UNIVERSITY OF NAIROBI

SCHOOL OF COMPUTING & INFORMATICS

FACTORS INFLUENCING CLOUD COMPUTING TECHNOLOGY ADOPTION BY DEPOSIT TAKING (DT) SACCOS IN KENYA.

BY

MAORE PHINEAS MUGAMBI

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Declaration.

I, the undersigned, declare that this is my original work and has not been submitted to any other college, institution or university for academic credit.

Signed: _____

Date: 15/11/2023

Declaration by supervisor.

This proposal has been submitted for examination with our approval as University Supervisor

Name of Supervisor: **Prof. Elisha Toyne O. Opiyo**

Professor of Artificial Intelligence.

Signature: _____

Date: 17/11/2023

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Abbreviations

CCT – Cloud Computing Technology

DFA - Deterministic Frontier Analysis

DT - Deposit Taking

FOSA - Front Office Services Activity

ICT - Information, Communication and Technology

IT – Information Technology

Kshs. – Kenya Shillings

SACCO - Savings and Credit Co-operative Society

SASRA - SACCO Societies Regulatory Authority

SPSS - Statistical Package for Social Sciences

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ABSTRACT

Cloud Computing Technology (CCT) is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources like networks, servers, storage, applications, and services that can be rapidly provisioned and released with minimal management effort or service provider interaction (Mell & Grance, 2009).

The cloud computing technology is typically offered through geographically distributed data centers based on well-defined Service Level Agreements (SLAs). Given the prevalence of adopting the technology by organizations in various industry and sectors due to the benefits it provides such as cost savings, reliability and scalability.
The purpose of the study is to assess the factors that influence the adoption of CCT by Deposit Taking Sacco's in Kenya. The study will also determine the relationship between organizational and external factors in adoption of cloud computing. The study was guided by the Technology Organization Environment (TOE) theory, the Diffusion of Innovation theory and the Unified Theory of Acceptance and Use of Technology (UTAUT).

A descriptive status research design was employed to guide the study. The target population of the study was 172 licensed deposit taking Sacco's operating in Kenya, as registered by the regulator as at December 2020. A sample size of the entire population was drawn to participate in the study. Purposive sampling technique was employed in identifying the participants to take part in the study. The quantitative data was collected using an online questionnaire; the data was analyzed using descriptive and inferential statistics on SPSS Version 23 and presented in tables, charts and graphs.

The study is significant to the financial sector in Kenya specifically the rapidly growing Sacco sector. Policymakers including and not limited to the regulator SASRA, the National Treasury and Planning, Ministry of Information, Communications and Technology, and Ministry of Industry, Trade and Cooperatives will find value in considering the results of this study as they review policies to support innovations and technologies in the financial services sectors.

CHAPTER ONE

1.1 Introduction

This Chapter provides an introduction and background to the study as well as clarify the problem's statement. The Chapter outlines the purpose, objectives, and research questions for this study. In addition, the chapter gives the value, assumptions, scope, and limitations of the study.

1.2 Background of the study

In the recent years, financial organizations around the world have deployed significant resources toward in-house computing capacities and specialized Information Technology (IT) staff to support their primary business processes and/or to achieve a competitive advantage.

It is clear with the rapid services of providers offering technology driven solution also known as rise Fintech, a new financial industry that applies information technology and systems to improve financial activities (Schueffel, 2016).

Information Technology creates competitive advantage by giving companies new ways to outperform their rivals (Porter &Millar, 1985). To gain competitive advantage over rivals, a company must either execute these activities at a lower cost or in a way that leads to diversification and premium price (Porter & Millar, 1985).

Today organizations are making use of IT to operate more efficiently and help to reduce the overall costs. The concept of outsourcing has contributed to this, by transferring entire business functions to an external service provider (Van Elst, 2010).

CCT involves the provision of Information Technology (IT) solutions as a service rather than as a product through the Internet (Senyo, Effah, & Addae, 2016). According to Gartner (2016), by the year 2020, more than $1 trillion in IT expenditure was directly or indirectly toward transition to cloud computing systems. As such there is fierce competition among major cloud service providers such as Amazon, Microsoft, Salesforce, and Google for a share in this projected revenue.

The formal financial industry in Kenya comprises majorly of banks, insurance firms, fund managers, and registered deposit taking SACCOs. The latter playing a significant role in provision of banking services to SMEs and middle-to-low-income earners which comprise the larger part of Kenya’s

economy. The provision of access to financial services to the bottom end of the economy. Moreover, gaining access to financial services is a critical step in connecting the poor to a broader economic life and in building the confidence for them to play a role in the larger community (Thirlwall, 1994). The impact of which is also expected to shore up the profitability of SACCOs and broadly the entire economy.

1.3 The SACCO Sector in Kenya

Co-operatives can be defined as independent associations of persons united voluntarily to meet their common economic, social and cultural needs and aspirations (Birchall, 2004). The Savings and Credit Co-operative (SACCO) is therefore a member owned financial institutions that offer both savings and credit services.

The history of SACCOs in Kenya traces back to the Co-operative Societies Act, Cap. 490 of 1966 (Republic of Kenya, 1966). This was then replaced by the Co-operative Societies Act Chapter 12 of 1997 (Republic of Kenya, 1997). This was then amended to give rise to the Co-operative Societies (Amendment) Act of 2004 (Republic of Kenya, 2004). In 2008, SASRA was enacted in law to license, regulate, supervise and promote savings and credit co-operatives.

The primary purpose of a SACCO is mobilization of savings (deposit taking) and extending of credit to members. According to the report by SASRA (December 2020), the SACCO subsector constituted 162 fully and duly licensed DT-SACCOs. The sector continued to register impressive growths in all the key performance parameters of total assets, total deposits, and gross loans during the year 2019. The total assets portfolio crossed the half-trillion mark to Kshs. 556.71 Billion in 2019 representing a 12.41% increase from Kshs. 495.25 Billion recorded in 2019 (SASRA, Annual Report 2020).

Kenya's SACCO industry appears to be healthy and on a growth path. However, this view is simplistic, given the changing nature of financial services, competition, and technology. Not all regulated SACCOs are financially strong, 23 out of 172 DT SACCOs made losses in 2019, and a further 25 made profits of less than KES 1 million (Sacco Supervision Report 2020). Not all SACCOs are large, 51 DT SACCOs have a small staff capacity of less than 20 technical staff. The regulator (SASRA) is concerned to ensure the long-term health of the industry in an increasingly competitive environment.

1.4 Statement of the problem

The SACCO sector in Kenya faces challenges including and not limited to market disruption by more financially stable institutions like commercial banks, a burgeoning digital finance space i.e. Fintech firms, and the revolution in all aspects of technology. It is clear however that SACCOs are struggling to respond resolutely especially with regard to the growing trends toward technological based solution for financial service provision. This is evidenced in the minimal uptake of outsourced technology services like cloud computing with a preferred reliance on in-house albeit outpaced IT solutions.

The efficiency of SACCOs is in theory related to factors such as strength of the bond of association among the members, size of entity, managerial competency, and degree of adoption of technology (Mwangi, 2014) and while the list of technological services is endless, versatility of opportunity CCT presents is enormous. It is therefore crucial for SACCOs to examine CCT as an avenue to facilitate their market competitive edge, improve service delivery and increase internal processes efficacy.

While other studies have looked at the adoption of outsourcing of ICT services in the financial sector in Kenya, most have focused on banks and insurance companies and few on CCT in specific. This study intends to cover the above gap by examining internal and external factors that influence SACCO in adoption of cloud computing technology.

1.5 Purpose of the Study

The purpose of the study is to assess the Factors Influencing Adoption of Cloud
Computing Technology in Kenya's Deposit Taking Saccos. in Kenya,

1.6 Objectives of the Study

The specific objectives of the study are to:

i. Illustrate the influence of organizational factors that influence the adoption of cloud computing technology in deposit taking SACCOs in Kenya;
ii. Analyze the influence of external factors on adoption of cloud computing technology in deposit taking SACCOs in Kenya

1.7 Research Questions

The research questions for the study are:

1. What are the organizational factors that influence the adoption of cloud computing technology by Kenya's deposit taking SACCOs?
2. What are the external factors that influence the adoption of cloud computing technology by Kenya's deposit taking SACCOs?

1.8 Justification of the Study

Cloud computing is different from the other computing concepts (Si Xue, et al., 2016). It is imperative to provide scientific information that facilitates the various aspects, benefits and risk threats of cloud computing. This study analyzes from an organizational point of view the factors that need to be considered by a commercial firm specifically SACCOs when making the decision of using cloud computing. Looking at factors like: integration with existing IT infrastructure, costs implication, regulation and policy, management support, competitive returns, partnerships, risk and security among other indicators. Thus providing relevant findings for finance professionals, investors, policymaker and academics.

The study is also of value as it illustrates the correlation of these factors to the SACCO size in regard to asset base, skills and capacity building, tech readiness among others to allow manager execute successful decisions in regards to moving toward adoption of cloud computing solutions for their business.

1.9 Scope and limitations of the study

The study will investigate the prevalence of cloud computing in SACCOs in Kenya. The population of the study was the staff members of the 172 duly licensed deposit taking SACCOs, data collection was done through questionnaire forms emailed to the respondents via database made available to the researcher at SASRA. Email forms was chosen as it is convenient and allow the respondents, busy professionals at their place of work, time to fill in their responses at their convenience. The study will employ a descriptive, purposive sampling and analyzed using SPSS version 23.

The findings can therefore be generalized to all SACCOs in Kenya as the respondent will provide a cross-section of all levels and most administrative and operational departments predominant in such organizations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the literature on the factors influencing the adoption CCT technology in SACCO in Kenya as per the two study objectives. Further, the chapter will present a theoretical framework for the study and the conceptual framework.

2.2 Theoretical framework

This study was based on three major technology theories; Technology Organization Environment (TOE) theory, the Diffusion of Innovation theory and the Unified Theory of Acceptance and Use of Technology (UTAUT).

2.3 Technology Organization Environment (TOE) Theory

The TOE framework is an organization-level theory developed by Rocco DePietro, Edith Wiarda and Mitchell Fleischer (DePietro et al., 1990). It represents a segment of the innovation process regarding how a firm's context influences the adoption and implementation of innovations (Baker, 2011). Based on this framework, the technology innovation adoption process is influenced by three aspects of an enterprise's context, namely, Technological context, Organizational context and the Environmental context. These three contexts present both constraints and opportunities for technological innovation and adoption (DePietro, Wiarda, & Fleischer, 1990).

The TOE framework focus on organizational context in summary, it evaluates aspects like management and policymakers, size by assets of the organizations, and technological and financial readiness to examine and predict technology adoption patterns.

In the technological context the emphasis is on the internal and external technologies that are relevant to an organization in this case technologies may include both equipment as well as processes (Tornatzky and Fleisher 1990) and the features influencing adoption such as; relative advantage, relative ease of use, perceived barriers, complexity, perceived importance of compliance, compatibility, testability, perceived ease of use, and perceived risk (Oliveira et al., 2014). Lastly on the environment, the theory addresses external aspects that play a significant role in influencing technologies adoptions by firms such as; the industry characteristics and market structure, regulations for instance by government and technology infrastructure like the availability of reliable internet connectivity (DePierto et al., 1990)

TOE is appropriate for this study as it focuses on internal organizational, technological and external attributes like top management, size, and technological and financial readiness and others which in similar studies are found to be significant and positively influence adoption decision making, therefore is a reasonable theory to assess the adoption of CCT by SACCOs in Kenya

2.4 Diffusion of Innovation Theory.

The diffusion of innovation theory (DIT) was developed in 1962 by Rogers E. Mitchel as he sought to explain why and at what rate ideas and technology are accepted by a population or in a system. Moreover, the theory defined innovativeness as the degree to which an individual or other unit of a population receives, evaluates, adopts or rejects new ideas than other members giving rising to the Rogers S-shaped adoption curve; that categories innovation adopters as innovators, early adopters, early majority, late majority and laggards (Rogers, 1995).

Innovators refers to an individual or individuals willing to try an introduced technology, despite potential risks. Early adopters refer to a population that is influenced greatly in adoption decision by opinions, reviews about products and ideas (Dube & Gumbo, 2017). Late majority refers to a group that is critical of innovation and only adopt any technology once it has been proven by innovators and early adopters to have worked. They embrace the products after a broad population has been successful in the testing, and results (Ali & Miraz, 2016).

Finally, laggards never change with evolving innovation and are conservatives. This group requires statistics, research, change in numbers, growth and mass appeal for them to embrace technology (Nikou, 2012). This theory is useful in this study, as it illustrates how different individuals or organizations seek out, deploy or accept new technologies in their operations.

2.5 Unified Theory of Acceptance and Use of Technology.

Repeated below UTAUT is a theory developed by Venkatesh et al (2003) which aims to produce a unifying model of users' technology acceptance through review and comparison of other models (Alshamaileh, 2013; Venkatesh, Morris, Davis, & Davis, 2003). This model analyzes adoption at an individual level by using four constructs namely performance expectation, effort expectation, social influence and facilitating conditions.

In performance expectation UTAUT implies that adoption of a technology is hinged on the utility it delivers in regards to positively improving the overall job performance or results including and not limited to perceived usefulness, internal and external motivation, perceived advantage and desired outcomes (Interdisciplinary Journal of E-skills and Life Long Learning, Vol 14., 2018). The effort

expectation refers to simply to the ease of use of information technology meaning the effort required to acquire, deploy and implement the technology versus the reward. “The degree of ease associated with the use of the system” (Venkatesh et al., 2003). The social influence construct on the other hand assess refers to the perceived feeling of importance an individual or group get when others or peers believe they are using the new system. “The degree to which an individual perceives that important others believe he or she should use the new system” (Venkatesh et al., 2003). Lastly the facilitating conditions posits that adoption of a system is dependent on the presence or availability of organizational and technical infrastructure support for the new system.

The UTAUT theory is relevant to the study as it provides a scientific basis to explain adoption of technological innovations based on key metrics for organizations including performance, resource allocation, industry (social) perception and effort requirements. It is therefore useful in evaluating the influences of these factors on CCT adoption by SACCOs in Kenya.

2.6 Empirical Review of Literature on Cloud Computing Technology

This section presents an evaluation and summary of the existing body of empirical studies on cloud computing technology, with the aim of identifying patterns, trends, and consistencies in the data in regards to the technology specifically to DT-SACCOs.

Key in assessing the viability of an innovation is in its ability to identify global trends and to assess their relevance for development or deployment (Jonyo, 2018). This study analyzes organizational and external factors affecting the adoption of Cloud Computing in Deposit Taking SACCOs in Kenya. From this perspective technology that is deployed for instance cloud computing technology should be seen to be useful in increasing efficiency and productivity in an organization to its internal and external stakeholders.

From an organizational perspective, management support, technological innovation and readiness as well as capacity building are fundamental in the adoption of CCT by deposit taking SACCOs in Kenya. At a management level the adoption of cloud computing is to be viewed from the lens of enhancing productivity, competitiveness and improved customer experience. According to (Tolbert and Zucker, 1983) the purposeful vindication of a technological innovation is achieved by establishing it on a wider business agenda and in illustrating its relevance to prominent organizational needs.

Ma and Liu, (2022), posit that people take a long time to adopt to new technology as it will adversely disrupt their lives. People are not willing to embrace technology because of the effects, for instance at an organizational level staff members may feel that technology renders them jobless and they would rather use the conventional ways of doing work. Although not completely unfounded such uncertainty on technology can be adjusted positively through ICT skills training, and continual improvement of productivity lines.

On information technology training, (Forster, 2018) avers that staff capacity building enhances productivity and efficiency. By applying this approach proactively deposit taking SACCOs in Kenya would ensure less apprehension by stakeholders in embracing of the use of CCT at their respective organizations. For instance, in adopting CCT staff in various branches of a hypothetical DT SACCO would more effectively make use of the features of the technology, to collaborate in sharing documents virtually, securely and in real-time, hence reduces on time and costs that are incurred in the physical operations.

Further, in regard to external influences on the adoption of technology, (Davis, 1989), argues that perceived ease of use and perceived usefulness predict the acceptance of information technology. He further states that technology is accepted at different rates in society and any product launch or use goes through the different phases of acceptance. Cloud computing has been used in different sectors of service delivery to improve efficacy. In a study by (Obe, 2017) demonstrated that increased usage of an online automated vehicle queuing system had improved security levels, increased abilities of security and reliability of the identification systems, were important to the management and users of the system. The security features of the CCT reduced on redundancies thus making the processes of faster and with lesser complexity, and hence the system was widely adopted.

2.6.1 Cloud Computing Concept

Over the recent years the definition of cloud computing has also evolved in the attempt to clearly stipulate what cloud services comprises of. One of the most widely cited definition from the National Institute of Standards and Technology (NIST) defines cloud computing as

“a model for enabling very convenient, on-demand network access to a shared pool of configurable computing resources such as networks, servers, storage, applications, and services, which can be

rapidly provisioned and released with minimal management effort or service provider interaction" (Mell & Grance, 2011).

Cloud computing can therefore be explained as the provision and delivery of on-demand computing services (Lamba & Singh, 2011).

Cloud-based services are the services that are provided through cloud computing technology which individuals, businesses, governments or any other institutions can employ. These services include the various computing resources such as computing time or storage space and solutions that address particular problems such as software applications that are used for various operations. Following are characteristics that help identify cloud computing technology deployment.

2.6.2 Characteristics of Cloud Computing

Cloud computing has unique characteristics that makes it different from traditional computing. There are five essential characteristics that need to exist in an IT environment for it to be considered as a Cloud. These are; 1. On-demand self-service, 2. Broad network access, 3. Resource pooling, 4. Rapid elasticity and 5.Measured service (Mell & Grance, 2011; Erl, Mahmood, & Puttini, 2013).

On-demand self-service refers to an expectation that cloud computing should allow IT resources to be provisioned whenever needed by a consumer or user. Therefore, a consumer can provision computing capabilities which could include server time and network storage whenever needed and automatically without requiring human interaction with each service provider (Mell & Grance, 2011).

Broad network access indicates that cloud computing and the services provided should be widely accessible (Nedev, 2014). The cloud computing services are made available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms, for example, mobile phones, tablets, laptops, and workstations (Mell & Grance, 2011).

Resource pooling generally means that cloud computing consumers share computing environments in a multi-tenant model. The Cloud provider's computing resources are pooled to serve multiple consumers using the multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand (Mell & Grance, 2011). Users may also not generally know the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter), hence location independence. Examples of resources include storage, processing, memory, and network bandwidth (Mell & Grance, 2011).

Rapid elasticity refers to the ability of a cloud to balance the available IT resources, depending on the runtime conditions or as agreed by the cloud consumer and provider (Erl, Mahmood, & Puttini, 2013). The computing resources can be provisioned and released, in some cases automatically, to scale rapidly outward and inward in response to the demand (Mell & Grance, 2011). To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time.

Measured service refers to the ability of the cloud platform to measure the usage of the IT resources that have been used by a consumer (Nedev, 2014). Cloud systems automatically control and optimize resource use by leveraging a metering capability, which could be on pay-per-use or charge-per-use basis (Mell & Grance, 2011). This is normally at some level of abstraction appropriate to the type of service. Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service (Erl, Mahmood, & Puttini, 2013).

These characteristics have therefore been widely adopted to help explain cloud computing and how it differs from traditional computing. Over time, various service delivery models have also been defined which help explain which services are available on cloud computing and how they are delivered to the consumers.

2.6.3 Cloud Computing Service Delivery Models

NIST defined three main categories of service models of cloud computing. These are; Platform as a Service (PaaS), Infrastructure as a Service (IaaS) or even Software as a Service (SaaS) (NIST, 2009; Kamra, Sonawane, & Alappanavar, 2012; Erl, Mahmood, & Puttini, 2013). These have been widely used and accepted as the main categories of Cloud-based Service models. The three main categories of cloud computing can be defined as:

Platform as a Service (PaaS) - PaaS provides a computing environment for the development and deployment of applications over the internet without a need of buying the hardware and software, configuring it for the same purpose (Kamra, Sonawane, & Alappanavar, 2012). A developer can build an application in this environment, test it and deliver it.

For example: Google app engine, Africa's Talking platform as a service. Google app engine allows developers to develop and host their applications on Google's cloud. Africa's Talking is a Kenyan based ICT company that provides communication-based platforms for mobile based applications which developers can build applications on such as SMS based (Short Message Service) applications.

Infrastructure as a Service (IaaS) - IaaS provides cloud service providers provide physical or virtualized hardware in the form of storage, servers, network, firewalls and load balancers (Barnatt,

2010). This is very useful for small scale businesses as they cannot afford to buy such costlier hardware components (Kamra, Sonawane, & Alappanavar, 2012). For example: Amazon Elastic cloud (EC2), Node Africa. Amazon also provides server instances to users for hosting their applications. Node Africa is a company that is headquartered in Nairobi, Kenya that provides Infrastructure as a Service to customers across Africa and the entire world.

Software as a Service (SaaS) - SaaS is the delivery of software over the internet as a service (Barnatt, 2010). Using this service, a user does not require to install any application related to the software on his/her computing device, rather he/she uses it on the cloud (Kamra, Sonawane, & Alappanavar, 2012). The user can access this service anywhere and anytime over any computing device. Simply, SaaS allows users to run existing online applications.

For example: Microsoft Office365. Microsoft Office365 provides online document creation and formatting on the cloud. These resemble the traditional Microsoft Word, Excel and Power Point, however, they are accessed over the internet. Uhasibu is an accounting service in Kenya providing accounting services through a SaaS model.

Although the three classifications of cloud computing have been widely accepted as the standard, apart from PaaS, SaaS and IaaS, new classifications have come up including Testing as a Service, Security as a Service, Management as a Service, Process as a Service, Database as a Service, Storage as a Service and so forth (Čandrlić, 2013). All these were all originally considered within the primary categories of PaaS, IaaS and SaaS and this study will therefore only focus on the primary categories and where necessary discuss these secondary classifications.

Software as a Service is the main Cloud-based Service consumed by businesses, and more so, by SACCOs (Rosa, 2015). Since SaaS applications are delivered directly over the internet as a service, generally without need of installing nor maintaining any software, the user simply accesses it through the internet, thereby freeing him/herself from the complex hardware and software management (Sultan, 2010). SaaS offers the entire 10 application functionality which ranges from basic productivity-based applications e.g. word processors to applications such as those for enterprise resource planning (ERP) and customer relationship management (CRM). These applications form part of daily Sacco needs from basic productivity to specialized needs such as accounting and customer management.

A consumer of cloud computing can access the services through different deployment models.

2.7 Cloud Computing Deployment Models

There are various approaches to deployment of cloud-based services. Deployment models for cloud can either be Community cloud, Private cloud, Public cloud or Hybrid cloud (Mell & Grance, 2011). A private cloud service is provisioned for exclusive use by a single organization and can be accessed only by an organization's employees (Rittinghouse & Ransome, 2011). It is usually owned and run by the organization, although it could also be internally provided by a third-party supplier or externally provided by a third-party supplier as an IT outsourcing service.

A community cloud is a private cloud for shared use by multiple organizations and can be accessed by their employees and the trusted employees of other organizations (Rittinghouse & Ransome, 2011). The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns such as mission, security requirements, policy, and compliance considerations (Mell & Grance, 2011). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.

A public cloud is one that can be accessed be anyone (Rittinghouse & Ransome, 2011). This cloud infrastructure is open for use by the general public. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them (Mell & Grance, 2011). It exists fully on the premises of the cloud provider.

Hybrid cloud is where more than one deployment model is used, more commonly a blend of the private and public cloud (Rittinghouse & Ransome, 2011).

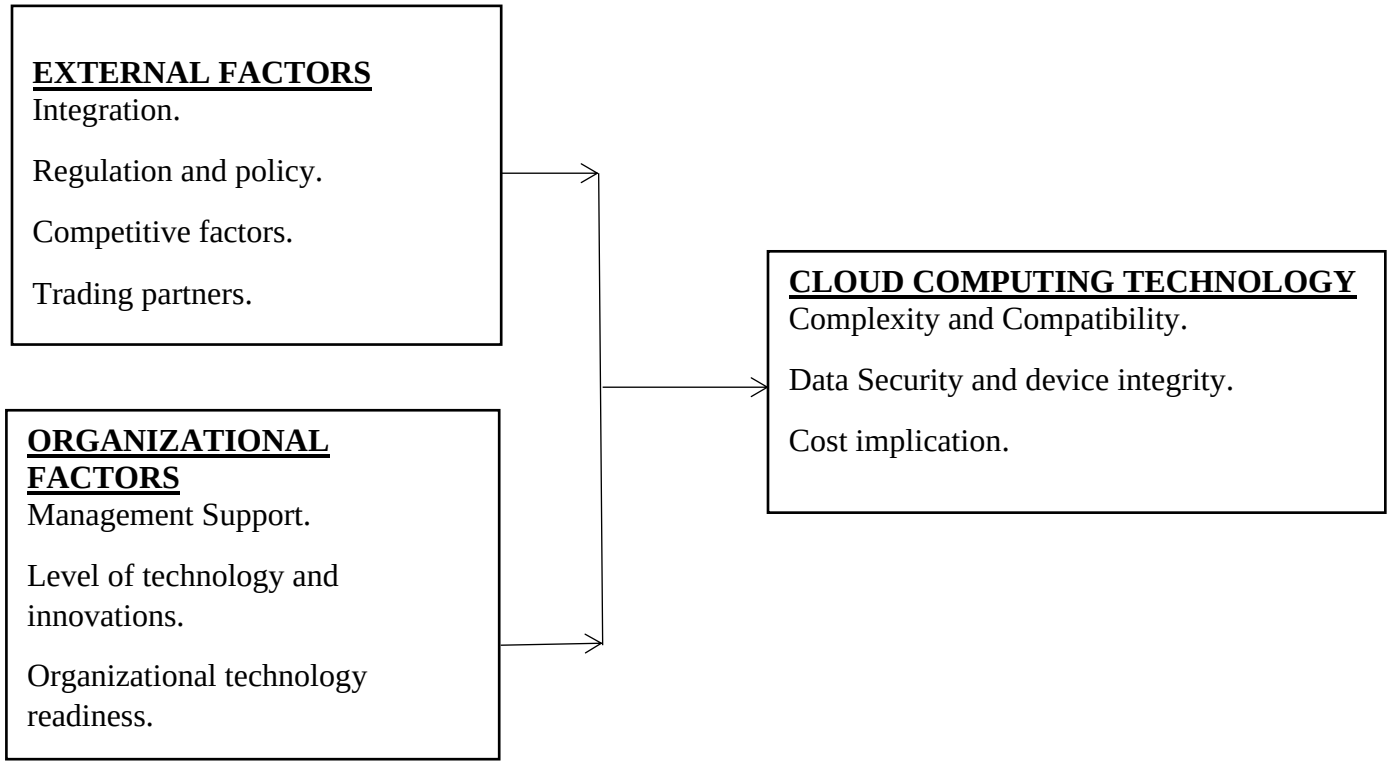
2.8 Cloud Computing Pricing Models

The initial setup costs of cloud-based solutions is relatively low since most cloud-based services providers rely on having large numbers of users, hence only charging for usage or consumption. Pricing of the cloud-based services can be based on per user model especially for Software as a Service solutions or based on usage of computing resources such as for Platform and Infrastructure as a Service solution. Also, different deployment models generally have different pricing models. Pricing can be categorized into Static Pricing or Dynamic Pricing (Kamra, Sonawane, & Alappanavar, 2012). In Static pricing, the cost per period of time is known and does not change even if there's more or less usage of the service. For example, use of a service such as Microsoft Office365 attracts a monthly or annual charge which is static and does not change based on usage of the service. Dynamic pricing on the other hand considers usage, whereas there is a fixed charge, the user attracts an extra cost for using the software. For example, use of a service such as Amazon Elastic cloud

(EC2) has a fixed charge which is paid irrespective of any usage and an extra charge based on per hourly rate of use of the service. Therefore, the more servers deployed that consume compute, bandwidth and memory resources would result in higher cost than when there's low use. The various pricing schemes for cloud computing and subsequently the cloud-based services mean that cloud computing can serve a wide range of consumers. This leads to the various benefits and drivers of cloud computing technology

2.9 Conceptual framework

The conceptual framework is a graphic representation of the major variables connected by lines and arrows to show relationships and interactions (Adom, Hussein, and Agyem, 2018). In this study, the conceptual framework illustrates the interaction variables in regards to the assessment of factors influencing the adoption of Cloud Computing Technologies by SACCOs in Kenya.



CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the study design to be used, the research variables, population. data sampling and collection and analysis procedures and ethical considerations.

3.2 Research Design

The study adopted a quantitative method in the research design, which entails the descriptive and correlational designs. The descriptive research design provides an empirical account of characteristics of an event or real-life situation (Kothari, 2014). This design was key in determining the factors influencing the uptake of CCT by the subject of the research.

The study will further apply correlation research design to allow the researcher assess the relationship between two or more of the variable, without manipulation of the variables (Mugenda & Mugenda, 2012). This design was useful in determining the relationship between the external and internal factors in influencing adoption of CCT by the deposit taking SACCOs in Kenya. The study is not experimental therefore there was no manipulation of variables to determine the effects of the dependents on non-dependent variable of the study.

3.3 Target population

The target population for the study are the 172 fully and duly licensed deposit taking SACCOs as listed by the regulator SASRA as at December 2021.

3.4 Sampling Technique

The researcher will employ a non-probability sampling technique, more specifically purposive sampling technique. The method will allow the researcher to target the respondents, who are the ICT department's employees of the DT SACCOs (Creswell, 2013). It will also facilitate the research to focus on hypothesis testing that the study aims to determine and also manage expenses in view of the large number of SACCOs dispersed over a large geographical area. The research however notes that the technique has not lend itself well to generalization or selection of sampling frames in regard to occupational or demographic markers.

3.5 Data Collection Instruments

Quantitative data was collected using an online questionnaire issued to respondents. This is because in research on adoption of innovation, quantitative approaches founded on questionnaire-based surveys are the most prevalent methodologies (Kumar, 2017).

3.5 Types of Data

The study sought to collect quantitative data from the questionnaire. The data was coded to be organized in nominal form to ensure it answers the study objectives. This also means that the synthesized data was original for this study and the population choice, and has not been modified or used for a secondary purpose (van Zittert, 2014)

3.6 Data Analysis Plan

The research generated quantitative data which was coded before being statistically analyzed. Analysis of the data was aided by SPSS. Descriptive statistics was analyzed using frequencies, percentages, standard deviations and presented using tables, graphs and charts.

3.7 Ethical Considerations

Ethical principles were considered prior to conducting the primary research and the appropriate actions taken. The research instruments were submitted to faculty for review prior to being administered. Anonymity and privacy of all respondents was respected and no personal information of the participants was shared.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the analysis of findings that include response rate, demographics, and the analysis of descriptive statistics on the specific objectives. Also, the regression analysis is based on Factors Influencing Adoption of Cloud Computing Technology in Deposit Taking SACCOs.

4.2 Response rate

Response rate according to Morton, Bandara, Robinson and Atatoa (2012) indicates that the percentage of respondents should be 60% or higher for a research validity. The study targeted 172 respondents but only 103 respondents were obtained representing 63.5% which was adequate for the study.

Table 1: *Response Rate*

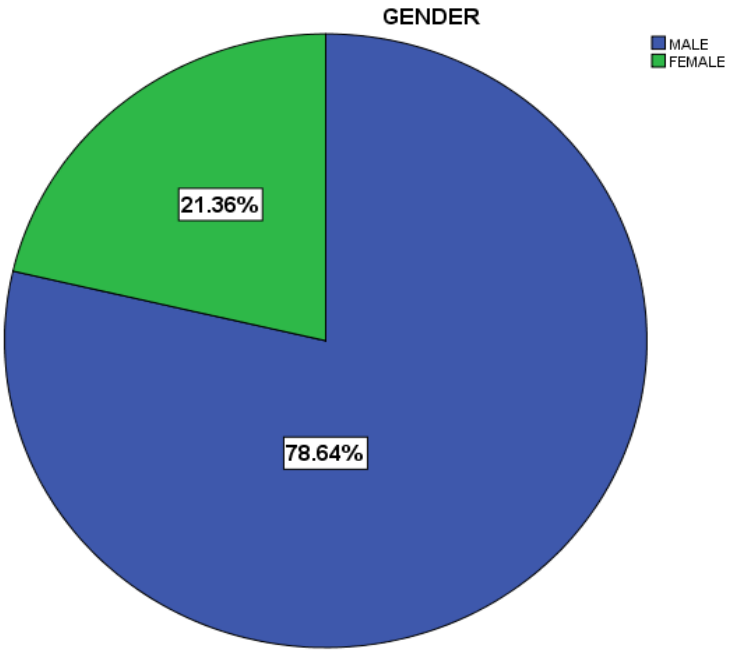
Response	Filled	Not filled	Total
Rate	103	69	172
Percentage	63.6	36.4	100

4.3 Demographic Characteristics

Gender

The study assessed the types of gender and the data was presented in the table/graph the study established the males represented and the females represented

Figure 1: Gender of respondents



4.3.1 Age of respondents

The study assessed the ages of respondents as depicted in the table.

Table 2: Age of respondents

Age in years	24-29	30-34	35-39	40-44	45-49	50-54	55-59	ABOVE 60	Total
Frequency	7	9	42	8	20	4	5	8	103
Percentage	6.8	8.7	40.8	7.8	19.4	3.9	4.9	7.8	100.0

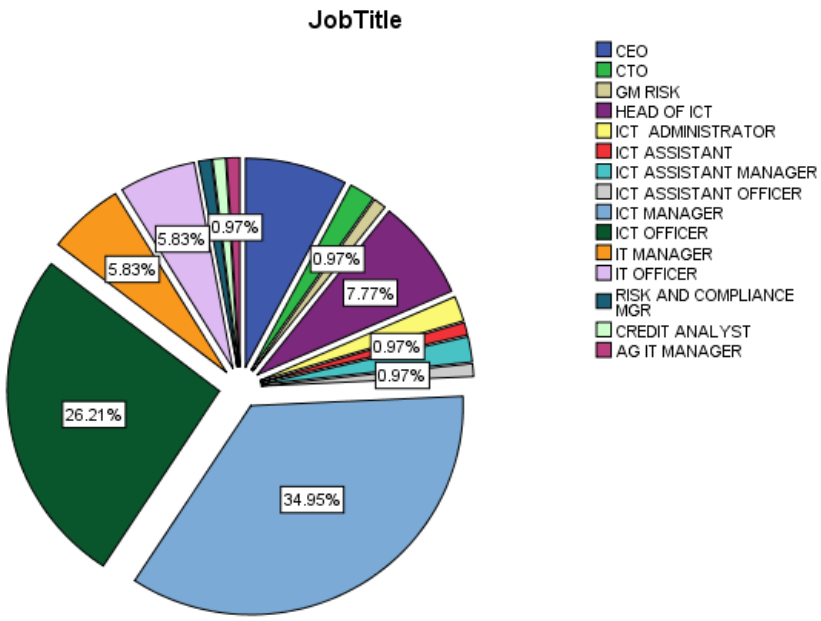
The data showed ages 35-39 represented 40.8%, 45-49 was 19.4%,30-434 was was 8.7%, 40-44 was 7.8%, above 60 was 7.8%, 24-29 was 6.8%, 55-59 was 4.9% and 50-54 was 3.9%. This indicated

that there was a mixed population that involved both the young and old across the different age categories.

4.3.2 Job Title

The study assessed the job titles of the different respondents represented in the chart below

Figure 2: Job levels of the respondents

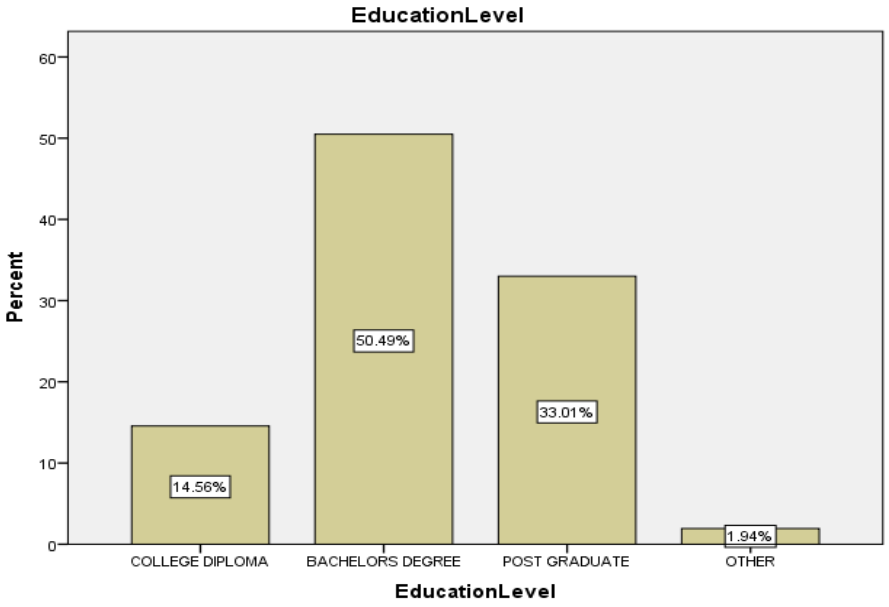


The study established that majority of job holders were ICT managers followed by ICT officers, who represented the majority of respondents.

4.3.3 Education level

The study established the education level of respondents represented in the graph below

Figure 3: Education level of respondents



The study established that most of the respondents had a formal of college education level, an indication of a skilled workforce

4.4 Categories of SACCOs

The study assessed the different categories of SACCOs from the responses shown in the table below

Table 3: Categories of Deposit Taking SACCOS

Category	Frequency	Percent
Government Based	20	19.4
Teacher Based	25	24.3
Community Based	21	20.4
Farmer Based	15	14.6
Private Sector	18	17.5
Other	4	3.9
Total	103	100.0

The study established teacher-based Sacco's were 24.3%, Community based Sacco's 20.4%, government Sacco's 19.4%, private sector 17.5%, farmer based 14.6% and other Sacco's accounted 3.9%.

4.5 Size of SACCO

The study assessed the Sacco's based on their total assets in their portfolio indicated in the chart below

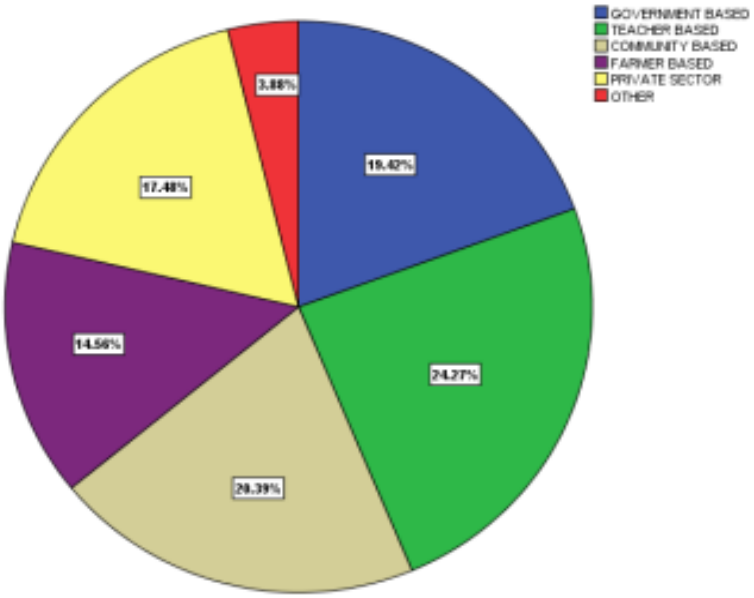


Figure 4: Size of Sacco based on Total Assets

The study established the size of Sacco's accounting for between 1B-$b was 32%.100M-1B 30.1%,4B-8B 24.3% Above 8B 11.7% and others 1.9%

4.6 Research Analysis and Findings

4.6.1 External Factors

The first objective was to analyze the influence of external factors on adoption of CCT by deposit taking SACCOs in Kenya.

The responses were analyzed in a Likert scale through various analysis that included charts, graphs, percentages the responses were indicated using the following format (1- Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 – Strongly Agree). The responses were analyzed in table 3 below.

The findings showed that respondents strongly agreed that integration contributed to cloud computing technology having (mean = 4.0097; Std deviation = 1.59346). Respondents strongly agreed that cloud computing technology improved trading partners, systems compatibility and collaborations (mean = 4.3204.; Std deviation = 1.13943). There was also a strongly agreed position that the regulation framework affects implementation of cloud computing technology (mean = 3.6214.; Std deviation = 1.70418). Lastly there was an agreed position that improved systems give an organization an edge over its competitors (mean = 4.0097.; Std deviation = 1.24849). The mean of weighted means was 4.0103 and the mean of standard deviations was 1.42139.

Table 4: Analysis of findings of external factors influencing adoption of Cloud Computing Technologies in SACCOs

Statement	**1 SD%**	**2 D%**	**3 N%**	**4 A%**	**5 SA%**	**Mean**	**Std. Deviation**
Does Integration of various organization systems affect its performance?	17.5	5.8	2.9	5.8	68	4.0097	1.59346
Does the Regulation and policy framework affect implementation of cloud computing technology?	19.4	16.5	3.9	2.9	57.3	3.6214	1.70418
Does improved system capabilities give an organization a competitive edge?	8.7	7.8	1.0	38.8	43.7	4.0097	1.24849
Does cloud computing technology improve trading partners systems compatibility and collaborations?	5.8	3.9	6.8	19.4	64.1	4.3204	1.13943
Mean of weighted means.						4.0103	1.42139

4.6.2 Organizational Factors

The second objective was to analyze the influence of organizational factors on adoption of CCT by deposit taking SACCOs in Kenya.

The responses were analyzed in a likert scale through various analysis that included charts, graphs, percentages the responses were indicated using the following format (1- Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 – Strongly Agree).

The respondents strongly agreed that organizations have adequate skilled personnel to facilitate capacity building (mean = 4.5922.; Std deviation = 0.99446). There was also a strongly agreed position that management plays a key role in adapting to new systems (mean = 4.4660.; Std deviation = 0.91625). Respondents strongly agreed that there has been changes in the level of technology and innovation within the organization (mean = 4.4272.; Std deviation = 0.91625). Finally there was a strong agreement that organizations are ready and have adapted to the new technology models present. The mean of weighted means was 4.46115 and the mean of standard deviations was 0.91322.

Table 5: Analysis of findings of external factors influencing adoption of Cloud Computing Technologies in SACCOs

Statement	**1 SD%**	**2 D%**	**3 N%**	**4 A%**	**5 SA%**	**Mean**	**Std. Deviation**
Does management play a role in adopting to new system?	3.9	1.0	3.0	29	63.0	4.4660	0.91625
Has there been changes in the Level of technology and innovations within the organization?	1.9	2.9	2.9	35	57.3	4.4272	0.84716
Are organizations ready and have they adopted to the new Technology models present?	2.9	1.9	4.9	36.9	53.4	4.3592	0.89502
Does the organization have adequate skilled personnel and facilitate capacity building?	3.9	3.9	1.9	9.7	80.6	4.5922	0.99446
Mean of weighted means.						4.46115	0.91322

4.6.3 Cloud Computing Technology

Regarding cloud computing technology, the responses were analyzed in a Likert scale through various analysis that included charts, graphs, percentages the responses were indicated using the following format (1- Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 – Strongly Agree). In regards to cloud computing technology, respondents strongly agreed that data security and device integrity is essential to cloud computing technology (mean = 4.4078.; Std deviation = 1.07955). Furthermore, there was a strongly agreed position that system complexity and compatibility hinders cloud computing technology (mean = 4.4660; Std deviation = 0.10981). Finally there was a strongly agreed opinion that cost is a major consideration in cloud computing technology (mean = 4.4466; Std deviation = 0.96739). The mean of weighted means was 4.4013 and the mean of weighted standard deviations was 0.71891.

Table 6: Analysis of findings of adoption of Cloud Computing Technologies

Statement	**1 SD%**	**2 D%**	**3 N%**	**4 A%**	**5 SA%**	**Mean**	**Std. Deviation**
Does system Complexity and compatibility hinder cloud computing technology?	4.9	1.9	1.9	16.5	74.8	4.4660	0.10981
Is data security and device integrity essential to cloud computing technology?	1.9	9.7	4.9	12.6	70.9	4.4078	1.07955
Is cost a major consideration in cloud computing technology	2.9	4.9	1.9	25.3	65.0	4.4466	0.96739
Mean of weighted means?						4.4013	0.71891

4.7 Regression Model.

Table 7: Regression model for organizational and external variable against CCT

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
				R Square Change	F Change	Sig. F Change
.838[a]	.703	.671	.61949	.703	21.775	.000

Table 7 indicates the regression model of the main two variables independent against the dependent variable, cloud computing technology.

The model indicated the study was able to explain 70.3% of the adoption in cloud computing technology. This indicates that 29.7% of the study carried out could be explained by other different models that have not been presented in the study.

Results in table 8 are representative of the ANOVA model representing the significance of model the df and sum of squares.

Table 8: Significance modeling of dependent variables

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	83.567	10	8.357	21.775	.000[b]
Residual	35.307	92	.384		
Total	118.874	102			

The F statistic is significant in predicting the dependent variable this is indicated by the P<0.00 value which is less than the significant level of P<0.05, therefore the model is a fit in predicting the dependent variables form the two main variables in the study model.

Table 9: Coefficient significance of independent Variables

	Unstandardized Coefficients		Standardized Coefficients		
Variables	B	Std. Error	Beta	t	Sig.
(Constant)	2.717	.697		3.899	.000
External Factors	3.511	.342	0.627	10.267	.000
Organizational Factors	4.986	.616	0.135	8.094	.000

Table 8 depicts that external factors had a significant effect in predicting the adoption of cloud computing technology ($\beta = 3.511$; $p = 0.000$), this is indicative that for every one unit change in external factors there is a change in cloud computing technology by 3.511.

Results also indicate organizational factors had a significant effect in predicting the adoption of cloud computing technology ($\beta = 4.9861$; $p = 0.000$), this is indicative that for every one unit change in organizational factors there is a change in cloud computing technology by 4.9861

In determining the standard coefficients results indicated that external factors was the most critical (standardized $\beta = 0.627$) followed by organization factors (standardized $\beta = 0.135$).

The regression model obtained when regressing the variables is of the form

$CTA(y) = \beta 0 + \beta 1EF + \beta 2OF$

$CTA = 2.717 + 3.511 + 4.986$

Y = dependent variable, $\beta 0$ are unknown, $\beta 1$=Slope of the regression line

Where CTA= Cloud Computing Technology, EF= External Factors, OF= Organizational Factors

4.8 Collinearity Diagnostics.

Results in table 9 indicate the tolerance and the value inflation factors of the variables in the study. Tolerance is the level of variability in one independent variable that is explained by other independent variables. VIF indicate the level of Multicollinearity of a set of variables in a study this shows that items are highly correlated. The table indicates VIF <10 which is acceptable in a study, all the items are below 10 from the results in the table indicative that variables are not correlated.

Table 10: Analysis indicating prioritized list of factors

Coefficients		
	Tolerance	VIF
Integration	.235	4.247
Regulation	.325	3.074
Competitive	.166	6.028
Trading	.253	3.954
Management	.247	4.042
Innovation	.483	2.069
Readiness	.685	1.460
Skills	.595	1.681

4.9 Descriptive statistics

Skewness measures the symmetry of the distribution of items in a data set, while kurtosis determines the heaviness of the distribution tails in the data set. Results from the study table 10 indicate values in the distribution.

Table 11: Statistics data of factors influencing adoption of CCT by the SACCOs

Descriptive Statistics

	N	Minimum	Maximum	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Integration	103	1.00	5.00	1.59346	-1.173	.238	-.437	.472
Regulation	103	1.00	5.00	1.70418	-.563	.238	-1.518	.472
Competitive	103	1.00	5.00	1.24849	-1.375	.238	.818	.472
Trading	103	1.00	5.00	1.13943	-1.796	.238	2.343	.472
Management	103	1.00	5.00	.91625	-2.393	.238	6.275	.472
Innovation	103	1.00	5.00	.84716	-2.037	.238	4.985	.472
Readiness	103	1.00	5.00	.89502	-1.950	.238	4.541	.472
Skills	103	1.00	5.00	.99446	-2.639	.238	6.085	.472
Complexity	103	1.00	5.00	1.10981	-2.326	.238	4.452	.472
Security	103	1.00	5.00	1.07955	-1.736	.238	1.769	.472
Cost	103	1.00	5.00	.96739	-2.132	.238	4.254	.472
Valid N (listwise)	103							

Results from the table in statistic skewness and statistic Kurtosis indicates the results range from (-7 and +7) based on the sample size of 103. This indicates there is a normal distribution of the items in the study.

CHAPTER 5

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS.

4.1 Introduction.

The purpose of this chapter is to summarize the major findings of this study and to draw conclusions based on the same results. It also provides recommendations for successful adoption and implementation of cloud computing DT SACCOs. The chapter includes the summary and discussions.

4.2 Summary of the study findings.

The purpose of this study was to analyze the effects of cloud computing on strategic planning by using

1. What are the organizational factors that influence the adoption of cloud computing technology by Kenya's deposit taking SACCOs?
2. What are the external factors that influence the adoption of cloud computing technology by Kenya's deposit taking SACCOs?

DT SACCOs in Kenya as a case study The study sought to answer two research questions which were;

The researcher conducted a literature review based on the study research questions from published articles and available material from internet sources. The researcher adopted a case study approach as the appropriate research design. The study sampled staff from the top-management, mid-level management and staff from departments in the DT SACCOs in Kenya company. The study had a sample of 172 respondents and the researcher was able to acquire 103 complete questionnaires for the data analysis process. The data collected was captured through the Microsoft Excel software and subjected to SPSS for further analysis. The study conducted descriptive statistics which summarized the data into percentages and frequencies presented in tables and pie charts.

4.3 Key Findings.

The study found that there was adoption of cloud computing in the organizations, DT SACCOs are member owned institutions that provides financial services to their members. However, the adoption of cloud computing has been gradual albeit hesitant. These findings are consistent with Kiiru (2011) study on cloud computing in Kenyan financial institutions who found that majority of the respondents

had computerized their services and work which was a precondition for adopting cloud computing. Lin and Tan (2012) findings shows that most adopters are in the media, information and communication industry with 75 % (9 out of 12 organizations) as well as others players such as private sector firms with 59 % (10 out of 17 organizations). It appears that those organizations in the construction, engineering, real estate and leasing services have not adopted cloud computing services yet. Their findings also showed that there is no significant difference between adopter and non-adopters in the private sectors and sole proprietorship or family-owned business, although there are more adopters (63 %) versus non-adopters (37 %) in the public listed organizations.

4.4 Discussions.

4.4.1 Influence of Technological Factors on Adoption of Cloud Computing.

The most significant factor among the technological factors was perceived usefulness with a beta coefficient of 0.451; complexity of the system with a beta coefficient of 0.132 and the least predictor was compatibility with a beta coefficient of 0.067. Similarly, the correlation analysis showed that perceived usefulness was positively related to adoption of cloud computing with r = .274 which was followed by compatibility (r =.176) and complexity (r = .088). Perceived usefulness was identified by Davis et al. (1986), in their Technology Acceptance Model (TAM). According to the objective of technological factors the TOE framework states that an organization is likely to adopt a technology as they perceive how useful it will be to their operations. Perceived usefulness has been widely studied and applied as a critical factor associated with the adoption of technology in information systems research. Technological context refers to internal and external technologies applicable to the firm (Kuan & Chow, 2000). According to Rogers (2003), adopting an innovation is affected by its perceived characteristics, including relative advantage, compatibility, complexity and trial-ability. Of these, relative advantage of the technology has been consistently identified as one of the most critical adoption factors (Iacovou et al., 1995; Kuan & Chau, 2001). These findings support Buyya et al. (2009) whom argue that firms may not have confidence in a cloud computing system because it is relatively new concept to them. Similarly, findings agree with Premkumar et al. (1994) agreeing that complexity of an innovation can act as a barrier to implementation of new technology; complexity factor is usually negatively affected. According to Armbrust et al. (2010) many IT services can be commoditized and include e-mail, archiving and storage of documents. According to Lin and Tan (2012) when perceived benefit is high, there are higher chances that the organization will allocate more managerial, financial and technological resources to implement the technological system.

4.4.2 Influence of Organizational Factors on Adoption of Cloud Computing.

Organizational context includes several indexes regarding institution size and scope, centralization, formalization, and complexity of managerial structure and quality of human resources (Kuan & Chow, 2000). Prior research finds that larger businesses are often more well-equipped with resources and infrastructure to facilitate innovation adoption, while small firms might suffer from resource poverty (Thong, 1999). In Iacovou et al. (1995) study on adoption of IT in small firms, found cost of investment and lack of IT expertise are two major concerns among organizational members. Among the organizational factors influencing cloud computing, adoption was change attitude with a beta coefficient of 0.285; top-management buy-in with a beta coefficient of 0.255 and the least contributing was skills of the staff with a beta coefficient of 0.170. The correlation analysis at 95 % confidence level showed that there was a positive relationship between skills and adoption of cloud computing with a value of r = .112, followed by top management buy-in r = -091 and change attitude with a value of r =-.046. Top management was found to be also significant in determining cloud computing adoption. Lin and Tan (2012) report that companies of different sizes, locations, and industries embrace cloud as a way to reduce complexity and costs associated with traditional IT approaches. 72 percent of executives in the IBM survey indicated their companies had piloted, adopted or substantially implemented cloud and 90 percent would adopt cloud computing in the next three year (Berman et al., 2011). The findings show that the most significant organizational factor influencing adoption of cloud computing systems in DT SACCOs in Kenya was skills, followed by change attitude and the least contributing factor was top management buy-in. The findings agree with previous research (Kuan & Chau, 2001; Oliveira & Martins, 2010; Pan & Jang, 2008; Wang et al., 2010; Zhu et al., 2006) that the technological readiness of organizations, meaning technological infrastructure and IT human resources, influences the adoption of new technology. Similarly, findings support Wang et al. (2010), view of IT human resources as providing the knowledge and skills to implement cloud-computing-related IT applications.

4.4.3 Influence of Environmental Factors on Adoption of Cloud Computing.

Environmental context refers to a institution's industry, competitors and government policies (Kuan & Chau, 2000). Organizations operate their businesses within an environmental context which brings them opportunities and constraints. Although the external environment can provide an organization with information, resources and technology, it has regulations and restrictions on the flow of capital and information (Damanpour & Schneider, 2006). The multiple regression analysis shows that among the environmental factors, the regression analysis shows that competition was the most significant with a f beta coefficient of 0.395, followed by competition with a beta coefficient of 0.169; trends with a beta coefficient of 0.142 and the least contributing factor was found to be industry with a beta coefficient of 0.1742 at 95 % confidence level, the correlation analysis revealed that there was a positive and strong relationship between competition and adoption of cloud computing with a value of r = .534, trends r = .506 and the industry at r = .180. This implies that the trends of using information technology in organizations drives or motivates them to adopt cloud computing systems so as to gain competitive advantage and to remain relevant in the sector that they are involved in. similarly, competition was found to influence adoption of cloud computing in organizations. Researchers (Kuan & Chau, 2001; Zhu et al., 2004) suggest that the experience of intense competition is an important determinant of IT adoption. Study findings indicate that however although there is competition between financial institutions; the slow adoption of cloud computing in the sector does not significantly influence adoption of cloud computing systems at DT SACCOs in Kenya. These findings are consistent to Banerjee (2009) pointing out cloud computing has been discussed as a new technology that can provide several advantages, both strategic and operational, to its adopters. However, the cloud computing adoption rate is not growing as fast as expected. Kiiru (2011) reports that by 2010 there were no financial institutions that were using cloud computing.

4.5 Conclusion.

4.5.1 Influence of Technological Factors on Adoption of Cloud Computing.

The study concludes that technological factors were the most significant factors influencing adoption of cloud computing in DT SACCOs in Kenya. This was attributed to the perceived usefulness of cloud computing to the organization. Perceived usefulness is a significant factor towards adoption of information technology according to the Technology Acceptance Model developed by Davis et al.

(1986). This shows that an organization is more likely to adopt an information technology based on the benefits that it can provide for its staff and overall performance of the organization.

4.5.2 Influence of Organizational Factors on Adoption of Cloud Computing.

The study concludes that the change attitude of the organizations is the most predominant factor for cloud computing adoption. This shows that the attitude of the top management of the organizations towards new technologies such as cloud computing will determine the direction which the organizations will take in terms of adoption. The top executives can act as champions of technology to enable other staff and employees in adopting the innovation. However, the study found that the skills of the staff is the most dominant factor. This is because organizations work through their employees who are also assumed to be using the cloud computing technology in their day to day duties.

4.5.3 Influence of Environmental Factors on Adoption of Cloud Computing.

In regard to the environmental factors, the study concludes that competition is the most significant contributor to adoption of cloud computing in the organizations. Adoption of new technology is associated with gaining a competitive advantage in their market share and as such competition in the insurance sector prompt organizations such as SACCOs to adopt cloud computing. The study concludes that technological factors are the most dominant factors in our model to influence adoption of cloud computing. This is attributed to the technological capability of the organizations would influence their ability to consider adoption of cloud computing. These requirements would include both software and hardware. The results showed that organizational factors also contribute to adoption of cloud computing whereas environmental factors were the least contributing factor to the adoption of cloud computing in the organizations.

4.6 Recommendations.

4.6.1 Recommendations for Improvement.

Based on the study findings the researcher gives the following recommendations;
First, the researcher recommends that top management should invest in information technology that will work towards the benefit of their organization.

Second, the researcher recommends for top management adoption of cloud computing systems will enhance adoption of the system in the organization

And third, the researcher recommends for industry research on cloud computing adoption which will enhance contribute to knowledge and awareness on cloud computing systems.

4.6.2 Recommendations for Further Studies.

Firstly, the researcher recommends for further research on the adoption of cloud computing among small and medium enterprise (SMEs). Small and medium enterprise lay a critical role in the economy of a country and would therefore benefit from the advantages of using cloud computing in costs reduction. The researcher therefore recommends for academicians to explore or investigate the extent to which Kenyan SMES are ready to adopt cloud computing.

Secondly, the researcher recommends further studies on the challenges facing organizations adopting cloud computing. The most significant risk for the study in terms of cloud computing was found to be the confidentiality of information from internal and external users. There needs to be research on the challenges and issue of cloud computing in Kenyan organizations.

REFERENCES.

Airehrour, D., & Nair,N,V. & Madanian, S. (2018).

Social Engineering Attacks and Countermeasures in the New Zealand Banking System:

Advancing a User-Reflective Mitigation Model. May 2018 Information (Switzerland) 9(5):110

Abdulrahim, N. (2019).

Managing Cybersecurity as a Business Risk in Information Technology-based SMEs (Doctoral dissertation, University of Nairobi).

Abdullah, M. S., Toycan, M., & Anwar, K. (2017). The cost readiness of implementing e-learning. Custos E Agronegocio on Line, 13(2), 156-175.

Amos W. Wambugu. *Adoption of cloud-based services by SACCOs in developing countries: development of a T-O-E based model. USIU 2018.*

Bandara, I.; Ioras, F. and Maher, K. (2014). Cyber Security Concerns in E-Learning Education. In: Proceedings of ICERI2014 Conference, IATED, 0728-0734

Bazimaziki, G. (2020). Challenges in using ICT Gadgets to cope with effects of COVID-19 on Education: A short survey of online teaching Literature in English. Journal of Humanities and Education Development (JHED), 2(4), 299-307.

Byrne, B. M. (2010). Structural Equation Modeling with Amos: Basic Concepts, Applications, and Programming (2nd ed.). New York: Taylor and Francis Group.

Bandara, I., Ioras, F., & Maher, K. (2014). Cyber security concerns in e-learning education.

Baillette, P., & Barlette, Y. (2018). BYOD-related innovations and organizational change for entrepreneurs and their employees in SMEs. *Journal of Organizational Change Management*.

Chairoel, L., & Widyarto, S., & Pujani, V. (2015). ICT adoption in affecting organizational performance among Indonesian SMEs. *The International Technology Management Review Vol. 5* (2015)(No. 2):82-93

Chitrey A., Singh D., Bag M. and Singh V. A Comprehensive Study of Social Engineering Based Attacks in India to Develop a Conceptual Model. International Journal of Information & Network Security (IJINS), 1(2), (2012).

Davis, F.D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance. MIS Quarterly, 13(3), 319- 340

Dickson Adom, Emad Kamil Hussein, Joe Adu Agyem. *Theoretical and conceptual framework: mandatory ingredients of a quality research, International Journal of Scientific Research.* Volume-7 | Issue-1 | January-2018.

Fakeeh, K. A., & Ph, D. (2015). The Realization of Cloud ERP Systems in Higher Education. *International Journal of Applied Information Systems (IJAIS)*, *9*(5), 37–41

Forster. F. G. (2018). IOM African capacity Building Centre annual report. Moshi, United Republic of Tanzania. https://www.iom.int/sites/g/files/tmzbdl486/files/our_work/DMM/IBM/iom_acbc_2018_annual_report_report_2017_and_outlook_2018.pdf

Jonyo, Bonn., Challenges Faced By Middle Level Managers In The Decision Making Process: A Case Of G4s Security Services (K) Limited

J. Oredo, J Njihia, XN Iraki. *Cloud computing adoption in the Kenya's financial sector: An institutional perspective*, IST-Africa 2017 Conference Proceedings Paul Cunningham and Miriam Cunningham (Eds) IIMC International Information Management Corporation. 2017.

Kamra, V., Sonawane, K., & Alappanavar, P. (2012, April). Cloud Computing and it's Pricing Schemes. International Journal on Computer Science and Engineering, 4(4), 577-581. KNBS. (2016). Micro, Small and Medium Establishments Basic Report 2016. Nairobi: Kenya National Bureau of Statistics. Retrieved from https://www.knbs.or.ke/2016-micro-small-and-medium-enterprises-msme-survey-basic-report-2/

Kumar, M., Garg, A., & Kumar, A. (2021). Critical Factors of Post Implementation of ERP in Higher Education Systems Survey Review. *IOP Conference Series: Materials Science and Engineering*, *1149*(1), 012017. https://doi.org/10.1088/1757-899x/1149/1/012017

Keke Gai, J. Comput. *A Review of Leveraging Private Cloud Computing in Financial Service Institutions: Value Propositions and Current Performances.* College of Management, Lawrence Technological University Southfield, MI, USA. 2014

Harjit Singh Lamba and Gurdev Singh. *Cloud Computing Future Framework for e-management of NGO's*, International Journal of Advancements in Technology(IJoAT). Vol. 2 No. 3 July 2011.

Makokha, N., Musiega, D., & Juma, S. (2013). Implementation of Enterprise Resource Planning Systems in Kenyan Public Universities, A Case of Masinde Muliro University of Science and Technology. In *Research Journal of Finance and Accounting www.iiste.org ISSN* (Vol. 4, Issue 6). Online. www.iiste.org

Mell, P. M., & Grance, T. (2011). *The NIST definition of cloud computing*. https://doi.org/10.6028/NIST.SP.800-145

Ministry of ICT, & GoK. (2022). *Kenya Digital Blue Print*

Mugenda, A. G. (2008). Social science research: Theory and principles. Nairobi: Applied Research and Training Services.

Nguyen, T. D., Nguyen, T. T. T., & Misra, S. (2014). Cloud-based ERP solution for modern education in Vietnam. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *8860*(November 2015), 234–247. https://doi.org/10.1007/978-3-319-12778-1_18

Noorliza Karia, M. S. (2015). Enterprise Resource Planning Systems in Higher Education Context: Functionalities and Characteristics. *International Journal of Innovative Research in Science, Engineering and Technology*, *4*(11), 10408–10413. https://doi.org/10.15680/ijirset.2015.0411011

Obe. O.O., (2017). Automated vehicle queuing management system, International Journal of Scientific & Engineering Research, 8(8), 646-649

Oracle. (2021). *New Realities for Higher Education Technology and the campus transformed Oracle Cloud Infrastructure for higher education*.

Pathak, P. B., & Nanded, Y. M. (2016). A dangerous trend of cybercrime: ransomware growing challenge. International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), 5(2), 371-373

Peter Mell, Tim Grance; *Effectively and securely using the cloud computing paradigm.* 2009. JW Rittinghouse, JF Ransome; *Cloud computing: implementation, management, and security.* Pg 1-54. 2016.

Peter Mell, Timothy Grance. *NIST Special Publication 800-145, The NIST Definition of Cloud Computing*. Sept. 2011.

SASRA Report on a shared services policy and framework for SACCO societies., 2019.

Sean Marston, Zhi Li, Subhajyoti Bandyopadhyay, Juheng Zhang, Anand Ghalsasi; *Cloud computing - The business perspective*. 2010.

S. Nirmala Sugirtha Rajini, S. Ramamoorthy, S. Radha Rammohan, P.S.Rajakumar,S. Nedev., *Exploring the factors influencing the adoption of Cloud computing and the challenges faced by the business*es. 2014.

Tolbert, P., and Zucker, L., Institutional Sources of Change in the Formal Structure of Organizations: The Diffusion of Civil Service Reform, 1880-1935, Artic. Chapters, Mar. 1983.

T Erl, R Puttini, Z Mahmood. Cloud computing: Concepts, Technology, & Architecture. 2013.

United Nations report on Cybercrime 2013[Online] Available at: https://www.unodc.org/documents/organized

crime/UNODC_CCPCJ_EG.4_2013/CYBERCRIME_STUDY_210213.pdf (Accessed: 23 June, 2021)

V Kamra, K Sonawane, P Alappanavar. *Cloud computing and its pricing schemes*. International Journal on Computer Science and Engineering (IJCSE). 2012.

V.R.Niveditha. *Reliability of Cloud Services Provided To Non-Banking Financial Institutions.* 2020.

Wanjau, S. K. (2019). *Enterprise Resource Planning System Implementation in Higher Education Institutions*. 236–264. https://doi.org/10.4018/978-1-5225-7678-5.ch010

Weinberg, N. (2022). *10 most powerful ERP vendors today | CIO*. https://www.cio.com/article/304902/10-most-powerful-erp-vendors-today.html

APPENDICES

APPENDIX 1. LIST OF LICENSED DEPOSIT-TAKING SACCO SOCIETIES IN KENYA

1.	2NK Sacco Society Ltd
2.	Acumen Sacco Society Ltd
3.	Afya Sacco Society Ltd
4.	Agro-Chem Sacco Society Ltd
5.	Ainabkoi Sacco Society Ltd
6.	Airports Sacco Society Ltd
7.	Amica Sacco Society Ltd
8.	Ammar Sacco Society Ltd
9.	Ardhi Sacco Society Ltd
10.	Asili Sacco Society Ltd
11.	Azima Sacco Society Ltd
12.	Bandari Sacco Society Ltd
13.	Baraka Sacco Society Ltd
14.	Baraton University Sacco Society Ltd
15.	Biashara Sacco Society Ltd

16.	Biashara Tosha Sacco Society Ltd
17.	Bi-High Sacco Society Ltd
18.	Bingwa Sacco Society Ltd
19.	Boresha Sacco Society Ltd
20.	Capital Sacco Society Ltd
21.	Centenary Sacco Society Ltd
22.	Chai Sacco Society Ltd
23.	Chuna Sacco Society Ltd
24.	Comoco Sacco Society Ltd
25.	Cosmopolitan Sacco Society Ltd
26.	County Sacco Society Ltd
27.	Daima Sacco Society Ltd
28.	Dhabiti Sacco Society Ltd
29.	Dimkes Sacco Society Ltd
30.	Dumisha Sacco Society Ltd
31.	Eco-Pillar Sacco Society Ltd
32.	Egerton Sacco Society Ltd
33.	Elimu Sacco Society Ltd
34.	Enea Sacco Society Ltd
35.	Faridi Sacco Society Ltd
36.	Fariji Sacco Society Ltd
37.	Fortitude Sacco Society Ltd
38.	Fortune Sacco Society Ltd
39.	Fundilima Sacco Society Ltd
40.	GDC Sacco Society Ltd
41.	Golden Pillar Sacco Society Ltd
42.	Good Faith Sacco Society Ltd
43.	Goodhope Sacco Society Ltd

44.	Goodway Sacco Society Ltd
45.	Gusii Mwalimu Sacco Society Ltd
46.	Harambee Sacco Society Ltd
47.	Hazina Sacco Society Ltd
48.	Ilkisonko Sacco Society Ltd
49.	Imarika Sacco Society Ltd
50.	Imarisha Sacco Society Ltd
51.	Invest and Grow (IG) Sacco Society Ltd
52.	Jacaranda Sacco Society Ltd
53.	Jamii Sacco Society Ltd
54.	Jitegemee Sacco Society Ltd
55.	Joinas Sacco Society Ltd
56.	Jumuika Sacco Society Ltd
57.	Kencream Sacco Society Ltd
58.	Kenpipe Sacco Society Ltd
59.	Kenversity Sacco Society Ltd
60.	Kenya Achievas Sacco Society Ltd
61.	Kenya Bankers Sacco Society Ltd
62.	Kenya Highlands Sacco Society Ltd
63.	Kenya Midland Sacco Society Ltd
64.	Kenya Police Sacco Society Ltd
65.	Kimbilio Daima Sacco Society Ltd
66.	Kimisitu Sacco Society Ltd
67.	Kingdom Sacco Society Ltd
68.	Kipsigis Edis Sacco Society Ltd
69.	Kite Sacco Society Ltd
70.	Kitui Teachers Sacco Society Ltd
71.	Kolenge Tea Sacco Society Ltd

72.	Koru Sacco Society Ltd
73.	K-Pillar Sacco Society Ltd
74.	K-Unity Sacco Society Ltd
75.	Kwetu Sacco Society Ltd
76.	Lainisha Sacco Society Ltd
77.	Lamu Teachers Sacco Society Ltd
78.	Lengo Sacco Society Ltd
79.	Mafanikio Sacco Society Ltd
80.	Magadi Sacco Society Ltd
81.	Magereza Sacco Society Ltd
82.	Maisha Bora Sacco Society Ltd
83.	Mentor Sacco Society Ltd
84.	Metropolitan National Sacco Society Ltd
85.	MMH Sacco Society Ltd
86.	Mombasa Port Sacco Society Ltd
87.	Mudete Factory Tea Growers Sacco Society Ltd
88.	Muki Sacco Society Ltd
89.	Mwalimu National Sacco Society Ltd
90.	Mwietheri Sacco Society Ltd
91.	Mwito Sacco Society Ltd
92.	Nacico Sacco Society Ltd
93.	Nafaka Sacco Society Ltd
94.	Nandi Farmers Sacco
95.	Nanyuki Equator Sacco Society Ltd
96.	Nation Sacco Society Ltd
97.	Nawiri Sacco Society Ltd
98.	Ndege Chai Sacco Society Ltd
99.	Ndosha Sacco Society Ltd

100.	New Forties Sacco Society Ltd
101.	Nexus Sacco Society Ltd
102.	Ng'arisha Sacco Society Ltd
103.	Noble Sacco Society Ltd
104.	NRS Sacco Society Ltd
105.	NSSF Sacco Society Ltd
106.	Nufaika Sacco Society Ltd
107.	Nyala Vision Sacco Society Ltd
108.	Nyambene Arimi Sacco Society Ltd
109.	Nyamira Tea Farmers Sacco Society Ltd
110.	Nyati Sacco Society Ltd
111.	Ollin Sacco Society Ltd
112.	Orient Sacco Society Ltd
113.	Patnas Sacco Society Ltd
114.	Prime Time Sacco
115.	PUAN Sacco Society Ltd
116.	Qwetu Sacco Society Ltd
117.	Rachuonyo Teachers Sacco Society Ltd
118.	Safaricom Sacco Society Ltd
119.	Sheria Sacco Society Ltd
120.	Shirika Deposit Taking Sacco Society Ltd
121.	Shoppers Sacco Society Ltd
122.	Simba Chai Sacco Society Ltd
123.	Siraji Sacco Society Ltd
124.	Skyline Sacco Society Ltd
125.	Smart Champions Sacco Society Ltd
126.	Smart-Life Sacco Society Ltd
127.	Solution Sacco Society Ltd

128.	Sotico Sacco Society Ltd
129.	Southern Star Sacco Society Ltd
130.	Stake Kenya Sacco Society Ltd
131.	Stawisha Sacco Society Ltd
132.	Stima Sacco Society Ltd
133.	Suluhu Sacco Society Ltd
134.	Supa Sacco Society Ltd
135.	Tabasamu Sacco Society Ltd
136.	Tabasuri Sacco Society Ltd
137.	TAI Sacco Society Ltd
138.	Taifa Sacco Society Ltd
139.	Taqwa Sacco Society Ltd
140.	Taraji Sacco Society Ltd
141.	Telepost Sacco Society Ltd
142.	Tembo Sacco Society Ltd
143.	Tenhos Sacco Society Ltd
144.	Thamani Sacco Society Ltd
145.	The Apple Sacco Society Ltd
146.	Times-U Sacco Society Ltd
147.	Tower Sacco Society Ltd
148.	Trans- Elite County Sacco Society Ltd
149.	Trans Nation Sacco Society Ltd
150.	Trans-Counties Sacco Society Ltd
151.	Trans-National Times Sacco Society Ltd
152.	Uchongaji Sacco Society Ltd
153.	Ufanisi Sacco Society Ltd
154.	Ukristo Na Ufanisi Wa Anglicana Sacco Society Ltd

155.	Ukulima Saco Society Ltd
156.	Unaitas Sacco Society Ltd
157.	Uni-County Sacco Society Ltd
158.	Unison Sacco Society Ltd
159.	United Nations Sacco Society Ltd
160.	Universal Traders Sacco Society Ltd
161.	Ushuru Sacco Society Ltd
162.	Vihiga County Farmers Sacco Society Ltd
163.	Viktas Sacco Society Ltd
164.	Vision Africa Sacco Society Ltd
165.	Vision Point Sacco Society Ltd
166.	Wakenya Pamoja Sacco Society Ltd
167.	Wakulima Commercial Sacco Society Ltd
168.	Wana-anga Sacco Society Ltd
169.	Wananchi Sacco Society Ltd
170.	Wanandege Sacco Society Ltd
171.	Washa Sacco Society Ltd
172.	Waumini Sacco Society Ltd

APPENDIX 2: SASRA (EMPLOYER) ACADEMIC RESEARCH AUTHORIZATION LETTER

UAP Old Mutual Towers,
19th Floor,
Upper Hill Road, Upper Hill
P.O. Box 25089-00100,
Nairobi, Kenya

Tel: +254 (20) 2935101
Email: info@sasra.go.ke
Web: www. sasra.go.ke

THE SACCO SOCIETIES REGULATORY AUTHORITY
(SASRA)

Our ref: SASRA/700/703/GEN/VOL. 1(204) **16th July 2021**

To whom it may concern,

PHINEAS MUGAMBI MAORE - P54/34307/2019

The above named is a student of **MSc** in **Information Technology Management, School of Computing and Informatics** at the **University of Nairobi**. As part of the requirements for the program, the student is required to undertake a research project and write a report. The project title for the student's research project is: **Factors Influencing Adoption of Cloud Computing Technology in Kenya's Deposit Taking Saccos.**

He has identified your Sacco as a key source of data required for his project. I am therefore requesting that you assist the student, who is also our member of staff, to obtain the required information. Data collection is through an online questionnaire that is shared through a link https://forms.gle/endFdNy9gGqSJB4P9.

Your assistance will be highly appreciated.

Yours Faithfully,

Joseph Osoro,
Manager, Compliance.

SECURING SACCO FUNDS

APPENDIX 3: QUESTIONNAIRE

This questionnaire is purely for academic purpose and is designed to get your opinion on factors affecting Cloud Computing Technology (CCT) adoption in DT-SACCOs in Kenya. Please answer the questions precisely and honestly as possible. Kindly note that all the responses will be treated with utmost confidentiality.

Section A: Individual and Organizational Data

What is your gender?

Male [ ] Female [ ]

What is your age bracket?

Below 25 years [] 26 – 30 years [] 31 – 35 years []

36 – 40 years [] 41 - 45years [] 46 – 50 years []

Above 50 years []

What is your highest level of education?

O Level [] A Level [] Diploma []

Degree Level [] Post Graduate Level[]

Others:

What is your job role?

Operations [] IT Security Practitioner [] Business Analyst []

ICT Manager []

Others

What is the size of the Sacco in terms of value of total assets?

Below Ksh 500 Million [] Between Ksh 500 Million and Ksh 1 Billion []

Above Ksh 1 Billion []

SECTION B:

1) External factors in adoption of CCT in Deposit Taking SACCOs

Please indicate the extent of external factors adoption of CCT at your DT- SACCO

Use the scale from 1 to 5, by ticking in the appropriate box: 1) No Extent 2) Little Extent 3) Moderate Extent 4) Large Extent 5) Very Large Extent

SERVICE	1	2	3	4	5
Point of Sale (POS)					
ATM					
Mobile Sacco Services					
Internet Sacco services					
Customer Relationship Management					
Enterprise Resource Planning					
Core Banking [Deposits and Credit Facilities)					
Trade-Finance					
Treasury					
Office Email					
Other(s), specify and rate accordingly					

2) Organizational factors in adoption of CCT at the SACCO

Please indicate the organizational benefits associated in using CCT.

Use the scale from 1 to 5, by ticking in the appropriate box: 1) No Extent 2) Little Extent 3) Moderate Extent 4) Large Extent 5) Very Large Extent

BENEFIT	1	2	3	4	5
Reduced up front IT Cost					
Reduced cost of maintaining IT infrastructure					
Improved communication and collaboration between individuals					
Standardized and efficient business processes					
Provision of new ways to engage and interact with customers					

Assured IT services with limited resources					
Faster Product/Service Development					
Rapid changing of business processed					
Improved analytical capabilities					
Enabled processes that are not otherwise cost-effective or feasible					
Facilitation of efficient data exchange with external organizations					
Establishment of uniform processes in different regions					
Development of products or services that were not feasible before					
Reduced energy consumption					
Other(s), please specify and rate accordingly					

3) Cloud Computing Technology

Please indicate the risks associated with using CCT at your DT- SACCO.

Use the scale from 1 to 5, by ticking in the appropriate box: 1) No Extent 2) Little Extent 3) Moderate Extent 4) Large Extent 5) Very Large Extent

CLOUD COMPUTING RISK	1	2	3	4	5
Vendor Lock-in					
Loss of Governance					
Compliance Challenges					
Loss of Business Reputation					
Cloud Service termination or failure					
Availability of Service					
Resource Exhaustion					
Intercepting data in transit					
Data transfer bottlenecks					
Distributed denial of service					

Subpoena and e-discovery					
Changes of jurisdiction					
Data privacy					

SECTION E:

4) Cloud Computing Technology

Please indicate the risks mitigation strategies associated with using CCT at your DT-SACCO. Use the scale from 1 to 5, by ticking in the appropriate box: 1) No Extent 2) Little Extent 3) Moderate Extent 4) Large Extent 5) Very Large Extent

MITIGATION STRATEGY	1	2	3	4	5
Reviewing of a vendors' internal audit process					
Determining of the frequency a vendor is audited by external agencies.					
Determining if a vendor is willing to be audited for compliance					
Establishing of the level of control surrounding the content and applications on the cloud.					