CLOUD COMPUTING SERVICES IN AFRICA NAZARENE UNIVERSITY: AN EVALUATION OF AFFECTING FACTORS AND PROPOSED MODEL FOR ADOPTION

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DECLARATION

This thesis is my original work and has not been submitted for any award in any other University.

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DEDICATION

To my children, John, Zipporah, Victor, Esther who play a key role in inspiring me in much of what I do and were always a constant source of motivation, supported and gave me encouragement during this project. I also extend my dedication to my parents for their motivation and good foundation they instilled in me.

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ABSTRACT

Cloud computing is an internet based, remote driven and service oriented technology emerged to provide software as a service among others. Adopting cloud computing software as a service (SaaS) in Africa Nazarene University (ANU) libraries will significantly reduce the cost of maintaining systems; expose library users to multi-variant information resources and optimize library services. This research study was guided by the following objectives: to assess the technological, organizational and environmental factors affecting the full adoption of SaaS at ANU, and; to investigate the different types of service users, assess their needs, and to recommend an adoption strategy of SaaS model for ANU libraries. The study adopted a descriptive survey design through the use of semi-structured questionnaires and interview guides. Purposive sampling method was used to select five library users from ANU for interview. In addition, library users from the student body were selected through stratified random sampling method and issued with questionnaires. A total of 97 respondents were used as the sample size in this study. The study utilized quantitative and qualitative approaches for data analysis, which was presented using tables and graphs. Qualitative data was analyzed as per the order of questions in the questionnaires and then computed using SPSS software. The research findings indicated that the most significant factors was organizational factors (0.216). On this basis, the researcher was able to recommend that the organization of the university should be encouraged to support the deployed of SaaS in the university.

ACKNOWLEDGMENT

I am very grateful to the all mighty God for all the blessings he poured on me throughout the study. I also give thanks to God and acknowledge his support in the completion of this course.

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It is demanding to exaggerate my appreciation to my supervisor to Dr. Amos Gichamba. His insights and tutorage throughout the years was invaluable in shaping my work into the book that you are holding right now. I learned a great deal from him not only within the academic domain. My sincere gratitude also goes to my second supervisor, Dr. Kendi Muchungi, who guided me, provided typical supervision and sustenance. Without their assistance, this development would not have been accomplished. I also extend my gratitude to Dr. Mark Mutinda for his continued support, useful advice and comments at various stages of my research.

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OPERATIONAL DEFINITION OF TERMS

Client platform: Devices (s) to access cloud resources. e. g. mobile tablets, Laptops etc. (2006).

Cloud: Public or Semi-public space in the cloud used for transmission (2011).

Infrastructure as a service (IaaS):   Allows users to control and manage computing resources (2009).

Platform as a service (PaaS):   Allows users to deploy their own applications on the provider's cloud infrastructure under the Provider's (2009).

Resource pooling: Enables provider's computing resources to server multiple users (2014).

Software a Service (SaaS):   Allows users to use the provider's applications on a cloud through a Web browser or an application programming interface (2009).

Virtualization: Act of creating virtual object rather than actual (2011).

LIST OF ABREVIATION ACRONYMS

ANU: Africa Nazarene University

IaaS: Infrastructure as a Service

IBM: International Business Machine Corporation

ICT: Information Communication Technology

ILL: Interlibrary loan

NIST: National Institute of Standards Technology

OCLC: Online Computer Library Center

PAAS: Platform Access catalogue

SaaS: Software as a Service

SPI Model: Software as a Service; Platform as a service; Infrastructure as a

Services Models

IJIDT: International Journal of Information Dissemination and Technology

INASP: International Network for the availability of Scientific Publication

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Cloud computing (CC) is a new technology model of Information Technology services which many libraries and organizations are adopting (Scale, 2010). Cloud computing has attracted attention from both practitioners and libraries as one of the latest information technology trends (low & Chen, 2011. In cloud computing, cloud users rent applications and infrastructure from cloud providers on a pay when they need them. Cloud users only pay to cloud providers for the services used in specific times via the internet (Christauskas & Miseviciene, 2012). Cloud providers deliver computing services to cloud users through three main forms: Infrastructure as a service (IaaS), Platform as a service (PaaS) and Software as a Service (SaaS). In IaaS, cloud providers offer fundamental computing resources such as storage, networks and processing powers on which cloud users can run operating and applications. At one level higher, PaaS denotes operating platforms on which cloud users can deploy their own application (Markov, 2013).

The emergence of software as a service (SaaS), is one of the trends in the IT industry, which has attracted much interest from researchers and practitioners that seek an explanation on how this type of IT innovation is adopted in libraries. Software as a service offers adopting libraries potential benefits including; computing cost reduction, better system scalability and mobility, which are relevant to the libraries (Seethamraju & Raj, 2015). It is estimated that by 2022, fifty percentages of libraries in Kenya would spend at least one third of their IT budget on cloud solutions (CISCO IBSSG, 2015). Among libraries compound annual growth rate of SaaS is expected to considerably grow

to about 22-27 percentages during 2020-2022 (CISCO IBSSG, 2015). Despite the potential benefits and expected growth of SaaS adoption in libraries, growth of cloud computing adoption is not consistent across different libraries to meet library user's needs (ACCA, 2014). The readiness of Software as a Service (SaaS) adoption in regional libraries, such as. Africa Nazarene University (ANU) library is still low in comparison with that of developed countries (BSA Global Cloud computing Scorecard 2014). Thus, there is need for an investigation on determinants that could facilitate or inhibit SaaS adoption in libraries.

Since 2006, "a few local providers in Indonesia started to offer Software as a service for Indonesia libraries to improve and provide various SaaS applications to their current techno-savvy users". Most importantly, software as a service has enabled new streamlined workflows for corporations and community building among libraries in Indonesia (Mangula et al., 2012). All over the world, libraries are moving towards cloud computing technology for maintaining digital libraries and social networking with multiple flexibilities. NIST (2010) defines various services models such as SaaS, PaaS and IaaS with various characteristics and deployed model such as: public, private, community and hybrid model.

Software as a service (SaaS) is one of the cloud computing service models that has the potential options for adding to the cost saving initiative in Indonesia libraries. It has contributed to the improvement of library services such as: acquisitions, an Online public access catalogue (OPAC) an online database of materials held by a library or group of libraries. It can also create a powerful, unified presence for libraries on the web and give

users a local, group and global reach. Cloud computing is a new form of computing and Libraries are on the path to apply it in order to enhance their services effectively and efficiently (Mell & Grance, 2011; Arif, Mahmood, & Puttin, 2013).

The recent past has seen many libraries constructing /refurbishing their libraries. The trend has been going on in both public and private institutions starting with ANU, Catholic University of East Africa (CUEA), United States International University (USIU), Daystar University, and Kenyatta University. The observed trend in these new library buildings is the provision of ICT facilities, including; computer section, internet ports and online public access catalogue (OPAC) section among others.

Libraries in Kenya are constantly in search of low-cost and best solutions that may enable them to serve the user needs efficiently and effectively. Ironically, with the involvement in IT, the commitment, as well as services, has been miserably infested. Under such conditions, cloud computing and SaaS model is the saviour of all the ebbs of the information technology. Chen (2011) states that cloud computing is a mega change that robbed IT of its traditional obligations and empowered the end-users, with demand utility computing. Software as a service is one of the cloud computing model services that are set to transform the way libraries work and unleashing librarians from the administrative burden in order to focus on services for clients and researchers (JISC, 2011). Mavodza, (2013) also explains how, "Libraries have stepped and are increasingly stepping into the realm of digital Librarianship, as well as platforms that extend its capabilities which extensively depends on using the cloud". Therefore, there is need for libraries in Kenya to fully adopt SaaS cloud computing model, to create a highly efficient IT ecosystem, where

resources are pooled together and costs are aligned with what resources are actually used for, as well as access more of library services and data from anywhere and at any time.

ANU is a dynamic Chartered Christian Wesleyan liberal Arts University. It is founded on an education philosophy that is premised on the understanding of a good education that is essential for holistic development of individuals, rests on the integration of faith and learning that provides the foundation on which students are nurtured, towards intellectual maturity and moral integrity. The university serves a diverse student and staff population from many countries and entrenches value and principles of diversity.

Alongside the establishment of ANU (ANU) was a library to support its programmes. The main library is located at its main campus at Ongata Rongai. In view of its rapid expansion, another library started, that serves students at town campus located at Agro-house. The library has been in operation since the inception of the school in 1994, when the town campus school was located on Ngong Road. The library provides information and library services to the students, faculty, non- teaching staff, its alumni and the surrounding community. ANU Library recognizes that information in the current age is packaged in physical formats and electronically**.** ANU library's user statistics show that only 33% access to the SaaS library services are available. Therefore, there is need for the library to fully adopt more SaaS applications services in order to meet the needs of users such as: self-service of clients outside ANU library. This will enable users to make use or to subscribe to the available resources at the ANU library. Second, improving of Public Online Catalogue and Third, introduction of interlibrary loaning of materials and the application services, which will serve users especially in distance learning mode and evening programmes who are the most affected.

In its five years strategic plan (2015 - 2020), ANU library was to keep abreast of global ICT initiatives and create electronic content to meet user's needs. The plan also aimed at acquiring new skills through training of both staff and users. Currently, the library is playing a leading role towards capacity building among the library professionals in the country, with the assistance of International Network for the Availability of Scientific Publication (INASP). ANU has organized cloud computing related workshops training for library professionals, in both public and private institutions in Kenya. (ANUL) has already embarked on the process of creating and developing its Institution Repository (IR) (Makori, 2009).

1.2 Statement of the Problem

SaaS is one of the cloud computing model services that has been gaining momentum all over the world. The changes in SaaS are mainly caused by its cost efficiency and promotion in the libraries which have limited capital to invest in IT and limited internal knowledge to handle (Luenendonk, 2007). The application is delivered all over the internet, without library users needing to physically install the software in their infrastructure (Mavodza, 2013).

ANU Library has invested a substantial amount of resources to its library both human and material, to satisfy the ever-growing number of users. The university has an automated library that offers online information resources such as; electronic journals, electronic books as well as institutional repositories to the clients. Despite the library's investments in technological and human resource advances, it has not fully adopted full online services, which effectively serve its users, especially in distance learning mode and

evening program users who make access of the library services occasionally. Therefore, ANU library should plan to adopt more SaaS application services, by moving additional application such as; Self-Service of clients outside ANU library, improving of Public Online Catalogue, introduction of interlibrary loaning of materials and additional access to e-resources to the cloud, where IT cost saving is the key motivation. The savings are realized through the omission of any upfront investment in software license and infrastructure costs, as the charges are incurred on pay per usage basis. The application services will serve ANU library users, especially those who make use of the library and physical books occasionally. For example, users in distance learning mode and evening programme users who are the most affected. This challenge has been attributed to many factors facing ANU library which include; technological skills, environment and organizational factors to name a few.

1.3 Purpose of the study

This study sought to evaluate the factors affecting the adoption of cloud computing SaaS in libraries.

1.4 Objectives of the study

The general objective of the study was to evaluate the factors affecting the adoption of cloud computing (SaaS) in ANU library. The specific objectives were:

(i)   To assess technological factors affecting the adoption of SaaS in ANU library;

(ii)   To assess organizational factors affecting the adoption of SaaS in ANU library;

(iii)   To assess environmental factors affecting the adoption of SaaS in ANU library;

(iv)   To assess the different types of users and their needs in ANU;

(v)   To recommend an adoption strategy of SaaS for ANU library.

1.5 Research Questions

The following were the research questions for the study;

(i)   What are the technological factors that affect the adoption of SaaS in ANU library?

(ii)   What are the organizational factors that affect the adoption of SaaS in ANU library?

(iii)   What are the environmental factors that affect the adoption of SaaS in ANU library?

(iv)   What are the different types of users and their needs in ANU library?

(v)   What would be the appropriate adoption strategy to improve or increase SaaS cloud computing uptake in ANU library?

1.7 Significance of the study

From the late 1950's to the present time, there is recognition that libraries have played a crucial part towards an improved and provision of quality services (Ngui, 2014). One way they can reduce their costs is through full adoption of more SaaS applications. The cost that an academic library can incur yearly to maintain its software is estimated to be more than three times the cost they incur to obtain the software. As a result, the library ends up spending more than 75% of their total IT budget just on maintaining and running existing systems and software infrastructure. Adoption of more SaaS applications will enable the library give quality services to the users, who make access of library and physical books occasionally. The model will also enable the institution to reduce library maintenance costs (Timoth, 2005). Therefore, the study findings will be important to the

library users of the ANU in acknowledging the benefits of cloud computing SaaS model in the ANU library.

1.8 Scope of the study

The scope of this study was limited to ANU libraries. Both libraries are utilized by students, staff, its alumni and the surrounding community.

1.9 Limitation of the study

The study was limited by cost; whereby the researcher did not have the resources of setting up replica of the (SaaS) model network service operations infrastructure, to carry out the review evaluation of the solution that was under development. As such, the study relied on primary data sources. Some of the respondents were not readily willing to reveal their cloud computing practices. To mitigate this limitation, they were assured of anonymity and told that the finding obtained would only be used for academic purposes only. Some of the students and faculty sampled were absent or much occupied during the days slotted for administration of the research instruments. This limitation was mitigated by creating more time to maximally reach the respondents.

1.10 Delimitation

In research, delimitations refers to the parameters set by the researcher, highlighting what the research does not intend to cover in its execution (Kothari, 2004). This study evaluated the factors affecting the adoption of cloud computing SaaS model in higher education libraries, focusing on (ANU Library). The target respondents the researcher considered were; the library users, students, faculty and non-teaching staff who were well

placed to provide information on the research study. Therefore, the researcher specifically focused on these respondents who provided relevant information needed for this study.

1.11 Assumption of the study

As Simon (2011) states, assumptions in research are the things that are somewhat out of the researcher's control in carrying out the research, but they are important to the study as the research would not be relevant without them. The study assumed that the respondents answered questions truthfully and without any bias.

1.12 Technology- Organization-Environment Framework

The TOE framework was proposed by Tornatzky and Fleischer (1990), to analyze the adoption of new IT technologies at an organizational level. This framework investigated the impact of three factors which include; (Technology, Organization and Environment) on the organization's decision to adopt a new technology. The technology aspect describes the effect of internal and external technologies of the library and how adopting new technology applications can affect the library (Chau & Tam, 2011). The organizational factor refers to different measures of the organization for example, the size, top management and technological readiness. These measures have a significant impact on the adoption decision. Lastly, the environmental context is the field where libraries will run its business; such as, the competitors and government regulation.

1.13 Conceptual framework

A conceptual framework is a model of presentation where researchers conceptualize or represent the relationship between variables in the study and shows the relationship graphically or diagrammatically (Orodho, 2004). In this study, the adoption of Software as a Service is the dependent variable. The dependent variable is analyzed in order to find out the answer or solution to the problem.

In this situation, the study was based on TOE framework by Chen (2011). The framework evaluated the impact of three factors (Technology, Organization and Environment) on the organization's decision to adopt a new technology services. On the concept of ANU library, the study evaluated the factors affecting adoption of cloud computing SaaS applications i.e. technological factors, organizational factors, environment factors and also tested the variables that addressed the types of users believed to affect the dependent variable, SaaS cloud computing service model adoption. The relationship between independent variables and dependent variable in the study are illustrated in Figure 1.1

Independent Variables   **Dependent Variable**

Technological factors
• Relative advantage
• Compatibility
• Complexity
• Technological infrastructure
• Data concern

Organizational factors
• Top management
• Organizational size
• Technological readiness

Adoption of Software as a Service
• Types of SaaS (email, databases, social media)

User factors
• Target users
• Needs of users
• Nature of interaction
• Duration of use
• Frequency

Environment factors
• Competitive pressure
• Government regulation
• Trends

Figure 1.1 Conceptual Framework

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter investigated relevant previous studies and provided a comprehensive critical review about factors affecting the adoption of cloud computing Software as a Service, identified gaps in present knowledge, and also presented legal ethical considerations.

2.2 Adoption of Cloud Computing Software as a Service Concept

Cloud computing is described as the facility that is easy to get by internet means, usually "Software as a service (SaaS)". The existent files and services are usually defended by the hardware system. These hardware and the systems are situated in data centers that are referred to as "cloud". A recent study conducted by Deloitte (2010), a cloud computation provider realized that, 55% of library services were not being offered over the "cloud". The remaining percent of the available services that are already in the cloud, many of the library users are not aware of, and many are facing financial problem to subscribe to the available online services, such as e- resources, which have been affecting the library users, who access the library and physical books occasionally. It is after the adoption of full software as a Service application that there will be more flexible and affordable computing library services, to satisfy their clients.

Over recent years, cloud computing has evolved with many different services and opportunities. One of the most widely cited definition from National Institute of

Standards and Technology (NIST), defines cloud computing as: "a model for enabling and 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 transforms the way systems are built and services are delivered, providing libraries the opportunity to improve and extend their impact (Wang et al., 2010). Thus, the National Institute of standard and Technology classifies cloud computing service into three services models (NIST, 2010). It lets users have full control of storage and operating systems, controlling over the applications of a certain limit over the networking facilities.

Some of the most important characteristics of SaaS cloud computing that differentiate them from traditional computing include; on-demand self-service, broad network access resource pooling, rapid elasticity and measured service (Mell & Grance, 2011). On-demand self-service is an expectation that, cloud computing should allow IT resources to be provisioned, whenever needed by a library service (Arif, Mahmood, & Puttini, 2013). In this type, users may have authority to provision of the services or not when required, minus any interaction by human beings. Therefore, a user can provide computing

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On-demand self-service is an expectation that, cloud computing should allow IT resources to be provisioned, whenever needed by a library service (Arif, Mahmood, & Puttini, 2013). In this type, users may have authority to provision of the services or not when required, minus any interaction by human beings. Therefore, a user can provide 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).

This has the capability over most networks and can be accessed through standard mechanisms (Barnett, 2010). Broad network access will indicate how cloud computing

and the services provided should be widely accessible. Mell and Grance (2011) state that, "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.

This is where the resource provider is frequently pulled to serve some users. According to Mell and Grance (2011), resources are pooled to serve multiple library users, using a multi-tenant model, with different physical and virtual resources dynamically, assigned and reassigned according to library user's demand. Library users may not 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 data center), hence location independence. Examples of resources include storage, processing, memory and network bandwidth (Mell & Grace, 2011).

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

Measured service is the ability of the cloud platform to measure the usage of the IT resources that have been used by library users (Neves, 2004). This is a computing system that automatically optimizes and controls the usage of resources, by provision of the mattering capability to a given type of service, for example bandwidth, active use of

accounts, storage and processing, according to SaaS security Alliance (2009). In addition, in resource aggression, this SaaS provider allows for the computing resources to be shared amongst the computer users, regardless of the actual location (Mell & Grance, 2011). This is normally at some level of abstraction appropriate to the type of service. However, resources usage in the library will be monitored, controlled, reported and provide transparency for both provider and library user of the utilized service (Buyya, 2009).

2.3 Cloud Computing Model Services

Cloud computing providers offer their services according to different models, which include; three standard models known as software as a service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (SaaS) (NST, 2010).

Infrastructure as a Service (IaaS) provides cloud service provider with a physical or virtualized hardware in form of storage, server, network, firewalls and load balancers (Barnett, 2010). The library services need more control but IaaS gives access to low level computing resources like storage, memory and CPUs, in addition to control over which OS runs on cloud infrastructure. IaaS cloud is more like physical computers, which you can reboot as you need or shut them down, if they are no longer used (Yang, 2012).

By the use of cloud computing, ANU Library will improve its services such, as self-service check out of books, the interlibrary loan services as well as self- services check out. After extensive renovations, the library will become an exemplar for library users

space, providing flexible facilities and services, that positively respond to the needs of today's (and future) users (Buyya, 2009).

PaaS provides a computing environment for the development and deployment of applications over the internet, without any need of buying hardware or software. For instance, Google app engine, Africa's taking platform as a service and Google app engine, allow developers to develop and host their applications on Google's cloud (Buyya, 2009). However, PaaS provides a little more control, as it provides a predefined software environment, such as SQL server or NET that its professionals can use to run applications on. While PaaS gives you control over what you set up on the platform, you have no control over the underlying hardware or operating system that powers it (Yang, 2012).

SaaS, as one of the cloud services, has been gaining momentum all over the world, due to its delivery of software over the internet known as "a service" (Barnett, 2010). The changes to SaaS are mainly caused by its cost efficiency and promotion in the libraries (Luenendonk, 2007), which have limited capital to invest in IT and limited internal knowledge to handle and maintain. While using these services, library users does not require installing any application related to the software on their computing devices, but rather use it on cloud (Sonawane, 2012). Users can access this service anywhere and anytime in any computing device.

The SaaS model is very simple because there is nothing to setup. You simply access applications online that previously would have been hosted locally. While it's the easiest

cloud model to set up, you have no control over the cloud infrastructure that the library

SaaS application runs on (Yang, 2012).

2.4. Cloud Computing SaaS Deployed Models

Deployed models for the cloud can either be community cloud, private cloud, public or

Hybrid cloud, which library users can access their services (Mell & Grance, 2011)**.**

According to Ambrust et al. (2010), private SaaS can be defined as "an inside center of

information for library association, that is not accessible to people of that community."

Furthermore, the physical infrastructure in private SaaS may be owned by or may be

located in the organization data that are available on the premise. It can be made of

signated server provider (off-premise). In contrast to the public SaaS, in private SaaS,

users are considered and trusted (Mell & Grance, 2011).

This model can easily be managed by an organization or a third party. When there are

several organizations that share the same goals, rules, and some infrastructure, the SaaS

community happens (Choubey et al., 2013) to be a very good option when forming

partnerships (Mell & Grance, 2011). The service model that is applicable determines

the involvement of the service provider.

In their view, Ambrust et al. (2010) considers a public SaaS as one available to the public

in the form of utility and referred to be unsafe for library users. They are considered less

safe because in various occasions customers only rent the virtual services and also share

them with other customers. Barcomb (2012) notes that, despite being less safe, it was

discovered to benefit the customers. It is measured to be inexpensive amongst the four

categories, as it is referred by organizations as it enables to safe more money on the IT cost. In addition, it offers both scalability and flexibility advantages. Further, it's always accessible to the users. At many instances, it is usually free with some payable options. Various actors provide these services including the libraries, unions and the government (Mell & Grance, 2011).

According to Mell and Grance (2011), hybrid SaaS can be considered to be an amalgamation of both secretive and civic SaaS. For this reason, the hybrid SaaS is capable of benefiting from the capabilities derived by both the SaaS. According to Barnett (2010) the user of the hybrid SaaS can fall into the category of both trusted and untrusted users. However, in many cases, the untrusted users are frequently denied from using and accessing the services of both the hybrid and the private SaaS. Hybrid SaaS is therefore, a mixture of public, private and the community SaaS. They are commonly bound together but still as a deployment model. For example, a SaaS that exists in a library can be used by all library users, but within the same SaaS, there could be a private SaaS that is only accessible by the managers (Mell & Grance, 2011).

2.5 Technological Factors

SaaS computing might be an appealing chance to libraries to meet the library user's needs, especially for users who are in distance learning mode and evening program, who makes access to library and physical books occasionally. The study will investigate the impact of factors such as; Technology, Organization, Environment and type of users and their needs on the organization's decision to adopt more SaaS applications technologies in libraries.

The technological factors that affect the adoption of SaaS model services in libraries decision include; relative advantage, compatibility and complexity, technological infrastructure as well as data concerns. Relative advantage is a term encapsulating the idea that, "benefits accrue to an organization which it adopts a particular technology that gives edge or advantage within its sphere of operation (Rogers, 2010)". The adoption of SaaS model has the potential to deliver a relative advantage to the libraries. In this study, relative denotes to a decline in administration requirement, reorganized IT systems, reduced maintenance efforts, reduced software costs and increased flexibility of computing resources, because simplifying or reducing the costs of all of these features, would improve the administration of libraries in providing SaaS services.

Compatibility is "the extent to which technology is suited to an organization's existing normed occurrences and practices (Rogers, 2010)". Grandon and Pearson (2014) argued that, "compatibility is the strongest driver for the adoption of technology, compared to other innovative factors". Compatibility in this study will be considered as an essential factor for innovation and adoption of cloud computing (Cooper & Zmud, 1990; Wang et al., 2010). Further, when technology is recognized as compatible with work application systems; libraries will likely consider the adoption of cloud computing technology. When technology is viewed as significantly incompatible, major adjustments in processes will be involved and considerable learning will be required (Jeyaraj et al., 2006).

According to Jeyaraj et al. (2006), "Cloud services in the libraries are finally taking off because of technology advances, particularly ubiquitous higher-speed internet

connectivity and the ever-decreasing cost of storage". Therefore, this finally enables service providers to meet user's needs for simplicity, cost and flexibility. Handheld wireless computers have accelerated development of cloud services that will provide application functionality to those devices (Rao, 2009).

The adoption of cloud computing in libraries services will provide users with the benefit of; Increased operational efficiency by Improving IT agility and creating more room for IT to be innovative (Jeyaraj et al., 2006). ANU library will be able to benefit through 'time to market', which means that they will be able to push their services faster in the market. Libraries should bank on this, since it gives them competitive edges to reach a wider or larger market.

Infrastructure is a major issue in adopting cloud computing. Due to improved infrastructure more developed libraries are adopting the benefits of cloud computing quickly. Technological infrastructure encompases "installed network technologies and enterprise systems, which provide a platform on which the cloud computing (SaaS) application can be build".

Data risks require careful consideration by organizations contemplating on SaaS Services (Carroll et al., 2011). Concerns around cloud computing data concerns are well-founded, given the intersection of storage and computing in multi-user environment such as a cloud computer system (Schneidererman, 2011).

Ogigau (2012) argued that, to help reduce threat, cloud computing stakeholders should invest in security implementation measures, in order to ensure data is kept protected and private at all times. However, concerns that security cannot be achieved might cause university library managers to resist the adoption of cloud computing by organizations.

2.6 Organization Factors

Organizational factors are one of the most important determinants of successful projects. By understanding their impact and identifying them will help to plan for a systematic cloud computing (SaaS) model implementation (Wang et al., 2010). Since cloud computing involves resource allocation, services integration and procedures reengineering, the role of top management is critical in the implementation process (Wang & Lai, 2014). The top management of the organizations will provide the commitment and vision for innovation, creating an environment that fosters this innovation.

When the benefit of cloud computing are acknowledged, comprehended and consented to, the resources necessary to enable implementation will be provided by ANU top management. This will foster smooth and more efficient adoption of more SaaS applications. Failure on part of top management to comprehend or to accept the benefits of cloud computing can result in opposition to the adoption process and failure of the project. Innovative organization displays the desire to support the change to a new technology, by spending time and effort motivating employees (Altameem, 2007).

Organization size is essential factor that can impact on the adoption of cloud computing in an organization (Wang et al., 2010). Some organizations have resources and can afford greater risks connected with innovative adoption; though bigger firms have a plus point over the smaller ones. Ross (2010) states that, "smaller firms do not willingly accept newer technologies, although they are more adaptable". Bigger sized library, typically have more flexibility in their resources and therefore can assign more organizational resources (e.g., financial, technical, and human resources). Therefore, adoption of any new IT technologies services is one possible reason for the substantial relationship between organizational size and IT acceptance (Goldner, 2010).

Organizational readiness is determined by state of technological readiness within the organization itself (Dillon, 2012). Enhanced technological readiness in libraries will involve both structural features and specialized human resources. The structural features are the technological infrastructure already in place within the University, such as network technologies and enterprise systems (Lee & Wang, 2009).

2.7 Environment Factors

Environment factors refers to the identifiable elements in the economic , political, regulatory, that affects how organization operates, grows and survives (Zhu & Kraemer, 2002). Competitive pressure describes the degree of exertion brought to bear upon to an organization by adversaries from within industry (Zhu & Kraemer, 2002). Adopting new technology is often times a strategic essential when competing in the market, "consequent to rapidly changing technology, libraries will require cloud computing to satisfy their on-going technological needs". According to Ross (2010) libraries face pressure and become

increasingly aware of and follow their competitors' adoption of new technologies (Misra & Mondal, 2010).

According to Thatcher et al. (2006) "Regulation support is provided by government to promote IT adoption in libraries". The ICT Authority has expressed mandate, to set and enforce ICT standards and guidelines across all aspect of information and communication technology for the libraries. The overall purpose of this specific mandate is to ensure coherence and unified approach to acquisition, in order to promote quality services in libraries and cost savings through economies of scale in IT investments. The power and the willingness of governments to foster institutional environment that encourage private investment and activity are critical to the adoption of innovative technology (Young, 2001).

From a library service point of view, library are increasingly attempting to integrate service processes into their existing IS applications and build internet- based technologies for transacting library services with other libraries (Tuncay, 2010). In high-tech libraries, ubiquitous data transformation practices have become one of the key aspects for improving operation efficiency.

2.8. Types of Users

The provision of quality services to library users is undoubtedly one of the most exciting and challenging developments that have occurred (Zhu & Kraemer, 2002). This study targeted library users especially the distance learning users, evening program users,

University non- teaching staff and the faculty, who make use of the library and physical books occasionally. For instance, librarians are used as a reference since they are in a better position to assist users online all the time.

The need of cloud computing in expanding provision of library services and preserving issues are based on applications in the education libraries (Zhu & Kraemer, 2002). Adoption of cloud computing (SaaS) services in libraries is increasingly becoming a part of academic learning community, to fulfil the user's requirements or satisfactions which have greater efficiency. This is because adoption of more cloud services in libraries, will meet user's needs by meeting several significant number of importance such as: bringing information to user, making services easier to use and access, providing enhanced searching, collaboration, sharing and also help library users learn new skills (Young, 2001).

The libraries need not have all the latest technology services within their physical IT infrastructure. A network of libraries is created with a public cloud (at least University libraries) (Young, 2001), where the latest technology services is put for consumption of member libraries for their user clientele. The integration of resources among the libraries and providing services through distributed uniform access platform, can be achieved with cloud computing. Services through OPAC and inter library loan services can be unsatisfactory sometimes. This can be obtained through fully adoption of cloud computing technology (Zhu & Kraemer, 2002). A shared public cloud will have infinite storage capacity and computing power, which will enhance the productivity and capabilities of providing cloud computing services in libraries. Therefore, the users need

not to visit libraries regularly. They can access self-services by clients outside the library, and search for information from a terminal located in their place. The terminal can be a PC, mobile or any other electronic equipment which can be utilized for storage, as well as information dissemination (Roes, 2001).

SaaS is today world's leading technological shift focused on because of how it has scaled IT services and the ICRT services to its client over the web. There are several authors who have SaaS adoption among libraries. Sultan (2008) discussed how SaaS exist in deferent platforms, like virtualization and internet. His research also contrasted on how libraries face some challenges in the adoption of SaaS, despite its importance such as pay as you use, cost saving and its flexibility in libraries services. This increases library competitiveness and ability to meet library user's needs.

Other researchers such as Alshmaila, Papagiannidis and Li (2013) also looked at adoption of SaaS for libraries. They found out that, technological factors affects adoption of SaaS in academic libraries, to deliver more applications services over the cloud. They also conducted an a qualitative explorative research based on the TOE framework for the research and findings indicated that, some factors play a big role in SaaS adoption in the libraries.

Another study conducted by Chau, (2011). Looked at how SaaS cloud computing can be used to motivate a library that intend to adopt fully services of SaaS. His findings indicated that, libraries can't fully benefit from SaaS, because the human capital and financial capital is little for the project.

Pundit (2012) in his book the grounded theory, categories articles into forms and factors library use for fully SaaS adoption. According to his findings, there are critical issues facing SaaS adoption for libraries, such as prior technology infrastructure. Gupta, (2015) also conducted a study on factors affecting the adoption of SaaS, their benefits and comparative advantage to the libraries. He argued that technological and organizational factors affected libraries adoption of more application.

2.9 Summary of Review of Literature

This study provides cloud computing (SaaS) concept and its implication in the libraries in order to enhance delivery of services in a more efficient manner. No doubt, libraries are moving towards cloud computing technology in present times and taking advantages of cloud computing services, especially in building cloud libraries, social networking and information communication with manifold flexibilities. However, some issues related to technological, organizational, environment and target users factors are still not fully resolved. Therefore, it is time for libraries to act and ponder more on adoption of these SaaS services before clubbing on more application to enhance libraries services to their users (Taylor, 2005).

2.10 Research Gap

Libraries suffer from common problems like flexibility associated with digital data, lower levels of efficiency and huge cost involved in managing the entire IT infrastructure themselves (Buyyaa et al., 2009). Few options are available when it comes to collaborating with other libraries, meeting the needs of users, especially in distance

learning and evening program's, who makes access of library and physical books occasionally.

However, sharing of data among the libraries in principle will reduce the overall cost and increase the efficiency. Capital expenditure done on infrastructure will chiefly be converted into operational expenditure. This would help in bridging the gap between cloud libraries and library users. Therefore, ANU library should plan to adopt more SaaS applications services, to enhance the user's experience, making services easier to use and access.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter describes the research design, research site, target population, sampled size, sampling procedures, data collection methods, data processing and analysis, research instrument validity and reliability and ethical considerations in the study.

3.2 Research Design

The research employed a descriptive survey design. A descriptive design is concerned with describing the characteristics of a particular individual or group as it is, and no attempts is made to change the behavior or conditions (Kothari, 2004). The researcher used a descriptive design in order to describe the factors affecting adoption of cloud computing SaaS model in libraries. A survey is a research method involving the use of standardized questionnaires or interviews to collect data in a systematic manner (Bhattacherjee, 2012). Qualitative data was obtained through the use of secondary sources, such as books, personal sources, websites, and journal articles. While the quantitative data was derived from semi-structured questionnaires and interviews conducted. Qualitative data was used to reinforce the quantitative data.

3.3 Research Site

The choice of research site depends upon the general nature of the research questions (Taylor, 2005). The area of inquiry usually is taken to suggest behaviour or a phenomenon of interest. The study was carried out at the ANU library, Main campus and

CBD campus respectively, because the ANU library users utilize these libraries for research output. A map is provided showing these locations in Appendix VI.

3.4 Target Population

The target population for a survey is the entire set of units from which the survey data is to be used to make inferences (Bryman, 2008). The study targeted a population of 4036 university Library users, comprised of University non- teaching staff, faculty and students of ANU.

3.5 Determination of Study Sample

3.5.1 Sampling Procedure

The researcher used a purposive sampling method on the following five library users for interviews; university librarians, librarian in charge of IT, chair department of distance learning and academic registrar personnel of ANU. The other library users were selected through a stratified random sampling method and were issued with questionnaires.

3.5.2 Sample Size

The target population size was obtained from a population of 4036 university Library users. The determination of the sample size was based on the formula developed by Taro Yamane (Yamane, 1967). The formula has been used in numerous studies. Israel used in evaluation programs (Israel, 1992). The formula was also used by Nyamu in a study on "Factors influencing adoption of information communication technology among small and medium enterprises in Nairobi County (Kenya) (Nyamu, 2014).

The formula is:

$$n=N/1+N*e\ 2$$

Where:

n=the sample size

N= the population size

e = the acceptable sampling error (assumed at 0.1)

When fitted, the sample size for study is:

n = 97 respondents

The sample size of 97 was proportionately stratified the across the three stratums (students, faculty and non-teaching staff) as follows:

Students	=	$\dfrac{3{,}641 \times 97 =}{4036}$	88
Faculty	=	$\dfrac{130 \times 97 =}{4036}$	3
Non- teaching staff	=	$\dfrac{265 \times 97 =}{4036}$	6

Total sample size were 88+ 3+ 6 = 97 as shown in Table 3.2.

Table 3.1 Sampling Size

Category	Total Number of Users	Sample Size	Percent
Students	3,641	88	32.4
Faculty	130	3	10.7
Non-teaching staff	265	6	14.3
Total	**4,036**	**97**	**100**

3.6. Data Collection Measures

3.6.1 Development and application of Instruments

Research instrument refers to "the tools to be used for collecting data and how those tools were developed" (Goldner, 2010). This research used the semi-structured questionnaire to collect quantitative data and an interview guide to collect quantitative data. A Questionnaire either qualitative or quantitative in nature is "a research instrument consisting set of questions or items intended to capture responses from respondents in a standardized manner (Bhattacherjee, 2012)". According to Mugenda and Mugenda (2014), a questionnaire is used to obtain information about a population. The researcher visited the two University campuses prior to data collection day, in order to obtain permission to carry out the research in the university and also obtain the information from human resource department on the target population. The questionnaires were distributed to the target population in ANU consisting of faculty staff, non-teaching staff, and students of ANU. The researcher used structured interviews for collecting data from the respondents. The advantage of the interview method is that there is an in- depth response from the respondents as one gets to probe them (Kothari 2004). All Face to face interviews were conducted with the respondents at a convenient time and the responses were recorded using a tape recorder. The questionnaires were issued, collected the same day and arrangements were made with the respondents who were absent on the day of data collection. The researcher obtained permission from the NACOSTI and university authority to conduct the research.

The researcher factored the following in constructing a questionnaire. The first part of the questionnaire included questions about demographic and general information (addressing target user types and needs) while the second part sought information on factors (environmental, technological and organizational) affecting the adoption of cloud computing as a service model in libraries. This created a total of 23 questions items on the questionnaire and 6 questions on the interview guide comprising both closed and open ended questions. The likert scale with five points scale ranging from strong agree to strong disagree was integrated in the tools. Data was collected using likert-scale type statements on a scale of 1 to 5 where: 1= Strong agree; 2=Agree; 3=Neutral; 4=Disagree and; 5=Strongly Disagree. Means (M) were used to explain the level of agreement with each of the statements. Data about the first four objectives was used to make recommendations on an adoption strategy of SaaS for ANU library.

3.6.2 Pilot Testing of Research Instruments

Kothari (2004), states that 10% to 30% of the study sample is adequate for pilot studies. In this study thus, a pilot study encompassing 20 students (20.6% of the sample size of 97) was conducted at ANU on sub- sample student's users who were selected randomly. Piloting is used to pre-test the questionnaire and interview guide with the aim of finding out ambiguous or difficult questions that the respondent cannot comprehend (Reis & Judd, 2014). Piloting assisted the researcher in detecting and collecting ambiguous questions from the questionnaires and interview guide and recognizing it before the actual study.

3.7 Instrument Reliability

According to Mugenda and Mugenda (2014), reliability is "the ability of a research instrument to consistently measure characteristics of interest over time". To establish the reliability of the research instrument, the researcher carried out a pilot test of the instrument. This was done on 20 students. These were not included in the final study. Reliability of the questionnaires was computed using the Cronbach Alpha (α). The alpha assess the reliability of instruments on a scale of 0 to 1 whereby the close the alpha coefficient is close to 1, the higher the reliability. Cronbach values of more than 0.7 are considered sufficient (Goldstein, 2012; Sekaran, 2008; Hair et al, 2010). In this survey, Cronbach alpha values of more than 0.7 were obtained. The questionnaires were thus considered sufficient for analysis.

Table 3.2: Reliability Test

Reliability Statistics		
Variable	**Cronbach's Alpha**	**N of Items**
Technological factors	.789	5
Organization factors	.788	6
Environment factors	.802	6
Target users	.813	6

3.8 Instrument Validity

Validity is "the accuracy and meaningfulness of inferences, which are based on the research results (Kothari 2004)". Content validity shows how well a set of scale items matches with the relevant content domain of the construct of the indicators (Bhattacherjee, 2012). Content and construct validity was used to determine if the items

on the questionnaires and interview gave the desired data from the respondents. An expert in IT department verified the test validity. The internal validity was addressed during piloting. The first parts of questionnaire had questions on general demographic information of the respondents such as gender, category of users and experience in use of online services. The second part of questionnaire had information on the independent variables (Technological, Organizational, environment factors and the Target users) and the dependent variable (adoption of Software as a Service).

From the pilot study findings, the ease with which the respondents answered the study questions was established. Any ambiguous questions were identified and adjusted accordingly. The researcher also amended some questions on the interview guide, by merging those that had similar responses and reduced them from 8 to 6. In order to establish the external validity of the study, it was important to establish if the response rate was adequate for the study. According to Babbie (2014), a response rate of more than 70% is considered sufficient for the study, hence the study targeted a response rate of 70% and above.

3.9 Data Processing and Analysis

The research used both qualitative and quantitative statistics to analyze data. Data from questionnaires was analyzed quantitatively while qualitative data was subjected to content analysis. The findings were then expressed in prose. Qualitative data was computed using Statistical Package for Social Sciences (SPSS) version 20 and output was presented in tables. The descriptive statistics involved use of frequencies, means, standard deviation and percentages. The inferential statistics involved testing of hypothesis using multiple regression analysis.

3.10 Legal and Ethical Considerations

According to Goldner (2011), ethics refers to "moral principles or values that generally govern the conduct of individual or group". Researchers have responsibilities to their profession, client and respondents and must adhere to higher ethical standards, to ensure that both the function and the information are not brought into disrepute. The information obtained from the individual respondents was treated with anonymity, confidentiality and privacy. The researcher ensured that the respondents were well informed on the well disclosure of the information given before conducting an interview. The researcher requested for consent from the participants, before issuing them with questionnaires or interviewing them and also created an environment which would make respondents give information freely and voluntary. An access letter from ANU and research permit from NACOSTI, were obtained to allow the researcher to conduct the study. Further, permission from university management to conduct research in the university was as well obtained. The researcher took protections against plagiarism by recognizing work cited from other sources and authors to ensure honestly of the information.

CHAPTER FOUR

RESULTS AND ANALYSIS

4.1 Introduction

This chapter presents the findings and analysis of the study. The purpose of this study was to assess factors affecting adoption of cloud computing Software as a service (SaaS) model in the libraries. The research variables were technological factors, organizational factors, environment factors and target users. Lastly, the study recommends an adoption strategy of SaaS for ANU library.

4.2 Presentation of Findings

This section presents findings of the study. This is done in line with the objectives of the study.

4.2.1 Response Rate

The targeted population was 97 library users who were issued with questionnaires and administration of interview guide. Out of 97 questionnaires and interview guide administered, 91 questionnaires and interviews were successfully completed (93.8 % of the target). The remaining 6.2% (consisting of students) were unable to fill in the questionnaire due to their busy schedule, and others were on leave at the time of data collection. Table 4.1 shows the response rate.

Table 4.1: Response Rate

Category	Respondents	Target Population
Students	82	88
Faculty	3	3
Non-teaching staff	6	6
Total	**91**	**97**

4.2.3 Demographics of the Respondents

The study sought to investigate the gender, category of users and duration of use for users using Online Services in the Library. The findings obtained are presented in the following section.

4.2.3.1 Gender of Respondents

The respondents were asked to indicate their gender. The findings obtained are presented in Figure 1.1. A fair distribution of gender was considered important and either gender was well represented in the study.
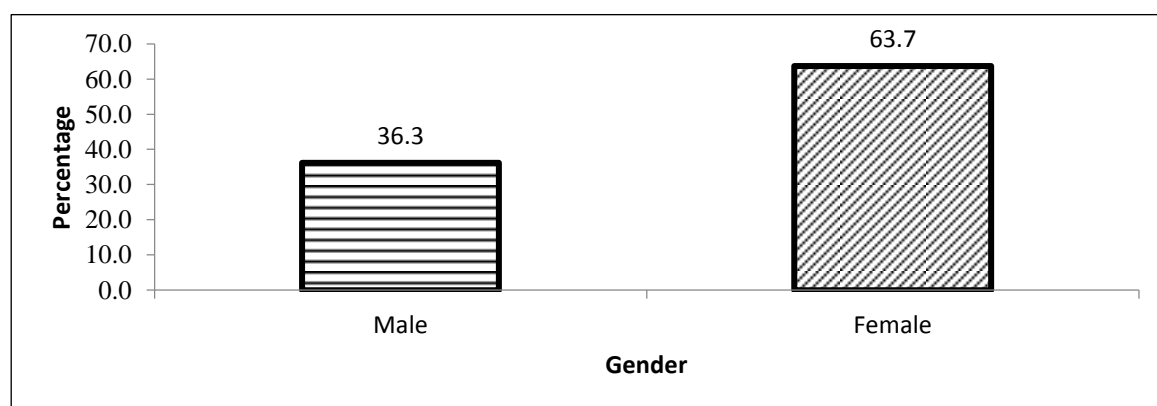
n=91

Figure 4.1 Gender of respondents

4.2.3.2 Category of Library Users at ANU

The study sought to establish the categories under which the library users belonged to.

The findings obtained were presented in Figure 4.2.
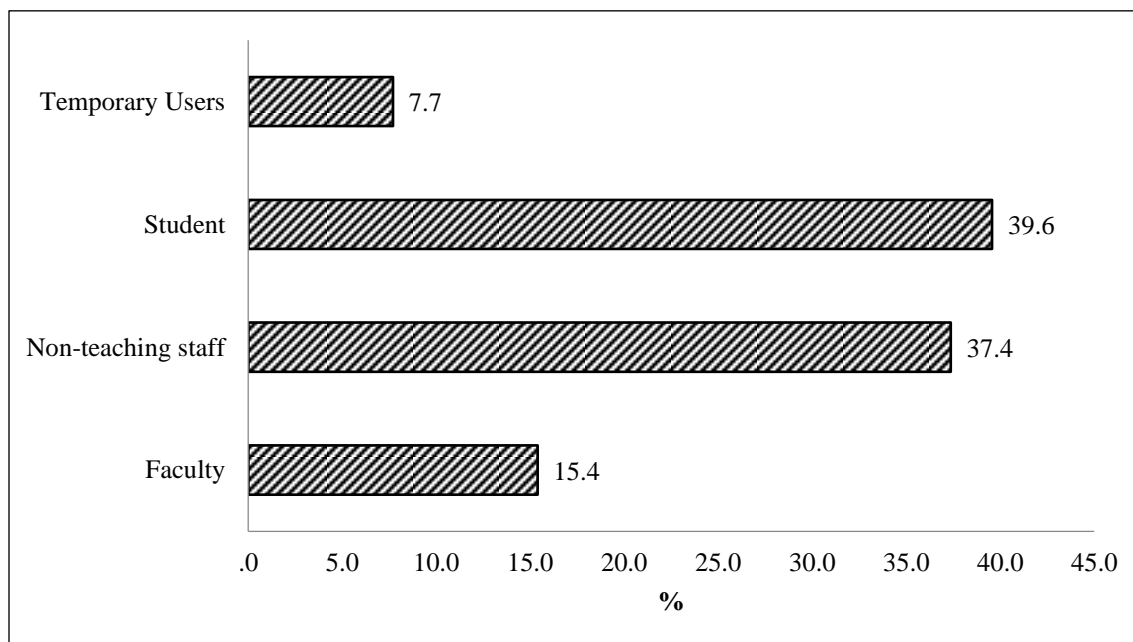
Figure 4.2 Category of library users at ANU (n = 91)

From the Figure 4.2, it is evident that majority of library users were students and least active users were temporary users.

4.2.3.3 Duration Using Online Services in the Library

The respondents were asked to indicate the number of years that they have used online services in the library.
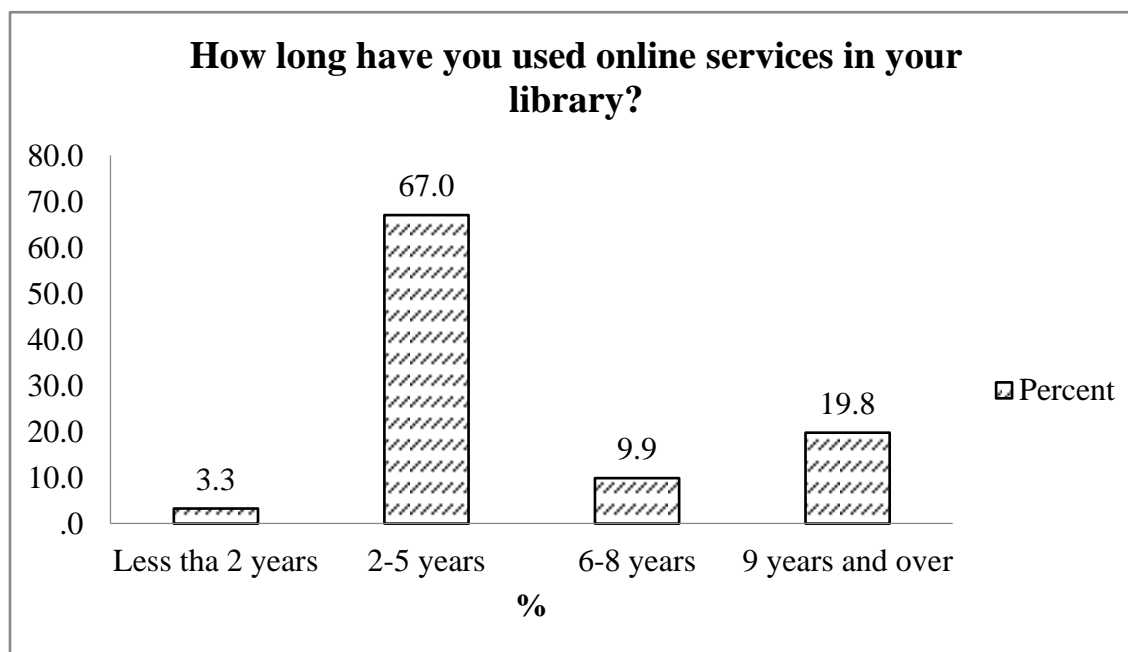
Figure 4.3 **Duration Using Online Services in the Library (n = 91)**

As shown in Figure 4.3, most of the respondents indicated they had used online services for 2-5 years while the least had done so for less than 2 years. This shows that the respondents had been using the online services for diverse periods of time.

4.2.4 Technological Factors Affecting Adoption of SaaS Model in Libraries

The study sought to assess how technological factors are affecting the adoption of cloud computing software as a service application in libraries. The results regarding this were presented and summarized in the Tables 4.2. From the findings, a mean of 1 shows that the respondents strongly disagreed, whereas a mean of 5 shows that the respondents strongly agreed.

Table 4.2 Technological Factors

Technological Factors	SA		A		N		D		SD		Total		Mean	Std. Dev.
	F	%	F	%	F	%	F	%	F	%	F	%		
Cloud computing (SaaS) model is the latest trend and the library should keep up with the pace of technological advancement	64	70	17	19	10	11	0	0	0	0	91	100	1	0.68
The technological system in ANU library improves job performance	42	46	33	36	12	13	4	4	0	0	91	100	2	0.85
Using Software as a model would enable ANU library to accomplish tasks more quickly and gives us greater control over work	26	29	39	43	16	18	3	3	7	8	91	100	2	1.12
The technological system in ANU library fits into all aspects of work as it interacts with other system within the University	12	13	37	41	16	18	13	14	13	14	91	100	3	1.13
It takes too long to use software as a service to make it worth the effort	9	10	17	19	37	41	6	7	22	24	91	100	3	1.27

n=91

According to the Tables 4.3, the respondents agreed that cloud computing (SaaS) model was the latest trend and the library should keep up with the pace of technological advancement. It was also made manifest that technological system in ANU library improved job performance and that using Software as a model would enable ANU library to accomplish tasks more quickly and gives us greater control over work.

The interviews shows that technological factors affected the level of adoption of cloud computing software in putting in place rapid technological changes that necessitated the library

to continuously introduce the latest trend of Software as a service application. ANU library thus needs to have more adoption of software as a service, in order to meet the growing number of its library users in both campuses.

4.2.4 Organizational Factors affecting adoption of cloud computing Software as a Service

The study sought to examine how organizational factors affect the adoption of cloud computing software as a service application in libraries. The results regarding this were presented and summarized in the Table 4.3.

Table 4.3 Organizational Factors (Frequency Distributions)

Organizational Factors	SA F	SA %F	A %F	A	N %F	N	D %F	D	SD %F	SD	Total	Total %	Mean	Std. Dev.
The university's top management is critical to provide strong leadership and engagement in the process cloud	44	48	12	13	15	17	0	0	20	22	91	100	2	1.59
The University top management is likely to consider the adoption of Software as a Service computing model	37	41	24	26	6	7	8	9	16	18	91	100	2	0.85
All employees have basic knowledge about online services	8	9	26	29	4	4	12	13	41	45	91	100	4	1.51
All library users have already used Online services (personal use /academic purpose	4	4	35	39	13	14	3	3	36	40	91	100	3	1.44
The university has sufficient technological resources to implement cloud computing (SaaS) high band width connectivity to the internet	16	18	3	3	12	13	25	28	35	39	91	100	4	1.44
Overall, ANU library staff have extensive technical knowledge about technology similar to cloud computing	7	8	15	17	3	3	3	3	63	69	91	100	4	1.45

n=91

As shown in Tables 4.3, the university's top management is critical in providing a strong leadership and engagement in the process of cloud computing (SaaS) model adoption in the in

the University library. The University top management is also likely to disregard the adoption of
Software as a Service computing model. Furthermore, most of the University employees did not
have basic knowledge about online services. The university also lacked sufficient technological
resources to implement cloud computing (SaaS) high band width connectivity to the internet.
This was coupled with lack of extensive technical knowledge about technology similar to cloud
computing among most of the ANU library staff.

4.2.5 Environment Factors Affect the Adoption of Cloud Computing (SaaS) Model

The researcher went on to investigate the effect of environment factors affecting the
adoption of cloud computing (SaaS) model. The findings obtained are presented in Tables
4.4.

Table 4.4 Environment factors (Frequency Distributions)

Environment Factors	SA		A		N		D		SD		Total		Mean	Std. Dev.
	F	%	F	%	F	%	F	%	F	%	F	%		
It is easy for our library users to switch to other libraries for similar services without much difficulty using cloud	22	24	21	23	14	15	12	13	22	24	91	100	3	1.52
The rivalry among libraries in the industry which my library is operating in is very intense hence I find it necessary to use newer technologies as the rest	42	46	13	14	24	26	12	13	0	0	91	100	2	1.12
I am aware of cloud computing (SaaS) implementation in our competitor's libraries	8	9	33	39	36	40	7	8	7	8	91	100	3	1.01
I understand the competitive advantages offered by cloud computing in our libraries	7	8	46	51	6	7	14	15	18	20	91	100	3	1.33
It is important for our library to receive cloud computing training from cloud computing providers	69	76	18	20	4	4	0	0	0	0	91	100	1	0.70
I believe that good relationships with other parties through new trends will be crucial	49	54	27	30	15	17	0	0	0	0	91	100	2	0.08

n=91

The respondents strongly opined that it is important for ANU library to receive cloud computing training from cloud computing providers. Furthermore, the rivalry among libraries in the industry which ANU library is operating was very intense; hence, it was necessary to use newer technologies as the rest. Good relationships with other parties through new trends were also seen as being crucial.

4.2.6 Target Users in the Decision to Adopt Cloud Computing (SaaS) For Libraries

Lastly, the researcher went on to investigate the effect of target users on the Decision to Adopt Cloud Computing (SaaS) for Libraries. The findings obtained were presented in Table 4.5.

Table 4.5 Target Users

Target Users	SA		A		N		D		SD		Total			
	F	%	F	%	F	%	F	%	F	%	F	%	Mean	Std. Dev
Software as Service (SaaS) makes work more effective and efficient	73	80	14	15	0	0	0	0	4	4	91	100	1	0.87
I prefer to use Software as a service application than downloading and installing specific software	60	66	31	34	0	0	0	0	0	0	91	100	1	0.48
The adoption of Software as a Service technology at the library helps to activate new services	38	42	42	46	4	4	4	4	3	3	91	100	2	0.95
Using cloud computing service(s) is convenient	39	43	46	51	6	7	0	0	0	0	91	100	2	0.61
Using cloud computing services(s) enable me to accomplish tasks more quickly	41	45	24	26	3	3	4	4	19	21	91	100	2	1.57
Satisfied with the use of online services applications provided by library services	12	13	13	14	3	3	27	30	36	40	91	100	4	1.45

n=91

The respondents strongly pointed out that the existing Software as Service (SaaS) made work more effective and efficient and that they preferred to use Software as a service application than downloading and installing specific software. It was also made manifest that the existing technology helped to activate new cloud computing (SaaS) service(s) in ANU library and that it was preferable to using the existing (SaaS) services(s) since most library users were not aware of the existing cloud computing software, that are already exist in ANU library. Most of the respondents were not satisfied with the use of online services applications, provided by ANU library.

4.2.7 Adoption of Cloud Computing Software as a Service

This study sought to assess how technological, environmental, organizational factors and end-user behaviour affects the adoption of cloud computing software as a service. The study identified adoption patterns in the use of cloud computing among ANU library users. To begin with, the study assessed the overall adoption of cloud computing services as a service. These finding are presented in Table 4.6.

Table 4.6 Online Services Used / Accessed by users at ANU library

Cloud computing Services	Many Times Daily		Many Times in a Week		Few months		Never		Total	
	F	%	F	%	F	%	F	%	F	%
Internet	57	62.6	0	0.0	0	0.0	0	0.0	91	100
Email Storage of documents	21	23.1	14	15.4	0	0.0	0	0.0	91	100
Social Media	17	18.4	15	16.2	6	6.6	26	28.3	91	100
Gmail	25	27.5	14	15.4	10	11.0	15	16.5	91	100
Yahoo	7	7.7	12	13.2	34	37.4	30	33.0	91	100
										100
Hotmail	8	8.8	0	0.0	14	15.4	58	63.7	91	

The findings show that the most used online service per day was internet services at 62.6%. This was followed by Gmail, email storage of documents and social media. Based on the descriptive statistics, the most important factors affected the adoption of Cloud Computing Software as a Service as shown in Table 4.7 are analyzed.

Table 4.7 Adoption Model for Cloud Computing Services

Technological	Organizational	Environmental	Target Users	Adoption of Cloud Computing as a Service
It's a new service	Provides strong leadership and is likely to consider adoption	Training from service providers	Makes work more effective and efficient	Internet services, Gmail, email storage of documents and social media.
M= 2 (A)	M=2 (A)	M= 1 (SA)	M=1 (SA)	32.9% (Average Daily Use)

The findings show that the newness of the service and its utility was an essential predictor of adoption of cloud computing services as shown by most of the respondents who agreed (M=2). This was influenced by strong leadership (M=2). The external environment was also pivotal. Training from service providers strengthened adoption processes (M=1). Target users appreciation of the fact that the service was effective and efficient also played a facilitative role (M=1). The level to which these factors affected the adoption of cloud computing as a service, indicated by use of internet services, Gmail, email storage of documents and social media use by an average of 32.9% daily, was assessed using multiple regression analysis.

4.3 Analysis

The study carried out multiple regression analysis to test the relationship between the study variables. The findings obtained are presented in the following section.

4.3.1 Multiple Regression Analysis

The following section presents the findings from the regression model adopted by the study.

4.3.1.1 Model Summary

A multiple regression analysis was done. The output of the analysis is as shown in Tables 4.8, 4.9 and 4.10. From table 4.8, the coefficient of determinant of R squared was used to establish the predictive power of the study model, which was found to be 0.240 implying 24% of the variation of factors affecting adoption of cloud computing software as a service model in libraries, were explained by the fact that the university's top management is critical to provide strong leadership and engagement in the process cloud computing (SaaS) model adoption in the library, it is important for our library to receive cloud computing training from cloud computing providers, Cloud computing (SaaS) model is the latest trend and the library should keep up with the pace of technological advancement. The remaining 76 % was distributed to other factors not investigated in this study. The R values reflect the true estimates of the overall model. The adjusted R squared shows that if another new variable is introduced in the study, the total variation that is established would contribute to 20.4%.

Table 4.8 Multiple Regression Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.490[a]	.240	.204	.434

a. Predictors: (Constant), Software as Service (SaaS) makes work more effective and efficient, The university's top management is critical to provide strong leadership and engagement in the process cloud computing (SaaS) model adoption in the library, It is important for our library to receive cloud computing training from cloud computing providers, Cloud computing (SaaS) model is the latest trend and the library should keep up with the pace of technological advancement

3.1.2 Analysis of Variance

Table 4.9, shows the analysis of variance (ANOVA) output. The F-ratio in the ANOVA table tests, whether the overall regression model is fit for the data. The table shows that, independent variables statistically predict the dependent variable, $F = 6.782$, $p < 0.5$ in other words the regression model was fit for the data.

Table 4.9: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
		ANOVA[a]				
1	Regression	5.107	4	1.277	6.782	.000[b]
	Residual	16.190	86	.188		
	Total	21.297	90			

a. Dependent Variable: Use of Clouding Computing Services (Internet)

b. Predictors: (Constant), Software as Service (SaaS) makes work more effective and efficient, The university's top management is critical to provide strong leadership and engagement in the process cloud computing (SaaS) model adoption in the library, It is important for our library to receive cloud computing training from cloud computing providers, Cloud computing (SaaS) model is the latest trend and the library should keep up with the pace of technological advancement

4.3.1.3 Regression Coefficients

To assess the effects of independent variables on dependent variable, the independent variables were regressed on adoption of Software as a Service (dependent variable). All the predictors did not register significant Beta coefficients except the organizational factors predicted by the fact that the university's top management is critical to provide strong leadership and engagement in the process.

Y= 1.738 -0.144* university's top management provision of strong leadership and engagement in the process + .161

These findings show that the most important predictor of adoption of clouding computing as a service was support from the top management of the university.

Table 4.10: Regression Coefficients

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.738	.161		10.764	.000
Cloud computing (SaaS) model is the latest trend and the library should keep up with the pace of technological advancement	.047	.072	.066	.653	.516
The university's top management is critical to provide strong leadership and engagement in the process cloud computing (SaaS) model adoption in the library	-.144	.030	-.471	-4.789	.000

	.051	.068	.074	.750	.455
It is important for our library to receive cloud computing training from cloud computing providers					
Software as Service (SaaS) makes work more effective and efficient	.069	.053	.123	1.293	.199

a. Dependent Variable: Use of Clouding Computing Services (Internet)

Source: Study Findings, 2020

4.3.1.3 Validation of the Adoption Model

The study found out that, the variables under investigation affected the adoption of SaaS in Libraries in varying extents. As showed by multiple regression analysis, the strongest determinants of adoption of SaaS as a service was organizational factors (B=-0.471, p<0.05). In this regard, the validated model for adoption of SaaS is as follows: Strengthening organizational support by securing support from top management, expanding the use of SaaS to service all parts of the organization and ensuring that the top management is ready for SaaS. The level on which the management of the organization supports the adoption of cloud computing as a service would affect its adoption as a service in libraries. The adoption model is presented in Figure 4.4.

Enhanced organizational support
- Securing support from top management
- Expanding the use of SaaS to service all parts of the organization
- And ensuring that the top management is ready SaaS.
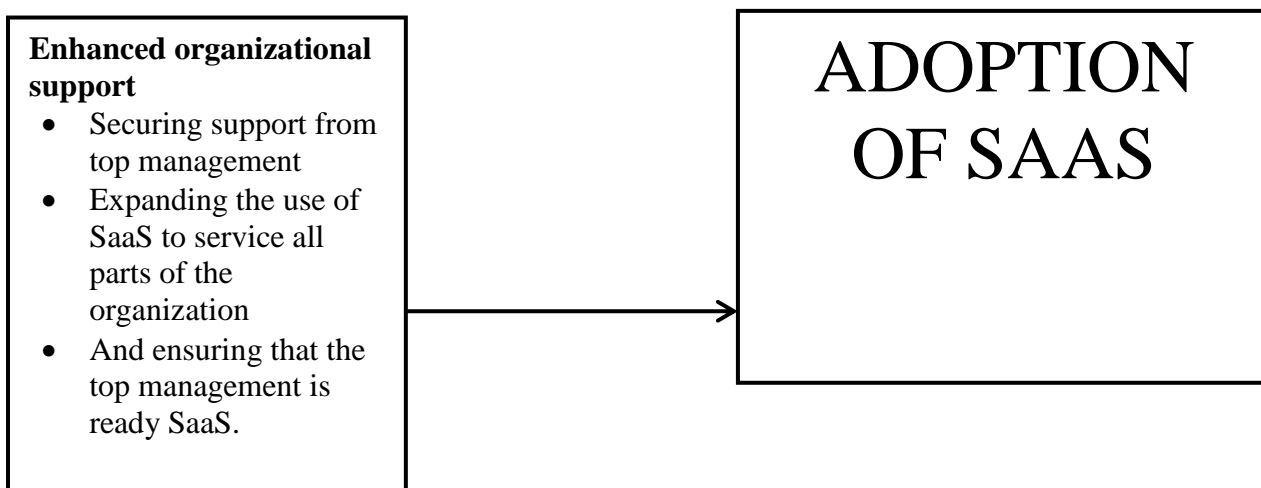
ADOPTION OF SAAS

Figure 4.4 Adoption Model of SaaS

Source: Study Findings, 2020

CHAPTER FIVE

DISCUSSION, SUMMARY OF FINDINGS, CONCLUSION AND

RECOMMENDATIONS

5.1 Introduction

The purpose of this study was to find out the factors affecting adoption of cloud computing software as a service in libraries. The objectives of the study were; to determine the technological factors affecting the adoption of SaaS in ANU library; to establish the organizational factors affecting the adoption of SaaS in ANU library; to determine environment factors affecting the adoption of SaaS in ANU library and to investigate the different types of users and their needs in ANU Library. This chapter presents the summary of findings, conclusions based on the results analyzed and recommendations.

5.2 Discussions

The study findings are discussed in the following section. This is done on the basis of the study objectives.

5.2.1 Technological Factors Affecting Adoption of Cloud Computing SaaS Technology in the Libraries

In line with the first objective, technological infrastructure factors affected the adoption of cloud computing SaaS technologies in the libraries. The technological aspect was assessed under the sub measures. Cloud computing (SaaS) model that exist is the latest trend and the library, keep up with the pace of technological advancement. Descriptive

results findings show that, technology affected the adoption of SaaS within libraries to a very great extent. Using the system enables employees to accomplish tasks more quickly, gives greater control over work and the technological system in ANU library improves job performance. The technological system in ANU library fits into all aspects of work, as it interacts with other systems within the University. The findings concurs with the work of Ismail (2015) who discovered that, cloud computing leads to positive competitive advantage (e.g. helping libraries to create competitive advantage and establishing useful links with other libraries) and information accuracy (e.g. easier access to information and improve information accuracy).

The findings also show that, respondents disagree that SaaS model application takes too long to learn how to use cloud computing to make it worth the effort. But in general cloud computing software as a service is complex to use. The findings concur with the study conducted by Oliverira and Martins (2010) that, the complexity of integrating different cloud services with existing infrastructure is a real challenge to many libraries.

5.2.2 Organizational Factors Affecting Adoption of Cloud Computing SaaS Technology in Libraries

In line with the second objective, top management factor affected the adoption of cloud computing Software as a service within libraries. The organizational context was assessed under the sub measures that, the university's top management is not critical in providing strong leadership and engagement in the process of cloud computing (SaaS) model adoption in the library. The University top management is likely to disregard the adoption

of Software as a Service computing model. All employees have basic knowledge about online services. Further, all library users have already used Online services for (personal use /academic purpose). The university has sufficient technological resources to implement cloud computing (SaaS) high band width connectivity to the internet. Overall, ANU library staffs have extensive technical knowledge about technology similar to cloud computing.

Descriptive results revealed that, organizational factors affected the adoption of cloud computing SaaS technology within libraries to very great extent. However, the findings of this research study noted that, majority of the respondents disagreed that, the university's top management is not critical in providing strong leadership and engagement in the process of cloud computing (SaaS) model adoption in the library. They argued that, the team has nothing to do with the adoption of SaaS project; the University top management is likely to disregard the adoption of Software as a Service computing model. Additionally, the management approves sufficient financial investment for adoption of cloud computing Software as a Service model. The findings are in support of the findings by Grandon and Pearson (2014) who argued that, lack of top management support would lead to failure of adoption. All employees have basic knowledge about online services. The findings are in support of the findings by Oliveira and Martins (2010) who posits that, the adoption of cloud computing SaaS model is highly dependent on employee competencies and positive attitude towards the technology**.** Using cloud computing SaaS technology is a way of increasing employee confidence.

The findings show that, all library users have already used online services for (personal use /academic purpose). Further, the respondents agreed that, the university has sufficient technological resources to implement cloud computing (SaaS) with high band width connectivity to the internet. The overall ANU library staffs have extensive technical knowledge about technology similar to cloud computing. The findings are in line with the study findings of Low, Chen, and Wu (2011) who argued that, human resources provide the necessary skills, experience and knowledge base, required to implement and integrate a new cloud computing software as a services applications. However, the findings show that, employees' interaction with the system is not very clear to comprehend. This also concurs with the study findings by Wang et al., (2010) who views that, adoption of new technology innovations is dependent on readiness of an organization, which includes the technological infrastructure and IT human resources.

5.2.3 Environment Factors Affecting Adoption of Cloud Computing SaaS Technology in Libraries

In line with the third objective, competitive pressure factors affected the adoption of cloud computing technology within libraries. Results obtained show that, environment factor affected the adoption of cloud computing Software as a Service technology within libraries, to a great extent. Having the system is easy for library users to switch to other libraries, for similar services without much difficulty using cloud. The rivalry among libraries in the industry which library is operating in is very intense hence, it is necessary to use newer technologies as the rest. Awareness of cloud computing (SaaS) implementation in our competitor's libraries, understanding the competitive advantages offered by cloud computing in our libraries, the important for library to receive cloud

computing training from cloud computing providers and good relationships with other parties through new trends will be crucial. The findings are in line with the findings conducted by Laforet (2011), Low, Chen (2011) who suggested that, there is the pressure from both competitors and library partners on the academic sphere, to stay current and adopt more new Software as Service applications. This competitive pressure has resulted in many libraries outsourcing their IT infrastructure, not only to improve effectiveness but also to enable lower prices to be offered.

5.2.2 Target Users' Decisions as Factors Affecting Adoption of Cloud Computing SaaS Technology in Libraries

In line with fourth objective, this research investigated the extent to which target users factors affected the adoption of cloud computing Software as a service technology within libraries. Descriptive findings show that, target users affected the adoption of cloud computing SaaS technology to a great extent. Software as Service (SaaS) makes work more effective and efficient. Most respondents argued that they prefer to use Software as a service application than downloading and installing specific software. The adoption of Software as a Service technology at the library helps to activate new services. Moreover, using cloud computing service(s) is convenient and enables one to accomplish tasks more quickly.

5.3 Summary of Main Findings

5.3.1 Technological Factors Affecting Adoption of Cloud Computing SaaS Technology in Libraries

The study established the extent to which technological factors affected the adoption of cloud computing SaaS technology in the libraries. Accordingly Technological affected the adoption of SaaS within libraries to a great extent. Using the technological system in ANU library enables employee to accomplish tasks more quickly, improves job performance, gives greater control over work and fits into all aspects of work, as it interacts with other systems within the University. The findings concur with the study findings by Ismail (2015) who discovered that, cloud computing leads to positive competitive advantage and information accuracy. The findings also shows that, respondents disagree that, SaaS model application takes too long to learn how to use cloud computing to make it worth the effort. But in general, cloud computing software as a service is complex to use, which concurs with the study by conducted by Oliverira and Martins (2010) who posits that, the complexity of integrating different cloud services with existing infrastructure is a real challenge to many libraries.

5.3.2 Organizational Factors Affecting Adoption of Cloud Computing SaaS Technology in Libraries

The study revealed that, organizational factors affected the adoption of cloud computing SaaS technology within libraries to very great extent. However, the findings of this research study noted that, majority of the respondents disagreed that, the university's top management is not critical in providing strong leadership and engagement in the process

of cloud computing (SaaS) model adoption in the library. They argued that, the team has nothing to do with the adoption of SaaS project; the University top management is likely to disregard the adoption of Software as a Service computing model. Additionally, the management approves sufficient financial investment for adoption of cloud computing Software as a Service model. The findings are in support of the findings by Grandon and Pearson (2014) who argued that, lack of top management support would lead to failure of adoption. All employees have basic knowledge about online services. The findings are in support of the findings by Oliveira and Martins (2010) who posits that, the adoption of cloud computing SaaS model is highly dependent on employee competencies and positive attitude towards the technology. Using cloud computing SaaS technology is a way of increasing employee confidence.

5.3.3 Environment Factors Affecting Adoption of Cloud Computing SaaS Technology in Libraries

Regarding environment factors, the findings obtained show that is easy for library users to switch to other libraries, for similar services without much difficulty using cloud. The rivalry among libraries in the industry which library is operating in is very intense hence, it is necessary to use newer technologies as the rest. Awareness of cloud computing (SaaS) implementation in our competitor's libraries, understanding the competitive advantages offered by cloud computing in our libraries, the important for library to receive cloud computing training from cloud computing providers and good relationships with other parties through new trends will be crucial. The findings are in line with the findings conducted by Laforet (2011), Low, Chen (2011) who suggested that, there is the pressure from both competitors and library partners on the academic sphere, to stay

current and adopt more new Software as Service applications. This competitive pressure has resulted in many libraries outsourcing their IT infrastructure, not only to improve effectiveness but also to enable lower prices to be offered.

5.3.2 Target Users' Decisions as Factors Affecting Adoption of Cloud Computing SaaS Technology in Libraries

The study shows that, target users affected the adoption of cloud computing SaaS technology to a very great extent. The findings show that, SaaS makes work more effective and efficient. Most of the respondents indicated that, they preferred to use Software as a service application, than downloading and installing specific software. The adoption of Software as a service technology at the library, helped to activate new services, it was convenient, it enables one to accomplish tasks more quickly and most of the participants indicated that, they were satisfied with the use of online services applications provided by library services.

5.4 Conclusions

The following are the conclusion of the study findings in line with the objectives of the study.

5.4.1 Technological Factors

Based on the study findings, the study concludes that, technological factors affected the adoption of cloud computing technology within the libraries. Cloud computing software as a service, leads to positive competitive advantage .i.e. (helping libraries to create

competitive advantage and establishing useful links with other libraries) and information accuracy i.e. (easier access to information and improve information accuracy in order to meet the needs of library users who make partially use of physical library books). However, the complexity of integrating different software as a service with the existing infrastructure is a real challenge to many libraries.

5.4.2 Organizational Factors

Regarding the second objective, the study concludes that, organizational factors pose significant effects on adoption of cloud computing technology within the libraries. The top management team has a big task in steering the adoption of cloud computing SaaS model in the libraries. The adoption of SaaS model in libraries is highly depended on employee's competence and the positive attitude towards technology. Therefore, human resources departments should provide the necessary skills, experience and knowledge base, required to implement and integrate new cloud computing software as a service applications. However, it's not easy for the employees to become skillful in using the systems as it's not very easy to comprehend.

5.4.3 Environment Factor

The study concludes that, environment factors affected the adoption of cloud computing Software as Service. The competitors in the libraries that use SaaS model services have more prestige than those who do not. The SaaS model applications allows for reliable interaction with other libraries and that, this competitive pressure has resulted in many libraries outsourcing their IT infrastructure not only to improve effectiveness but also to enable lower price to be offered, as an attempt to improve their library services.

5.4.4 Target Users

Lastly, the study concludes that, target users affected the adoption of cloud computing SaaS technology in various ways. In this regard, it is evident that, SaaS makes work more effective and efficient. It also makes work easy through easy installation and downloading of specific software's, as well as helping the library to activate new services. It was also convenient in making it easy to accomplish tasks more quickly.

5.5 Recommendations

Various recommendations can be made based on the study findings.

5.5.1 Technological Factors

Regarding technological factors, there is need for training and creating cloud services awareness (through workshops, benchmarking and seminars), so as to enhancing the knowledge and appreciation of SaaS. This could play a pivotal role in enhancing the adoption of SaaS technologies.

5.5.2 Organizational Factors

The study recommends for the formulation of strong policies aimed at enhancing the adoption of cloud computing SaaS model among libraries. It is important to promote positive attitudes towards technology and human resources within libraries, so as to enhance the adoption of cloud computing SaaS model among libraries.

5.5.3 Environment Factor

There is need to create the right environment in which the management of the organization, could provide resources for training employees on SaaS systems and their importance in organizations. It is also pertinent to enhance interaction between libraries, through physical and online forums, so as to exchange knowledge and information regarding cloud computing services.

5.5.4 Target Users

It is also pertinent to create awareness through training forums, workshops and other avenues among users, so as to make them appreciate clouding computing services. This is essential since it could enhance their uptake of cloud computing services in libraries.

5.5.5 Adoption Strategy of SaaS Model For ANU Library

There is need to promote favorable technological factors such as increasing IT literacy, leveraging on the relative advantage of using SaaS, procuring the relevant ICT infrastructure and installing the relevant software. Organizational support should be strengthened by securing support from top management, expanding the use of SaaS to service all parts of the organization and ensuring that the top management is ready for SaaS. Also, SaaS should also be formulated in such a way that, it is responsive to the needs of target users, based on the type of users and their nature of interaction among others. Lastly, there should be efforts to ensure that, SaaS is responsive to environmental realities, such as, competitive pressure, government regulation and trends in library use services. The level on which the organization is aligned to sequentially respond to the demands of these factors affecting the level of adoption of cloud computing software as a service in libraries. An actual adoption strategy is presented in Appendix IV.

5.6 Recommendations for Further Research

Future studies should focus on the following areas to ensure libraries operate effectively:

i)   Study on implementation challenges, while adopting cloud computing SaaS

model in the libraries

ii)   Study on cost and trust as stumbling blocks and how they affects cloud computing

Software as a Service

iii)   Study on the effective ways of implementing the roadmap to increase cloud

computing software as a service model in the libraries

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APPENDICES

APPENDIX I: LETTER OF INTRODUCTION

Mary Mutata

Department of Information Technology

ANU

P.O BOX 53067

Nairobi.

Dear Sir/ Madam,

Ref: Requesting for your participation in a study proposal

I am a postgraduate student in the above named department carrying out a research on the "Factors affecting adoption of cloud computing SaaS model in libraries" I am writing this letter to ask for your time and attention to participate in the study. The study is purely for educational purposes as the findings will of importance to the university and the library department.

I will be glad if you participate in this research. The information obtained will be treated with highly anonymity.

Thank you.

Yours faithfully

Mary Mutata.

APPENDIX II: QUESTIONNAIRE ON CLOUD COMPUTING (SAAS) MODEL

SERVICES

The goal of this study is to evaluate the factors affecting the adoption of cloud computing

SaaS model for libraries .Any help will be inform of your contribution is important for

this study. You are not required to write to write to write your name and any information

obtained will be treated with utmost confidentiality and will only be used for purposes of

this research.

Respondent physical

Location………………………………………………………………

PART I Demographic Information

1. Please select your gender   Male   [ ]   Female   [ ]

2. What category of user are you?

   Faculty   [ ]   Non-teaching staff   [ ]   Students   [ ] others [ ]

3. How long have you used online services in your library?

   Less than 2 Years   [ ]   2- 5 years   [ ]   6-8 years   [ ]   9 years and over [ ]

4 Which of the following online services do you use/ access and at what frequency?

Cloud computing services	Hourly	Many times daily	Few times a day	Many times in a week	Few months	Never
Internet						
Email Storage of documents						
Facebook						
YouTube						
My Space						
Linked – in						
Gmail						
Yahoo						
Hotmail						

PART II: The technological factors affecting the decision to adopt cloud computing SaaS model for libraries.

The following are technological factors that affects adoption of cloud computing (SaaS) model, kindly indicate the extent to which you agree with the statements with regard to you library.

Please tick [√] Strong Agree [1] Agree [2]   Neutral   [3] Disagree [4] Strong Disagree [5]

Technological factors	1	2	3	4	5
1.Cloud computing (SaaS) model is the latest trend and the library should keep up with the pace of technological advancement					
2.The technological system in ANU library improves job performance					
3. Using Software as a model would enable ANU library to accomplish tasks more quickly and gives us greater control over work					
4.The technological system in ANU library fits into all aspects of work as it interacts with other system within the University					
5.It takes too long to use software as a service to make it worth the effort					

PART III: The organizational factors affecting the decision to adopt cloud computing (SaaS) model for libraries.

The following are organizational factors that affect adoption of Software as a Service (SaaS) model, kindly indicate the extent to which you agree with the statements with regard to you library.

Please tick [√] Strong Agree [1] Agree [2]   Neutral   [3] Disagree [4] Strong Disagree [5]

Organization factors	1	2	3	4	5
11. The university's top management is critical to provide strong leadership and engagement in the process cloud computing (SaaS) model adoption in the library					
2. The University top management is likely to consider the adoption of Software as a Service computing model					
3.All employees have basic knowledge about online services					
4.All library users have already used Online services (personal use /academic purpose)					
5. The university has sufficient technological resources to implement cloud computing g (SaaS) high band width connectivity to the internet .					
6. Overall, ANU library staff have extensive technical knowledge about technology similar to cloud computing					

IV: The environment factors affecting the decision to adopt cloud computing (SaaS) for libraries.

The following are environment factors that affect adoption of cloud computing (SaaS) model,

Kindly indicate the extent to which you agree with the statements with regard to you library.

Please tick [√] Strong Agree [1] Agree [2]   Neutral   [3] Disagree [4] Strong Disagree [5]

Environment factors	1	2	3	4	5
1. It is easy for our library users to switch to other libraries for similar services without much difficulty using cloud computing applications					
2.The rivalry among libraries in the industry which my library is operating in is very intense hence I find it necessary to use newer technologies as the rest					
3.I am aware of cloud computing (SaaS) implementation in our competitor's libraries					
4.I understand the competitive advantages offered by cloud computing in our libraries					
5.It is important for our library to receive cloud computing training from cloud computing providers					
6.I believe that good relationships with other parties through new trends will be crucial					

PART V: The Target users in the decision to adopt cloud computing (SaaS) for libraries.

Please tick [√] Strong Agree [1] Agree [2]   Neutral   [3] Disagree [4] Strong Disagree [5]

Target users	1	2	3	4	5
1.Software as Service (SaaS) makes work more effective and efficient					
2. I prefer to use Software as a service applications than downloading and installing specific software					
3.The adoption of Software as a Service technology at the library helps to activate new services					
4.Using cloud computing service(s) is convenient					
5.Using cloud computing services(s) enable me to accomplish tasks more quickly					
6.Satisfied with the use of online services applications provided by library services					

Thank you

APPENDIX III: INTERVIEW GUIDE

The goal of this study is to determine and evaluate the factors affecting adoption of cloud computing (SaaS) model in ANU library. Any help will be in form of your contribution is important for this study. Do not write your name and any information obtained will be treated with high anonymity

Respondent physical

Location……………………………………………………………………………………

1. Does the existing technological system in ANU library enable cloud computing (SaaS) model?

2. Does the available technological system in ANU library support the usage of library resources efficiently?

3. In your own opinion what benefits will your library receive from this adoption?

4. In your opinion what are the challenges are likely to be encountered in the adoption cloud computing (SaaS) model in your library?

5. What support you would like the University institution provide in relation to the above challenges?

6. Is the existing library system compatible with all aspects of work? (Librarians only).

Thank you

APPENDIX IV: ADOPTION STRATEGY

Factor	Objective	Strategic Activity
Technological	Promote favorable technological factors	• Increasing IT literacy • Procuring the relevant ICT infrastructure installing the relevant software
Organizational	Strengthening organizational support by securing support from top management and their responsiveness to the software through	• Training and advocacy.
Environmental	Strengthening the environment under which SAAS are implemented	• Respond to competitive pressure • Comply to government regulation • Align to trends in library use services
Users	Ensuring readiness to use SaaS in all departments	• Ensure effectiveness and efficiency in work processes • Easy installation and downloading of specific software's, • Activate new services

Source: Study Findings, 2020

APPENDIX V: INTRODUCTION LETTER

AFRICA NAZARENE
U N I V E R S I T Y

July 16, 2019

To Whom It May Concern

Dear Sir/Madam,

RE: PROPOSAL APPROVAL FOR MARY MUTATA (17S03DMIT004)

The above named is a Master of Applied IT student at Africa Nazarene University. This is to confirm that her research proposal titled **"Evaluating Factors Affecting Adoption of Cloud Computing Software As A Service in Libraries: A Case Study of Africa Nazarene University"** has been approved for conduct of research, subject to obtaining other permissions and/or clearances that may be required beforehand.

Any support and/or assistance accorded to her will be highly appreciated.

Please feel free to contact me via email on jobuhuma@anu.ac.ke in case of further clarity required.
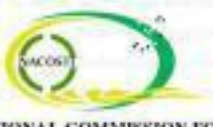
Yours Sincerely,
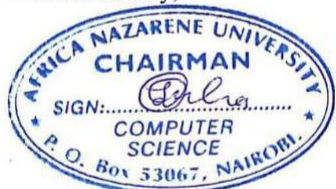
Obuhuma James
Head of Department, Computer and Information Technology

APPENDIX VI: RESEARCH PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: **979628**

Date of Issue: **09/September/2019**

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APPENDIX VII: MAP OF STUDY AREA