	4.968	26.462	.000[b]
	Residual	26.657	142	.188		
	Total	31.625	143			

a. Dependent Variable: Member loan guarantee costs
b. Predictors: (Constant), Bond of association

b) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.396[a]	.157	.151	.43328

a. Predictors: (Constant), Bond of association
b. Dependent Variable: Member loan guarantee costs

c) Regression Coefficients

		Unstandardized Coefficients			
Model		B	Std. Error	t	Sig.
1	(Constant)	1.291	.063	20.358	.000
	Bond of association	-.096	.019	-5.144	.000

From the results in Table 5.6 (a), bond of association is a significant predictor of member loan guarantee costs (Sig.=<0.05). 15.1% of the variation in member loan guarantee costs

are explained by changes in bond of association as shown in Table 5.6 (b). The regression model with member loan guarantee costs as dependent variable and bond of association as independent variable is given by:

$G_i = 1.291 - 0.096B_{i,}$ where G_i is member loan guarantee costs of SACCO i, and B_i is strength of bond of association among members of SACCO i.

Table 5.7: Regression Results with Economies of Scope as Dependent Variable and Size of SACCO as Predictor

a) Goodness of Fit

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1530.857	1	1530.857	194.708	.000[b]
	Residual	1116.449	142	7.862		
	Total	2647.306	143			

a. Dependent Variable: Economies of scope
b. Predictors: (Constant), Size of SACCO

b) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.760[a]	.578	.575	2.804

a. Predictors: (Constant), Size of SACCO
b. Dependent Variable: Economies of scope

c) Regression Coefficients

Model		Unstandardized Coefficients B	Std. Error	t	Sig.
1	(Constant)	-23.505	2.872	-8.186	.000
	Size of SACCO	4.670	.335	13.954	.000

From Table 5.7 (a), size of SACCO is a significant predictor of economies of scope of the SACCO (Sig.=<0.05). As shown in Table 5.7 (b), changes in size of SACCO account for 57.5% of the variability in the dependent variable of economies of scope. The relationship between economies of scope as dependent variable and size of SACCO as predictor is given by:

$N_i = -23.505+4.670S_i$ where N_i is economies of scope of SACCO i, and S_i is size of SACCO i.

Table 5.8: Regression Results with Innovation of Management as Dependent Variable and Managerial Competency as Predictor

a) Goodness of Fit

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	453.170	1	453.170	124.516	.000[b]
	Residual	516.802	142	3.639		
	Total	969.972	143			

a. Dependent Variable: Innovation of management
b. Predictors: (Constant), Managerial competency

b) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.684[a]	.467	.463	1.908

a. Predictors: (Constant), Managerial competency
b. Dependent Variable: Innovation of management

c) Regression Coefficients

Model		Unstandardized Coefficients			
		B	Std. Error	t	Sig.
1	(Constant)	-17.735	2.157	-8.224	.000
	Managerial competency	3.417	.306	11.159	.000

Managerial competency is significantly related to the innovation of management (Sig.=<0.05) as shown in Table 5.8. 46.3% of the variation in innovation of management is explained by changes in managerial competency. The regression model between innovation of management as dependent variable and managerial competency as independent variable is given by:

V_i = -17.735 +3.417C_i where V_i is innovation of management of SACCO i and C_i is managerial competency of SACCO i.

Table 5.9: Regression Results with Transactions Processing as Dependent Variable and Adoption of Technology as Predictor

a) Goodness of Fit

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.092	1	.092	1.184	.278[b]
	Residual	10.996	142	.077		
	Total	11.087	143			

a. Dependent Variable: Transactions Processing
b. Predictors: (Constant), Adoption of technology

b) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.091[a]	.008	.001	.27827

a. Predictors: (Constant), Adoption of Technology
b. Dependent Variable: Transactions Processing

c) Regression Coefficients

Model		Unstandardized Coefficients			
		B	Std. Error	t	Sig.
1	(Constant)	2.395	.026	92.481	.000
	Adoption of Technology	.027	.025	1.088	.278

From Table 5.9, adoption of technology is not a significant predictor of transactions processing (Sig.>0.05). Only an insignificant 0.1% of the variation in transactions processing is explained by changes in adoption of technology. As adoption of technology is not a significant predictor of members per employee, a model is not specified.

Table 5.10: Regression Findings with Saver - Borrower Domination as Dependent Variable and Age of SACCO as Predictor

a) Goodness of Fit

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	190.300	1	190.300	8.756	.004[b]
	Residual	3086.290	142	21.734		
	Total	3276.589	143			

a. Dependent Variable: Saver - borrower domination
b. Predictors: (Constant), Age of SACCO

b) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.241[a]	.058	.051	4.66202

a. Predictors: (Constant), Age of SACCO
b. Dependent Variable: Saver - borrower domination

c) Regression Coefficients

Model		Unstandardized Coefficients			
		B	Std. Error	t	Sig.
1	(Constant)	-1.926	.982	-1.962	.052
	Age of SACCO	.108	.036	2.959	.004

From Table 5.10, age of SACCO is a significant predictor of saver - borrower domination of the SACCO (Sig.=<0.05). Variation in age of SACCO accounts for 5.1% of the changes in saver - borrower domination. The relationship between age of SACCO and of saver – borrower domination is given by:

$D_i = -1.926 + 0.108A_i$, where D_i saver-borrower domination of SACCO i and A_i is age of SACCO i.

Intervening effect of conduct of SACCO in the relationship between efficiency of SACCO and SACCO characteristics is carried out in three steps. Step one is to regress efficiency of SACCO against SACCO characteristics. Step two is to carry out a regression between each of the significant SACCO characteristics (independent variable) in step one and the corresponding conduct of SACCOs variable. The results of steps one and two are summarized in Table 5.11. The relationships that are significant in steps one

and two will be further analyzed in step three, where regression will be performed between on one hand the dependent variable (efficiency of SACCO) and on the other both the independent (SACCO characteristics) and intervening variables (conduct of SACCOs).

Table 5.11: Summary of Results of Intervention Assessment Steps One and Two

	Step one		**Step two**	**Step three**
Characteristic	*****	**Conduct**	******	*******
Bond of association	Yes	Member loan guarantee costs	Yes	Yes
Size of SACCO	Yes	Economies of scope	Yes	Yes
Managerial competency	No	Innovation of management	Yes	No
Adoption of technology	Yes	Transactions processing	No	No
Age of SACCO	Yes	Saver - borrower domination	Yes	Yes

* - Is characteristic a significant predictor of efficiency of SACCO (Dependent variable)?

** - Is characteristic a significant predictor of conduct of SACCO (Dependent variable)?

*** - Characteristic and conduct to be considered further.

From the summary table, efficiency of SACCO was significantly related to bond of association, size of SACCO, adoption of technology and age of SACCO as indicated by a ‘‘yes’’ in column two. Further, each of these four characteristics, except adoption of technology, was significantly related to the respective conduct of SACCO variable as shown by a ‘‘yes’’ in column four.

The results of standard linear multiple regression with SACCO efficiency as the dependent variable and SACCO characteristics, conduct of SACCO as predictors are reported in Table 5.12. The model reveals a statistically significant relationship between SACCO efficiency and both SACCO characteristics and conduct of SACCO ($p=< 0.05$), and the multiple regression model had an adjusted $R^2 = .736$, $F (10, 133) = 40.950$. SACCO characteristics and conduct of SACCO accounted for 73.6% of the variance in efficiency of SACCO.

Table 5.12: Regression Results with Efficiency of SACCO as Dependent Variable and SACCO Characteristics and Conduct of SACCO as Predictors

a) Goodness of Fit

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.663	10	.066	40.950	.000(a)
	Residual	.215	133	.002		
	Total	.879	143			

a Predictors: (Constant), Saver - borrower domination, Bond of association, Managerial competency, Transactions processing, Adoption of technology, Age of SACCO, Member loan guarantee costs, Economies of scope, Size of SACCO, Innovation of management
b Dependent Variable: Efficiency of SACCO

b) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.869(a)	.755	.736	.040

a Predictors: (Constant), Saver - borrower domination, Bond of association, Managerial competency, Transactions processing, Adoption of technology, Age of SACCO, Member loan guarantee costs, Economies of scope, Size of SACCO, Innovation of management

c) Regression Coefficients

Model		Unstandardized Coefficients B	Std. Error	t	Sig.
1	(Constant)	.146	.091	1.617	.108
	Bond of association	-.004	.002	-2.050	.042
	Size of SACCO	.078	.012	6.591	.000
	Managerial competency	-.011	.012	-.887	.377
	Adoption of technology	-.004	.002	-2.415	.017
	Age of SACCO	.001	.000	2.035	.044
	Member loan guarantee costs	.674	1.043	.646	.519
	Economies of scope	.001	.002	.319	.750
	Innovation of management	.004	.003	1.110	.269
	Transactions processing	-6.354E-07	.000	-.039	.969
	Saver - borrower domination	.102	.082	1.250	.213

a Dependent Variable: Efficiency of SACCO

The findings indicate that efficiency of SACCO was significantly predicted by bond of association (β = -0.004, p=<0.05), size of SACCO (β = 0.078, p=<0.05), adoption of technology (β = -0.004, p=<0.05) and age of SACCO (β = 0.001, p=<0.05). Managerial competency was not a significant predictor of efficiency of SACCO (p>0.05). All the five SACCO conduct variables (member loan guarantee costs, economies of scope, innovation of management, transactions processing, saver - borrower domination) were not significant predictors of efficiency of SACCO. Consequently, member loan guarantee

costs, economies of scope, innovation of management, transactions processing and saver - borrower domination do not intervene in the relationships between efficiency of SACCO as a dependent variable and the respective predictor variables of bond of association, size, innovation of management, adoption of technology and age of SACCO. Therefore, conduct of SACCO does not intervene in the relationship between SACCO characteristics as a predictor and efficiency of SACCO as a dependent variable.

The analysis contained in Table 5.12 was repeated but only including the significant variables in steps one and two as shown in Table 5.11. The results of standard linear multiple regression with SACCO efficiency as the dependent variable and three SACCO characteristics, three conduct of SACCO elements as predictors are reported in Table 5.13. Size and age remain significant predictors of efficiency of SACCO ($p=<0.05$). Bond of association is not significant ($p>0.05$). All the corresponding SACCO conduct variables of member loan guarantee costs, economies of scope and saver - borrower domination are still not significant ($p>0.05$), and therefore are not intervening variables in the characteristic-efficiency relationship.

Table 5.13: Regression Findings with Efficiency of SACCO as Dependent Variable and Selected SACCO Characteristics and Some Elements of Conduct of SACCO as Predictors

a) Goodness of Fit

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.652	6	.109	65.476	.000(a)
	Residual	.227	137	.002		
	Total	.879	143			

a Predictors: (Constant), Saver - borrower domination, Age of SACCO, Size of SACCO, Economies of scope, Bond of association, Adoption of technology, Member loan guarantee costs, Transactions processing
b Dependent Variable: Efficiency of SACCO

b) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.861(a)	.741	.730	.041

a Predictors: (Constant), Saver - borrower domination, Age of SACCO, Size of SACCO, Economies of scope, Bond of association, Adoption of technology, Member loan guarantee costs, Transactions processing

c) Regression Coefficients

Model		Unstandardized Coefficients B	Std. Error	t	Sig.
1	(Constant)	.069	.079	.870	.386
	Bond of association	-.004	.002	-1.839	.068
	Size of SACCO	.077	.010	7.406	.000
	Age of SACCO	.001	.000	2.358	.020
	Member loan guarantee costs	.331	1.047	.316	.753
	Economies of scope	.002	.002	1.167	.245
	Saver - borrower domination	.135	.079	1.720	.088

a Dependent Variable: Efficiency of SACCO

Hypothesis three (H_3) had suggested that the conduct of SACCOs has a significant intervening effect on the relationship between SACCO characteristics and efficiency of SACCOs. Results of this study indicate that this is not the case ($p>0.05$). Therefore, the null hypothesis was accepted and consequently the alternate one was rejected. The conclusion is that the conduct of SACCOs has no significant intervening effect on the relationship between SACCO characteristics and efficiency of SACCOs.

5.3.4 Joint Effect of SACCO Characteristics, Income of Members and SACCO Conduct on Efficiency of SACCOs

The study set out to determine the joint effect of SACCO characteristics, income of members and SACCO conduct on the efficiency of SACCOs. The following is the null hypothesis:

Hypothesis 4: SACCO characteristics, income of members and SACCO conduct have no significant joint effect on the efficiency of SACCOs.

Table 5.14: Regression Results with Efficiency of SACCO as Dependent Variable and SACCO Characteristics, Income of Members and Conduct of SACCOs as Predictors

a) Goodness of Fit

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.668	11	.061	38.059	.000(a)
	Residual	.211	132	.002		
	Total	.879	143			

a Predictors: (Constant), Saver - borrower domination, Bond of association, Managerial competency, Transactions processing, Adoption of technology, Age of SACCO, Income of members, Member loan guarantee costs, Economies of scope, Size of SACCO, Innovation of management

b Dependent Variable: Efficiency of SACCO

b) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.872(a)	.760	.740	.040

a Predictors: (Constant), Saver - borrower domination, Bond of association, Managerial competency, Transactions processing, Adoption of technology, Age of SACCO, Member loan guarantee costs, Income of members, Economies of scope, Size of SACCO, Innovation of management

c) Regression Coefficients

Model		Unstandardized Coefficients			
		B	Std. Error	t	Sig.
1	(Constant)	.169	.091	1.859	.065
	Bond of association	-.006	.002	-.139	.012
	Size of SACCO	.077	.012	6.555	.000
	Managerial competency	-.012	.012	-.937	.350
	Adoption of technology	-.004	.002	-2.230	.027
	Age of SACCO	.001	.000	1.941	.050
	Income of members	.067	.039	1.731	.086

Member loan guarantee costs	.528	1.039	.509	.612
Economies of scope	.000	.002	-.127	.899
Innovation of management	.004	.003	1.131	.260
Transactions processing	1.077E-05	.000	.613	.541
Saver - borrower domination	.090	.082	1.105	.271

a Dependent Variable: Efficiency of SACCO

The goodness of fit results of standard linear multiple regression with SACCO efficiency as the dependent variable and SACCO characteristics, income of members and conduct of SACCOs as predictors are reported in Table 5.14 (a). The model summary is in Table 5.14(b). The model reveals a statistically significant relationship between SACCO efficiency and SACCO characteristics (Sig.=< 0.05). The multiple regression model had an Adjusted R^2 = .740, F (11, 132) = 38.059, and a standard error of 0.040. This level of standard error indicates that the mean deviation of efficiency of SACCO predicted by the model is about 5% (0.04/0.78). SACCO characteristics accounted for 73.4% of the variance in efficiency of SACCO.

The findings indicate that efficiency of SACCO was significantly predicted by bond of association (β = -0.006, p=<0.05), size of SACCO (β = 0.077, p=<0.05), adoption of technology (β = -0.004, p=<0.05) and age of SACCO (β = 0.001, p=<0.05). Managerial competency was not a significant predictor of efficiency of SACCO (p>0.05). All the five SACCO conduct variables (member loan guarantee costs, economies of scope, innovation of management, transactions processing, saver - borrower domination) were

not significant predictors of efficiency of SACCO. The moderating variable, income of members, was also not a significant predictor of efficiency of SACCOs.

Hypothesis one (H_4) had suggested that there is a statistically significant relationship between efficiency of SACCOs and SACCO characteristics, income of members and conduct of SACCOs. Results of this study indicate that the relationship between efficiency of SACCOs and SACCO characteristics, income of members and conduct of SACCOs is statistically significant ($p=<0.05$) for bond of association, size, age and adoption of technology. The null hypothesis was rejected and therefore the alternate one was accepted, meaning that there is a significant joint effect of SACCO characteristics, income of members and conduct of SACCOs on efficiency of SACCOs.

The analytical model which was:

$E_i = \alpha_4+\beta_{b4}B_i+\beta_{s4}S_i+\beta_{c4}C_i+\beta_{h4}H_i+\beta_{a4}A_i+\beta_{g4}G_i+\beta_{n4}N_i+\beta_{v4}V_i+\beta_{p4}P_i+\beta_{d4}D_i+\beta_{m4}M_i+\varepsilon_4$, is therefore specified as:

$E_i=0.169-0.006B_i+0.077S_i-0.012C_i-0.004H_i+0.001A_i+0.067M_i+0.528G_i+0N+0.004V_i+1.077E\text{-}05P_i+0.090D_i$

where E_i = efficiency of SACCO i, α_4 is intercept, B_i = strength of bond of association among members of SACCO i, S_i = size of SACCO i. H_i = the degree of adoption of technology, C_i = managerial competency of SACCO i, A_i = the age of SACCO i, M_i =

member income of SACCO I, G_i = member loan guarantee costs for SACCO i, N_i = sum of number of savings, loan and off-balance sheet products of SACCO i, V_i = innovation of management of SACCO i, P_i = average number of members per employee for SACCO i, D_i = saver – borrower domination for SACCO i and ε_4 is error term.

The joint regression model can be simplified to include only the significant coefficients as: $E_i = -0.004B_i+0.084S_i-0.004H_i+0.001A_i$

5.4 Discussion of Research Findings

The research findings relating to the study hypotheses were presented in section 5.3. In this section the meaning of those results, how they fit into existing knowledge are discussed and any deduced insights are presented.

5.4.1 Relationship Between Characteristics and Efficiency of SACCO

The first study objective was to determine the relationship between SACCO characteristics and efficiency of SACCOs in Kenya. The summary of the results of testing of hypotheses relating to the first study objective are shown in Table 5.15. The results are that characteristics significantly influence the efficiency of SACCOs. The results indicate that, as theory predicts, size is positively related to the efficiency of SACCOs. This finding is similar to the results of Murray and White (1980); Murray and White (1983) (both for British Columbia CUs); Gual and Clemente (1999) (for British Columbia CUs); and Ward and McKillop (2005) for UK CUs. However, Crapp (1983) and Brown and

O'Connor (1995) (both for Australian CUs) had found a negative size – efficiency relationship, while Fried et al (1993) for US CUs found no relationship. The average SACCO size in the current study is relatively small, hence a unit increase in size, for example total assets, is accompanied by less than unit increase in inputs, for example employee salaries. It is therefore concluded that growth in size results in economies of scale and hence increased efficiency of the SACCO.

Table 5.15: Summary of the Results from the Tests of Study Hypotheses Relating to Study Objective Number One

	Alternate Hypothesis	**Results**	**Interpretation**
H_{A1}	There is a significant relationship between SACCO characteristics and efficiency of SACCOs.	Regression model is significant (Sig.=<0.05)	Alternate hypothesis confirmed.
H_{A1i}	The stronger the bond of association among SACCO members, the higher the degree of efficiency	Variable coefficient significant (p=<0.05) β=-0.004) Negative	Alternate hypothesis not confirmed
H_{A1ii}	The larger the SACCO, the higher the degree of efficiency	Variable coefficient significant (p=<0.05, β=0.084)	Alternate hypothesis confirmed
H_{A1iii}	The higher the level of managerial competency, the higher the degree of efficiency	Variable coefficient not significant (p>0.05)	Alternate hypothesis not confirmed
H_{A1iv}	The higher the deployment of technology, the higher the degree of efficiency	Variable coefficient significant (p=<0.05) β=-0.004) Negative	Alternate hypothesis not confirmed
H_{A1v}	The older the SACCO, the higher the degree of efficiency	Variable coefficient significant (p=<0.05, β=0.001)	Alternate hypothesis confirmed.

Age was found to be significantly positively related to efficiency of SACCO, that is the older the SACCO, the more efficient it was found to be. This is in line with the findings of Esho (2001) for Australian credit unions and Ward and McKillop (2005) for UK CUs, both who found a positive relationship between age and efficiency. However, Njeru (2013) found no significant relationship between age and performance of tour firms in Kenya.

The study found that bond of association was negatively significantly related to efficiency of SACCOs. That is the lower the bond of association, the higher the efficiency. Fried et al (1993) in studying US credit unions found a positive relationship between bond of association and efficiency. Also Brown et al (1999) found positive relationships for Australian CUs. The results of negative relationship in the current study could be due to several factors. The first is that 85% of the SACCOs had a low degree of bond of association. Further, it maybe that the efficiency gains emanating from increase in SACCO size more than offsets the reduction in efficiency emanating from reduced strength of bond of association (since increase in size is related to a lower bond of association).

Managerial competency was not significantly related to efficiency of SACCOs. Managerial competency measured directors and employees qualifications (knowledge) and experience (skills). The lowest aggregate score was 5.3 (out of 10) and highest was 8.5. The results of this study are contrary to what theory predicts, that managerial

competency would be positively related to the efficiency of SACCOs. The finding of this study differs from that of Levenson et al (2006), who found a positive relationship between managerial competency and both individual and firm level performance. Therefore, although there were differences in managerial competency, it might be that the level of complexity in the management of SACCOs is low and hence increases in qualifications and experience of directors and employees may not lead to performance gains that exceed the additional costs of engaging these more competent persons.

The adoption of technology was negatively significantly related to efficiency of SACCOs. That is the higher the adoption of technology, the lower the efficiency. The theoretically expected relationship between adoption of technology and efficiency is a positive. Crapp (1983) for Australian credit unions and Chowdhury (2003) for nine Asian and Pacific Basin countries found a positive relationship between adoption of technology and efficiency. However, Murray and White (1980) (for British Columbia CUs) found a negative relationship. The levels of automation, measured by the ratio of capitalized and expensed hardware and software to total assets, was low at a mean of 2.3% and 77% of the SACCOs having less than 3%. The smaller SACCOs had adopted more technology than the larger ones as evidenced by the negative correlation coefficient. Efficiency gains emanating from increase in SACCO size more than offsets the reduction in efficiency emanating from reduced adoption of technology (since increase in size is related to a lower adoption of technology).

5.4.2 Moderating Influence of Income of Members in the Relationship Between Characteristics and Efficiency of SACCO

The second study objective was to establish the moderating effect of the income of members on the relationship between SACCO characteristics and the efficiency of SACCOs. The summary of the results of testing of hypotheses relating to the second study objective are shown in Table 5.16. The income of members moderated the relationship between efficiency of SACCOs and SACCO characteristics, and more specifically the size – efficiency relationship. The interaction term between size and income had a positive coefficient of 0.330, meaning that the higher the income the higher the efficiency (as size is positive). For SACCOs whose member incomes are higher, the effect of size on efficiency is greater than in those whose member incomes are lower. The relationship between efficiency and income of members was found to be positive by Esho (2001) for Australian credit unions and Ward and McKillop (2005) for UK CUS. Fried et al (1993) for US credit unions found no relationship at all.

Table 5.16: Summary of the Results from the Tests of Study Hypotheses Relating to Study Objective Number Two

	Alternate Hypothesis	**Results**	**Interpretation**
H_{A2}	The income of SACCO members has a moderating influence on the relationship between SACCO characteristics and efficiency of SACCOs.	One of the interaction terms (size of SACCO and income of members) significant – see H_{A2ii}	Alternate hypothesis confirmed
H_{A2i}	Income of members has no effect on the strength of relationship between bond of association and efficiency of SACCO	Interaction terms (bond of association and income of members) not significant ($p>0.05$)	Alternate hypothesis confirmed
H_{A2ii}	The higher the income of members, the stronger the relationship between size of SACCO and efficiency	Interaction terms (size of SACCO and income of members) significant ($p=<0.05$, $\beta=0.330$). Size is still a significant predictor	Alternate hypothesis confirmed

	Alternate Hypothesis	Results	Interpretation
		(p=<0.05, β=0.085).	
H_{A2iii}	The higher the income of members, the stronger the relationship between level of managerial competency and efficiency	Interaction terms (managerial competency and income of members) not significant (p>0.05)	Alternate hypothesis not confirmed
H_{A2iv}	The lower the income of members, the stronger the relationship between adoption of technology and efficiency of SACCO	Interaction terms (adoption of technology and income of members) not significant (p>0.05)	Alternate hypothesis not confirmed
H_{A2v}	Income of members has no effect on the strength of relationship between age and efficiency of SACCO	Interaction terms (age of SACCO and income of members) not significant (p>0.05)	Alternate hypothesis confirmed

Since the efficiency of SACCO was not significantly related to managerial competency, income of members could not be expected to moderate the relationship. Income of members had been hypothesized not to be a moderating variable between efficiency of SACCO and bond of association. The study confirmed this expectation. The study had expected that the lower the income of members, the stronger the relationship between adoption of technology and efficiency of SACCO. This was found not to be the case. This could be due to that the levels of technology adoption were relatively low. Income of members had been hypothesized not to affect the relationship between age and efficiency of SACCO. The study confirmed this hypothesis.

5.4.3 Intervening Effect of Conduct of SACCO in the Relationship Between Characteristics and Efficiency of SACCO

The third study objective was to determine the intervening influence of conduct of SACCOs on the relationship between SACCO characteristics and the efficiency of SACCOs. The summary of the results of testing of hypotheses relating to this study

objective are shown in Table 5.17. Efficiency of SACCO was not significantly predicted by managerial competency. Consequently, the respective SACCO conduct variable of innovation of management can not intervene in a relationship that does not exist. While size was related to efficiency of SACCO prior to and after the introduction of economies of scope (the coefficient reduced from 0.084 to 0.078), this second variable was not significant. This is inconsistent with White (1983) for British Columbia credit unions, and Goddard et al (2008) for small US CUs both of whom found a positive relationship between scope and efficiency. Worthington (1998a) for Australian CUs found a negative relationship scope – efficiency relationship. Therefore, economies of scope was not an intervening variable in the relationship between size and efficiency of SACCO.

Adoption of technology was not significantly related to transactions processing. Therefore, transactions processing could not be an intervening variable between efficiency of SACCO and adoption of technology. Age was positively related to efficiency of SACCO prior to and after introduction of saver-borrower domination. However, the age coefficient remained unchanged. Further, saver-borrower domination was not significantly related to efficiency of SACCO, although Esho (2001) had found a positive relationship in Australian credit unions. Therefore, saver-borrower domination was not an intervening variable in the age - efficiency of SACCO relationship.

Table 5.17: Summary of the Results from the Tests of Study Hypotheses Relating to Study Objective Number Three

	Alternate Hypothesis	Results	Interpretation
H_{A3}	The conduct of SACCOs has an intervening effect on the relationship between SACCO characteristics and efficiency of SACCOs.	See H_{A3i} - H_{A3v}	Alternate hypothesis not confirmed
H_{A3i}	Member loan guarantee cost mediates the relationship between the dependent variable efficiency of SACCO and the independent variable of bond of association.	After introducing member loan guarantee cost, bond of association is still significant ($p=<0.05$, $\beta=-0.004$), but β has remained the same. Further, member loan guarantee cost is not significant ($p>0.05$).	Alternate hypothesis not confirmed
H_{A3ii}	Economies of scope mediates the relationship between the dependent variable efficiency of SACCO and the size of the SACCO as the independent variable.	After introducing economies of scope, size of SACCO is still significant ($p=<0.05$, $\beta=0.078$), and β has reduced (from 0.084). However, economies of scope is not significant ($p>0.05$).	Alternate hypothesis not confirmed
H_{A3iii}	Innovation of management mediates the relationship between the dependent variable efficiency of SACCO and the managerial competency as the independent variable.	As per H_{A1iii}, managerial competency is not significant predictor of the dependent variable, efficiency of SACCO	Alternate hypothesis not confirmed
H_{A3iv}	Transactions processing mediates the relationship between the dependent variable efficiency of SACCO and adoption of technology as the independent variable.	Although adoption of technology was related to efficiency, it is not significantly related to transactions processing. Hence transactions processing can not be an intervening variable in the efficiency – adoption of technology relationship.	Alternate hypothesis not confirmed

	Alternate Hypothesis	Results	Interpretation
H_{A3v}	Saver-borrower domination mediates the relationship between the dependent variable efficiency of SACCO and the dependent variable of age of SACCO.	After introducing saver-borrower domination, age of SACCO is still significant ($p=<0.05$, $\beta=0.001$), but β has not reduced and saver-borrower is not significant ($p>0.05$).	Alternate hypothesis not confirmed

For intervention to be present, the independent and intervening variables require to be related. This was noted to be the case for bond of association, size of the SACCO, managerial competency and age of SACCO, which were significant predictors of member loan guarantee costs, economies of scope, innovation of management and saver-borrower domination respectively. Among the characteristics, only adoption of technology was not a significant predictor of its respective SACCO conduct variable of transactions processing.

5.4.4 Joint Effect of SACCO Characteristics, Income of Members and Conduct of SACCOs on Efficiency of SACCOs

The fourth study objective was to establish the joint effect of SACCO characteristics, income of members and SACCO conduct on the efficiency of SACCOs in Kenya. The results are that characteristics, income of members and SACCO conduct significantly jointly influence the efficiency of SACCOs. The results for the SACCO characteristic variables were as discussed in section 5.4.1, those for income of members in 5.4.2 and for conduct of SACCO as in 5.4.3.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The chapter summarises the study findings with regard to the research hypotheses. The conclusions, that is the meaning of the research finding for each of the objectives of the study are discussed. The chapter further highlights various contributions to knowledge and recommendations for policy and practice. The study has several limitations, and these are explained. Finally, some areas for further research are proposed.

6.2 Summary of Findings

In many measures of size such as total member deposits, number of SACCO members, inputs and outputs in the efficiency computation, the mean is relatively larger compared to the median, depicting that a few SACCOs are comparatively large while the majority are relatively small, for example the mean of member deposits per SACCO was KShs 776 million, lowest KShs 3 million and highest KShs 14.033 billion; number of members in a SACCO were a low of 196, high of 118,066 and a mean of 11,622. The SACCO characteristic, conduct and efficiency variables are relatively normally distributed. The mean efficiency of SACCOs was 0.775, highest was 1 and lowest was 0.557.

The first study objective was to determine the relationship between SACCO characteristics and efficiency of SACCOs in Kenya. The findings, which confirmed the alternate hypothesis, are that characteristics significantly influence the efficiency of

SACCOs. Size was found to be positively related to the efficiency of SACCOs. The alternate hypothesis which was that the larger the SACCO, the higher the degree of efficiency was confirmed. The alternate hypothesis for age was that the older the SACCO, the higher the degree of efficiency. The study found age to be significantly positively related to efficiency of SACCOs.

Bond of association was negatively significantly related to efficiency of SACCOs. The results were not as per the alternate hypothesis that the stronger the bond of association among SACCO members, the higher the degree of efficiency. The higher the level of managerial competency, the higher the degree of efficiency was another hypothesis. The study found that managerial competency was not significantly related to efficiency of SACCOs. Adoption of technology was found to be negatively significantly related to efficiency of SACCOs. Lower SACCO efficiencies were associated with higher adoption of technology. The alternate hypothesis was that the relationship between adoption of technology and efficiency is positive.

The second study objective was to establish the moderating effect of the income of members in the relationship between SACCO characteristics and the efficiency of SACCOs. The study findings were that income of members moderated the relationship between efficiency of SACCOs and SACCO characteristics. The alternate hypothesis was that the higher the income of members, the stronger the relationship between size of SACCO and efficiency. The study confirmed this hypothesis, that is the effect of increase

in size on efficiency is greater in SACCOs whose member incomes are higher than in those whose member incomes are lower.

Income of members did not moderate the relationship between efficiency of SACCO and managerial competency as efficiency of SACCO was not significantly related to managerial competency. This was not in line with the alternate hypothesis that the higher the income of members, the stronger the relationship between level of managerial competency and efficiency. Another hypothesis was that income of members has no effect on the strength of relationship between bond of association and efficiency of SACCO. The study confirmed this expectation.

The study had hypothesised that the lower the income of members, the stronger the relationship between adoption of technology and efficiency of SACCO. The study found that income of members did not moderate the efficiency of SACCO to adoption of technology relationship. The study confirmed the hypothesis that income of members would not affect the relationship between age and efficiency of SACCOs.

Study objective number three was to determine the intervening influence of conduct of SACCOs in the relationship between SACCO characteristics and the efficiency of SACCOs. The study found that the conduct of SACCOs did not have an intervening effect on the relationship between SACCO characteristics and efficiency of SACCOs. Bond of association, size of the SACCO, managerial competency and age of SACCO were significant predictors of member loan guarantee costs, economies of scope,

innovation of management and saver-borrower domination respectively. Adoption of technology was not a significant predictor of its associated conduct variable of transaction processing.

The fourth study objective was to establish the joint effect of SACCO characteristics, income of members and SACCO conduct on the efficiency of SACCOs in Kenya. The results are that characteristics, income of members and SACCO conduct significantly jointly influence the efficiency of SACCOs.

6.3 Conclusion

The main purpose of the study was to establish how the characteristics – efficiency relationship of SACCOs in Kenya is affected by SACCO members' income and conduct of SACCOs. The overall conclusion is that SACCO characteristics are good indicators of the efficiency of SACCOs. Stratifying SACCOs by income of members improves the power of characteristics to predict efficiency. Conduct of SACCO does not predict efficiency of SACCOs.

The descriptive statistics indicate that a few SACCOs are comparatively large while the majority are relatively small. The mean efficiency of SACCOs was 0.775, highest was 1 and lowest was 0.557. It is therefore possible to improve the relative efficiency of the SACCOs by on average 22.5%. That means that the outputs of loans to members and other earning assets (such as interest yielding bank deposits, treasury bills and bonds; investment in rental property; and shares), interest income and other income (includes

interest from bank deposits, treasury bills and bonds; rent from investment property; dividends from shares; money transfer and withdrawal charges) could potentially be increased by 22.5% without increasing the inputs, that is member deposits and borrowings, interest/dividends on member deposits and borrowing costs, staff costs and other operating expenses (such as rent payable, communication costs, office consumables). Or alternatively it is possible to reduce the inputs by 22.5% without any reduction in outputs.

Study objective number one was to determine the relationship between SACCO characteristics and efficiency of SACCOs in Kenya. SACCO characteristics were significantly related to efficiency of SACCOs. The overall conclusion is that by determining the characteristic of a SACCO, it is possible to deduce how efficient that SACCO would be. Larger SACCOs, measured by size of total assets, would be expected to be more efficient than smaller SACCOs. Younger SACCOs, measured by number of years, are less efficient that older ones.

SACCOs that draw their members from multiple employers or are not employer based are likely to be more efficient. This may be because opening up membership enables the SACCO to be larger. The higher efficiency emanating from increase in size more than compensates for the reduction in bond of association. Having regard to managerial competency would not assist predict how efficient a SACCO would be. This may be due to that SACCOs are not very complex entities and marginal efficiency gains from more knowledge and skills of management may be less than the additional costs of acquiring

the marginal increase in managerial competency. Adoption of technology was found to be negatively significantly related to efficiency of SACCOs. If a SACCO has a higher combined amount of hardware and software on its balance sheet and computer related expenses in its statement of comprehensive income, both standardised by total assets, then such a SACCO is likely to be less efficient than one with a lower ratio.

The second study objective was to establish the moderating effect of the income of members in the relationship between SACCO characteristics and the efficiency of SACCOs. The study concluded that if SACCOs are stratified by income of members, then the predictive power of SACCO characteristics to efficiency would be improved. More specifically, the predictive power of size to efficiency of SACCO is more in SACCOs whose member incomes are higher than in those whose member incomes are lower. Stratification of the SACCOs by income of members does not affect how well efficiency is predicted by managerial competency, bond of association, adoption of technology and age.

The third study objective was to determine the intervening influence of conduct of SACCOs in the relationship between SACCO characteristics and the efficiency of SACCOs. Conduct of SACCOs was found not to be a significant predictor of efficiency of SACCOs. Member loan guarantee costs, economies of scope, innovation of management, transactions processing and saver-borrower domination are not predictors of efficiency of SACCOs. However bond of association, size of the SACCO, managerial competency and age of SACCO can be used to determine member loan guarantee costs,

economies of scope, innovation of management and saver-borrower domination respectively. Adoption of technology would not aid in prediction of transaction processing.

The fourth study objective was to establish the joint effect of SACCO characteristics, income of members and SACCO conduct on the efficiency of SACCOs in Kenya. The results are that characteristics, income of members and SACCO conduct significantly jointly influence the efficiency of SACCOs.

6.4 Contribution of Study to Knowledge

The overall contribution of the study is the finding and conclusion that SACCO characteristics are good indicators of the efficiency of SACCOs and that stratifying SACCOs by income of members improves the power of characteristics (specifically size) to predict efficiency. The study eliminated conduct of SACCOs as a potential intervening variable in the characteristic – efficiency prediction.

The theory of financial intermediation suggests that a stronger bond of association among SACCO members would translate into higher efficiency due to lower information asymmetry. This is because the SACCO would incur lower costs of screening in order to alleviate the adverse selection risk as the members would be knowing one another more. Further, the SACCO would incur lower monitoring costs to guard against moral hazard risk as the members having a stronger bond would take up part of this role. The findings of the study were that SACCOs with a stronger bond of association among members had

lower efficiency. This suggests that the loss in efficiency emanating from a lower bond of association should be considered alongside the efficiency gains that would accrue from increase in size. That is while the theory of financial intermediation provides information asymmetry and transaction cost minimisation as two distinct motivations for the existence of these institutions, it would be better to consider the two in aggregate. Further, the results of the study (specifically the finding that SACCOs with a lower efficiency had a stronger bond of association among members) suggests that the information asymmetry paradigm does not offer a satisfactory explanation for the reason of existence of financial institutions.

The results of the study were that size of SACCO had a positive relationship with efficiency. This empirical finding contributes to knowledge in that it lends support to the aspect of the theory of financial intermediation that argues that financial institutions, like SACCOs, must focus on transaction cost minimization. The results also support the agency theory whereby managers would pursue growth if it results in the organization being more efficient.

The study empirically determined that stratification of SACCOs by income of members improved the predictive power of SACCO characteristics to efficiency. This was specifically for the relationship between size and efficiency of SACCO whereby the relationship was stronger in SACCOs whose member incomes are higher than in those whose member incomes are lower. The contribution to knowledge is that the

characteristic (specifically size) to efficiency relationship is moderated by income of members.

While the conduct of SACCOs did not mediate the characteristics-efficiency relationship, the study established the existence of significant relationships between specific characteristic variables and their corresponding conduct measures, that is bond of association- member loan guarantee costs; size of the SACCO- economies of scope, managerial competency- innovation of management; and age of SACCO- saver-borrower domination.

6.5 Recommendations for Policy and Practice

The implications for policy in Kenya and other countries with SACCOs are that as size is positively related to efficiency, then there would be need to institute policy reforms geared towards having the SACCOs grow either internally by recruiting more members or through mergers. The regulator can also consider setting a minimum size threshold with a view to significantly reducing the number of SACCOs which would translate into the remaining ones becoming larger. The efficiency gains from increase in size would be more than the efficiency loses emanating from reduction in strength of the bond of association.

The study found age to be significantly positively related to efficiency of SACCOs, that is the older the SACCO the more efficient it is. The regulator should consider being more stringent in permitting new SACCOs to be formed, for example in having the minimum

numbers of persons who can start a SACCO being relatively high. This would prevent having many young and small SACCOs being started which would be less efficient in availing members benefits for given inputs.

The study found that managerial competency, in terms of level of education and experience in SACCO management was not significantly related to efficiency of SACCOs. This might be because SACCOs are relatively not complex entities. The regulator, in approving persons to be in boards of SACCOs or hold senior management positions, might consider including, in addition to education and experience in SACCO management, other factors such as in the criteria that is considered.

The study results were that the members obtain more benefits, such as loans, from inputs such as member deposits, if the SACCO is larger in size than if it is smaller. On average, compared with the best performing, a SACCO could increase its outputs by 22.5% without an increase in inputs. Consequently, the members through their elected boards and employees should pursue growth strategies, including intensified recruitment of new members or merging with other SACCOs. The study found that efficiency gains emanating from increase in size were more for SACCOs whose member incomes were higher. Consequently, managers of SACCOs whose member incomes are higher should be more aggressive in pursuing growth strategies than for those whose member incomes are lower.

Age is positively related to efficiency of SACCO. If a group of persons start a new SACCO, the benefits (such as loans) from the inputs (such as member deposits) that they will receive will be less than if they joined an existing and hence older SACCO. Therefore, co-operators should consider joining existing SACCOs and strengthening them instead of starting new ones.

6.6 Limitations of the Study

The study used a cross sectional, descriptive study design. That design has various advantages, such as requiring lower resource inputs of time and money, while at the same time yielding results that are useful especially in establishing existence and direction of relationships among variables. However, a disadvantage of the design is that while it can establish the direction and significance of relationships, it cannot determine causality. While the study established among other results the relationships between SACCO characteristics and efficiency of SACCOs, the study did not establish causal relationships. Nevertheless, the results are useful as they establish the basis of attempting to determine causality.

Another limitation of the study is that it employed DEA for determination of the efficiency of SACCOs. DEA employs the frontier approach whereby each unit's efficiency is a relative measure depicting how its outputs to inputs differ from the unit in the sample with the best output to input ratio. Consequently, the 22.5% level of inefficiency found in the study could change in a similar study depending on the specific SACCOs analyzed. However, DEA has the advantage of that it is used without the

requirement to specify a specific output- input function that the parametric approaches need. To specify a valid econometric production function would require the carrying out of extensive engineering studies. Nevertheless, the results obtained using DEA are very useful in that although they did not derive absolute inefficiencies, they indicate the existence of significant relative inefficiencies in the SACCOs.

The study analysed a responsive 144 (out of a target population of 215) SACCOs that are regulated by SASRA, while there are others that are not regulated. This may tend to reduce the generalisability of the results to those that are not regulated. The decision to target the 215 was based on that they define the SACCO sector in Kenya and data about them was more likely to be available. As shown in Table 1.1, the regulated have 86% of the total members and control 76% of the assets of both regulated and non-regulated. Consequently, the results of the study would tend to apply to the SACCO sector in Kenya.

6.7 Suggestions for Further Research

In order to overcome the study limitation of not having established causality between variables such as size, age and efficiency of SACCOs, a further research extending this work can be carried. This should be a longitudinal study designed to establish causality. It would involve selecting a panel of SACCOs and analyzing the relationships among the variables in a considerably long duration of time. It would however require substantial resources.

The understanding of the nature of the relationship between independent and dependent variables is improved by the introduction of a moderating variable. In this study income of members moderated the effect of size on efficiency of SACCO, in that the higher the income of members the more the efficiency gains from increases in size. This study can be continued in an endeavour to determine the appropriate moderating variables between characteristics that were related to efficiency of SACCO such as bond of association, adoption of technology and age of SACCO. The study employed DEA in assessing efficiency of SACCOs. If sufficient resources are available, it may be useful to carry out a detailed investigation of the determinants of efficiency of SACCOs using an econometric method such as SFA, DFA or TFA.

One of the research gaps that this study had endeavoured to fill was to determine statistically the existence of intervening variables, SACCO conduct, between characteristics and efficiency of SACCOs. The choice of conduct of SACCO had been based on a review of the literature. However, conduct was found not to be a significant intervening variable. It is therefore suggested that other researchers attempt to identify and test other intervening variables.

Results indicated that 'bond of association' had no influence on efficiency of a SACCO. It might be useful to consider other types of bonds other than that emanating from the workplace, such as belonging to the same village, social class, kinship, same religious faith, belonging to the same church, mosque.

The two most significant services that members obtain from SACCOs are them being availed an avenue to make savings that earn interest or dividends and access to loans. These services can also be obtained from commercial banks. A comparative study of the financial impact to persons who access the saving and loan products from SACCOs and commercial banks would be very informative and it is suggested that a research is undertaken in the area.

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APPENDICES

Appendix 1: Selected Statistics of Credit Unions

	Country	Number of CUs	Number of members ('000')	** (%)	Savings (US $ millions)	Loans (US $ millions)	Assets (US $ millions)
1	USA	6,960	95,060	45.39	889,579	605,270	1,034,869
2	Canada	771	10,230	43.75	136,200	245,778	296,852
3	Australia	103	4,504	30.09	71,697	72,978	90,071
4	India	1,618	20,000	2.50	52,536	34,803	66,809
5	Korea	950	5,925	16.54	33,192	30,111	51,795
6	Thailand	2,220	3,749	7.82	35,192	37,133	48,537
7	Brazil	641	4,684	3.40	22,435	18,839	32,021
8	Ireland	487	3,200	73.22	15,210	6,370	17,919
9	Ecuador	896	4,678	47.14	N/A	N/A	5,796
10	Poland	55	2,591	10.67	5,018	3,589	5,473
11	Colombia	192	2,175	7.02	1,730	3,711	4,531
12	**Kenya**	**5,000**	**4,722**	**19.53**	**2,973**	**3,398**	**4,181**
13	Senegal	234	1,572	21.73	323	402	536
14	Tanzania	5,344	922	3.62	155	117	N/A
15	Uganda	2,414	1,281	7.52	85	90	N/A
16	S. Africa	25	53	0.17	N/A	N/A	23
17	Britain	397	1,026	2.47	1,305	1,014	1,580
	Global	**55,952**	**200,244**	**7.70**	**1,293,256**	**1,083,819**	**1,693,949**

Source: Extracted from WOCCU, 2012

** = Penetration rate, defined as credit union members/economically active population, that is 15-64 years of age.

N/A – Not available.

Appendix 2: List of Deposit-Taking SACCOs

(Arranged starting with largest by asset size)

1	MWALIMU	31	CAPITAL
2	HARAMBEE	32	WAUMINI
3	AFYA	33	NDEGE CHAI
4	STIMA	34	JAMII
5	KENYA POLICE	35	MURATA
6	UNITED NATIONS	36	THARAKA NITHI TEACHERS
7	UKULIMA	37	TAIFA
8	KENYA BANKERS	38	WINAS
9	IMARISHA	39	ASILI COOPERATIVE
10	GUSII MWALIMU	40	TELEPOSTA
11	METROPOLITAN	41	MOMBASA PORT
12	UNAITAS	42	CHUNA
13	MAGEREZA	43	EGERTON UNIVERSITY
14	KATECO	44	CHAI
15	BANDARI	45	LAIKIPIA TEACHERS
16	BORESHA SACCO	46	KENYA HIGHLANDS
17	HAZINA	47	MAISHA BORA
18	NYERI TEACHERS	48	KENPIPE
19	KILIFI TEACHERS	49	YETU
20	NACICO	50	MOI UNIVERSITY
21	SOLUTION SACCO	51	WANANDEGE
22	SHERIA	52	FORTUNE
23	MENTOR	53	NAKU
24	COSMOPOLITAN	54	ARDHI
25	BINGWA	55	BUNGOMA TEACHERS
26	MUHIGIA	56	SAFARICOM
27	TOWER LIMITED	57	SUKARI
28	KITUI TEACHERS	58	NASSEFU
29	MASAKU TEACHERS	59	WAKENYA PAMOJA
30	K. UNITY FINANCE	60	MOMBASA TEACHERS

List of Deposit-Taking SACCOs – Continued

61	NAWIRI	91	MOSACCO
62	WANAANGA	92	KENVERSITY
63	WANANCHI	93	KEIYO TEACHERS
64	WARENG TEACHERS	94	DAIMA
65	JITEGEMEE	95	GITHUNGURI DAIRY
66	TAI	96	UNIVERSAL TRADERS
67	TAITA TAVETA TEACHERS	97	TARAJI
68	NATION STAFF	98	MUKI
69	MWITO	99	MAGADI
70	MERU SOUTH FARMERS	100	BIASHARA
71	KENYA CANNERS	101	AIRPORTS
72	TEMBO	102	MIGORI TEACHERS
73	KITE	103	BURETI TEA GROWERS
74	ELIMU	104	CHEPSOL SACCO
75	TRANSNZOIA TEACHERS	105	2NK
76	SIMBA CHAI	106	IRIYANYI
77	KAPENGURIA TEACHERS	107	SOT TEA
78	UFUNDI	108	MASENO UNIVERSITY
79	MARAKWET TEACHERS	109	NTIMINYAKIRU
80	NANDI TEACHERS	110	MARSABIT TEACHERS
81	RELI	111	KINGDOM
82	UKRISTO NA UFANISI	112	NDETIKA RURAL
83	COMOCO	113	NYAMIRA TEA FARMERS
84	FUNDILIMA	114	NAFAKA
85	ORIENT SACCO	115	THAMANI
86	MWENDIWEGA	116	CHEMELIL
87	KWALE TEACHERS	117	SKYLINE
88	NAROK TEACHERS	118	MAUA METHODIST
89	BUTETE	119	VISION POINT
90	TRANSCOM	120	MWEA RICE FARMERS

List of Deposit-Taking SACCOs – Continued

121	COUNTY	151	KIMUTE
122	PUAN	152	SUBA TEACHERS
123	MWINGI MWALIMU	153	NDOSHA
124	DHABITI	154	ENEA
125	DIMKES	155	MUDETE TEA FACTORY
126	KMFRI	156	UFANISI
127	SAMBURU TEACHERS	157	BANANA HILL MATATU
128	BARAKA	158	SOTICO
129	KERENGA	159	NZOIA
130	NANDI HEKIMA	160	NANDI FARMERS
131	KURIA TEACHERS	161	TUPENDANE
132	ISIOLO TEACHERS	162	AINABKOI FARMERS
133	WEVARSITY	163	NYALA DAIRY
134	IMENTI	164	SIRAJI L
135	NYAMBENE ARIMI	165	JACARANDA
136	KONOIN TEA GROWERS	166	VISION AFRIKA
137	LAMU TEACHERS	167	NGP BAMBURI
138	CENTENARY	168	JIJENGE
139	WAKULIMA COMMERCIAL	169	FARIJI
140	SAMBURU TRADERS	170	KENYA MIDLAND
141	TIMES	171	BONDE LA KERIO
142	TANA RIVER TEACHERS	172	KIAMBAA DAIRY RURAL
143	WASHA	173	GITHONGO MAJANI
144	BONDO TEACHERS	174	LENGO
145	TENHOS	175	OGEMBO TEA GROWERS
146	NANYUKI EQUATOR	176	MWIETHERI
147	SHERACO	177	KIPSIGIS EDIS
148	ELGON TEACHERS	178	ORTHODOX
149	ABERDARE RURAL	179	TRANS-COUNTIES
150	RACHUONYO TEACHERS	180	AGRO-CHEM NL

List of Deposit-Taking SACCOs – Continued

181	KOLENGE TEA	211	CHEBOSOBON
182	BARATON	212	SIGOR FSA RURAL
183	KATHERA SACCO	213	CHESIKAKI RURAL
184	NUFAIKA	214	IHURURU
185	UCHONGAJI	215	KIAMOKAMA TG
186	NYAHURURU UMOJA		
187	KORU-HOMALINE COMPANY		
188	TUUNGANE TUJIJENGE SACCO		
189	GOOD FAITH		
190	GASTAMECO SACCO		
191	NEST		
192	OMOREMI RURAL		
193	NYANDO-KISUMU		
194	FLOUSPAR		
195	REA VIPINGO		
196	KAIMOSI TEA GROWERS		
197	TESCOM		
198	VIHIGA DISTRICT		
199	ALL CHURCHES SACCO		
200	ILKISONKO RURAL		
201	NYANKOBA SACCO		
202	MICII MIKURU		
203	MULOT FSA RURAL		
204	NYABIERA SACCO		
205	RONGAI RURAL		
206	LIMURU TRADERS		
207	KINAMBA JUA-COMM		
208	LENGA TUMAINI		
209	RUBET SACCO		
210	KIKAI RURAL		

(Source: SASRA, 2012)

Appendix 3: Data Collection Form

1. Name of SACCO……..

2. Year the SACCO was established……..

	ITEM	Year 2008	Year 2009	Year 2010	Year 2011	Year 2012	Year 2013
	From audited financial statements						
F1	Loans to members (KShs)						
F2	Other interest earning assets (such as interest yielding bank deposits, treasury bills and bonds; investment in rental property; and shares) (KShs)						
F3	Total assets (KShs)						
F4	Interest income from member loans (KShs)	XXX XXX					
F5	Other income (includes interest from bank deposits, treasury bills and bonds; rent from investment property; dividends from shares; money transfer and withdrawal charges) (KShs)	XXX XXX XXX XXX XXX XX X					

F6	Employee costs (KShs)	XXX XXX					
F7	Other operating expenses (such as rent payable, communication costs, office consumables) (KShs)	XXX XXX XXX					
F8a	Member deposits (KShs)						
F8b	Borrowings (KShs)						
F9a	Interest/dividends on members deposits (KShs)	XXX XXX					
F9b	Interest expense on borrowings (KShs)	XXX XXX					
	From SASRA/SACCO records						
F10	Number of members at the end of the year (Number)						
F11	Number of employees at the end of the year (Number)						
F12	Number of current savings products (Number)	XXX XXX	XXX XXX	XXX XXX	XXX XXX	XXX XXX	
F13	Number of current loan products (Number)	XXX XXX	XXX XXX	XXX XXX	XXX XXX	XXX XXX	

F14	Number of current off-balance sheet (Number)	XXX XXX	XXX XXX	XXX XXX	XXX XXX	XXX XXX	
F15	Value included in fixed assets of computer hardware and software at the end of the year (KShs)						
F16	Software expenses included in the statement of comprehensive income for the year (KShs)	XXX XXX XXX					
F17	Approximate annual amount of loans defaulted recovered from guarantors (deposits set-off or treated as loan to guarantors, etc) (KShs)	XXX XXX XXX XXX	XXX XXX XXX XXX	XXX XXX XXX XXX	XXX XXX XXX XXX	XXX XXX XXX XXX	

F18 Indicate, by ticking (√) in the appropriate box, the number of employers from whom your SACCO members are currently drawn from:

Number of employers from whom SACCO members were from					
1 Employer	**2-3 Employers**	**4-6 Employers**	**7-10 Employers**	**Over 10 Employers**	**Not Employer based**
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

F19		(a)				
		Highest level of education attained Tick (√) one box per person				
	Board members	Masters degree and above	First degree	Diploma	High school	Primary school
	1	[ ]	[ ]	[ ]	[ ]	[ ]
	2	[ ]	[ ]	[ ]	[ ]	[ ]
	3	[ ]	[ ]	[ ]	[ ]	[ ]
	4	[ ]	[ ]	[ ]	[ ]	[ ]
	5	[ ]	[ ]	[ ]	[ ]	[ ]
	6	[ ]	[ ]	[ ]	[ ]	[ ]
	7	[ ]	[ ]	[ ]	[ ]	[ ]
	8	[ ]	[ ]	[ ]	[ ]	[ ]
	9	[ ]	[ ]	[ ]	[ ]	[ ]
	10	[ ]	[ ]	[ ]	[ ]	[ ]
	11	[ ]	[ ]	[ ]	[ ]	[ ]
	12	[ ]	[ ]	[ ]	[ ]	[ ]

F19		(b)				
		Number of years experience in SACCO management Tick (√) one box per person				
	Board members	10 years and above	6 years and less than 10	3 years and less than 6	one year and less than 3	Less than one year
	1	[ ]	[ ]	[ ]	[ ]	[ ]
	2	[ ]	[ ]	[ ]	[ ]	[ ]
	3	[ ]	[ ]	[ ]	[ ]	[ ]
	4	[ ]	[ ]	[ ]	[ ]	[ ]
	5	[ ]	[ ]	[ ]	[ ]	[ ]
	6	[ ]	[ ]	[ ]	[ ]	[ ]
	7	[ ]	[ ]	[ ]	[ ]	[ ]
	8	[ ]	[ ]	[ ]	[ ]	[ ]
	9	[ ]	[ ]	[ ]	[ ]	[ ]
	10	[ ]	[ ]	[ ]	[ ]	[ ]
	11	[ ]	[ ]	[ ]	[ ]	[ ]
	12	[ ]	[ ]	[ ]	[ ]	[ ]

F20		(a)				
		Highest level of education attained Tick (√)one box per employee				
	Top ten (if applicable) employees	Masters degree and above	First degree	Diploma	High school	Primary school
	1	[ ]	[ ]	[ ]	[ ]	[ ]
	2	[ ]	[ ]	[ ]	[ ]	[ ]
	3	[ ]	[ ]	[ ]	[ ]	[ ]
	4	[ ]	[ ]	[ ]	[ ]	[ ]
	5	[ ]	[ ]	[ ]	[ ]	[ ]
	6	[ ]	[ ]	[ ]	[ ]	[ ]
	7	[ ]	[ ]	[ ]	[ ]	[ ]
	8	[ ]	[ ]	[ ]	[ ]	[ ]
	9	[ ]	[ ]	[ ]	[ ]	[ ]
	10	[ ]	[ ]	[ ]	[ ]	[ ]

F20		(b)				
		Number of years experience in SACCO management Tick (√) one box per person				
	Top ten (if applicable) employees	10 years and above	6 years and less than 10	3 years and less than 6	one year and less than 3	Less than one year
	1	[ ]	[ ]	[ ]	[ ]	[ ]
	2	[ ]	[ ]	[ ]	[ ]	[ ]
	3	[ ]	[ ]	[ ]	[ ]	[ ]
	4	[ ]	[ ]	[ ]	[ ]	[ ]
	5	[ ]	[ ]	[ ]	[ ]	[ ]
	6	[ ]	[ ]	[ ]	[ ]	[ ]
	7	[ ]	[ ]	[ ]	[ ]	[ ]
	8	[ ]	[ ]	[ ]	[ ]	[ ]
	9	[ ]	[ ]	[ ]	[ ]	[ ]
	10	[ ]	[ ]	[ ]	[ ]	[ ]

F21	Indicate, by ticking (√) in the appropriate box, the number of new products introduced by your SACCO during the last five years:					
		Nil Products	**1-2 Products**	**3-4 Products**	**5-6 Products**	**Over 6 Products**
	Savings products	[ ]	[ ]	[ ]	[ ]	[ ]
	Loan products	[ ]	[ ]	[ ]	[ ]	[ ]
	Off-balance sheet products	[ ]	[ ]	[ ]	[ ]	[ ]

Appendix 4: Types of Products Offered by the SACCOs

The products are in three categories – savings, loans and services. In the various SACCOs some of these products were introduced during the period covered by the study. SACCOs use different names for products and services that are the same.

SAVINGS

1. Shares (non-withdrawable, can only be transferred)
2. Normal deposits (non-withdrawable deposits unless on exit)
3. Normal deposits boost
4. With-drawable deposits
5. Childrens' savings (deposit account for a child, sub-accounts of principal members)
6. FOSA personal savings
7. FOSA group savings
8. Biashara savings account
9. Ukulima savings account
10. Shariah compliant savings
11. Current accounts (current account issued via a commercial bank)
12. Investment deposit account

LOANS

1. Normal loans (short term loans for investment, consumption)
2. Development loans (medium term loans for investment)
3. Super loans (long term loans for investment)

4. Vision loans (longer term loans for investment)
5. Emergency loans (payable within a shorter term than normal loans, for unforeseen circumstances)
6. Instant loans (loans processed immediately)
7. School fees (payable within a shorter term than normal loans, for educational purposes)
8. Continuous professional education scheme loan
9. Loan repurchase loan
10. Holiday loans
11. FOSA flex loan
12. FOSA advance loan
13. Insurance premium finance loan
14. Individual business loan
15. Produce loan
16. Loan top ups
17. FOSA instant loans
18. FOSA personal loan
19. Group business loan (business loan to members in a group)
20. Asset financing (for purchase of a specific asset)
21. FOSA salary advance
22. Bridging loan
23. Commercial bank loan refinancing
24. Securities purchase loan

25. Motor vehicle purchase loan

SERVICES

1. ATM withdrawal services
2. Mobile banking
3. Holiday trip facilitation
4. Salary processing
5. Money transfer

Appendix 5: Descriptive Statistics Summary

	Variable	Mean	Standard Deviation	Coefficient of Variation	Lowest	Highest
1	Bond of Association (scale of 0 to 10)	2.79	1.93	0.69	2.0	10.0
2	Size of SACCO (Log of total assets)	8.55	0.70	0.08	6.78	10.26
3	Managerial Competency (scale of 0 to 10)	7.02	0.52	0.07	5.33	8.46
4	Degree of Adoption of Technology (%)	2.33	2.35	1.01	0.01	17.90
5	Age of SACCOs (years)	25	11	0.43	2	42
6a	Member Deposits (KShs millions)	776	1,573	2.03	3	14,033
6b	Number of SACCO Members	11,622	18,644	1.60	196	118,066
6c	Income of Members (KShs '000')	101	130	1.29	2	1,164
7	Member Loan Guarantee Costs (%)	1.02	0.47	0.46	0	2.73
8	Economies of Scope (number of products)	16.8	4.34	0.26	10	32
9	Innovation of Management (number of products introduced)	6.3	2.50	0.40	3	17
10	Transactions Processing (number of members per employee)	315	227	0.72	40	1,313
11	Saver-Borrower Domination (%)	0.7	4.8	6.4	-12.0	10.7
12a	Member Deposits and Borrowings (KShs millions)	870	1,675	1.93	3	14,371
12b	Interest, Dividends and Borrowing Costs (KShs millions)	77	170	2.19	0	1,516
12c	Staff Costs (KShs millions)	25	45	1.77	0.07	374
12d	Other Operating Expenses (KShs	39	52	1.33	0.5	315

	Variable	Mean	Standard Deviation	Coefficient of Variation	Lowest	Highest
	millions)					
12e	Loans and Other Earning Assets (KShs millions)	815	1,690	2.07	5	15,417
12f	Interest Income (KShs millions)	131	267	2.05	0.5	2,420
12g	Other Income (KShs millions)	32	51	1.609	0.3	393
12h	Efficiency of SACCO (scale of 0 to 1)	0.775	0.095	0.123	0.557	1

Source: Research Data