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# Evaluating the Quality of Management Information Systems: A case of SACCOs in Nairobi, Kenya

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**A project report Submitted in partial fulfillment of the requirements of the Master of Science in Information Systems**

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# DECLARATION

This research project is my original work and has not been presented in any University.

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# ABSTRACT

Core banking management information systems are the foundation upon which financial institutions worldwide run their business, serve their clients, and provide differentiated products and services to gain competitive advantage. Savings and credit cooperatives in developing countries require the same foundation for the same reasons but have fewer vendor choices, more limited budgets, and sometimes unique requirements, leaving savings and credit cooperatives to build their own systems or make do with spreadsheets or even manual paper systems. This research paper employed the ISO/IEC 25010 Software Product Quality Model to evaluate the management information systems used by savings and credit cooperatives in Kenya to determine their level of performance in supporting their business. This was accomplished through a questionnaire designed as per the quality characteristics defined by the model and distributed to sampled system administrators. The results indicated that the management information systems in use currently by the savings and credit cooperatives serve them well in terms of functionality, efficiency, reliability, ease of use and portability. However, vendor support, technical training and implementation process are a big concern to them.

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# LIST OF ABBREVIATIONS

**ATM**-Automated Teller Machines

**BOSA**-Back Office Savings Activity

**CMM**-Capability Maturity Model

**COBIT**-Common Objectives for Information and Related Technology

**COSO**-Committee of the sponsorship Organization of the Treadway Commission

**EFT**-Electronics Funds Transfer

**FOSA**-Front Office Savings Activity

**ICT**-Information and Communication Technology

**IEC**-International Electrotechnical Commission

**IS**-Information System

**ISO**-International Standards Organization

**IT**-Information Technology

**KMS**-Knowledge Management System

**MIS**- Management Information System

**SACCO**- Savings and Credit Cooperative

**SME**-Small and Medium-Size Enterprises

**WOCCU**-World Council for Credit Unions

# CHAPTER ONE: INTRODUCTION

## 1.1 Background

Information and Communication Technology (ICT) is a key facilitator for Savings and Credit Cooperatives (SACCOs) to provide products and services to members as well as provide the information required to ensure that they are operated in safe and secure manner. As SACCOs continue their expansion by recruiting more members and introducing new products and services, their technological requirements will become more sophisticated and likely to increase governance challenges and regulatory oversight (Mainhart, 1999). However, through the effective and efficient use of ICT, SACCOs will be able to address all their future business needs. Information technology is crucial in the operation of SACCOs, as it is throughout the financial services industry. The central role of information technology in the operation of financial services firms is often credited with fostering the increasing dominance of larger financial institutions most able to capture the increasing returns to scale inherent in the technology. The same information and communication technologies that may aid consolidation may also foster the existence of smaller financial services firms. Information Systems in SACCOs provide computerized data processing for management decision making, Loan Portfolio Management, Accounting and Financial Performance Management.

A Savings and Credit Cooperatives (SACCO) is a member-owned financial institution that is controlled by its members and operated for the purpose of promoting savings, providing credit at competitive rates, and providing other financial services to its members. It differs from banks and other financial institutions in that the members who have accounts in the SACCO are the owners and they elect board of directors who oversee the operations of the SACCO on behalf of the members (Gamba & Komo, n.d.).

SACCOs forms part of the larger Cooperative movement in Kenya. There are two broad categories of co-operatives: Financial co-operatives (SACCOS) and Non-financial co-operatives (includes farm produce and other commodities marketing co-operatives, housing, transport and investment co-operatives). The SACCO sub-sector in Kenya comprises of Front Office Savings (FOSA) SACCOs and Back Office Savings (BOSA) SACCOs. The FOSA's operate the business of deposit taking while the BOSA's do not.

There are 6,007 registered SACCOS in Kenya as at December 2010 of which 2959 were active. Of the active SACCOS, 218 were deposit-taking while 2011 were non deposit-taking. The Kenya Cooperative sector plays a significant role in the Kenyan financial sector. It contributes 45% of the nation's GDP (Onsanse, et al., 2012).

In the recent past, the deposit taking SACCOs have grown in number, size and asset base. This led to the enactment of the Sacco Societies Act 2008 which established the Sacco Societies Regulatory Authority (SASRA) to license, supervise, regulate and promote SACCOS in Kenya.

Ineffective Management information systems have been one of the biggest setbacks for SACCOS in Kenya (Nyaga, 2012). However SACCOs have been making significant investments in technology in order to improve their operations and competitiveness in the financial market.

Software quality may be defined as conformance to explicitly stated functional and performance requirements, explicitly documented development standards and implicit characteristics that are expected of all professionally developed software. The quality of software is assessed by a number of variables. These variables can be divided into external and internal quality criteria. External quality is what a user experiences when running the software in its operational mode. Internal quality refers to aspects that are code-dependent, and that are not visible to the end-user. External quality is critical to the user, while internal quality is meaningful to the developer only. Some quality criteria are objective, and can be measured accordingly. Some quality criteria are subjective, and are therefore captured with more arbitrary measurements.

## 1.2 Statement of the Problem

Information lies at the very heart of a SACCO. Whether by hand or by computer, SACCOs maintain large amounts of critical business data, from basic client information to detailed analyses of portfolio statistics. These data must be stored, manipulated, and presented coherently to system users so that they can make sound management decisions. However, most of the systems in SACCOs are not specifically designed to cater for the SACCO business. It has been said that inconsistent level of adoption of ICT in relation to the fast growth of the SACCO movement has posed serious challenges to SACCOs (Bwisa, 2010). Also

Ineffective Management information systems have been one of the biggest setbacks for SACCOS in Kenya (Nyaga, 2012). In addition, Limited capacity by the board of management and underlying infrastructure are the main constraints in SACCO computerization (Owen, 2007).

There exist a number of Information systems being marketed for the SACCO sector. Most of those systems are not specifically designed to cater for the SACCO business. However, SACCOs being a microfinance institution, lack the necessary resources to acquire the best management information system. It is in light of this that this research subject aims at evaluating SACCOs' current management information systems quality to find out whether they are serving the SACCOs well in terms of the SACCO business requirements, reliability and efficiency.

## 1.3 Research Objectives

The main objectives of this research are;

1. To determine the most used management information systems in SACCOs
2. To evaluate existing models used in assessing information systems quality
3. To evaluate the quality of SACCO management information systems using the ISO/IEC 25010 Software product quality model
4. To propose improvement strategies for weaknesses identified in objective three

## 1.4 Assumptions

1. Every SACCO has a management information system that is implemented and fully operational
2. All SACCOs have almost similar requirements for their information systems
3. Knowledge from the evaluation of management information systems in SACCOs will assist them administer their systems better.

## 1.5 Justification

The study will provide insights into the level of quality and areas of weaknesses that exist in systems being utilized by SACCOs in Kenya. This study will also propose recommendations that SACCOs can adopt to improve the areas of weakness identified. The results will also assist SACCOs manage and administer their MIS well including the services provided by the vendors.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Savings and Cooperatives (SACCOs) in Kenya

A savings and credit cooperative also known as credit union is a micro financial institution that is owned and controlled by its members. The Kenyan SACCO sector has been observed to contribute over 45% of the Gross Domestic Product (GDP) (Makori, et al., 2013). The first SACCOs were registered in Kenya in 1964 after independence in 1963 (Owen, 2007). SACCOs based on common bonds linked to residence, occupation and churches were formed in the following years. An innovation in the development of Sacco sector in Kenya was the introduction of FOSAs (Front Office Savings Activities). Unlike BOSAs (Back Office Savings Activities) who offer service to members only, FOSA's offer services to both members and non-members.

Kenya has a long history of cooperative development that has been characterized by strong growth thus making a significant contribution to the economy. SACCOs are found in almost all sectors of the economy in Kenya. The government enacted the Kenya Cooperative Act (1997) and the Sacco Societies Act (2008) to regulate and oversee development of cooperatives in Kenya.

## 2.2 Other studies on Information Systems in SACCOS and SMEs

In the study of evaluating extent of use of Information Technology is SACCOS, the importance of IT in SACCOS is highlighted (Guto, 2005). The author reports that the extend of IT use in SACCOs is low as a result of low technical skills, few IT staff, lack of IT staff or recently established IT departments. The study focused on extend of use of IT generally rather than the benefit of the core system in place. The author recommends that SACCOs should engage qualified staff and train existing IT and management staff. The author also observes that IT is an important tool both in management of SACCOs and their record keeping.

A research study of factors affecting performance of savings and credit cooperative societies in Bomet County, observed that there is urgent need for all SACCOs to adapt modern technology and in particular computerization of services for effectiveness and efficiency operations (Langat, 2005). The author recommends that SACCO management ought to

identify suitable hardware and software based on their need. The above research provides an insight to the problem being addressed by this current research paper.

SACCOs have attempted to implement computerized information systems with varying degrees of success (Kaburu, 2010). The challenges to implementing computerized IS identified by the study include Quality of systems, Time schedules set, IT project funding, appropriate ICT Policies and existence of ICT project monitoring mechanism. This study identifies key challenges that many SACCOs need to overcome in order to realize full benefits of technology adoption.

Adoption of IT within SMEs is different from larger businesses. SMEs have limited resources to be allowed for managing IT adoption process (Sarosa & Zowghi, 2003). The authors proposed guidelines for adopting IT for SMEs formulated based on existing literature and their experience in Indonesian SMEs. It consist of assessing SMEs IT requirements, assessment of organization IT maturity, evaluation of available IT solutions in the market, matching the available solutions with the SMEs IT requirements, implementation of the selected IT solution and post adoption evaluation.

ICT Usage in Microfinance institutions in Uganda has been on the rise and different applications and technologies have been adopted by MFI to control costs, create efficiency and effectiveness in their operations, improve productivity and increase outreach to the poor (Ssewanyana, 2009). The study concludes that there is need for progressive policies that relate to ICT-based services and software to accelerate ICT usage in MFIs.

In his research, Bada investigated the extent to which Microfinance Institutions (MFI) use ICT to deliver business services (Bada, 2012). The research focused on the actual ICT usage by MFI's in Uganda specifically on ICT literacy, business applications and planning. Based on their findings, the research concluded that there was need to experiment e-learning for professional skills development in MFIs.

## 2.3 Models used in evaluating Information Systems

There are several models for evaluating information systems including those that evaluate specific details within an information system. Information Systems evaluation models are categorized into three categories namely; Economical benefits, Usability measurements for interfaces and measurements of user and/or customer satisfaction (Palmius, 2007).

### 2.3.1 The DELONE and MCLEAN Model of IS Success

This is one of the most cited models for measuring information systems success popularly referred to as DMSM (Delone & McClean, 2003). The purpose of this model is to provide a framework for measuring different dependent variables for IS research.

The DMSM has a basic model consisting of six categories of IS success. The six dimensions include System quality, Information quality, Use, User satisfaction, Individual impact and Organizational impact.

The above six dimensions are examined at three different levels: technical, semantic and effectiveness or influence level. The model has later been extended by other researchers and has also been empirically studied.

An empirical test in quasi-voluntary Information System use context regarding a Student Information Management System was carried out (Rai, et al., 2013). The findings support Delone and McLean's observations that IS success models must be carefully specified in a given context.

A test of Information System success model was done through a field study of a mandatory information system (Livari, 2005). The results showed that perceived system quality and perceived information quality were significant predictors of user satisfaction with the system but they did not matter to system use. User satisfaction was a strong predictor of individual impact.

An empirical test for a knowledge management system (KMS) success model using DMSM was proposed by Wu and Wang (Wu & Wang, 2006). Based on an analysis of current practice of knowledge management as well as Delone and McLean model, they used five dependent variables (system quality, knowledge or information quality, perceived KMS benefits, user satisfaction and system use) in evaluating KMS success.

### 2.3.2 Qualification and Selection of Open Source Software (QSOS)

This method was designed to qualify and select the Open Source Software within the framework of software support and technology watch (Deprez & Alexandre, 2008). The target audience is IT experts wanting to know and apply this method in day-to-day activities of evaluation and selection of components in order to build software solutions meeting their own or their customers' needs.

The general approach of the QSOS Method is composed of four interdependent steps as described below

1. **Step 1: Define**

The purpose of this step is to define different elements of typology that will be used during the next three steps of process. It defines the evaluation criteria, maturity and features.

2. **Step 2: Evaluate**

The purpose of this step is to evaluate free and open source software based on the criteria from the previous step. The QSOS evaluations are done from the templates that describe the different criteria and their structure. The evaluation criteria of the maturity of the project are imposed by the method and described further. They are completed by criteria describing expected features of the type of the evaluated software. Criteria are assigned a discrete score from 0 to 2. The scoring rule is 0, 1 and 2 representing functionality not covered, functionality partially covered and functionality fully covered respectively.

3. **Step 3 : Qualify**

The purpose of this step is to define a set of elements translating the needs and constraints lined to the selection approach of a piece of open source software. The context in which the software will be used has to be set, in order to get a filter used in the Selection step. The filters include identity filter, maturity filter and functional coverage filter.

4. **Step 4 : Select**

The purpose of this step is to select the software matching the user's needs, or to compare the software of the same type. Two modes of selection are considered. They include;

- Strict selection which is made by a process of elimination as soon as a piece of software does not comply with the demands
- Loose selection which is less strict than the previous one because instead of eliminating software that are non-eligible, it sort them while measuring the difference compared to the filters previously defined.

### 2.3.3 Oracle Cloud Computing Services Maturity Model

Oracle has developed a comprehensive cloud maturity model based on collective experience and best practices (Oracle, 2011). The Cloud Maturity Model consists of the following key concepts: capabilities, domains, maturity and adoption. The model includes sixty capabilities that capture the best practices. These capabilities provide the detail necessary to truly measure and guide the progress of a cloud initiative. The sixty capabilities have been classified and organized into domains. There are eight domains in the cloud maturity model:

**Business and Strategy-** contains capabilities that provide the high level constructs that allow the cloud initiative to proceed. This includes such things as business motivation, expected benefits, guiding principle, expected costs, funding model etc.

**Architecture-** contains capabilities concerning the definitions of the overall architecture and guidelines for various practitioners to ensure adherence to the architecture.

**Infrastructure-** contains capabilities concerning the service infrastructure and tools that provide the technical foundation for the cloud initiative.

**Information-** contains capabilities concerning the information aspect of Cloud such as metadata management, as well as customer entitlements and data durability.

**A project, Portfolio and Services-** contains capabilities concerning the planning and building of cloud services, and management of the portfolio services.

**Operations, Administration and Management-** contain capabilities concerning the post implementation aspect of the cloud service. This includes capabilities for the delivery of self-service function and change management.

**Organization-** contains capabilities concerning the development of organizational competency around cloud computing including the organizational structure and skills development.

**Governance-** contains capabilities concerning the governance structure and processes that support and guide the cloud efforts. These include policy management, risk management and auditing capabilities.

## 2.4 International Standards for evaluating Software

### 2.4.1 ISO/IEC 25010: 2011 Systems and Software Engineering

The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) form the specialized system for worldwide standardization (British Standards Institute, 2013). ISO/IEC 25010 is a part of the SQuaRE series of International Standards which consist of the following divisions;

- Quality Management Division
- Quality Model Division
- Quality Measurement Division
- Quality Requirements Division
- Quality Evaluation Division
- SQuaRE Extention Division

This International Standard can be used in conjunction with ISO/IEC 15504 which is concerned with software process assessment to provide;

- A framework for software product quality definition in the customer-supplier process
- Support for review, verification and validation, and a framework for quantitative quality evaluation, in the support process
- Support for setting organizational quality goals in the management process

This International Standard also defines;

a) A quality in use model composed of characteristics that relate to the outcome of interaction when a product is used in particular context of use. This model is applicable to both computer systems in use and software product in use.
b) A product quality model composed of characteristics that relate to static properties of software and dynamic properties of the computer system. This model is applicable to both computer systems in use and software product in use.

**Product Quality model**

The model that is relevant to our study is the second model i.e the product quality model. The product quality model categorizes system/software product quality properties into eight characteristics: functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability and portability.

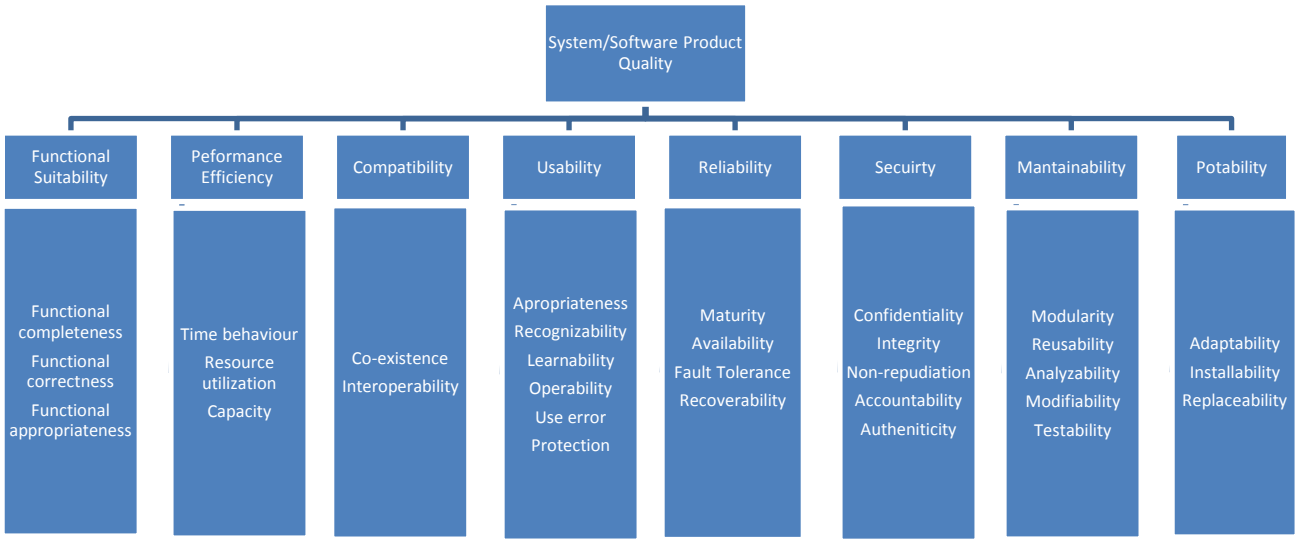


**Figure 1:** The ISO/IEC 25010 *System/Software product model*

The Product Quality Model can be applied to just a software product or to a computer system that include software as most of the characteristics are relevant to both software and systems. The model's categories are explained below

**Functional suitability**

This is the capability of the software product to provide functions which meet stated and implied needs when the software is used under specified conditions. It's subdivided into three categories

a) Functional completeness- is the degree to which the set of functions covers all the specified tasks and user objectives
b) Functional correctness- is the degree to which a product or system provides the correct results with the needed degree of precision.
c) Functional appropriateness- degree to which the functions facilitate the accomplishment of specified tasks and objectives.

**Performance Efficiency**

This is the capability of the software to perform efficiently relative to the amount of resources used under stated conditions. It's sub-dived into three attributes;

a) Time behavior- degree to which the response and processing times and through put rates of a product or system, when performing its functions, meet requirements
b) Resource utilization- degree to which the amounts and types of resources used by a product or system, when performing its functions, meet requirements.
c) Capacity- degree to which the maximum limits of a product or system parameter meets requirements.

**Compatibility**

This is the degree to which a product, system or a component can exchange information with other products, systems or components, and/or perform its required functions, while sharing the same hardware or software environment. It has two attributes;

a) Co-existence- degree to which a product can perform its required functions while sharing a common environment and resources with other products, without detrimental impact on any other product
b) Interoperability- degree to which two or more products, systems or components can exchange information and use the information that has been exchanged.

**Usability**

This is the degree to which a product or a system can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. It has the following sub-characteristics;

a) Appropriate recognizability- degree to which users can recognize whether a product or a system is appropriate for their needs.
b) Learnability- degree to which a product or a system can be used by specified users to achieve specified goals of learning to use the product or system with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use.
c) Operability- degree to which a product or system has attributes that make it easy to operate and control
d) User error protection- degree to which a system protects users against making errors.
e) User interface aesthetics- degree to which a user interface enables pleasing and satisfying interaction for the user.
f) Accessibility- degree to which a product or a system can be used by people with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use.

**Reliability**

This is the capability to which a system, product or component performs specified functions under specified conditions for a specified period of time. It has the following sub-characteristics;

a) Maturity- degree to which a system, product or component meets needs for reliability under normal operation.
b) Availability- degree to which a system, product or component is operational and accessible when required for use
c) Fault tolerance- degree to which a system, product or component operates as intended despite the presence of hardware or software faults

d) Recoverability- degree to which in an event of an interruption or a failure, a product or a system can recover the data directly affected and re-establish the desired state of the system.

**Security**

This is the capability to which a system or product protects information and data so that persons or other products or systems have the degree of data access appropriate to their types and levels of authorization. It has the following sub-characteristics;

a) Confidentiality- degree to which a product or system ensures the data are accessible to only those authorized have access.
b) Integrity- degree to which a system, product or component prevents unauthorized access to, or modification of, computer programs or data.
c) Non-repudiation- degree to which actions or events can be proven to have taken place, so that the events or actions cannot be repudiated later.
d) Accountability- degree to which the actions of an entity can be traced uniquely to the entity.
e) Authenticity- degree to which the identity of a subject or resource can be proved to be the one claimed.

**Maintainability**

This is the capability of effectiveness and efficiency with which a product or a system can be modified by the intended maintainers. It has the following characteristics;

a) Modularity- degree to which a system or computer program of discrete components such that a change to one component has minimal impact on other components.
b) Reusability- degree to which an asset can be used in more than one system or in building other assets.
c) Analyzability- degree of effectiveness and efficiency with which it is possible to assess the impact on a product or system of an intended change to one or more of its parts, or to diagnose a product for deficiencies or causes of failure, or to identify parts to be modified.

d) Modifiability- degree to which a product or system can be effectively and efficiently modified without introducing defects or degrading the existing product quality.
e) Testability- degree of effectiveness or efficiency with which test criteria can be established for a system, product or component and test can be performed to determine whether those criteria have been met.

**Portability**

This is the capability of effectiveness and efficiency with which a system, product or component can be transferred from one hardware, software or other operational or usage environment to another. It has the following sub-characteristics;

a) Adaptability- degree to which a product or a system can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments.
b) Installability- degree of effectiveness or efficiency with which a product or system can be successfully installed and/or uninstalled in a specified environment.
c) Replaceability- degree to which a product can replace another specified software product for the same purpose in the same environment.

Besides the software quality characteristics, management criteria were also introduced to achieve a complete assessment of the software quality and its management. The following three major criteria were added by Lian and Lien (Lian & Lien, 2007) to the software quality model; vendor factors, cost factors and time factors. By the way of literature review and deep interview with two project teams in their research, they sifted out four sub criteria of vender factors and four sub criteria of cost factors. And then they sorted three time factors to be the sub criteria of time factors. Consequently, a total of 11 sub criteria were decomposed from the three major criteria. The 11 criteria are displayed as follows, and were categorized to the management criteria.

1. Sub-criteria of vender factors: market share and reputation, industrial credential, service and support, training solution.
2. Sub-criteria of cost factors: software cost, hardware cost, annual maintenance cost, staff training cost.

3. Sub-criteria of time factors: time for planning and preparation, time for BPR and system tuning, time for testing and go-live.

### 2.4.2 Control Objectives for Information and Related Technology (COBIT)

COBIT provides good practices across a domain and process framework and presents activities in a manageable and logical structure (IT Governance Institute, 2005). COBIT's good practices represent the consensus of experts. The business orientation of COBIT consists of linking business goals to IT goals, providing metrics and maturity models to measure their achievement, and identifying the associated responsibilities of business and IT process owners.

The process focus of COBIT is illustrated by a process model that subdivides IT into four domains and 34 processes in line with the responsibility areas of plan, build, run and monitor, providing an end-to-end view of IT. Enterprise architecture concepts help to identify the resources essential for process success, i.e., applications, information, infrastructure and people.

COBIT is a framework and supporting tool set that allow managers to bridge the gap with respect to control requirements, technical issues and business risks, and communicate that level of control to stakeholders. COBIT enables the development of clear policies and good practice for IT control throughout enterprises.

The benefits of implementing COBIT as a governance framework over IT include:

- Better alignment, based on a business focus
- A view, understandable to management, of what IT does
- Clear ownership and responsibilities, based on process orientation
- General acceptability with third parties and regulators
- Shared understanding amongst all stakeholders, based on a common language
- Fulfillment of the COSO requirements for the IT control environment

COBIT defines IT activities in a generic process model within four domains. These domains are Plan and Organise, Acquire and Implement, Deliver and Support, and Monitor and Evaluate. The domains map to its traditional responsibility areas of plan, build, run and monitor.

**Plan and Organise (PO)** -Provides direction to solution delivery (AI) and service delivery (DS)

**Acquire and Implement (AI)** -Provides the solutions and passes them to be turned into services

**Deliver and Support (DS)** -Receives the solutions and makes them usable for end users

**Monitor and Evaluate (ME)** -Monitors all processes to ensure that the direction provided is followed

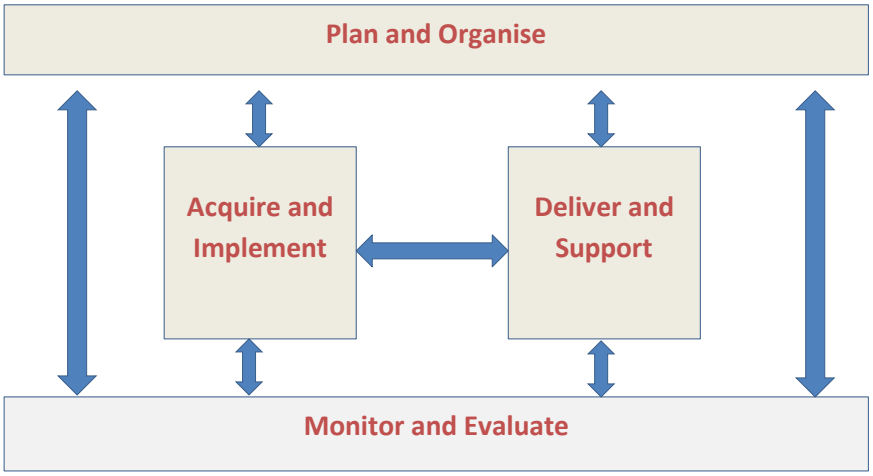


**Figure 2:** *The Four interrelated domains of COBIT*

A study using CobiT version 4.1 to investigate performance indicators for IT operational management of financial industry in Taiwan came up with six importance key performance indicators for IT operational management within the financial industry (Shaw, et al., 2012). They include;

- Frequency of data verification
- Changes that follow formal change control processes
- Problems resolved within the required time period
- User satisfaction with data availability
- Successful data restoration
- Monitoring of critical processes

The study confirms that CobiT can be successfully used both as a tool and benchmark for IT operational management in financial industry.

A research on IT auditing challenges for Small and Medium-Sized financial institutions concluded that ISO 27002, COBIT and COSO frameworks are too large and cover considerably more than what fits small and medium-sized financial institutions (Lovaas & Wagner, 2012). They recommend that if these organizations are to develop an IT audit program, a combination of IT industry standards must be implemented.

### 2.4.3 Capability Maturity Model (CMM) for Software

The Capability Maturity Model for Software provides software organizations with guidance on how to gain control of their processes for developing and maintaining software and how to evolve toward a culture of software engineering and management excellence (Software Engineering Institute, 1996). The CMM was designed to guide software organizations in selecting process improvement strategies by determining current process maturity and identifying the few issues most critical to software quality and process improvement.

The CMM provides a framework for organizing evolutionary steps into five maturity levels that lay successive foundations for continuous process improvement. These five maturity levels define an ordinal scale for measuring the maturity of an organization's software process and for evaluating its software process capability.

A *maturity level* is a well-defined evolutionary plateau toward achieving a mature software process. Each maturity level provides a layer in the foundation for continuous process improvement. Each level comprises a set of process goals that, when satisfied, stabilize an important component of the software process. The five maturity levels are;

**Initial** -The software process is characterized as ad hoc, and occasionally even chaotic. Few processes are defined, and success depends on individual effort.

**Repeatable** -Basic project management processes are established to track cost, schedule, and functionality. The necessary process discipline is in place to repeat earlier successes on projects with similar applications.

**Defined** -The software process for both management and engineering activities is documented, standardized, and integrated into a standard software process for the organization.

**Managed** -Detailed measures of the software process and product quality are collected. Both the software process and products are quantitatively understood and controlled.

**Optimizing** -Continuous process improvement is enabled by quantitative feedback from the process and from piloting innovative ideas and technologies.

There are at least four uses of the CMM that are supported:

- Assessments teams will use the CMM to identify strengths and weaknesses in the organization.
- Evaluation teams will use the CMM to identify the risks of selecting among different contractors for awarding business and to monitor contracts.
- Managers and technical staff will use the CMM to understand the activities necessary to plan and implement a software process improvement program for their organization.
- Process improvement groups, such as an SEPG, will use the CMM as a guide to help them define and improve the software process in their organization.

The problem with this model is that it focuses more on the maturity of the organization and the software development processes. It does not consider the features and capabilities of the software itself. It cannot be used to assess commercial off-the-shelf software applications.

The Capability Maturity Model (CMM) has been updated to Capability Maturity Model Integrated (CMMI). The CMMI

A study of the level of business intelligence in Iranian banking industry utilized CMMI as the model of study and concluded that maturity level of business intelligence in Iranian banking industry is at level three (Tabatabaei, 2009). It was also observed in the study that small and medium sized banks had more automated systems in the area of business intelligence. This research demonstrated that CMMI can be used as a tool to evaluate IT systems within banking industry.

A case study on implementation of CMMI-ACQ in banking industries based in Taiwan concluded that standard practice can ensure project quality within different units or teams

in spite of the implementation method (Chang, et al., 2013). It also showed that CMMI can improve efficiency and enable the project to be completed as scheduled.

### 2.4.4 Management Information Systems Standards for Credit Unions

The Word Council of Credit Unions (2001) published a standard of minimum requirements for software package to be considered for use by credit unions. The standards also included standards for software design and quality. The standards are divided into nine categories namely; Functionality, Expandability and institutional growth, Flexibility, Usability, Reporting, Standards and Compliance, Administration and Support, Technical specification and Pricing and Cost.

#### 2.4.4.1 Functionality

This section measures the extent to which a software product meets the requirements of different types of microfinance programs. It has four categories which include Accounting package, Loan Portfolio, Savings, Deposits and Shares and Client Information.

#### 2.4.4.2 Expandability and institutional growth

This is the ability of the MIS to support the horizontal and vertical institutional growth. The expandability should permit the growth of organization and introduction of new services planning at least 5 years ahead.

#### 2.4.4.3 Flexibility

This defines how configurable is the system to adapt to the current situation, as well as future requirements of the credit union. It is the ability to handle multiple offices, either on a branch or regional level. In addition, how quickly the system can be updated to handle multiple branches or regions or new locations. It covers the Lending and Savings areas of the credit union.

#### 2.4.4.4 Usability

This allows the user to perform needed tasks easily and efficiently without errors. It includes the friendliness of the user interface. The usability has two categories which include Ease of use and User friendliness.

#### 2.4.4.5 Reporting

This deals with adequacy and accuracy of the standard reports produced by the system. It includes how easy and useable the different reports are.

#### 2.4.4.6 Standards and Compliance

This is concerned with whether the accounting portion of the software product meets generally held standards and process accounts in a sound and consistent way.

#### 2.4.4.7 Administration and Support

This section evaluates the security of the system, its backup and recovery features, as well as its robustness. Also the vendor's support and upgrade strategy, as well as maintenance necessary.

#### 2.4.4.8 Technical Specification

This looks at the programs and programming language of the software, the type of network and hardware it is designed to work on, and the implications of these for future performance. In addition, the overall performance of the system in terms of speed and storage requirements.

#### 2.4.4.9 Pricing and Costs

Considers all costs associated with purchasing, installing, and operating the system. Cost information should include the base price of the software (as well as an assessment of the pricing structure), maintenance agreements, installation and training, conversion, upgrades, and maintenance releases. The cost ratio basically measures the adequacy of pricing and all associated costs to the general functionality to the software.

# CHAPTER THREE: RESEARCH METHODOLOGY

## 3.1 Research Design

This study employed a descriptive research design where an investigation was conducted to evaluate the quality of management information systems' being operated by SACCOs in Kenya. The study was carried out in Kenya and in particular the SACCO sub-sector.

The purpose of the study was to evaluate the management information systems in SACCOs to identify weak and strong areas and thereafter propose strategies to improve their quality.

## 3.2 Population

Population is defined as the aggregation of elements from which sample is actually selected or the theoretical specification of the universe. The samples of the study are thus drawn from the population but the results of the study will apply to the whole population. The population for this study was based on the 215 Deposit-Taking SACCOs in Kenya. The research participants included the SACCO Information Technology managers.

## 3.3 Sample Design

Sampling is defined as the process of systematically selecting representative elements of the population. When selected elements are examined closely, it is assumed their analysis will reveal useful information about the population as a whole.

They add sampling has four advantages:

- It helps accelerate the process of gathering and analyzing data rather than for entire population.
- It helps in following up missing or incomplete data thus helps in improving effectiveness.
- It helps in containing costs.
- Helps in reducing bias.

This research used a sample of 34 respondents comprising of all licensed SACCOs in Nairobi, Kenya to achieve a good representation of the Deposit-Taking Sacco sub-sector. Out of 34 questionnaires distributed 29 were received back which translates to 85% response rate.

## 3.4 Data Collection

This is a process of gathering pertinent information about a phenomenon under study. In dealing with a problem, it may be found out that the data at hand is inadequate and thus one needs to collect adequate data. The forms of data collection techniques are:

- Observational methods
- Survey research
- Secondary Data analysis (Document review)
- Qualitative research

This project employed survey research, qualitative research and secondary data analysis.

### 3.4.1 Survey Research

This method was used when collecting data not accessible using observation. This technique has two forms: Questionnaires and Interviews. Interviews are further divided into; Personal and Telephone interviews. Questionnaires and Personal Interviews were employed in our research.

#### 3.4.1.1 Questionnaires

This is a technique that allows one to study the attitudes, beliefs, behavior and characteristics of several people in an organization who may be affected by current system or proposed system. Attitudes are what people in an organisation say they want (in a new system), beliefs are what people think is true, behaviour is what people do and characteristics are properties of people or things.

The questionnaires were distributed to IT and Business Managers in SACCOs through emails and personal visits. They were used to collect data on systems in use by SACCOs and allowed the participants to evaluate the systems according to quality standards provided for by the ISO/IEC 25010. The questionnaire method was adopted because it is cheap. The respondents were given the questionnaires to fill at their own time and convenience.

Besides the software quality characteristics, management criteria were also introduced to achieve a complete assessment of the software quality and its management. Lian and Lien (Lian & Lien, 2007) added the following three major criteria to the software quality model; vendor factors, cost factors and time factors. By the way of literature review and deep

interview with two project teams in their research, they sifted out four sub criteria of vender factors and four sub criteria of cost factors. And then they sorted three time factors to be the sub criteria of time factors. Consequently, a total of 11 sub criteria were decomposed from the three major criteria. The 11 criteria are displayed as follows, and were categorized to the management criteria.

1. Sub-criteria of vender factors: market share and reputation, industrial credential, service and support, training solution.

2. Sub-criteria of cost factors: software cost, hardware cost, annual maintenance cost, staff training cost.

3. Sub-criteria of time factors: time for planning and preparation, time for BPR and system tuning, time for testing and go-live.

### 3.4.2 Questionnaire design

The questionnaire was linked to research model through a five point likert scale. The five-point likert scale has five alternatives according to the measurements scales used in previous well known studies. This scales ranges from strongly disagree=1, slightly disagree=2, Neutral=3, slightly agree=4 and strongly agree=5. The questionnaire items for this study were developed based on the ISO/IEC 25010 software quality model.

**Table 1:** Summary of the questionnaire categories and sub-categories

| Category | Sub-category | Attribute |
|---|---|---|
| Software Quality | Functionality | Suitability<br>Accuracy<br>Interoperability<br>Compliance<br>Security |
| | Reliability | Maturity<br>Fault tolerance<br>Recoverability |
| | Usability | Understandability<br>Learnability<br>Operability |
| | Efficiency | Time behavior<br>Resource behavior |
| | Maintainability | Analyzability<br>Changeability<br>Stability<br>Testability |
| | Portability | Adaptability<br>Installability<br>Conformance<br>Replaceability |
| Management | Vendor | Market share & reputation<br>Industrial credential<br>Service & support<br>Training solution |
| | Cost | Software cost<br>Hardware cost<br>Annual maintenance<br>Staff training |
| | Implementing Time | Planning & preparation<br>BFR & system tuning<br>Testing & go-live |

In order to enhance the response, the following strategies were considered in the design of the questionnaire;

1. An introduction of the research purpose and importance of software quality at the beginning of the questionnaire to enable the respondents understand the research.
2. The questionnaire was divided into sections A and B with easy to answer questions established in section A, with a view of encouraging participation and engaging curiosity.
3. Sensitive questions that required confidential responses such as age, education level together with demographics questions were put in section B.

### 3.4.3 Questionnaire Pre-testing

Pre-testing is a trial run with a group of respondents for the purpose of detecting problems in the questionnaire instructions or design, whether the respondents have any difficulty understanding the questionnaire or whether there are any ambiguous or biased questions.

In a bid to validate the instrument, feedback about the layout of the questionnaire and questionnaire ambiguity was obtained. Thereafter, measures of internal consistency to test reliability of the questionnaire items were conducted in SPSS. Preliminary questionnaire items are shown in the table below;

**Table 2:** Preliminary questionnaire items

| | |
|---|---|
| Suitability | The MIS modules satisfies the Sacco business requirements |
| Accuracy | The output data report of MIS is absolutely identical with the conventionally manual way |
| Interoperability | The MIS can interact with other application systems such as POS (point of sales system), M-Sacco, SaccoLink etc |
| Compliance | The software is developed by the popular CASE (computer-aided software engineering) tools |
| | The software developing process conforms to software-related standards such as CMM (capability maturity model), etc |
| Security | The software provides various functions of security such as data encryption techniques, firewalls and authority access |
| Maturity | The software has been implemented in other companies of the same industries, and holds high customers' satisfaction |
| Fault tolerance | The MIS is capable of restoring itself after a failure or abnormal behavior i.e. |
| Recoverability | The recovering and resuming process is automatic performing, and the recovered data is completely correct |
| | There are at least 2 redundancies of backup modes such as hard- disk, CD-ROM and tape, etc. |
| Understandability | The logic concepts of MIS modules are similar to the actual business processes (users can easily identify function within the MIS) |
| Learnability | The MIS provides help functions, and the vendor has provided user manuals and system documentation |
| | The vendor provides the BPR (business process reengineering) training to make the logic concepts of software more understandable |
| Operability | The GUI (graphical user interface) and window interface are available. |
| Time behavior | The response time of report is reduced under the equivalent data processing loading *(output from MIS is prompt) |
| Resource behavior | The MIS utilizes resources efficiently |
| Analyzability | The software can record log files of all transactions |
| Changeability | The software is well-modularized and can be easily modified |
| | There are high-level cohesion and low-level coupling between the software modules to avoid ripple effect. |
| Stability | The MIS would not fail after the customizing or modification. (MIS works well after modification) |
| Testability | The system admin or the support staff can easily perform operational testing and determine whether the MIS is ready for operation or not |
| Adaptability | The software could be installed on various operation systems such as UNIX and Windows, etc |
| Installability | The software could automatically process the dependence between modules |
| | MIS installation is simple (One step) |
| Market share & reputation | The vendor has a good market share and is reputable |
| Industrial credential | The vendor is well-known in the country |
| Service & support | The vendor support services are good and reliable |
| Training solution | The vendor has provided training for MIS and trains after every upgrade |
| Software cost | The cost of the MIS is fair and fits the Sacco budget |
| Hardware cost | The hardware to run MIS is affordable to the Sacco |
| Annual maintenance | The vendor provides annual maintenance that is reliable and costs fairly |
| Staff training | The Sacco staff have been trained well on the use of the MIS. |
| Planning & preparation | The implementation process was well planned and was done according to the schedule |
| BPR & system tuning Testing & go-live | The implementation process was successful, all errors identified and corrected. |

## 3.5 Data Analysis

The data collected was subjected to both quantitative and qualitative data analysis techniques.

### 3.5.1 Quantitative Data Analysis

The data collected using questionnaires was subjected to descriptive statistical analysis technique of frequency and cross tabulation analysis. SPSS and spreadsheet were used to analyze large sets of data.

### 3.5.2 Data Reliability

Reliability is the extent to which research findings would be the same if the research were to be repeated at a later date or within a different sample of subjects. This research used the most popular test of inter-item consistency reliability that is the Cronbach's coefficient alpha. This is attest of consistency of respondents' answers to all the items in a measure. Reliabilities less than 0.6 are considered to be poor, those in the 0.7 range acceptable and those over 0.8 are good. The closer the reliability coefficient gets to 1.0, the better. The table below shows a summary of results of the alpha scores obtained from the 34 test cases.

**Table 3:** *Reliability coefficient*

| | Scale Mean if Item Deleted | Scale variance if Item Deleted | Corredted Item-Total Correlation | Alpha If Item Deleted |
|---|---|---|---|---|
| SUITABILITY | 147.5357 | 311.7394 | 0.7275 | 0.9159 |
| ACCURACY | 148 | 316 | 0.3257 | 0.9192 |
| INTEROPERABILITY | 147.25 | 314.787 | 0.4416 | 0.9179 |
| COMPLIANCE | 147.6786 | 306.9669 | 0.6966 | 0.9153 |
| SECURITY | 147.8571 | 304.3492 | 0.5807 | 0.9161 |
| MATURITY | 147.7857 | 304.8413 | 0.7674 | 0.9145 |
| FAULT_TOLERANCE | 148.1071 | 304.1733 | 0.5648 | 0.9164 |
| RECOVERABILITY | 148.0357 | 306.4061 | 0.6005 | 0.916 |
| UNDERSTANDABILITY | 147.6071 | 313.9511 | 0.5854 | 0.9169 |
| LEANABILITY | 148.4643 | 303.4431 | 0.685 | 0.9149 |
| OPERABILITY | 147.2143 | 319.7302 | 0.4329 | 0.9183 |
| TIME_BEHAVIOUR | 147.7143 | 317.4709 | 0.4643 | 0.9179 |
| RESOURCE-BEHAVIOUR | 147.8929 | 310.6177 | 0.7039 | 0.9158 |
| ANALYZABILITY | 147.4286 | 315.7354 | 0.4896 | 0.9176 |
| CHANGEABILITY | 147.6786 | 303.1151 | 0.7199 | 0.9146 |
| STABILITY | 148.0714 | 306.6614 | 0.7038 | 0.9152 |
| TESTABILITY | 147.75 | 307.4537 | 0.7022 | 0.9153 |
| ADAPATABILITY | 148.3214 | 331.041 | -0.0941 | 0.9263 |
| INSTALLABILITY | 147.6429 | 311.4233 | 0.6048 | 0.9164 |
| MARKET_SHARE | 147.6786 | 308.5966 | 0.7245 | 0.9154 |
| INDUSTRIAL CREDIBILITY | 147.7143 | 312.2857 | 0.5925 | 0.9166 |
| SERVICE & SUPPORT | 148.5 | 299.8889 | 0.7634 | 0.9139 |
| TRAINING | 148.6071 | 297.5066 | 0.7167 | 0.9141 |
| SOFTWARE COST | 148.1786 | 312.8929 | 0.4916 | 0.9174 |
| HARDWARE COST | 147.5357 | 327.1468 | 0.0272 | 0.9214 |
| MAINTENABILITY | 148.25 | 304.2685 | 0.735 | 0.9146 |
| STAFF_TRAINING | 148.1071 | 308.4696 | 0.524 | 0.9169 |
| PLANNING & PREPARATI | 148.5357 | 300.2579 | 0.6604 | 0.915 |
| BPR | 148.2143 | 301.3598 | 0.6845 | 0.9148 |
| GENDER | 150.75 | 324.9352 | 0.2278 | 0.9196 |
| AGE | 149.7143 | 326.7302 | 0.0603 | 0.9208 |
| EDUCATION | 149.8929 | 335.0622 | -0.3077 | 0.9236 |
| MIS IN USE | 148.8571 | 337.4603 | -0.2006 | 0.9308 |
| YEARS_OF MIS USE | 149.1071 | 338.914 | -0.3201 | 0.9265 |

Reliability coefficients 34 items

Alpha = .9197 Standardized item alpha= .9289

# CHAPTER FOUR: RESULTS AND DISCUSSION

## 4.1 Demographic Data

All the 29 respondents of the questionnaire were IT managers of licensed deposit-taking SACCOs in Nairobi. The demographic characteristics of the respondents were based on gender, age, level of education, the MIS in use and number of years the respondent's SACCO has operated the MIS.

The results indicated that most of the respondents were male with 83% compared to female which had 17%. This implies that there were more male IT managers in the SACCO subsector in Nairobi. The IT profession has been dominated by male in almost all the sectors both in Kenya and other countries.

A substantial number of respondents were in the age range of 25-35 years with a percentage of 75.9% followed by age 35-45 years with 17.2%. This indicates that most of the IT Managers within the SACCO subsector are young as it is generally in the IT profession. The analysis of education background data indicated that majority of the respondents had attained at least a college diploma. The largest population had attained a bachelor's degree, 72.4% followed by Master's degree and diploma with a percentage of 13.8% and 10.3% respectively.

## 4.2 Software Evaluation Analysis

The main objective of this research project was to apply the ISO/ICE 25010 Software Quality model in evaluating management information systems' in use by SACCOs in Nairobi. The model has two major attributes of software that it measures and they include software quality and software management. Both attributes were considered in this research. Software quality is divided into six major criteria that were used to evaluate the SACCO MIS'. The six criteria include functionality, reliability, usability, efficiency, maintainability and portability. Software management on the other hand is divided into three major criteria which were also evaluated. The three criteria include vendor, cost and software implementation. The sections below present analysis and results on how the above criteria were rated by the research respondents in relation to their current MIS in use.

### 4.2.1 Management Information System in Use

There are number of MIS in use by different SACCOs in Kenya. Figure 6 indicates that Microsoft Dynamics NAV had the biggest market share for SACCOs in Nairobi with a share of 41.4% followed by ASMAS with 27.6%. The other dominant MIS were FinExtreme and Bankers Realm each with 10.3% market share in Nairobi. One reason for MS Dynamics NV in leading the market is that it enjoys good marketing and technical support from the mother company Microsoft.

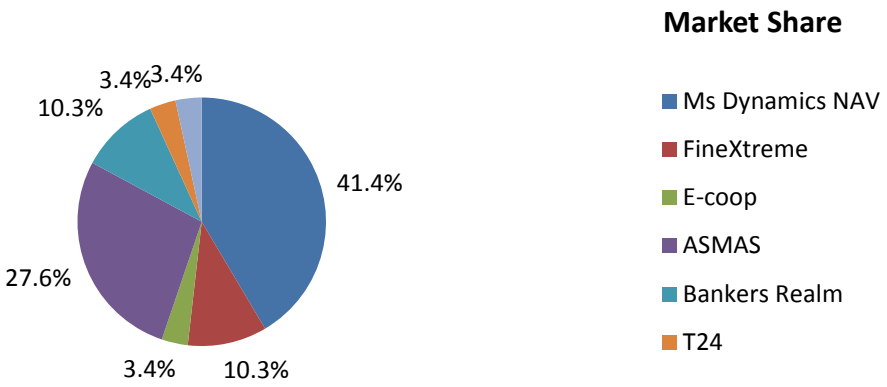


**Figure 3:** *MIS Market share*

### 4.2.2 Number of years the MIS operated

The research also wanted to find out the number of years that the respondent's SACCO has operated the current MIS. This was to ensure that the respondent has interacted with the MIS for a substantial period in order to be in a position to evaluate it objectively. From the data analyzed, it was observed that majority of the SACCOs had used the current MIS for a period of 3-5 years with a percentage of 34.5% followed by period of between 5-10 and 1-3 years each with a percentage of 27.6%. It was also observed that only 10.3% of the SACCO had operated the MIS for a period less than one year and none had operated for more ten years.

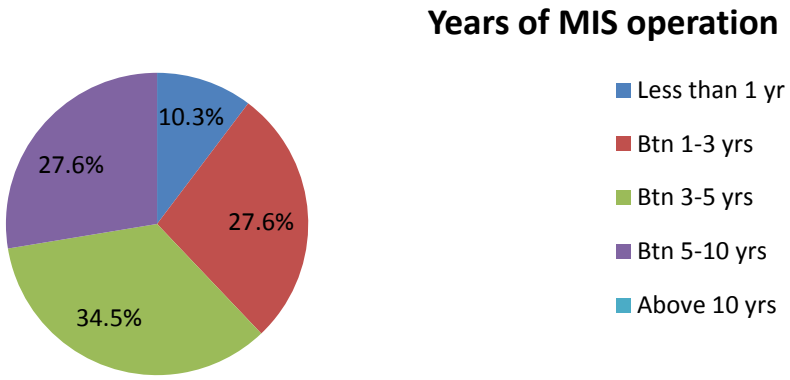


**Figure 4:** *Years of MIS operation*

### 4.2.3 Functionality

This attributes evaluates the degree to which the software functions satisfies stated or implied needs of the users. The research respondents were asked to evaluate their current software in relation to its suitability, accuracy, interoperability, compliance and security. The results are shown below.

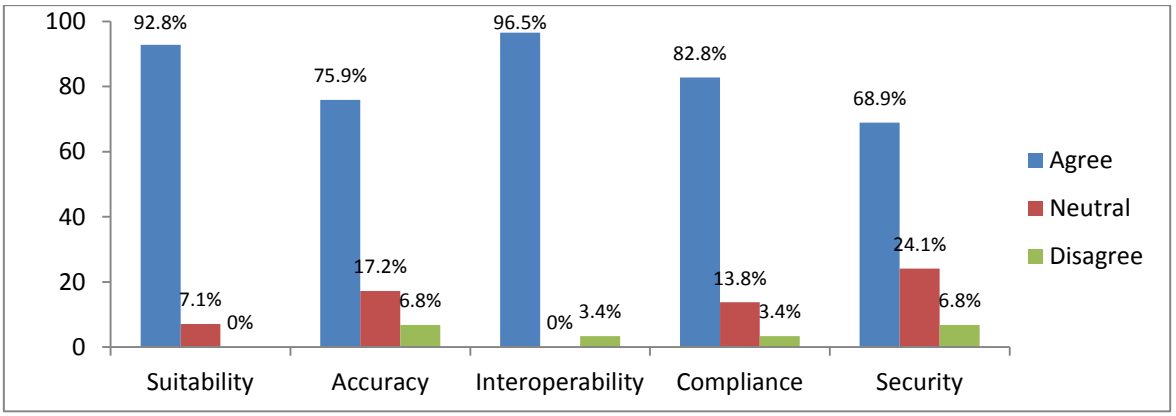


**Figure 5:** *Quality evaluation score (%) for Software functionality attributes*

From figure 5, 92.8% of the respondents agreed that their software MIS modules satisfy the SACCO business requirements while only 7.1% of respondents were neutral. None of the respondents said that their MIS modules do not satisfy requirements. On accuracy, 73.9% agreed that the output data report is identical with when manual method is used, while only 17.2% and 6.8% were neutral and disagreed (respectively) that the output report is identical. This implies that the respondents are satisfied with the accuracy of the data from their MIS.

Most of the MIS in SACCOs can interact with other systems (interoperability). This is according to 96.5% of respondents who agreed that the MIS in use at their SACCO can interact with other systems like Point-of-Sale, SMS and ATM banking. Only 3.4% disagreed that their MIS can interact with other systems. Compliance to CASE (Computer Aided Software Engineering) tools was also highly rated with 82.8% agreeing that the MIS complies while 13.8% were neutral and 3.4% disagreed. Since most of the MIS are commercial off-the-shelf software, the respondents may not be aware whether CASE tools were used in during their development.

On software security, 68.9% agreed that the MIS provides various function of security such as data encryption, firewalls and access control. Only 24.1% of the respondents were neutral while 6.8% disagreed. Those who were neutral might have not been aware whether those security functions exist or not.

### 4.2.4 Reliability

Reliability attributes evaluates software capability to maintain its level of performance under stated conditions for stated period of time. The research respondents evaluated the MIS in their SACCO based on its maturity, fault-tolerance and recoverability. Most MIS had been implemented in other companies and are also capable of restoring themselves after failure. The results are illustrated below.

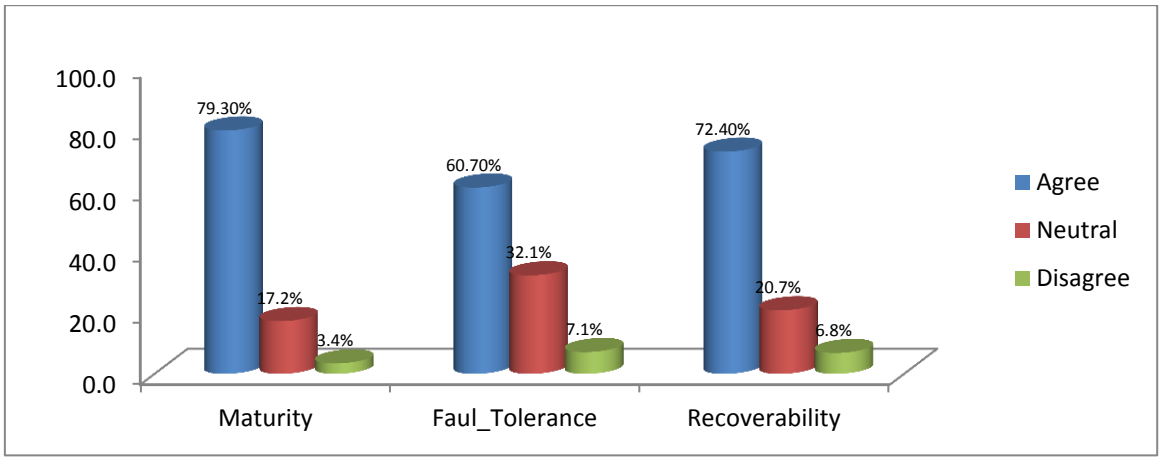


**Figure 6:** *Quality evaluation score (%) for Software reliability attributes*

### 4.2.5 Usability

This attribute evaluates the degree to which the software is available for use. The respondents evaluated the MIS in terms of its understandability, learnability and operability. The results are as shown below.

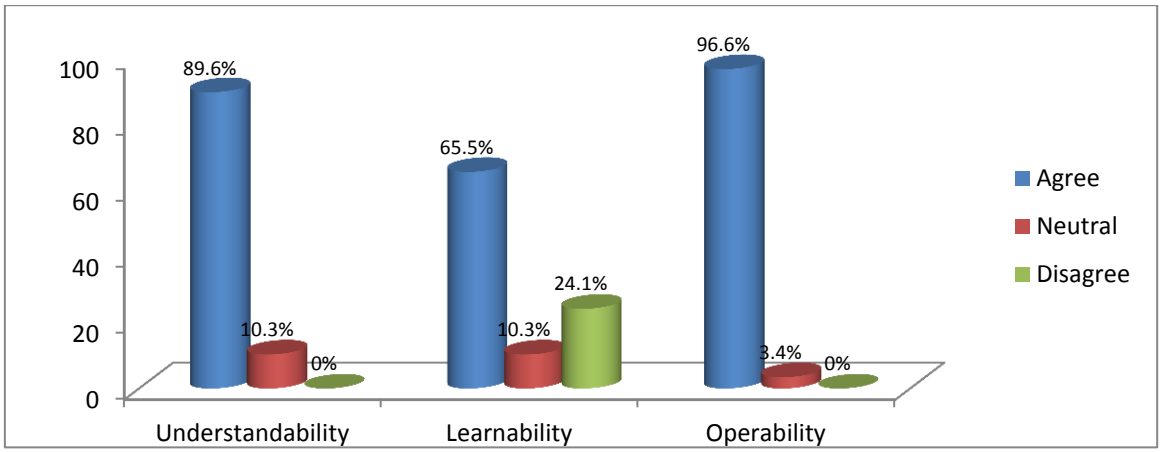


**Figure 7:** *Quality evaluation score (%) for Software usability attributes*

From figure 7 above, 89.6% of the respondents agreed that the logic in the MIS modules was similar to the actual business process while 10.3% were neutral. Most of the MIS in SACCOS are financial systems and Enterprise Resource Planning systems that were not designed specifically for SACCOS but they have been highly customized to suit the SACCO business.

With regard to MIS learnability, 65.5% agreed that the MIS provides help functions and that the vendor had provided user manuals while 24.1% disagreed and 10.3% were neutral. This is an indication that MIS vendors need to ensure the systems have in-built help functions as well provide comprehensive user manuals.

As evidenced in figure 7 above, MIS operability was highly evaluated. This is so since 96.6% of the respondents agreed that their MIS has graphical user interface (GUI) and window interface is also available.

### 4.2.6 Efficiency

This attributes is concerned with the degree to which the software makes optimal use of system resources. The respondents evaluated the MIS efficiency in terms of time behavior and resource behavior. The results are illustrated below.

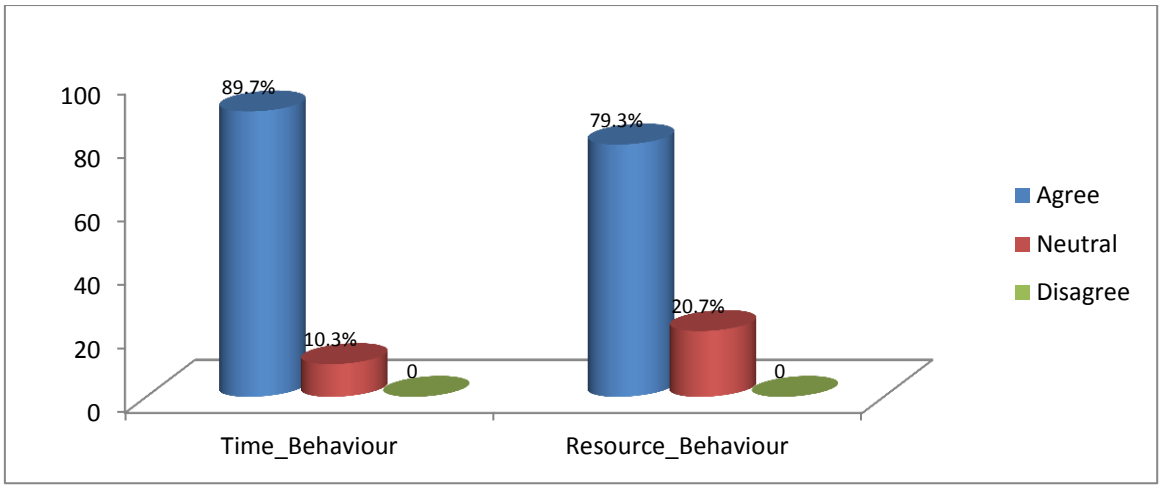


**Figure 8:** *Quality evaluation score (%) for Software efficiency attributes*

The results shown in figure 8 above indicate that 89.7% of respondents agreed that the output from the MIS is prompt whereas 10.3% were neutral. This may be due to the fact that SACCOs being a microfinance institution, the volume of transactions is not big to put pressure on both the software and the hardware. It is also noted from the results that resource behavior is also not a major issue with 79.3% of the respondents agreeing that the MIS utilizes resources efficiently and only 20.7% were neutral.

### 4.2.7 Maintainability

This criterion measured the ease with which repair may be made to the software. The users evaluated this criterion in terms of the MIS analyzability, changeability, stability and testability. The results are illustrated in the chart below.

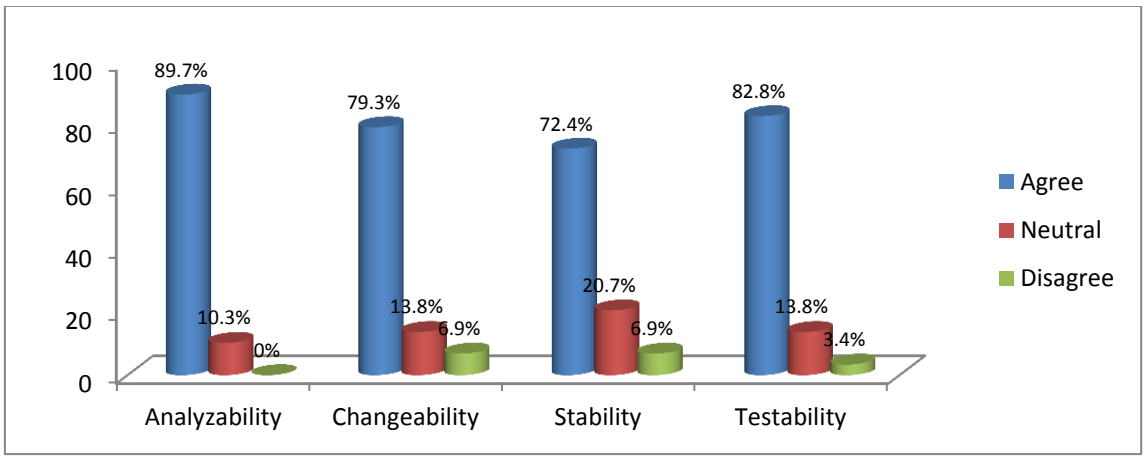


**Figure 9:** *Quality evaluation scores (%) for Software Maintainability attributes*

From figure 9, 89.7% of the respondents agreed that the MIS can record log files of all transactions while 10.3% were neutral. It is important for a financial management information system to have log files for use in case of errors and during reconciliation of financial transactions. Most respondents (79.3%) agreed that the MIS could be easily changed while 5.9% disagreed and 13.8% were neutral. This implies most MIS in SACCOs can be customized or upgraded to the latest and better version.

As regards MIS stability, 72.4% agreed that the MIS would not fail after modification while only 6.9% disagreed and 20.7% were neutral. This is an indication that most MIS in SACCOs work well after modification. This is strengthened by the fact that System administrators in SACCOs (82.8%) could easily perform operational testing and determine whether MIS is ready for operation. Sometimes the work of modification, testing and installation is done under the guidance of a technician from the software vendor.

### 4.2.8 Portability

This attribute is defined as the ability that enables software to be transferred from one environment to another. Under this criterion the research respondents evaluated their MIS in terms of its adaptability and installability. The results are as shown below.

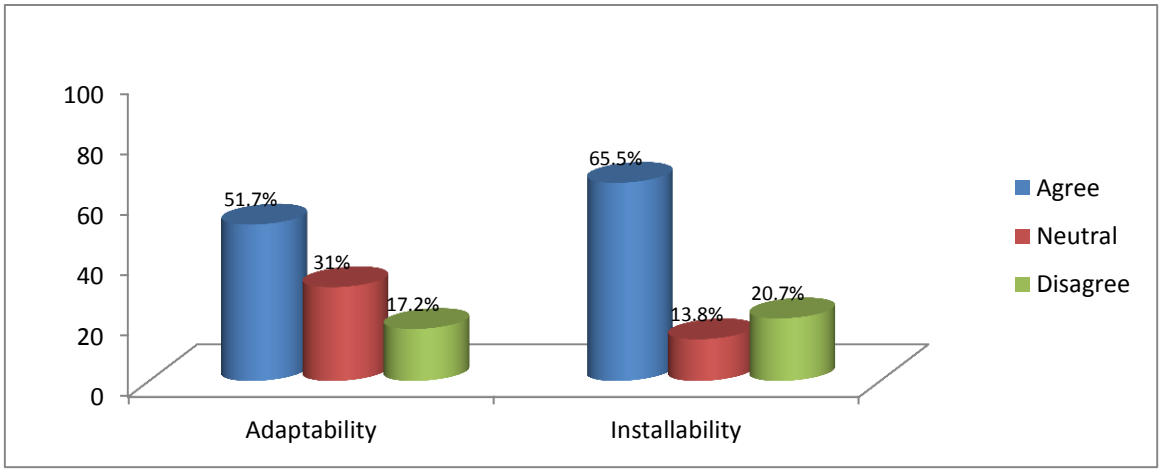


**Figure 10:** *Quality evaluation scores (%) for Software portability attributes*

As illustrated in figure 10 above, 51.7% of the respondents agreed that their MIS could be installed on various operating systems while 17.2% disagreed and 31% were neutral. This indicates that most of the MIS in SACCOs can only run on one platform mostly windows platform due to its simplicity in use. The process of installing an MIS was found to be simple as it is step-by-step process where 65.5% agreed that it was indeed simple while 20.7%

disagreed and 13.8% were neutral. The installation of MIS depends on the platform and to large extent on the knowledge of the system administrator performing the installation. However, in most SACCOs the installation would be done by the vendor or a consultant.

### 4.2.9 Vendor Market share, Reputation and Service support

This attribute affects the quality of software in that a vendor who has a large market share, is reputable and the service is excellent and is likely is to provide an MIS that will ensure the SACCO services run without failures and other interruptions related to the software. The service support and regular software upgrades by the vendor ensures that the SACCO always runs superior and error free MIS. Also the training provided by the vendor during and after implementation impacts on how the SACCO will operate on its own. Good in-house training ensures that the SACCO system administrator is capable of trouble shooting and only contact vendor on critical issues requiring escalation. During the research respondents were asked to give their opinion on vendor market share, reputation, industrial credential and service support. The results are illustrated in the chart below.

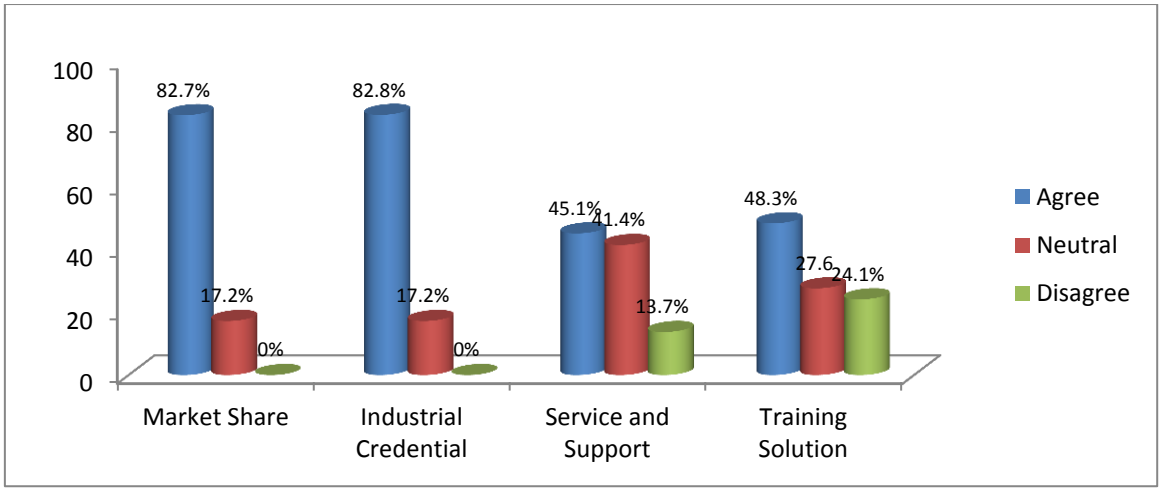


**Figure 11:** *Quality evaluation score (%) for vendor reputation attributes*

As shown in the figure 11 above, most respondents felt that their MIS vendor had a good market share and is reputable in Kenya with 82.7% supporting and 17.2% being neutral. This can be explained by the fact that there were a few vendors for SACCO MIS in Kenya as indicated in Figure 4 where the top two MIS have a market share of 69% (Microsoft Dynamics with 41.4% and ASMAS with 27.6%). Most SACCO software also scored high (82.8%) on industrial credential of whether they are well-known in the country. This is more related to their market share and reputation.

As regards service and support, most MIS scored poorly with 45.1% supporting that the vendor support services are good and reliable while 13.7% disagreeing and 41.4% were neutral. Similar results were also observed on vendor training solution with only 48.3% supporting that the vendor has provided training for the MIS while 24.1% disagreed and 27.6% were neutral. This is an indication that vendors of MIS used in SACCOs have not been providing their services satisfactorily. This may be due to lack of enough resources to support the SACCOs especially on qualified staff. As seen in Figure 3, the top two MIS have more than 60% of market share and this could be the reason that they are not able to provide effective service support.

### 4.2.10 Software and Hardware Cost

The cost of computer hardware has been falling but still expensive to microfinance institutions (Bada, 2012) while on the other hand specialized software (MIS) for MFI's are expensive and costly. In this research, the respondents were required to provide their opinion on the cost of hardware, software, annual maintenance and staff training. The results are shown below.

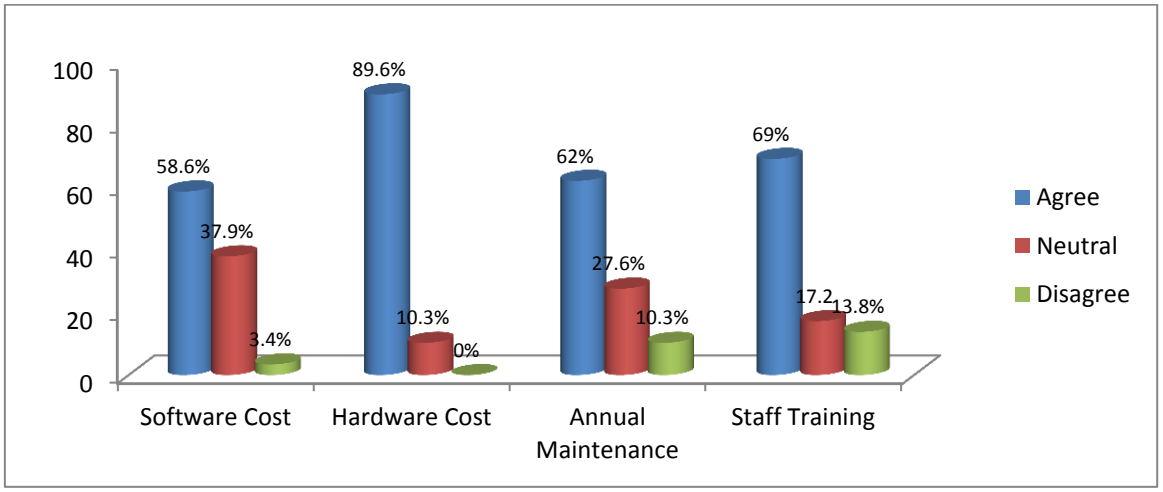


**Figure 12:** *Quality evaluation score (%) for Software Cost attributes*

The cost of software (MIS) remains high for SACCOs to afford with only 58.6% supporting that the cost is fair and fits within their budget. However, the cost of hardware is affordable and fits within their budget with 89.6% supporting and 10.3% were neutral. The area of vendor annual maintenance cost was found to be fair with 62% of the respondents supportive of the cost. SACCOs feel staff training as well has been satisfactory and therefore vendors need to improve on software cost, annual maintenance and staff training.

### 4.2.11 MIS Implementation

Implementation is the process devoted to delivering a management information system into its context of use. There are a number of problems that can occur during MIS implementation process and the SACCO should ensure such problems are controlled for successful implementation. In the research, respondents were required to assess the implementation process of the MIS in terms of preparation process and testing and go-live. The results are shown below.

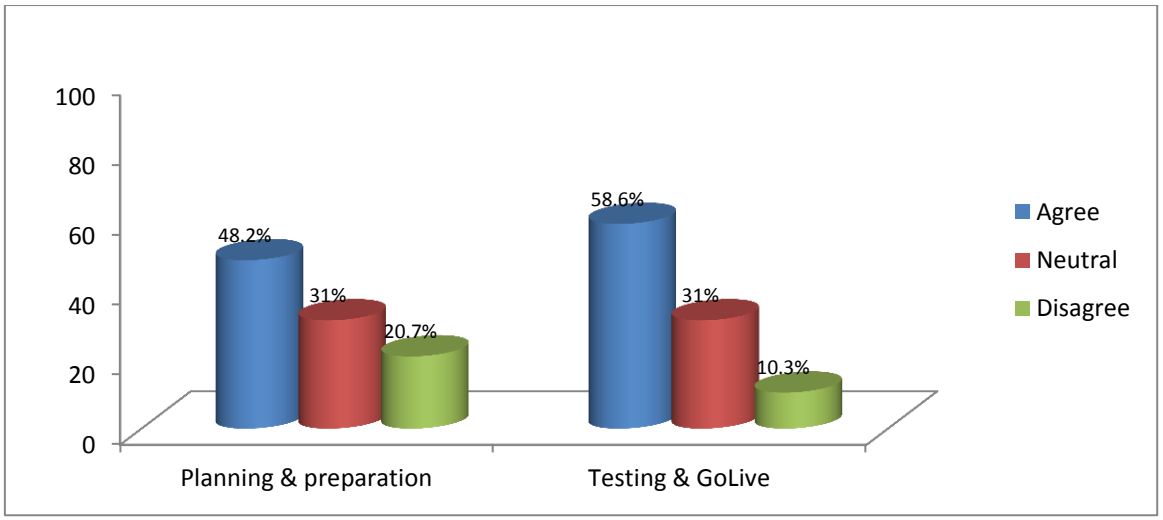


**Figure 13:** *Quality evaluation score (%) for Software implementation attributes*

It is clearly seen in the results that software implementation planning and preparation is a major problem to SACCOs. Only 48.2% of the respondents agreed that the implementation process is well planned and done according to schedule while 20.7% disagreed and 31% were neutral. Implementation is key as it puts the MIS into production and without careful planning and execution errors could occur that might interfere with smooth running of the MIS. Testing and go-lives process was also found to be unsatisfactory as most respondents slightly above average (58.6%) felt that not all errors were identified and corrected.

## 4.3 Discussion

SACCOs over the past few years have been paying increasing attention to information systems. They are increasingly realizing that information lies in at the very heart of microfinance. Formal and informal financial institutions have also become aware of the vital need to manage large amounts of data (Wolfe, et al., 2011). As a result, there is massive need to improve the effective understanding and use of this data.

Despite the availability of technology today, there is a problem in developing a good and problem free MIS software for the SACCOs. The diverse nature of SACCOs creates an intriguing complexity for software application development. This research employed the ISO/IEC 25010 software product quality model and evaluated the sampled SACCO MIS' to identify strong and weak areas.

The research has shown that the SACCO MIS' are good in meeting the business and functional requirements of the SACCOs. This implies that the MIS are serving SACCOs in terms of their suitability to be applied in the SACCO sub-sector. Similar results were obtained when the ISO 9126 (earlier version of ISO/IEC 25010) was used to evaluate an el-learning system. The ISO 9126 model provided an indication to educators and educational administrators of the quality of a system they are considering buying into and provided a basis of comparison of different systems (Chua & Dyson, 2004).

In addition, the SACCO MIS' are considered to be providing accurate and timely data and information that SACCOs use to make operational decisions. The MIS' were also found to work well with other applications systems including point-of-sale (POS), mobile banking and ATM banking. This was strengthened by the fact that the systems provides for various functions of security such as encryption, firewalls and authorized access. This compares well with results of a report on lessons from deploying the remote transaction system with three microfinance institutions in Uganda which concluded that MIS integration with remote channels help to serve remote areas (Kam & Tran, n.d.).

The research also revealed that most of the MIS' in SACCOs have been in the market for some time and have been implemented in a good number of SACCOs. This can be attributed to them having a good customer satisfaction. The MIS' were found to be fault-tolerant and

can easily restore themself after a failure with the data recovered being complete and correct.

Most of the MIS' in SACCOs scored high regarding their usability. This is the case because most of them have graphical user interface (GUI) and or window based interface. The logic concepts of the MIS modules are similar to the actual business processes and users can easily understand them (Kolhe, et al., 2012). In addition, the vendor has provided user manuals and system documentation and as well, the MIS provides online help functions. The MIS' were also found to use resources efficiently and could log files of all transactions.

The study established that the SACCO software are well modularized and can be easily modified or customized. Even though the SACCO software works well after customization or modification, the system administrator and the support staff can easily perform operational testing after modification and determine whether the MIS is ready for operation. In addition, the software are simple to install (one-step) and also can be installed on various operating systems such as UNIX and Windows.

The study also established that most of the vendors had a good market share, are reputable and well-known in the country. However, their support services and training solution are not good and reliable. Most system administrators felt that their software vendor does not provide quality technical training after implementation and any other software upgrade. In spite of this, the users are happy about the cost of the software, annual maintenance fee and cost of the hardware are fair and within the SACCO budget.

Software implementation and its planning was an area that most vendors also did not perform well. The implementation is never planned and therefore no schedule or project management practices are employed during the process. In some instances, SACCO software is never fully implemented with errors never identified nor corrected. A study on successful software adoption revealed that organization change management and individual people issues affect successful software implementation (Varadaraj & Goud , 2012). A successful software implementation and adoption requires to address four elements, namely, commitment from leadership, the right technology, the right business process and getting it right with the people inside the organization towards adoption of this technology.

# CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

## 5.1 Achievements

The study demonstrated that the ISO/IEC 25010 Software product quality model can be used to evaluate the quality of management information systems in SACCOs and in general microfinance institutions. The study also reviewed other models and frameworks that can be used to evaluate software systems. By use of software attributes defined by the ISO/IEC 25010 Software product quality model, the study successfully evaluated the management information systems in SACCOs and was able to determine how system administrators within SACCOs rate their quality of their management information systems. Finally, the study identified areas that the management information systems were strong and/or weak and made recommendations.

## 5.2 Conclusion and recommendations

The SACCO MIS' were found to functionally adequate to support the SACCO business and its operations. They were also found to be reliable, efficient and easy to use. Therefore, SACCOs do not need to look for other MIS as the ones in use satisfied the condition required by the ISO/IEC 25010 Software product quality model. In addition, the study established the areas of vendor support services, training and software implementation were poor, and therefore makes the following recommendations;

### 5.2.1 Contract Agreement

The SACCO and the vendor must enter into a written contract agreement that includes user and technical training as component of the deliverables. This ensures that the vendor must provide the training before signing off the project and receiving final payment. The contract should also contain a clause protecting the SACCO in case the vendor fails to provide full services as per the contract. The SACCO should request vendors to quote their price inclusive of training during bidding and also ensure it is included in the implementation plan.

### 5.2.2 Service Level Agreement (SLA)

A Service Level Agreement is an important document that is used to define the level of a service that exists between a service provider and their customer. SACCOs should ensure they enter into Service level agreement with vendors where their support service standards and performance levels are agreed upon. The SLA should be a legally binding document with

penalty clauses that can be invoked by the SACCO when the vendor does not meet the service standards agreed upon. This ensures that the vendor is committed to the SACCO and that the SACCO has cushion to fall back when services by the vendor are poor.

### 5.2.3 Project Management

It was established in the research that software implementation planning and execution was poor. Therefore, SACCOs need to ensure that a team is appointed with a substantive Project Manager to spearhead implementation of the software. A project plan should be prepared and agreed upon between the SACCO and the software vendor which should be adhered to during the whole process.

After completion of the implementation process, an independent post implementation review should be carried to ensure the process was complete and all errors were handled conclusively. A user acceptance testing should also be carried out and the software should only be put in production if all issues raised by users are resolved.

## 5.3 Contribution of the research

This study makes a significant contribution towards the area of information technology in SACCOs and Microfinance sectors. It specifically adds more knowledge in understanding the quality, performance and suitability of management information systems in running a SACCO or a microfinance institution. Its academic contribution is:

a) The research identified the key management information systems used in SACCOs and their market share. The MIS with big market share can be selected for further academic research on why and what factors contributes to its great adoption
b) The identification of the major areas of shortcoming in MIS used by SACCOs that need improvement
c) The research also outlined standards and models that can be used to evaluate the quality and performance of MIS in SACCOs.

## 5.4 Limitations and Recommendations for further study

This study had its strengths as well as its limitations. Due to limited resources in terms of time and funding, the study focused on SACCOs in Nairobi since it has all types of SACCOs represented. However, SACCOs are found in the whole country and therefore, further

studies are necessary to confirm whether same results could be obtained from the other regions in Kenya.

Another limitation of the study was that it only evaluated the MIS based on specific attributes as given by the ISO/IEC 25010 model. It did not explore the factors contributing to the reason why some attributes were evaluated high or low. Further studies could be carried out to determine factors influencing the quality and performance of the MIS in SACCOs.

This study outlined the various software in use by SACCOs and their market share. To extend this research, further studies could also be carried out to determine factors influencing the market share of MIS software in SACCOs and also their specific strengths and weaknesses.

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