

**THE RELATIONSHIP BETWEEN FINANCIAL  
INNOVATION AND EFFICIENCY OF SACCOS IN KENYA**

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## DECLARATION

This research project is my original work and has not been submitted for examination in any other university.

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

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## **DEDICATION**

I dedicate this project to my family and friends. A special feeling of gratitude to my loving Mum and Dad who believed in the pursuit of academic excellence and who taught me that even the largest task can be accomplished if it is done one step at a time .

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## LIST OF ABBREVIATIONS

ATM	Automated Teller Machines
CBK	Central Bank of Kenya
DMU	Decision Making Unit
FOSA	Front Office Service Activity
ICA	International Cooperation Alliance
IT	Information Technology
MC	Marginal Costs
MFI	Microfinance Institution
P	Price
R&D	Research and Development
ROSKA	Rotating Savings and Credit Association
SACCO	Savings and Credit Cooperative
SASRA	SACCO Societies Regulatory Authority
SPSS	Statistical Package for Social Sciences



## **ABSTRACT**

Financial innovation is the act of creating and then popularizing new financial instruments as well as new financial technologies, institutions and markets. The ability to provide a specified volume and quality of service with the lowest level of resources capable of meeting that specification, performance measures and or indicators is required. Most of the innovations that have occurred have been occasioned by new distribution channel systems such as automatic teller machines (ATMs) and debit card technologies, which have allowed banks to diversify the way in which customers transfer funds, pay bills and buy goods and services without using cash or cheques. SACCOs today are experiencing a reduction in their member numbers since established banking institutions are taking the challenge by investing in faster and more efficient systems that can satisfy their customers' needs. The objective of the study was to establish the effect of financial innovation on efficiency of SACCOs in Kenya. The research problem was studied by use of a descriptive research design. The population consisted of the 130 SACCOs licensed by Sacco Societies Regulatory Authority (SASRA) as at 31<sup>st</sup> of December 2013. Secondary data was used in this study. The data collected was analyzed in order to determine the relationship between efficiency and determinants of efficiency. the study concluded that management quality, size, credit risk and capital had varying degrees of impact on the efficiency of SACCOs in Kenya in the period under study. This study concludes that management quality and size influenced efficiency positively but the two variables were statistically insignificant and thus their overall contribution was negligible. This study recommends the adoption of innovation strategies by the various SACCOs operating in Kenya so as to enhance efficiency in operations, boost profitability and attract more public attention. SACCOs need to invest more capital so as to guarantee the going concern aspect and thus win the confidence of potential clients. This study recommends that all SACCOs should highly embrace research and development to foresee new and innovative ideas to boost efficiency in internal operations, increase customer base and subsequently increase profitability.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

The Kenya financial sector comprises of many players seeking to gain competitive advantage over each other. Savings and Credit Cooperatives (SACCOs) form part of these financial institutions. In a bid to attract and retain their customer base as well as to survive in the volatile and dynamic sector SACCOs have had to adopt, better ways of managing and running through innovation of their institutions, operations, processes as well as their products. All these strategies are aimed at attaining efficiency in all operational levels by employing the best practices that ensure sustainability and growth.

Goldsmith (1969) in a criticized study found a positive relationship between financial and economic development. Schumpeter (1912) contended that a well-functioning banking sector is fundamental to technological innovation. "The primary function of the financial system is to facilitate the allocation and deployment of economic resources, both spatially and across time, in an uncertain environment." (Merton 1992). This function, in turn, encompasses a payments system with a medium of exchange; the transfer of resources from savers to investor-users of the resources (and the eventual repayment to the savers); the gathering of savings for the purposes of pure time transformation (i.e., deferral/smoothing of consumption); and the reduction of risk through insurance and diversification.

The operation of a financial system involves real resource costs, such as labor, materials and capital employed by financial intermediaries (e.g., banks, insurance companies, etc.) and by financial facilitators (e.g., stock brokers, market makers, financial advisors, etc.). Further, since multiple time periods are an inherent characteristic of finance, there are also uncertainties about future states of the world that generate risks. For risk-averse individuals, these risks represent costs. The possibility of new financial products/services/instruments that can better satisfy financial system participants' demands is always present (Merton, 1992).

### **1.1.1 Financial Innovation**

Financial innovation is the act of creating and then popularizing new financial instruments as well as new financial technologies, institutions and markets. The “innovations” are sometimes divided into product or process innovation, with product innovations exemplified by new derivative contracts, new corporate securities or new forms of pooled investment products, and process improvements typified by new means of distributing securities, processing transactions, or pricing transactions (Tufano, 2003). Innovation includes the acts of invention (the ongoing research and development function) and diffusion (or adoption) of new products, services or ideas (Rogers, 1983).

Hawawini (1987) conducted a study in the French capital markets over the eight year period from 1978 to 1985, to examine the process of financial innovation and the role of fiscal incentives in accelerating the development of capital markets. According to him, “financial Innovation is any new development taking place in the domestic or international financial system which (1) increases the rate of financial saving (the flow of

savings held in the form of financial assets, expressed as a percentage of disposable income), (2) allocates the available flow of savings more efficiently among its alternative uses, or (3) increases the financial system's operational efficiency by reducing the cost and/or the risk of transactions in the primary and secondary markets.

Many leading scholars, including Miller (1986) and Merton (1992) highlighted the importance of new products and services in the financial arena, sometimes characterizing these innovations as an "engine of economic growth." At several levels, these arguments are plausible. Financial innovations can be seen as playing a role similar to that of the "general purpose technologies" delineated by Bresnahan and Trajtenberg (1995) and Helpman (1998): not only do these breakthroughs generate returns for the innovators, but they have the potential to affect the entire economic system and can lead to far-reaching changes. For instance, these innovations may have broad implications for households, enabling new choices for investment and consumption, and reducing the costs of raising and deploying funds.

Similarly, financial innovations enable firms to raise capital in larger amounts and at a lower cost than they could otherwise and in some cases (for instance, biotechnology start-ups) to obtaining financing that they would otherwise simply be unable to raise. This latter idea is captured in a recent model of economic growth by Michalopoulos, Laeven, and Levine (2010), who argue that growth is driven not just by profit-maximizing entrepreneurs who spring up to commercialize new technologies, but also by the financial entrepreneurs who develop new ways to screen and fund the technologists.

### **1.1.2 Efficiency**

Efficiency as expressed by Drucker in his 2011 publication on people and performance is “doing the things the right way”. This denotes the fulfillment of the objective with minimum sacrifice of the available scarce resources. The ability to provide a specified volume and quality of service with the lowest level of resources capable of meeting that specification, performance measures and or indicators is required. These include measures of productivity, unit or volume of service etc. These measures help in minimizing of the resources in achieving the organizational objectives i.e., things rightly. Badunenko et al (2006) considered efficiency as an overall measure of innovativeness resulting from high productivity in production and the sale of highly priced innovative goods and services.

Assessing the efficiency of an institution or financial institution is also a powerful means of evaluating performance of firms, markets and whole economies. There are several types of efficiency all of which result to the operational efficiency of an organization. Operational efficiency of an organization is the ability utilizes its available resources to the maximum extent. Operational efficiency can be judged in the light of financial efficiency. It can be said that neither profitability ratios turnover ratios by themselves provide good indicators measure operational efficiency. Operational efficiency of an organization is associated with diverse aspects such as operational cost effectiveness profitability, customer services, priority sector lending, and deployment of credit in rural and backward regions and mobilization of deposits (Drucker, 2011).

Allocative efficiency occurs when consumers pay a market price that reflects the private marginal cost of production. The condition for allocative efficiency for a firm is to produce an output where marginal cost, MC, just equals price, P. Production efficiency occurs when a firm is combining resources in such a way as to produce a given output at the lowest possible average total cost. Technical efficiency relates to how much output can be obtained from a given input, such as a worker, or a machine or a specific combination of inputs. Maximum technical efficiency occurs when technical output is maximized from a given quantity of inputs. X-Efficiency is a concept that was originally applied to management efficiencies by Leibenstein in the 1960's. The concept can be applied specifically to situations where there is more or less motivation of management to maximize output, or not.

The concept of dynamic efficiency is commonly associated with the Austrian economist Schumpeter (1942) and means technological progressiveness and innovation. Neo-classical economic theory suggests that when existing firms in an industry, the incumbents are highly protected by barriers to entry they will tend to be inefficient. Schumpeter argued that this is not necessarily the case; indeed firms that are highly protected are more likely to undertake risky innovation, and generate dynamic efficiency. Social efficiency exists when all the private and external costs and benefits are taken into account if they are forced to internalize them through taxation or through the purchase of permit to pollute.

### **1.1.3 Financial Innovation and Efficiency**

The traditional innovation-growth view shows a positive relationship between Financial Innovation and efficiency. This view posits that financial innovation improves the quality and variety of banking services (Merton, 1992), facilitates risk sharing, completes the market and improves allocative efficiency (Allen and Gale, 1991 and 1994). Dynan, Elmendorf, and Sichel (2006) suggest that financial innovation has played a key role in reducing the volatility of economic activity in the early parts of the 21st century. Examples of financial innovation abound, ranging from new products, such as securities, over new processes, such as credit scoring, to new financial markets or institutions, such as Internet banks. As pointed out by Laeven, Levine and Michalopoulos (2011), financial innovation has been a driving force behind financial deepening and economic development over the past centuries.

Most of the innovations that have occurred have been occasioned by new distribution channel systems such as automatic teller machines (ATMs) and debit card technologies, which have allowed banks to diversify the way in which customers transfer funds, pay bills and buy goods and services without using cash or cheques. In essence, technological innovation in the financial institutions has lowered costs per transaction and realized processing efficiencies by shortening the time taken for completing a transaction and reducing the possibility of human errors (Parris, 2002)

Technological advance as embodied in process innovation improves productive efficiency by increasing the productivity of inputs and reducing average total costs,

similarly technological advance as embodied in product (or service) innovation enhances allocative efficiency by giving society a more preferred mix of goods and services. These two types of innovation have a significantly positive effect on efficiency (Therrien et al 2011)

#### **1.1.4 SACCOs in Kenya**

A cooperative organization is a voluntary organization which is established by some persons on the basis of cooperation and equality to safeguard their common economic interests. For example, Credit cooperatives are formed with the purpose of providing short-term loans and develop the habit of saving. Members of these organizations benefit from favorable terms catered to their needs as compared to other large financial institutions like commercial banks (Singla, 2008).

The Sacco subsector is part of the massive Kenyan Co-operative movement comprising of both Financial and non financial cooperatives. SACCOs are the financial cooperatives while non financial cooperatives include Dairy, livestock, coffee, fishermen, housing, multipurpose and many others which have made their indelible mark to the lives of Kenya. The uniqueness of Sacco movement is its geographical distribution across Kenya. In all the 47 counties, there are numerous SACCOs providing financial access to financially exclude. The fact that SACCOs are widely distributed across the counties in the country makes them better positioned to bring more Kenyans under financial inclusion compared to other financial services providers.

SACCOs despite their uniqueness have recently been experiencing member reduction, because other financial institutions started targeting the same market. This has made



SACCOs to reinvent their competitiveness from the traditional practices to modern business approaches and operations to remain afloat and relevant. They have had to re-engineer business processes such as marketing, new product development, technology adoption and market development for competitive advantage (Maina, 2011).

Maina (2011) observes that adoption of the new approaches has improved the SACCOs ability to manage risk, enforce leading contracts and reduce the transaction costs of delivering credit. Some of the innovative products adopted by SACCOs in Kenya are; automated teller machines (ATM's), centralized banking with a countrywide branch network, single tariff current accounts, credit and debit cards, low priced bank cheques, international/local money transfers, international trade, group lending by micro finance institutions (MFIs), unsecured personal loans and mobile banking – utility payments, air time top up, balance enquiry, funds transfer as well as statement requests.

## **1.2 Research Problem**

Several studies have found a positive relationship between financial innovations, suggesting that financial innovation has played a key role in reducing the volatility of economic activity through improving the quality and variety of banking services (Merton, 1992), facilitating risk sharing, and improving allocative efficiency (Allen and Gale, 1991 and 1994). The studies further show that costs per transaction have been lowered due to technological innovation in the financial institutions and processing efficiencies realized by shortening the time taken for completing a transaction and reducing the possibility of human errors (Parris, 2002).

SACCOs today are experiencing a reduction in their member numbers since established banking institutions are taking the challenge by investing in faster and more efficient systems that can satisfy their customers' needs. This is an area SACCOs cannot afford to ignore unless at the peril of being edged out of business. SACCOs have been playing a distinct and important role in rural areas in terms of outreach, volume of operation and the purpose they serve. The performance of rural financial cooperatives in the mobilization of savings and provision of credit has been inadequate. Therefore, greater degrees of efficiency among SACCOs would result in greater access to finance, higher profitability and increased financial services to people. Financial innovation enhances competitiveness, which is a key factor in the survival and success of an institution (Maingi & Wanjiru, et al 2013).

Global studies on financial innovation and efficiency of financial institutions have been conducted. King and Levine (1993) demonstrated that changes in intermediation margins affect the growth rate of aggregate output and, interestingly, these changes are associated with the costs of financial innovation. Innovation increases efficiency and reduces risk, so that monitoring costs decrease and investment productivity rises for any given equilibrium growth rate. Beck & Chen et.al, (2012) studied the bright and dark side of financial innovation, where they tested the different views of financial innovation; the innovation-growth view which predicts a positive relationship between financial innovation, resource allocation and economic growth, and the innovation-fragility view predicts higher financial and real sector fragility and volatility.

In local studies Kalui (2009) found that in order to compete in the global as well as domestic financial markets, financial institutions among them being SACCOs need to adopt and use modern and innovative technology. Maorwe (2011) found that SACCOs should adopt new innovative means and strategies to finance their activities instead of relying on the members deposits alone. Mosongo et al (2013) found that SACCOs dopted various types of financial innovation that lead to financial performance, these include process innovation, product innovation, and institutional innovation. Institutional innovation had greatest impact on financial performance, followed by product innovation and last was process innovation. Their study further concluded that there was a positive relationship between financial innovation and financial performance among SACCOs in Nairobi County.

Although extensive studies have been done on innovation and efficiency, literature on Kenya's Financial Innovation is limited with very little evidence of any studies evaluating the relationship between financial innovation and efficiency of SACCOs in Kenya. There was therefore a knowledge gap in empirical literature review needed to be filled by this research. This study therefore aimed to determine the relationship between financial innovation and efficiency of SACCOs in Kenya.

### **1.3 Research Objective**

The objective of the study was to establish the effect of financial innovation on efficiency of SACCOs in Kenya.

#### **1.4 Value of the Study**

Sacco Managers will be able to know that they can use financial innovation seek an alternative source of funds instead of only relying on the contribution of their members. This will enable them to provide members with financial services at lowered interest rates tailored to specific needs of their members. This in turn will lead to sustainable growth of the Sacco. The study therefore will enables Sacco managers to assess how they can substitute their members savings by adopting financing strategies that work for them.

To academicians, the research findings will add to the wealth of knowledge on operational efficiency in the financial sector as well as provide empirical evidence on innovation and efficiency especially in SACCOs as business entities. The study provides a foundation for further study on operational efficiency in SACCOs.

Policy makers will be able to formulate policies on the accessibility of financial services in the rural sector, which support adoption of financial innovations that seek to take financial services closer to the members, by innovating less expensive products and services leveraging technology. Accessibility of financial services will promote inclusion in the rural areas thereby supporting the most important role of SACCOs in the economy which is mobilization of funds through domestic savings.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

In this chapter, theories surrounding the study of efficiency in Financial Institutions are presented. Empirical literature related to financial innovation and operational efficiency is reviewed as presented by various scholars, researchers and authors, in a global as well as a local perspective. This chapter also considers the conceptual framework informed by review of the literature. The chapter is organized as follows: Section 2.2.0 presents the Theoretical review, section 2.3 presents empirical studies and section 2.4 presents the summary of literature review.

#### **2.2 Theoretical Review**

Different scholars have designed several theories to explain financial innovation as well as efficiency. This study analyses some of the financial innovation theories as well as the efficiency theories as studied by various scholars.

##### **2.2.1 Circumvention Innovation Theory**

The Circumvention innovation theory was pioneered by Kane (1981). He thinks that many forms of government regulations and controls, which have the same property of implicit taxation, embarrass the profitable activity engaged by the company and the opportunity of earning profit, so the market innovation and regulation innovation should be regarded as the continuous fighting process between independent economic force and political force. Because financial industry is special, it has the stricter regulations. Financial institutions deal with the status such as the reduction of profit and the failure of

management induced by government regulations in order to reduce the potential loss to the minimum. Therefore, financial innovation is mostly induced by the purpose of earning profit and circumventing government regulations. It comes true through the game between government and microcosmic economic unity.

His theory is however different from the reality. The regulation innovation he assumed is always towards the direction of reinforcing regulation, however, the regulation innovation in reality is always towards the direction of liberal markets innovation, the result of the game is release of financial regulation and market become more liberal. But his theory is better than constraint-induced financial innovation theory. It not only considered the origin of innovation in the market but also researched the process of regulation innovation and their dynamic relation.

### **2.2.2 Constraint Induced Financial Innovation Theory**

The constraint-induced financial innovation theory was advanced by American economist Silber (1983). In this theory he pointed out that the key reason of financial innovation is for the purpose of profit maximization of financial institution. In the process of pursuing profit maximization are some restrictions (including external handicaps such as policy and internal handicaps such as organizational management). Though these restrictions not only guarantee the stability of management, they reduce the efficiency of financial institution, so financial institutions strive toward casting them off. Constraint-induced innovation theory discussed the financial innovation from microeconomics, so it is originated and representative. But it emphasized “innovation in adversity” excessively. So it can't express the phenomenon of financial innovation increasing in the trend of liberal finance commendably.

### **2.2.3 Regulation Innovation Theory**

Scylla (1982) put forward the regulation innovation theory. They argued researching financial innovation from the perspective of economy development history. And they thought financial innovation connects with social regulation closely, and it is a regulation transformation which has mutual influence and is mutual causality with economic regulation. They thought that it is very difficult to have space of financial innovation in the planned economy with strict control and in the pure free-market economy, so any change leaded by regulation reform in financial system can be regarded as financial innovation. The Omni-directional finance innovative activities can only appear in the market economy controlled by government. When government's intervention and the management have hindered the finance activities, there will be many kinds of financial innovation which intend to circumvent or get rid of government controls.

In this theory which expanded the scope of financial innovation, government activity is also regards as the origin of financial innovation. But it regards regulation innovation as one part of financial innovation. Especially, it regards rules and regulations which are used to control as financial innovation.

### **2.2.4 Efficiency Models**

Leibenstein (1966) introduced the X-efficiency. This measure describes all the technical and allocative efficiencies of individual firms that are not scale or scope dependent. Thus X-efficiency is a measure of how well management is aligning technology, human resource management, and other resources to produce a given level of output. The X-efficiency hypothesis argues that financial institutions with better management and

practices control costs and increase profit, moving the firms to best-practice, lower bound cost curve.

Charnes et al. (1994) recently surveyed the new efficiency theory and applications of this field and Sengupta (1995) has considered its dynamic and stochastic extensions. The theory explores Data envelopment analysis (DEA) which is a new technique developed in operations research and management science over the last two decades for measuring efficiency of decision making units (DMU) in the public and private sectors.

Recently the DEA techniques have been generalized in several directions e.g., (a) dynamic situations involving capital inputs yielding outputs over several time periods (Sengupta (1995), (b) stochastic cases where distribution of efficiency is analyzed to see the extent of divergence from the mean or median efficiency level Sengupta (1989), (c) goal programming where the objective function of the DEA model is extended so as to include differential weights on the goals and sub goals of the manager not previously considered Stewart (1996), and finally (d) the case of allocative efficiencies and assurance regions, which include price information on the inputs and outputs whenever available and also adjoin additional constraints on the virtual multipliers so as to reflect the preferences of the DMU Cooper, Thompson and Thrall (1996).

Efficiency wage theory was pioneered by Leibenstein (1957) to help resolve the apparent paradox of there being long-run surplus labor in less developed economics at positive real wages. Surplus labor can take the form of either hidden or actual unemployment. All agents in his modeling framework are rational and maximizing with regard to profit (marginal cost equals marginal benefit) and utility. Leibenstein breaks with the



conventional wisdom by introducing the empirically based assumption that input varies positively with real wages. Since real wages affect the physiological ability of workers to work more or less hard will be translated into actual changes in effort input on the job. In the conventional modeling effort input remains constant in the face of change in real wages.

### **2.3 Determinants of Efficiency of Credit Unions**

Berger et. al. (1993) argued that “in a world in which the structures of financial services industries are changing rapidly, it is important to determine the cost and revenue efficiency of the evolving institutions”. Not only does efficiency have important ramifications for the institutions themselves- such as profitability, competitiveness and solvency-but also in terms of the demands placed upon regulatory authorities, and ultimately tax payers, in the provision of low risk, financial intermediation (Berger, et.al., 1993). Differences in management’s ability to control costs or promote revenues appear to comprise a far more important source of financial institution efficiency than either scale or scope efficiencies (Berger & Humphrey, 1991).

Efficiency levels in a firm may be explained by different factors some of which are skill level and experience of workers. The growing body of theoretical and empirical literature on firm performance has identified variables such as firm trade orientation, investment in fixed capital, soft budget constraints, quality of labor, competition, among others as determinants of firm performance and consequently firm efficiency. The existence of soft budget constraint is likely to lead to lower levels of efficiency, but ascertaining its effect is a difficult task due to lack of appropriate data to measure it (Sinani et. Al, 2007). Ab-

Rahim et al. (2012) identified capital, size of the firm, credit risk, and managerial quality as some of the factors which affect efficiency.

For the purpose of this study, capital will be measured as the ratio of equity to total assets; credit risk will be measured as the ratio of loans issued to members over total assets while the management quality will be measured as the ratio of non-interest expenses over total assets. Size will refer to the total assets of the SACCO and since other dependent variables under consideration will be standardized by using total assets, then size was measured as logarithm of total assets.

## **2.4 Empirical Studies**

Beck et al., (2012), assess the relationship between financial innovation in the banking sector and (i) real sector growth, (ii) real sector volatility, and (iii) bank fragility. Using bank-, industry- and country-level data for 32, mostly high-income, countries between 1996 and 2006. On the one hand, they find that a higher level of financial innovation is associated with a stronger relationship between a country's growth opportunities and capital and GDP per capita growth and with higher growth rates in industries that rely more on external financing and depend more on innovation. They also find that financial innovation is associated with higher growth volatility among industries more dependent on external financing and on innovation and with higher idiosyncratic bank fragility, higher bank profit volatility and higher bank losses during the recent crisis.

Ben-Horim and Silber (1977) tested the proposition that regulatory constraints induce innovation. Using a linear programming model to estimate the opportunity costs (shadow

prices) of deposits, debentures, and capital (net worth) for large banks from 1952-1972, they found that the rising shadow prices of these items, as they approached regulatory constraints (such as Regulation Q), were associated with some of the major innovations of the 1960s, such as the negotiable CD.

Tufano (1989) examines a cross-section of new securities to examine whether financial product innovators enjoy first mover advantages. Specifically, he uses a sample of 58 innovations (representing 1,944 public offerings) to test whether investment banks that create new securities benefit by charging higher prices (underwriting spreads) than imitators or by capturing larger quantities. Tufano found that, over the 1974-1986 period, investment banks that created new products did not charge higher prices in the period before imitative products appear and in the long-run charge lower prices than rivals. However, these innovators underwrote more public offerings of products that they innovated, than did imitating rivals. Overall, Tufano's results are not consistent with monopoly pricing of new securities issues by innovators, but rather with the presence of cost advantages that allow these institutions to capture market share.

A study by Gellman Research Associates (1976) used an output measure covering a broad spectrum of industries, a count of some 500 innovations judged by experts to be among the major innovations introduced in the United States between 1953 and 1973. They found that the share of innovations introduced by the largest firms was barely greater than their share of employment. This is roughly consistent with much of the regression literature. Contrary to the Schumpeterian hypothesis, but consistent with the

findings of Bound et al. (1984) concerning R&D intensity, they also found that companies with fewer than 1000 employees accounted for 47.3 percent of the important innovations, although their share of employment was only 41.2 percent in 1963, the sample period midpoint.

Scherer (1984) suggested that small firms may be a more important source of innovation in the United States than elsewhere; he noted that in a methodologically similar study using data on significant innovations in the United Kingdom between 1945 and 1980. Pavitt (1983) observes that the largest firms were found to have the highest ratio of innovations per employee. Pavitt et al. (1987), however, using an updated version of the same British data set, found that both very small and very large firms were responsible for a disproportionate share of innovations.

Das and Ghosh (2006) investigate the performance of Indian commercial banking sector during the post reform period 1992–2002. Several efficiency estimates of individual banks are evaluated using nonparametric Data Envelopment Analysis (DEA). Three different approaches; intermediation approach, value-added approach and operating approach have been employed to differentiate how efficiency scores vary with changes in inputs and outputs. The analysis links the variation in calculated efficiencies to a set of variables, i.e., bank size, ownership, capital adequacy ratio, non-performing loans and management quality. The findings suggest that medium-sized public sector banks performed reasonably well and are more likely to operate at higher levels of technical efficiency. A close relationship is observed between efficiency and soundness as determined by bank's capital adequacy ratio. The empirical results also show that

technically more efficient banks are those that have, on an average, less non-performing loans.

Altunbas et al. (2000) by taking into account risk and quality factors into the estimation of banks' cost efficiency in the Japanese commercial banks for the period 1993 to 1996, finds that the level of non-performing loans are positively related to bank inefficiency. Furthermore, banks tend to experience a decrease in their scale efficiency level after controlling for risk factors. The data comprise the population of Japanese banks listed in the London based IBCA bank Credit rating agencies Bankscope (1997) data base for the years 1993-1996 and consists of 139 banks for each year from 1993 to 1995 and 136 in 1996.

Tesfay and Tesfay (2013) in their study, apply the Data Envelopment Analysis (DEA) method to evaluate the relative efficiency of SACCOs in Tigray region of Ethiopia. They assess overall efficiency 329 rural SACCOs which were operating in the year 2012. In their study they find that Geographical location and the size of a SAACO determine its efficiency. Technical efficiency was high for larger SACCOs.

Mwangi (2013) investigated the determinants of efficiency of savings and credit cooperative (SACCO) societies in Nairobi County. His study used descriptive research design. The population of the study comprised of 1,102 active SACCOs in Nairobi County from which a sample of 56 SACCOs was selected for the years 2010 to 2012. Data Envelopment Analysis (DEA) was used to measure technical efficiency of the SACCOs. The study found out that there were factors influencing the efficiency of SACCOs in Kenya, which are size, capital, credit risk and management quality. They

either influenced it positively or negatively. The four independent variables that were studied (size, capital, credit risk and management quality). The study concluded that size, capitalization and management quality positively and significantly influenced efficiency of SACCOs while credit risk inversely affected efficiency of SACCOs.

Mwega (2011) investigated the factors that promote financial development in a reforming low-income African country (Kenya) as well as analyzed ways in which financial markets and policies influence growth and development. His study reviewed the status and structure of the financial markets in Kenya using a case study approach; the broad structural shifts in financial intermediaries in the face of globalization; as well as the internal factors that have encouraged or discouraged the necessary changes in the financial sector. His study found that Kenya has moved into universal banking, reflected by the gradual elimination of 'specified' non-bank financial institutions since 1994 and the increased share of net commissions and fees in the banks' total income, from 10 per cent in 1998 to 21 per cent in 2007.

The evidence suggested that the sector experienced reduced concentration and presumably more competition during 1998–2007. Further, it is found that small banks are the least competitive (most concentrated), followed by large banks and then medium-sized banks. Mwega (2013) found that despite a proliferation of financial institutions, only 19 per cent of Kenyans have access to financial services and products through commercial banks, according to a CBK survey study carried out in 2006. Others are served by SACCOs and microfinance institutions (8 per cent); informal financial services such as Rotating Savings and Credit Association (ROSCAs), shopkeepers and money lenders (35 per cent); or are 'unbanked' (38 per cent). This shows that there is need for

innovative financial products to reach the 'unbanked', including mobile telephony and branchless banking.

Gitonga (2013) in his study examined the relationship between financial innovation and the efficiency of commercial banks in Kenya for the period between 2009 and 2012. His study sought to establish the efficiency status with the view of establishing financial innovation types that can improve banks efficiency levels. The population comprised of 43 commercial banks out of which 21 were selected, forming the sample size. The Data Envelopment Analysis (DEA) model was used using a DEA computer program. His study found that large banks in terms of assets were found to be relatively more efficient than small and medium sized banks. Foreign banks were found to have a higher efficiency score than public and private-domestic banks in terms of ownership. Banks that had been operational more than 18 years were considered to be old. The old banks were found to be more efficient than the new ones.

Nguny (2013) examined the relationship between efficiency and financial performance of commercial banks in Kenya. The research adopted a descriptive survey design. The population of interest for this study was all the commercial banks in Kenya. Thus it was a census survey. The study utilized secondary sources of data. In order to situate the study theoretically and generate the conceptual framework with which to work on the secondary sources was obtained from financial statements of the banks for a 5 year-period (2007-2012) and publications were also used. From the findings, there was a fall in efficiency ratio from 2008 to 2012 in banks indicating that the banks were making considerably more than they were spending thus depicting a sound fiscal footing. The

findings revealed a significant positive relationship between Return on Asset and Efficiency.

Kamau (2009) investigated efficiency in the banking sector in the post liberalization period in Kenya. The study is in two major parts and addresses three main objectives. The first part measures efficiency scores and the productivity gains in the post liberalization period. The second part measures X-inefficiency and the factors determining-inefficiencies in the banking sector in Kenya. Thus, three forms of efficiency are analyzed - technical, scale and managerial efficiency referred to as X-inefficiency in the study. Her study adopted a non-parametric Data Envelopment Analysis (DEA) to analyze measures of various aspects of efficiency in the banking sector. The study made use of secondary annual financial data for ten years period. Input and output variables are defined to represent the intermediation role of banks.

The results showed that although the banks were not fully efficient in all respects, they performed fairly well during the period under study. Banks still have reason and scope to improve performance by improving their technology, skills and enlarging their scale of operations so as to be fully efficient. Analysis of determinants of X-inefficiency showed that there was a positive relationship with variables such as profitability, asset quality, proxy for financial liberalization, capital adequacy, GOP, market structure and liquidity, whereas variables such as size and multibank holding company were negatively related to X-inefficiency. GOP shows weak significance in the models. Based on the main conclusions, the study recommended policies that will encourage competition, product diversification, risks minimization and proper supervision of banks.



Nyathira (2012) in her study assessed the effect of financial innovation on commercial bank's financial performance as the key players in the banking sector over a period of 4 years. Kenya's financial sector has undergone significant transformation in the last few years. Many new more efficient and real time financial systems have come into place. Despite the undeniable importance of financial innovation, its effect on financial performance is not always obvious since there are reported cases of reverse causality between innovation and performance. The causal research design was used to carry out this study. The population of study was all the 43 commercial banks in Kenya as at 30th June 2012. The study used secondary data from published central banks' annual reports. The independent variable was financial innovations unique to commercial banks while dependent variable was consolidated financial performance of all banks.

Study results indicated that financial innovation indeed contributes to and is positively correlated to profitability in the banking sector particularly that of commercial banks. This is further supported by high uptake of more efficient financial systems in substitution for the less efficient traditional systems. This is evidenced by the negative correlation between Real Time Gross Settlement and Automated Clearing House (Cheques & EFTs) throughput over time; as well as that of profitability and Automated Clearing House throughput. Development of more efficient payment systems, with adequate regulation, should therefore be encouraged for improved financial performance and faster economic growth.

Theuri (2013) in his study, focused on the effect of financial innovation on banks financial performance. In particular he dealt with agency banking as a financial innovation in Kenyan banking sector focus being the listed bank. Three banks were

studied and these are Equity bank, Kenya commercial bank and Cooperative bank of Kenya. The study was done by collecting data on the total revenues that banks received from various outlet channels from where customers can do cash transactions; these channels are over the counter transactions at the branches, at the ATMs and at the agent's location. Also data was collected on the number of transactions done by an agent. Regression model was used to establish how the number of agents transactions influence the overall revenues from all the channels. He found that there has been a great revolution of how things are done in the financial sector globally, which has been derived by the need to satisfy the customers in a very competitive environment.

Competition has been both local and international, which has also seen non financial institutions start to offer financial services and solutions (Ndungu 2012). He observed the importance for banks to keep innovating new products and services for them to remain relevant to their customers especially at such a time when the world have experienced great technological breakthroughs.

#### **2.4 Summary of Literature Review**

This chapter has reviewed the literature on financial innovation and efficiency in SACCOs. The researchers have different views on the subject of how financial innovation affects efficiency of firms, and while some do not seem to find a direct relationship between financial innovation and efficiency, most of the studies done on innovation and efficiency, find a positive relationship between financial innovation and productivity of firms (Nyathira 2012) as well as a positive relationship between efficiency and productivity of firms (Gitonga 2013).

Studies done locally have concentrated on commercial banks, and they have found a positive relationship between financial innovation and performance as well as a positive relationship between efficiency and performance, but not a direct relationship between financial innovation and efficiency. These studies have not however been extensive on SACCOs. This paper therefore seeks to establish the effects of financial innovation on the efficiency of SACCOs in Kenya.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter sets out a description of the research methodology. It sets out ways to evaluate the relationship between financial innovation and efficiency of Sacco's in Kenya. Research methodology provides details regarding the procedures to be used in conducting the study, (Mugenda & Mugenda, 2003). Mutai (2000) states that research methodology is a specific plan for studying the research problem and constitutes the blue print for the proposed data collection, measurement and analysis of the data. Included in the methodology section are descriptions of the research design, the population, the sample and sampling techniques, and a description of instruments or tools used to collect data, the measurement of variables and the techniques to be used in analyzing the data.

#### **3.2 Research Design**

A research design is the specification of methods and procedures for acquiring the information needed. It is the overall operation pattern or framework of the project that stipulates what information is to be collected from which source by what procedures (Green & Tull 1966). The research problem was studied by use of a descriptive research design. Descriptive research is the investigation in which quantitative data is collected and analyzed in order to describe the specific phenomenon in its current trends, events and linkages between different factors at the current time. Descriptive research design enables the researcher to generalize findings to a larger population. The descriptive design approach has been credited to the fact that it allows analysis the relations of variable.

### **3.3 Target Population**

Population is an aggregate or totality of all the objects, subjects or members that conform to a set of specifications (Polit & Hungler 1999). In this study, the population consisted of the 130 SACCOs licensed by Sacco Societies Regulatory Authority (SASRA) as at 31<sup>st</sup> of December 2013.

### **3.4 Data Collection**

Secondary data was used in this study. The data was collected from publications at the SASRA offices for the variables under study. Secondary source of data was also used to collect data which includes: efficiency, size, capital, credit risk and management quality.

### **3.5 Sampling**

This study used the probability sampling method from which systematic sampling technique was used to determine the sample size. Systematic Sampling involves drawing every *n*th element in the population, *n*th is therefore the systematic interval. In this research *n*th item will be 4 which will lead to a sample size of 50. The first item will be selected randomly from the first four items and thereafter every *n*th will automatically be included (Kothari, 2004).

### **3.6 Data Analysis Techniques**

The data collected was analyzed in order to determine the relationship between efficiency and determinants of efficiency. The dependent variable was efficiency, while the independent variables were the determinants. The results were tested to see the extent of relationship using the following linear regression equation model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where Y = Efficiency

X1= Size (Logarithm of total assets)

X2= Capital (Equity / total assets)

X3= Credit Risk (Loans / total assets)

X4= Management quality (Non-interest expense / total asset)

$\beta_0$  = Constant, the value of Y when the value of X is zero.

$\beta_i$  (i= 1, 2, 3, 4) = Coefficients of determinants of efficiency.

$\epsilon$ = Error term

Efficiency = Output/ Input.

Where: Input = Savings and Total Expenses

Output = Loans and Total Income

Regression analysis was done using SPSS version 20.0. The coefficients from the equation above represented the strength and direction of the relationship between the variables. Assuming that the error term  $\epsilon$  in the linear regression model is independent of  $x$ , and is normally distributed, with zero mean and constant variance, we decided whether there was any *significant relationship* between  $x$  and  $y$  at *0.05 significance level* by testing the null hypothesis that  $\beta = 0$ .. Due to large numbers of samples we shall use Z test to test significance level.

## CHAPTER FOUR

### DATA ANALYSIS, FINDINGS AND DISCUSSIONS

#### 4.1 Introduction

This chapter presents analysis, findings and discussion of the study on the relationship between financial innovation and efficiency of Sacco's in Kenya. The study used secondary data gathered from the financial statements of the SACCOs. The findings from the descriptive statistics, correlation and regression analysis are presented below.

#### 4.2 Descriptive Statistics

The findings from the descriptive statistics are analyzed in Table 4.1 below.

**Table 4.1: Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
Efficiency	50	.19	1.46	1.0111	.29377
Size	50	21.01	23.92	21.8008	.72428
Capital	50	.02	.39	.1574	.07312
Credit Risk	50	.13	.98	.6707	.22703
Management Quality	50	.02	.15	.0862	.03994

For the independent variables, size showed a minimum of 21.01, a maximum of 23.92, a mean of 21.8008 and a standard deviation of 0.7243. Capital employed showed a minimum of 0.02, a maximum of 0.39, mean of 0.1574 and a standard deviation of 0.07312. Credit risk showed a minimum of 0.13, a maximum of 0.98, a mean of 0.6707 and a standard deviation of 0.22703. Management Quality showed a minimum of 0.02, a maximum of 0.15, a mean of 0.0862 and a standard deviation of 0.03994.

### 4.3 Correlation Analysis

The study conducted a correlation analysis to establish the strength of the relationship between efficiency and innovations embraced by the Sacco's. The Pearson product-moment correlation coefficient measures the strength of a linear association between two variables. The findings were as shown in the Table 4.2 below:

**Table 4. 2: Correlation Analysis**

	Efficiency	Size	Capital	Credit Risk	Management Quality
Efficiency	1				
Size	.208	1			
Capital	.248	.061	1		
Credit Risk	.854	.108	.092	1	
Management Quality	.138	-.031	.225	.055	1

Correlation is significant at the 0.05 level (2-tailed).

From the correlation analysis output above, the study established the strength of the relationship between the dependent variable and the four independent variables. From the findings indicated in the Table 4.2, it can be noted that there is a positive relationship between efficiency and the size as indicated by the correlation coefficient of 0.208. The relationship is insignificant as indicated by the p-value of 0.147 Sig. (2-tailed) value being greater than significance of 0.05. Efficiency and capital employed revealed a positive relationship as indicated by the co-efficient correlation of 0.248, this correlation was significant as indicated by p-value of 0.0083 being less than 0.005. For the credit risk and efficiency, there was a positive relationship as explained by the coefficient correlation of 0.854 with a p-value of 0.001 showing that credit risk was an important variable in the efficiency of the SACCOs in Kenya. The relationship between



management quality and efficiency revealed a positive relationship as indicated by the co-efficient correlation of 0.138. The management quality was however statistically insignificant in explaining the gain in efficiency as indicated by a significance value of 0.339. The findings revealed that only capital and credit risk variables showed significant correlation with efficiency.

#### 4.4 Regression Analysis

The study also conducted a multiple regression on the SACCOs and the findings are discussed below.

**Table 4. 3: Model Summary**

R	R Square	Adjusted R Square	Std. Error of the Estimate
.880	.774	.753	.14589

Predictors: (Constant), Management Quality, Size, Credit Risk, Capital.

The table shows the model summary of regression analysis between the four independent variables including Management Quality, Size, Credit Risk, and Capital employed and a dependent variable namely Efficiency. The table showed that the value of R was 0.8802, the value of R square was 0.774 and the value of adjusted R square was 0.753 and the value of standard error of the estimate is 0.14589. Positivity of all values showed that the model summary was significant and therefore gave a logical support to the study model. From the findings, 77.4% of the increase in efficiency experienced by the Sacco's' were attributed to four independent variables of the study.

**Table 4. 4: ANOVA**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3.271	4	.818	38.424	.001
Residual	.958	45	.021		
Total	4.229	49			

a. Dependent Variable: efficiency

b. Predictors: (Constant), Management Quality, Size, Credit Risk, Capital

The ANOVA statistics in table 4.4 at 5% significance level showed that the independent variables had an effect on the efficiency recorded by the Sacco's'. The value of F calculated at 5% level of significance was 38.424 while the tabulated F was 2.58. Since the value of F calculated was greater than the F critical (value = 2.58), this showed that the overall model was significant. The sig value of 0.001 was less than 0.05, this also supported the model being significant.

**Table 4. 5: Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	-.824	.631		-1.306	.198
size	.045	.029	.111	1.556	.127
Capital	.609	.294	.151	2.069	.044
Credit Risk	1.067	.093	.825	11.504	.000
Management Quality	.455	.537	.062	.849	.401

a. Dependent Variable: efficiency

b. Predictors: (Constant), Management Quality, Size, Credit Risk, Capital

The coefficient table in table 4.4 above was used in coming up with the model below;

$$Y = - 0.824 + 0.045 X_1 + 0.609 X_2 + 1.067 X_3 + 0.455 X_4$$

Where Y= Efficiency, X<sub>1</sub>= size, X<sub>2</sub> = Capital, X<sub>3</sub> = Credit Risk, X<sub>4</sub> = Management Quality

Size, Management quality, credit risk and capital were all positively correlated with efficiency. Taking all factors; management quality, size, credit risk and capital constant at

zero, efficiency was - 0.824. This showed that absence of innovations decreased efficiency by 0.824. A unit increase in size increased efficiency by 0.045, a unit increase in capital lead to a 0.609 increase in efficiency, a unit increase in credit risk lead to 1.067 increase in efficiency and finally a unit increase in management quality lead to efficiency increasing by 0.455, this was however statistically insignificant. This inferred that all the independent variables had a positive effect on efficiency. The size and management quality variables were insignificant as their significance values were greater than 0.05. Credit risk and capital were significant as their significance values were less than 0.05.

#### **4.5 Discussions**

From the findings, credit risk and capital employed by the SACCOs induced high efficiency of SACCOs in Kenya in the period under study. The study findings concur with Das and Ghosh (2006) who concluded that medium-sized public sector banks performed reasonably well and are more likely to operate at higher levels of technical efficiency. He also observed a close relationship between efficiency and soundness as determined by bank's capital adequacy ratio. Credit risk has a strong positive effect on the efficiency of the SACCOs as shown in the study findings. The findings disagree with Altunbas et al. (2000) who posited that the levels of non-performing loans by banks were positively related to bank inefficiency. The findings are in agreement with Tesfay and Tesfay (2013) who deduced that geographical location and the size of a Sacco determine its efficiency. The study found out that size was not an important factor in determining efficiency of SACCOs in Kenya. This finding contrasts Gitonga (2013) who found that large banks in terms of assets were found to be relatively more efficient than small and medium sized banks. From the study findings, we can therefore deduce that innovations

have a positive impact on the efficiency of SACCOs in Kenya. This finding concurs with Nyathira (2012) who concluded that financial innovation indeed contributes to and is positively correlated to profitability in the banking sector.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents the summary of the data findings, conclusions drawn and the recommendations made thereto. The conclusions arrived at and recommendations made thereto were drawn after addressing the research objective which was investigating the relationship between financial innovation and efficiency of Sacco's in Kenya.

#### 5.2 Summary of Findings

From the findings, it can be noted that there is a positive relationship between efficiency and the size as indicated by the correlation coefficient of 0.208. The relationship between management quality and efficiency revealed a positive relationship as indicated by the co-efficient correlation of 0.138. Efficiency and capital employed revealed a positive relationship as indicated by the co-efficient correlation of 0.248. For the credit risk and efficiency, there was a positive relationship as explained by the coefficient correlation of 0.854 with a p-value of 0.001 showing that credit risk was an important variable in the efficiency of the SACCOs in Kenya. Correlations between efficiency, management quality and size were significant as indicated by p-values greater than 0.05. The findings revealed that only capital and credit risk variables showed significant correlation with efficiency. The findings showed that the value of R was 0.8802, the value of R square was 0.774 and the value of adjusted R square was 0.753 and the value of standard error of the estimate was 0.14589. It was noted 77.4% of the increase in efficiency experienced

by the Sacco's' were attributed to four independent variables of the study. Positivity of all values showed that the model summary was significant and therefore gave a logical support to the study model. The value of F calculated at 5% level of significance was 38.424 while the tabulated F was 2.58. Since the value of F calculated was greater than the F critical (value = 2.58), this showed that the overall model was significant. Taking all factors; management quality, size, credit risk and capital constant at zero, efficiency was - 0.824. This showed that absence of innovations decreased efficiency by 0.824. A unit increase in size increased efficiency by 0.045, a unit increase in capital lead to a 0.609 increase in efficiency, a unit increase in credit risk lead to 1.067 increase in efficiency and finally a unit increase in management quality lead to efficiency increasing by 0.455. This inferred that all the independent variables had a positive effect on efficiency. The size and management quality variables were insignificant as their significance values were greater than 0.05. Credit risk and capital were significant as their significance values were less than 0.05. This showed that credit risk and capital contributed positively to the efficiency of SACCOs that had embraced innovations.

### **5.3 Conclusions**

From the analysis, the study concluded that management quality, size, credit risk and capital had varying degrees of impact on the efficiency of SACCOs in Kenya in the period under study. However, the effects of the four independent variables on the efficiency remained moderately weak except for credit risk and capital that exhibited high degree of association with the efficiency. This study therefore concluded that only credit risk and capital employed greatly influenced efficiency of SACCOs in Kenya.

Management quality and size influenced efficiency positively but the two variables were statistically insignificant and thus their overall contribution was negligible.

#### **5.4 Recommendations**

This study therefore concluded that credit risk and capital employed greatly influenced efficiency of SACCOs in Kenya while management quality and size influenced efficiency negligibly. This study therefore strongly recommends the adoption of innovation strategies by the various SACCOs operating in Kenya so as to enhance efficiency in operations, boost profitability and attract more public attention. The SACCOs should also invest more capital so as to guarantee the going concern aspect and thus win the confidence of potential clients. More capital investments is an indication that the management is able to attract more investors due to their effective leadership and direction in the SACCOs. The management of SACCOs should also strive to attain an optimum capital structure as this has a big impact on efficiency.

This study therefore recommends that all SACCOs should highly embrace research and development to foresee new and innovative ideas to boost efficiency in internal operations, increase customer base and subsequently increase profitability.

#### **5.5 Limitations of the Study**

The data used for this study was secondary data generated from the SACCOs financial statements. The measures and accounting policies were not uniform in all the SACCOs since they operated in different sectors of the economy. The researcher had to standardise the data gathered so as to ensure similarity in comparison and computation. Some SACCOs were also unwilling to disclose amounts in profits earned as a direct result of

innovations embraced. The researcher assured them that the information was to be used purely for academic purposes only and that it would not be disclosed to any third party whatsoever.

### **5.6 Suggestions for Further Research**

This study examined the relationship between financial innovation and efficiency of Sacco's in Kenya. To allow thorough comparison, this study recommended that future studies be conducted taking into account the effects of innovation and various competitive strategies on the financial performance of SACCOs.

The study recommended that further studies be conducted on customer perceptions towards SACCOs in Kenya and the various products they offer to distinguish themselves from other financial service providers, this will add to the literature on SACCOs in the country.



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**Appendix I: Deposit – Taking SACCO Societies Licensed by SASRA as at 30<sup>th</sup> December 2013**

1. Afya SACCO society ltd
2. Airports SACCO society ltd
3. Asili SACCO society ltd
4. Bandari SACCO society ltd
5. Baraka SACCO society ltd
6. Baringo farmers SACCO society ltd
7. Biashara SACCO society ltd
8. Bingwa SACCO society ltd
9. Borabu SACCO society ltd
10. Boresha SACCO society ltd
11. Bungoma Teachers SACCO society ltd
12. Bureti SACCO society ltd
13. Busia Teso Teachers SACCO society ltd
14. Capital SACCO society ltd
15. Centenary SACCO society ltd
16. Chai SACCO society ltd
17. Chemelil SACCO ltd
18. Chepsol SACCO society ltd
19. Chuna SACCO society ltd
20. Comoco SACCO society ltd
21. Cosmopolitan SACCO society ltd
22. County SACCO society ltd
23. Daima SACCO society ltd

24. Dhabiti SACCO society ltd
25. Dimkes SACCO society ltd
26. Egerton SACCO society ltd
27. Embu Teachers SACCO society ltd
28. Enea SACCO society ltd
29. Fariji SACCO society ltd
30. Fortune SACCO society ltd
31. Fundilima SACCO society ltd
32. Githunguri Dairy & Community SACCO society ltd
33. Gusii Mwalimu SACCO society ltd
34. Harambee SACCO society ltd
35. Hazina SACCO society ltd
36. Imenti SACCO society ltd
37. Irianyi Tea SACCO society ltd
38. Isiolo Teachers SACCO society ltd
39. Jamii SACCO society ltd
40. Jijenge SACCO society ltd
41. Kakamega Teachers SACCO society ltd
42. Keiyo Teachers SACCO society ltd
43. Kenpipe SACCO society ltd
44. Kenversity SACCO society
45. Kenya Bankers SACCO society ltd
46. Kenya Cannery SACCO society ltd
47. Kenya Police Staff SACCO society ltd
48. Kenya Highlands SACCO society ltd



49. Kenya Midland SACCO society ltd
50. Kiambaa Dairy Rural SACCO society ltd
51. Kilifi Teachers SACCO society
52. Kingdom SACCO society ltd
53. Kipsigis Edis SACCO society ltd
54. Kipsigis Teachers SACCO society ltd
55. Kite SACCO society ltd
56. Kitui Teachers SACCO society ltd
57. KMFRI SACCO society ltd
58. Konoin SACCO society ltd
59. K-Unity SACCO society ltd
60. Kuria Teachers SACCO society ltd
61. Laikipia Teachers SACCO society ltd
62. Lengo SACCO society ltd
63. Magadi SACCO society ltd
64. Magereza SACCO society ltd
65. Maisha Bora SACCO society ltd
66. Marakwet Teachers SACCO society ltd
67. Marsabit Teachers SACCO society ltd
68. Mentor SACCO society ltd
69. Meru South Farmers SACCO society ltd
70. Metropolitan Teachers SACCO society ltd
71. MMH SACCO society ltd
72. Mombasa Ports SACCO society ltd
73. Mombasa Teachers SACCO society

74. Mudete Tea Growers SACCO society
75. Muhigia SACCO society ltd
76. Mumias Outgrowers SACCO society ltd
77. Murata SACCO society ltd
78. Mwalimu National SACCO society ltd
79. Mwito SACCO society ltd
80. Nacico SACCO society ltd
81. Nafaka SACCO society ltd
82. Naku SACCO society ltd
83. Nandi Hekima SACCO society ltd
84. Narok Teachers SACCO society ltd
85. Nassefu SACCO society ltd
86. Nation SACCO society ltd
87. Ndege Chai SACCO society ltd
88. Ndosha SACCO society ltd
89. NRS SACCO society ltd
90. Ntiminyakiru SACCO society ltd
91. Nyambene Arimi SACCO society ltd
92. Nyamira Tea farmers SACCO ltd
93. Nyeri Teachers SACCO society ltd
94. Orthodox Development SACCO society ltd
95. Safaricom SACCO society ltd
96. Samburu Traders SACCO society ltd
97. Sheria SACCO society ltd
98. Siaya Teachers SACCO society ltd

99. Simba Chai SACCO society ltd
100. Siraji SACCO society ltd
101. Solution SACCO society ltd
102. Sot Tea Growers SACCO society ltd
103. Sotico SACCO society ltd
104. Stima SACCO society ltd
105. Sukari SACCO society ltd
106. Tai SACCO
107. Taifa SACCO society ltd
108. Taita Taveta Teachers SACCO society ltd
109. Tembo SACCO society ltd
110. Tenhos SACCO society ltd
111. Thamani SACCO society ltd
112. Tharaka Nithi Teachers SACCO society ltd
113. Thika District Teachers SACCO society ltd
114. Times U SACCO society ltd
115. Tower SACCO society ltd
116. Trans Nzoia Teachers SACCO society ltd
117. Ukristo na Ufanisi wa Anglicana SACCO society ltd
118. Ukulima SACCO society ltd
119. Unaitas SACCO society ltd
120. United Nations SACCO society ltd
121. Universal Traders SACCO society ltd
122. Wakenya Pamoja SACCO society ltd
123. Wakulima Commercial SACCO society ltd

124. Wanaanga SACCO society ltd
125. Wananchi SACCO society ltd
126. Wanandege SACCO society ltd
127. Wareng SACCO society ltd
128. Washa SACCO society ltd
129. Waumini SACCO society ltd
130. Yetu SACCO society ltd.

## Appendix II: Data

Efficiency	Size	Capital	Credit Risk	Management Quality
1.14	23.92	0.18	0.85	0.10
1.14	23.59	0.21	0.81	0.08
1.17	23.24	0.14	0.85	0.11
1.02	23.20	0.07	0.14	0.11
1.31	23.17	0.23	0.88	0.02
1.05	22.75	0.06	0.85	0.12
1.09	22.71	0.23	0.77	0.05
1.05	22.44	0.23	0.66	0.11
1.40	22.38	0.15	0.82	0.05
0.58	22.34	0.10	0.31	0.04
0.88	22.34	0.07	0.67	0.03
1.46	22.30	0.22	0.87	0.12
1.10	22.23	0.22	0.67	0.11
0.78	22.19	0.14	0.53	0.06
1.30	22.16	0.22	0.79	0.11
1.10	22.00	0.13	0.84	0.02
1.07	21.99	0.26	0.68	0.15
1.15	21.95	0.11	0.69	0.13
1.11	21.79	0.13	0.83	0.15
1.18	21.77	0.18	0.81	0.03
0.99	21.72	0.30	0.58	0.09
0.22	21.71	0.05	0.14	0.03
1.27	21.67	0.28	0.62	0.09
1.09	21.64	0.15	0.67	0.06
1.00	21.57	0.05	0.85	0.11
0.67	21.55	0.21	0.39	0.09
1.04	21.54	0.11	0.80	0.11
0.96	21.48	0.14	0.76	0.03
1.20	21.47	0.14	0.83	0.13
0.71	21.44	0.15	0.49	0.14
1.17	21.38	0.12	0.77	0.15
0.41	21.34	0.05	0.19	0.04
0.19	21.34	0.18	0.13	0.14
1.16	21.31	0.13	0.84	0.11
1.44	21.28	0.12	0.98	0.08
1.38	21.26	0.09	0.78	0.07
0.97	21.26	0.18	0.75	0.11
0.95	21.18	0.10	0.68	0.10

0.71	21.17	0.20	0.48	0.11
1.10	21.17	0.27	0.65	0.07
1.03	21.15	0.10	0.84	0.04
1.21	21.15	0.14	0.91	0.07
0.21	21.15	0.02	0.13	0.02
0.76	21.15	0.22	0.47	0.12
1.18	21.13	0.14	0.90	0.03
1.04	21.13	0.17	0.77	0.04
1.09	21.10	0.10	0.86	0.10
1.16	21.08	0.16	0.73	0.07
1.23	21.07	0.13	0.78	0.14
0.90	21.01	0.39	0.46	0.12