USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) IN PROVISION OF INFORMATION SERVICES IN PUBLIC UNIVERSITY LIBRARIES IN KENYA: A CASE STUDY OF MASENO UNIVERSITY LIBRARY, KENYA.

BY

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DECLARATION

Declaration by the Candidate

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This work is dedicated to my sons Isaac Zawadi and Aaron De Lewi; my late parents Leah Amoit Osere, and Barnaba Osere, my brothers and sisters for their extended support throughout my studies.

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ABSTRACT

Use of Information and Communication Technologies (ICTs) in public university libraries has transformed and boosted provision of information services as well as library operations. However, it has been observed that no steady strides towards this noble cause have been made by Maseno University library over the years and ever since the year 2001 only partial automation has been achieved leaving some very important processes and services like: Circulation desk functions (Charging and dis-charging of books, payment of overdue fines, sending out of overdue notices), manning security of information resources, information desk queries, among others performed manually. The aim of the study was to examine the use of Information and Communication Technologies (ICTs) in provision of information services in public university libraries in Kenya: A Case study of Maseno University library, Kenya with the view to propose measures for improvement. The objectives of the study were to: assess the status on the use of ICT application at Maseno University library; examine ICT policies and regulations governing use of ICTs in provision of information services at Maseno University library; examine the ICT infrastructure supporting provision of information services at Maseno University library; establish services provided at Maseno University library as a result of ICT utilization in provision of information services; and establish ICT knowledge, skills and training of library staff and users in ICT utilization in provision of information services at Maseno University library. The study adopted Information Technology (IT) Implementation model. The study employed mixed method approach (concurrent exploratory design) of which survey design was applied within a case study. The study target population was 3526 composed of undergraduate students, teaching staff, librarians' in-charge of sections, university librarian, director ICT, and finance officer. The population was stratified, thereafter simple random and purposive sampling was applied and a sample size of 186 respondents was drawn. Qualitative data was analyzed thematically while quantitative data was analyzed using descriptive statistics (frequencies and percentages). Study findings pointed out absence of library ICT policy and inadequate ICT equipment, tools and software. Further the study revealed other deficiencies such as: limited library staff with ICT skills and knowledge, high costs in purchase and maintenance of ICT tools and equipment; unstable, unreliable and costly internet connectivity and data loss during transfer from manual to digital. The study concluded that there was minimal use of ICTs in provision of information services as indicated herein that hampered efficient service delivery at Maseno University library. The study therefore recommends corrective measures such as: formulation, implementation and updating of library ICT working policy; the library ICT working policy should emphasize on fully automated library services and operations; and engage collaborative partnership in support and purchase of ICT tools, equipment and software. Further, the library management should organize programmes to upskill and reskill library staff and users on ICT application and use in provision of information services as well as, prioritization of funds for improvement and maintenance of ICT equipment, tools and resources.

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ACRONYMNS AND ABBREVIATIONS

ACRL	-	Association of College and Research Libraries
ALA	-	American Library Association
CAS	-	Current Awareness Services
CCTV	-	Closed Circuit Television
CDS/ISIS	-	Computerized Documentation System – Integrated Set for Information Systems
CD-ROM	-	Computer Disk Read Only Memory
CUE	-	Commission for University Education
ICT	-	Information and Communication Technology
ISO	-	International Organization for Standardization
IT	-	Information Technology
KENET	-	Kenya Education Network
LAN	-	Local Area Network
LMS	-	Library Management System
LMSS	-	Library Management System Software
OPAC	-	Online Public Access Catalogue
RFID	-	Radio Frequency Identification
SDI	-	Selective Dissemination of Information
UN	-	United Nations
UNESCO	-	United Nations Educational, Scientific, and Cultural Organization
UTAUT	-	Unified Theory of Acceptance and Use of Technology
WAN	-	Wide Area Network
WWW	-	World Wide Web

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

Public university libraries in Kenya, like other African libraries, are vital components of educational institutions (Oyedun, 2007; Wawire and Messah, 2010). Wawire and Messah (2010) further assert that university libraries are established to support study, learning, teaching, and research by transforming information into knowledge. Kuh and Gonyea (2003) affirmed that students, staff, researchers, and the surrounding community rely on libraries for information access. The emergence of ICTs has greatly impacted the quality of information provision, enabling the conversion of library services, routines, and operations from manual to computerized processes (Adebayo, Ahmed, and Adeniran, 2018; Kamau, 2018).

Makori (2009) affirms that the primary role of a university library is to provide effective services to its members in their quest for the required information for teaching, study, and research, thereby meeting each user's needs. Authors such as Odongo (2011), Ekwe (2013), Kamau (2018), Wangari (2021), and Guto and Wasike (2022) have defined ICTs as hardware and software that enable humanity to create, collect, store, consolidate, and communicate information in multimedia formats for various purposes. Similarly, applicable definitions and uses in this study are taken from the American Library Association (ALA) (1983), UNESCO (2002), and Ebijuwa and ToAnyakoha (2005), which define ICTs as a range of technologies, applications of computers, tools, and means applied in the processes of collecting, processing, storing, editing, retrieving, transferring, and disseminating information in various formats. Thus, Information and Communication Technologies (ICTs) can be split into three components: the technology; the information that the technology helps to deliver; and the communication process that the technology facilitates and serves as a medium for the information (Mane, 2018).

The uses of ICTs in public university libraries vary depending on the individual library users and their needs. However, authors like Ejigbo et al. (2016) posit that ICTs are heavily utilized in the storage, processing, and dissemination of information. Similarly, Chisenga (2004), Bhoi (2017), Makori (2013), and Wangari (2021) have outlined the uses of ICTs in public university libraries as: Provision of Web Access to OPAC; Networked Information Resources; Institutional Repository; Document Scanning Service; Communication Tools; Social Media Sites; Video Conferencing; Library Security and Library Automation Software.

University libraries globally, regionally, and nationally offer a variety of information services that meet the diverse needs of their users as noted by Makori (2010); Nzeyimana, Diki, Gibendi (2022); Nzewi (2023). Information services are defined as the services through which librarians directly interact with users to provide information, as well as the interfaces created by librarians through which users independently find the required information (Stojanovski & Papic, 2012). Jadranka and Anita (2014) highlight the usefulness of information services in assisting librarians to provide information sought by users, anticipate user needs, and encourage user awareness of the potential of information resources to fulfill individual information needs.

Information services can be divided into two categories: reference services and browsing and searching services (Jadranka and Anita, 2014). Katz (1991) further classified information services into direct and indirect services. Direct services involve communication between users and librarians, with librarians responding to users' queries. Indirect services include activities performed by librarians such as the preparation of catalog cards, bibliographic work, and classification, among other library operations.

Globally, research studies by authors such as Sharma (2006) noted that fully integrated online systems have improved the quality of operations and services in all departments of university libraries, including acquisitions, cataloguing, circulation, interlibrary loan, reference, periodicals, and bibliographic instruction/information literacy. Vijayakumar and Vijayan (2011) indicate that libraries, with the aid of new technologies, can perform effective and efficient services with fewer resources (staff, materials, money, and stock). Adeniji, Sarah and Samuel (2012) at Olabisi Onabanjo University library in Nigeria, specified that most respondents used computers and Internet services to access their information needs. The findings by Adeniji, Sarah and Samuel (2012) align with Nwezeh (2010), who confirms that the use of information and communication technologies is gaining momentum in Nigerian universities.

The Commission for University Education (CUE): Accreditation and Quality Report (2012) indicates that trends from developing countries show that a number of university libraries have adopted new technologies, while others are on the verge of doing so. This adoption aims to offer effective and efficient services that benefit more users within the library.

In this study, ICT is used to describe a range of equipment (hardware such as personal computers, scanners, and digital cameras) and computer programs (software such as database programs and multimedia programs), as well as the telecommunications infrastructure (phones, faxes, modems, video conferencing equipment, and web cameras) that enable users to access, retrieve, store, organize, manipulate, present, send material, and communicate locally, nationally, and globally through digital media (Dunmill and Arslanagic, 2006; Kamau, 2018; Bhat, 2022; Chore, 2023).

1.1.1 Contextualization of Information and Communication Technology (ICT) Use in University Libraries

A study by Shukla and Sialai (2018) on the use of ICT in university libraries confirms that ICT usage in American libraries increased steadily during World War II to manage the information explosion, as vast amounts of information needed to be processed, stored, and retrieved when necessary. They assert that the application of ICTs in university libraries has brought a fundamental shift to the information profession by providing accurate, up-to-date, and timely information. A survey by Nazim (2015) on the use of different ICTs in United States libraries revealed that learning in university libraries improved due to knowledge sharing among librarians through ICT utilization, highlighting the use of email, library websites, intranets, and telephone lines as part of their communication systems.

European university libraries are the most advanced in developing electronic-based services, with large collections of electronic journals and sophisticated searching tools available to both students and faculty (International Federation of Library Associations and Institutions; IFLA, 2003). The digital divide allows faster, broader, and more diverse access to global information in America and Europe than in Africa (Omekwe and Echezona, 2008).

In Africa, particularly Nigeria, enhanced service provision in libraries includes immense electronic formats equipped in libraries, facilitating simultaneous access for many users and bridging the global information gap (IFLA, 2003; Omagbemi, Akintola, and Olayiwola, 2004). In Tanzania, the application of ICTs for information access and retrieval began in the 1990s, simplifying university library duties and related tasks for students, such as online registration and clearance of students together with access to online information (Antidius, 2018). The Ugandan government established a fully-fledged ICT ministry in 2006, emphasizing the importance of ICT in promoting economic growth and development, with university libraries benefiting from rapid technological changes by being involved in research as Centre's of information services (Mishra and Mishra, 2014).

The development of public university libraries in Kenya (Otike, 2004; Ojiambo and Kasalu, 2015; Wawire and Messah, 2018) can be traced through two significant eras: the colonial era and the post-independence era. During the colonial era, three key institutions of higher learning were established: the Royal Technical College, Kenya Polytechnic, and Egerton College.

Post-independence saw a massive growth in the establishment of university libraries, with institutions such as the University of Nairobi library, Jomo Kenyatta University of Agriculture and Technology library, and Kenyatta University library among others. These libraries later embraced the use of Information and Communication Technologies (ICTs), implementing Library Management Systems to efficiently manage housekeeping functions and provide information services. The adoption of ICTs has enabled these libraries to effectively meet the diverse user needs. All these public universities established libraries to support their academic curricula and programs, ensuring that they provide the necessary resources and services to facilitate learning, teaching, and research.

Odero-Musakali and Mutula (2007) indicate that provision of information services in public university libraries was previously manual, involving activities such as acquisition, cataloging, and classification, Current Awareness Service (CAS); Selective Dissemination of Information (SDI), serial control, among other services. They assert that unless certain ICT applications are broadly deployed, the benefits of these technologies might be derailed. The Commission for University Education in Kenya (CUE) urges university libraries to adopt and maintain ICTs in information management and operations to positively impact higher education (CUE, 2012; Nyakweba et al., 2021).

Consequently, harnessing of ICTs in university libraries for provision of information services has received tremendous support from organizations such as Commission for University Education (CUE), United Nation Educational, Scientific and Cultural Organization (UNESCO), the International Organization for Standardization (ISO) and Kenya Education Network (KENET) by playing crucial roles in setting standards, establishing policies and providing connectivity services, respectively, to enhance ICT use in university libraries as indicated in studies by Islam (2017); Stojanovski and Papic (2012); KENET Strategic Plan (2007). International Organization for Standardization/ International Electro-technical Commission; (ISO/IEC); (ISO/IEC 27000:2009) and (Kenton, 2020) offers a summary of information security management systems that forms the subject of information security management.

Research studies on the adoption or use or application or value or integration of ICT in public university libraries by authors such as Uwaifo (2010), Odongo (2011), Mishra & Mishra (2014), Ashikuzzaman (2014), Nazim (2015), Adebayo, Ahmed, and Adeniran (2018), Antidius (2018), Nzioki (2021), Wangari (2021), and Guto and Wasike (2022) affirm that the utilization of ICT in the provision of information processes, functions, and services in public university libraries is increasingly being embraced by both library staff and users. The availability of the internet has facilitated the use of various ICTs, such as personal gadgets (mobile phones, iPads, and smartphones), enabling access to online information from any geographical location.

Although the harnessing of ICTs in university libraries for the provision of information services has received remarkable support from organizations such as the Commission for University Education (CUE), the International Organization for Standardization (ISO), United Nations Educational, Scientific and Cultural Organization (UNESCO), International Federation of Library Associations and Institutions (IFLA), and the Kenya Education Network (KENET), along with support from researchers, a study by Onuoha and Obialor (2015) alleges that the absence of standards, coupled with differing ICT standards used by hardware manufacturers, poses significant challenges to the proper adoption of ICTs in university libraries.

UNESCO also assists countries in understanding the role of ICT in achieving Sustainable Development Goal 4 (SDG4), emphasizing the potential of ICT to bridge learning divides and improve education administration and governance in provision of information services (United Nations, 2018; Boeren, 2019; UNESCO, 2019). UNESCO plays a significant role in the development of libraries, as highlighted by Abdelaziz (2003) and UNESCO (2019), through various initiatives and platforms:

1. CDS/ISIS: UNESCO has contributed to the development of the CDS/ISIS software, which is packaged and distributed free of charge to libraries and information centers worldwide. This software facilitates the management and organization of library resources, enhancing provision of information services to users.

2. Free Software Portal: UNESCO operates a Free Software Portal, providing access to documents and websites that offer reference works for free software and open-

source technology. This initiative aims to promote the use of open-source solutions in libraries and other information institutions.

3. UNESCO Libraries Portal: The UNESCO Libraries Portal serves as a platform for accessing information related to library resources and topics affecting librarianship. It offers a centralized repository of resources available on the World Wide Web, facilitating knowledge sharing and collaboration among library professionals.
4. Preservation of the Digital Heritage: UNESCO has developed strategies for the preservation of digital heritage, collaborating with governments, policymakers, information producers, experts, software industry stakeholders, and standard-setting organizations. These efforts aim to ensure the long-term preservation and accessibility of digital cultural artifacts and resources.

In conclusion, the contextualization of ICT in public university libraries for the provision of information services has been significantly supported by various organizations and frameworks, including the Commission for Higher Education (CUE), the International Organization for Standardization (ISO), Kenya Education Network (KENET), International Federation of Library Associations and Institutions (IFLA); United Nation UNESCO, and various authors. This support has enabled public university libraries to adapt to the use of ICTs through the creation of ICT policies, the establishment of necessary ICT infrastructure, the specification of ICT requirements for information provision, and the enhancement of ICT knowledge, skills, and training among library staff and users. These efforts have collectively contributed to the effective and efficient management of library functions and the improved delivery of information services, ultimately meeting the diverse library user needs.

1.2 Public University Libraries

Kavulya (2004); Makori (2010); Wawire and Messah (2010) assert that Public University libraries are libraries established in state funded universities and designed to support the vision and mission of each individual university, which is to provide quality education. These libraries offer a range of information services to students, teaching and non-teaching staff, as well as the community by supporting teaching, learning and research. Some characteristics of these libraries are:

a) Educational resource hub: The libraries offer academic resources that support the curriculum and research needs of the university. Resources like print and non- print such as e-resources (e-books, e-journals, data bases and digital content.
b) Information literacy: Training programs are often conducted within Public libraries to educate students and faculty on the effective use of library resources.
c) Support research: Public university libraries assist researchers by providing services and resources like scholarly publications, e-journals, Current Awareness Service (CAS); Selective dissemination of Information (SDI);
d) Community Access: Public university libraries in some cases extend services to the community especially farmers among others by educating them and providing resources that are not available to these users elsewhere.
e) Technology and ICT integration: Public university libraries have transformed by incorporating ICTs into their day – to - day services that have enabled access of digital resources, Online Public Access Catalog (OPAC), e-resources (e-books, e-journals), databases, etc.

1.2.1 Maseno University and Maseno University Library

Maseno University, established in 1990 as a constituent college of Moi University, is located in Kisumu County along the Kisumu-Busia highway (Maseno University, 1992). Maseno University Equator Newsletter (1992) states that the university was formed by merging Maseno Government Training Institute (GTI) with Siriba Teacher's Training College. Over the years, Maseno University has experienced significant growth, expanding its offerings in learning, teaching, and research. These activities are conducted at the main campus in Maseno and at branch campuses in Kisumu town and Homa Bay town. The university provides a range of certified courses, from certificate programs to PhD degrees, catering to a diverse student body (Maseno University, 1992).

According to the Maseno University Equator Newsletter (1992) and Maseno University (1992), the Maseno University library inherited its initial equipment and collections from the Government Training Institute (GTI) and Siriba Teacher’s College. Initially, the library had a combined seating capacity of 300. The library's general arrangement is by disciplines, with services provided across four different libraries within the campus. These are the Science Library, which houses science materials; the Resource Centre Library, which contains humanities resources; the College Campus Library, which specializes in languages; and the School of Graduate Studies (SGS) Library, dedicated to postgraduate students.

The seating capacity of the existing libraries is as follows:

Table 1.1: Seating Capacities According to Available Branch Libraries

Library	**Sitting capacity**
School of graduate studies library (SGS)	50
College Campus Library	200
Resource Centre Library	200
Science Library	150

Source: Maseno University Library Report (2001)

The library at Maseno University plays a vital role in supporting the institution's vision and mission. The university's vision is "To be a Centre of Excellence in training, research and development," and its mission is "To foster and develop academic excellence in basic and applied research at all levels of study by training practice-oriented manpower who can contribute effectively to social, intellectual, and academic development in the community, the nation, and the community of nations" (Maseno University Library Report, 1992; Maseno university strategic plan, 2013-2017).

To align with these goals, the library's role is to ensure the achievement of academic excellence and research by providing essential facilities for education and research. This includes participating in the discovery, creation, transmission, preservation, and enhancement of knowledge on behalf of the university. The library’s mandate is "to provide library and information services through acquisition, processing, presenting, disseminating and making available relevant literature to all its users” (Maseno University library report, 1991).

The provision of information services to library users at Maseno University has gradually improved due to the availability of internet and WiFi in the library. The library utilizes CDS/ISIS as its Library Management System (LMS) alongside a manual system to provide information services. Users can access available collections, which comprise print materials searchable via both an Online Public Access Catalogue (OPAC) and a print catalogue as a backup. Library users access e-resources such as e-journals, e-books, e-databases, e-theses, and e-past papers through the link: http://elibrary.maseno.ac.ke/. Users with laptops can access e-resources through a WiFi connection available in the library or from WiFi hotspots within the university (Maseno University Library Report, 1998).

The library boasts approximately 55,000 titles and 100,000 volumes, subscribes to 2 databases, and offers access to over 25,000 journal titles through the e-library, covering all disciplines. Additionally, the library provides a total of 5,000 e-book titles (Maseno University Self-Assessment Report, 2013).

1.2.2 Information Services Provided at Maseno University Library

American Library Association, (ALA) (1983); Stojanovski and Papic (2012); describe information service as an aspect of providing the information sought by the user in order to meet user needs.

To date, Maseno University provides blended information services delivered both traditionally and electronically due to partial automation in the library. Services provided using ICTs are: Acquisition, Cataloguing, classification, Online Public Access Catalog (OPAC); Online search service that has enabled user's access online information including e-resources (e-journals, e-books, e-data bases); among others such as social sites.

Other services, such as circulation desk, information desk queries, bindery, and reference services, are provided partly through ICTs and partly manually, as the library strives to achieve full ICT integration in delivering information services to meet user needs.

1.2.3 Library Automation at Maseno University Library

Moruf and Olaojo (2020); Ikegwuiro, et al (2023); allege that automation of library operations, functions, and services is a challenging aspect due to the numerous library functions, departments, varied user needs, and new trends in technology.

The study traced library automation at Maseno University back to 1998, when the World Bank donated Compaq computers specifically for library administration

(Maseno University Library Annual Report, 1999). In-house training on basic computer operations was initially provided to a few library staff members, who then trained the rest.

From the year 2000 onward, library automation was gradually introduced to all library staff using the available computers. Existing computers within administrative offices were used to provide internet and fax services for a fee, while one computer was allocated to the technical section for data entry of newly acquired books. Since then, the library has continued to embrace ICT use despite several setbacks (Maseno University Library Report, 2001).

In the year 2001, the library acquired several Acer computers, which were distributed across the four branch libraries. In-house training on electronic data entry and database use was provided to library staff. Later, CDS/ISIS software was purchased, facilitating the setup of an Online Public Access Catalogue (OPAC). However, by 2006, the software crashed, resulting in the loss of online data (Maseno University Library Annual Report, 2006).

To replace the CDS/ISIS software, HP computers and Softlink Liberty3 software were purchased in 2007. In-house training on the new software and its operations was provided at a workshop held at Maseno University, sponsored by the International Network for the Availability of Scientific Publications (INASP), from December 14th to 18th, 2009. Despite these efforts, the system crashed again, forcing the library to revert to manual services (Maseno Library Annual Report, 2010).

The library continued using Liberty3 software for OPAC, cataloguing, classification, and acquisitions for day-to-day operations, despite challenges. Other library operations and services remained manual, such as circulation desk services, reference services, information desk operations, and serials management. In 2018, the library adopted and set up KOHA software to address the issues encountered with the previous Library Management Software, aiming to improve the provision of information services to users.

However, the following ICTs were realized as available and used in the library, as supported by the Maseno University Library Annual Report (2019) and field report (2019):

1. Internet and WiFi: Has significantly improved the research skills of scholars. Multiple users can access the same information resource simultaneously from different locations. For example, users can access online resources such as e-journals, e-books, e-databases, e-theses, e-articles, and other online resources simultaneously.
2. Library Management System (LMS): The LMS is a software tool that simplifies day-to-day library operations and services, making tasks more effective and efficient. For example, in the circulation section, tasks such as charging and discharging of books, paying overdue fines, tracking specific documents, among others.
3. Computers: Available computers in the library are all connected to the internet and are used to provide a variety of electronic information resources, including the online catalog (OPAC), databases, and other online information, thus meeting individual user needs. Library staff are able to perform day –to –day activities efficiently and effectively using computers.
4. Scanners: Assist users in digitizing required information from print materials, allowing them to save it to a digital device or email for easy retrieval and fast communication.

5. Photocopier Machine: Enables users make copies of materials from any print resource in the library for their use outside. It also helps library staff protect print resources from theft and pilferage.
6. Landline: The analog telephone line facilitates communication between library sections as it does not require power or internet.

Automation procedures at Maseno University Library have been noted as sluggish due to various challenges, such as software crashes that resulted in data loss among others as reported by Maseno University library annual report (2006); Maseno University library annual report (2010). However, it is important to recognize the benefits that automation has brought to both library staff and users. These advancements have collectively contributed to the effective and efficient management of library functions and have improved the provision of information services. Ultimately, they have facilitated access to online information resources from any geographical location, thus meeting the diverse needs of library users.

1.3 Statement of the Problem

Adoption of Information and Communication Technologies (ICTs) in public university libraries enhances operations and service delivery to both library staff and clientele. Authors such as Kumar (2017) and Antidius (2018) emphasize that manual tasks in library operations have been transformed with the introduction of computerization software and related hardware. Authors such as Odero – Musakali and Mutula (2007); Kwanya, Kiplagat, and Wamukoya (2017); and Adebayo, Ahmed, and Adeniran (2018) assert that traditional library functions like cataloguing, classification, and circulation services can be transitioned to computerized operations. They further affirm that the adoption of ICTs in public libraries will now guarantee improved and quicker service provision.

Despite the increasing global emphasis on the integration of Information and Communication Technologies (ICTs) in higher education, many public universities in Kenya continue to face challenges in effectively adopting and utilizing ICTs for the provision of information services. At Maseno University, ICT infrastructure and digital systems have been introduced to support teaching, learning, research, and administrative functions. However, anecdotal evidence and preliminary observations suggest that the level of ICT integration in information service delivery may not be optimal

Further, with the partial implementation of Library Management Software (LMS) at Maseno university library, there is inadequacy of infrastructure, insufficient ICT skilled personnel, absence of tailored ICT policies among others that is supported by study done by Adamu and Ajayi (2023). Adamu and Ajayi (2023) revealing that public university libraries suffer from: insufficient funding, poor infrastructure, a skills gap among both staff and users, and the high cost of maintaining digital resources, all of which hinder the libraries' ability to meet user needs and modern demands for information access. On equal measure, partial automation of Maseno university library has led to dysfunctional automated processes, functions, operations, and services resulting in poor library services of which curtails to meet the user needs which is contrary to a study by Mylapilli (2023). asserting that the utilization of ICTs in various libraries ensures that users can acquire vast amount of information globally in less time, in accordance with Ranganathan’s fourth law of ‘saving the time of the user’.

Moreover, fractional implementation of ICT has further inhibited security measures by limiting utilization of devices such as CCTV and RFID to prevent theft and pilferage (Abba, 2019; Akor, Ekere, and Akor, 2019; Guto and Wasike, 2022). On the same breath, Library staff and users have not fully embraced the benefits that accompany full implementation of ICT like improved provision of information services, academic support, and research (Omosor, 2014; Kiprotich, 2016; Kamau, 2018; Wangari, 2021; Guto and Wasike, 2022). This underutilization has created a gap between the availability of ICT resources and their effective use, thereby constraining the libraries' ability to provide efficient, modern information services aligned with global digital standards.

It is for this reason that the study conducted a holistic investigation of the entire automation strategy adopted by Maseno university library management in terms of policy formulation and implementation; procedures; regulations; staffing and staff development; financing and development of ICT infrastructure on use of ICTs in provision of information services in public university libraries in Kenya: A Case study of Maseno university library and later proposes measures for improvement. Consequently, there is need to review and implement laid down ICT plans mentioned herein that supports proper ICT utilization in provision of information services at Maseno university library.

1.4. Aim of the Study

The aim of the study was to examine the use of Information Communication Technologies (ICTs) in provision of information services in public university libraries in Kenya, a case of Maseno university library with a focus on proposing measures for enhancing the provision of information services to support teaching, learning, and research.

1.5 Objectives of the Study

The objectives of the study were to:

i. Assess the status of ICT use in the provision of information services at Maseno University Library.
ii. Examine the ICT policies and regulations governing the use of ICTs in the provision of information services.
iii. Examine the ICT infrastructure that supports the provision of information services at Maseno University Library.
iv. Establish services provided at Maseno University library as a result of ICT utilization in provision of information services.
v. Establish ICT knowledge, skills and training of library staff and users in ICT utilization in provision of information services at Maseno University library.

1.6 Research Questions

i. What is the status of ICT use in the provision of information services at Maseno University library?
ii. How do ICT policies and regulations guide the use of ICTs in the provision of information services at Maseno University library?
iii. Which ICT infrastructure supports provision of information services at Maseno University library?
iv. Which services are provided at Maseno University library as a result of ICT utilization in provision of information services?
v. What ICT knowledge, skills and training do library staff and users possess in the utilization of ICTs for the provision of information services at Maseno University library?

vi. What recommendations can be proposed to ensure the proper utilization of ICTs in the provision of information services at Maseno university library?

1.7. Assumptions of the Study

The study is based on the following assumptions:

1. The study assumes that undergraduate students, deans, and department heads at Maseno University did not attain adequate provision of information services due to partial implementation of ICT in the library.
2. The study also assumes that Maseno university library has no tailored ICT policy that supports provision of information services.
3. The study assumes that Weak management support and poor budget allocation have stalled ICT implementation at Maseno University Library.

1.8. Significance of the Study

Significance for this study is based on the following:

Study findings will inform university management and policymakers about the need for tailored ICT policies to strengthen the provision of information services in the library.

The theoretical significance of this study lies in its contribution to knowledge, which may assist library management in improving the implementation and utilization of ICTs in the provision of information services.

The pragmatic significance of this study lies in its provision of actionable insights and evidence-based recommendations to guide library managers, administrators, and policymakers in enhancing ICT adoption, staff training, user sensitization, and infrastructure investment for modernized information service provision in public university libraries.

In summary, the study is justified by its potential to improve library tailored ICT policies, contribute to theoretical knowledge, and offer practical solutions for better ICT utilization in the provision of information services at Maseno University library.

1.9 Scope and Limitation of the Study

1.9.1 Scope of the Study

The title of the study, Use of Information Communication Technologies (ICTs) in Provision of Information Services in Public University Libraries in Kenya: A Case Study of Maseno University Library, Kenya. The title clearly defines the scope and focus of the research as it emphasizes on examining how ICTs are employed by library staff and users in provision of numerous information services.

The study focuses on the utilization of ICTs in providing information services in public university libraries, examining their effectiveness and efficiency. It evaluates the ICT knowledge, skills, and training required by library staff to manage these tools, and explores the various systems employed, including Library Management Systems (LMS), internet and Wi-Fi, computers, scanners, and other digital resources.

By focusing on Maseno University Library, the study offers a detailed case study analysis of ICT implementation, exploring its successes, challenges, and unique aspects. The goal is to determine how ICTs can enhance the effectiveness and efficiency of provision of information services, while identifying best practices and proposing improvements to ensure integration meets the diverse needs of library users.

Maseno University was chosen for its rural location and innovative approach to addressing socio-economic and technological needs through ICT integration in education. All programs are offered "with IT," equipping graduates with strong ICT skills. Its dynamic eCampus allows online learning, making education accessible to students anywhere (Maseno University Academic Programmes, 2018; maseno.ac.ke)

The university library, serving both traditional and eLearning students, was selected as the study site. Respondents included undergraduate students, deans and heads of departments, librarians in-charge of sections, the university librarian, the Director of ICT, and the finance officer, chosen for their roles in supporting the university's mission in teaching, learning, research, resource management, and policymaking.

1.9.2 Limitation of the Study

The study targeted undergraduate students from 1st year - 4th year 2017/2018. It was hectic to gather the respondents in one place to fill out the questionnaire, and it took the researcher some time to determine the appropriate modalities for distributing it.

Similarly, the deans and heads of departments were unwilling to be interviewed, stating that they primarily used their personal gadgets along with the desktops available in their offices. As a result, they did not regularly use the library for their learning, teaching or research purposes.

Therefore, the researcher issued persistent reminders and maintained follow-up with deans and heads of departments, while campus student leaders and class representatives were engaged to reach undergraduate students. Thus, the methodological consistency and theoretical grounding as supported by Mylapilli's (2023) study ensured both validity and reliability, making its findings a credible contribution to this study on ICT utilization in public university libraries.

1.10. Operational Definition of Terms

Definition of terms are given as used in this study

University Library

A university library is one of the departments established and maintained by a university to meet the needs of students, faculty, staff, and the broader university community. The library stocks both print and non-print resource materials that support learning, teaching, and research for the entire university community.

Electronic Resources

Electronic resources are materials that require computer access, whether through a personal computer, mainframe, or handheld mobile device. They can be accessed either remotely via the internet or locally. In this study, examples of e-resources include e-journals, e-books, online databases, e-theses, e-past papers, and websites.

Information Communication Technologies (ICTs)

These are technologies used by both library staff and users to communicate, create, manage, access, gather, and distribute information. These include computer hardware and software, the internet, telephone, television, radio, and audio-visual equipment, among others. ICTs, as used in this study, refer to technologies that provide access to information through telecommunications. They primarily focus on communication technologies, including the internet, wireless networks, cell phones, and other communication mediums.

Information Service

In this study, information service implies the provision of useful information to users using ICTs to meet their needs.

Library Automation

Library automation is the application of ICTs to library operations, functions, and services. Areas to be automated include acquisition, cataloging, classification, circulation desk modules, public access (OPAC and Web PAC), serials management, reference services and security of information resources.

Library Management Software

Library Management Software handles housekeeping activities such as acquisition, cataloging, and circulation modules. It tracks books, bills, and patrons who have borrowed from the library. It also includes functionalities like the Online Public Access Catalogue (OPAC), institutional repository, among other library functions.

Library Users:

These are individuals within the university community, including students, teaching staff, and non-teaching staff, who utilize the services offered by the library staff.

1.11 Structure of Thesis

The study consists of 5 chapters and outlines of the chapters with summary as explained below:

Chapter One: Introduction and Background to the Study

Chapter one presents introduction and background of the study, Maseno university library automation, contextualization of Information and Communication Technology (ICT) use in University Libraries, statement of the problem, aim of study, objectives of study and research questions, assumptions and justification of study, scope and limitation of study, definition of terms and chapter summary.

Chapter Two: Literature Review

Chapter two provides an introduction, theoretical frameworks and models informing use of ICTs, reviews related literature from developed and developing countries in relation to automation of university libraries, benefits and challenges of ICT utilization. Finally, proposal for improved use, knowledge gap and chapter summary.

Chapter Three: Research Methodology

This chapter introduces research, presents methodology of study, discusses the research approaches, research design and methods, location of study, study population, sampling techniques and sample size, data collection instruments, data presentation and analysis, ethical consideration and finally chapter summary.

Chapter Four: Data Presentation, Analysis, and Interpretation

The chapter outlines data presentation, analysis and discussions on findings, analyses qualitative and quantitative data and finally provides a summary of findings.

Chapter Five: Summary of Findings, Conclusion and Recommendations

This chapter presents a summary of study findings, conclusions and recommendations based on the study findings on the research question

1.12 Chapter Summary

This chapter presents introduction and background of the study, automation of library at Maseno University, statement of the problem and aim of study, objectives of study and research questions, assumptions and justification of study, scope of study, definition of terms and chapter summary.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents review of literature relevant to use of ICTs in provision of information services in university libraries. Literature review is a systematic analysis of documents containing information related to the research problem being investigated (Ridley, 2008; O'Gorman and Maclntosh, 2015; Cantero, 2019).

Purpose of literature review to this study is to indicate the relevant theories together with other research studies related to the topic studied as guided by research questions and themes. Related, relevant and timely research studies are evaluated and any identified gaps in the literature review are noted as supported in a study on writing a literature review research paper: A Step-by -step approach (Ramdhani, Ramdhani and Amin, 2014).

2.2 Theoretical Framework

A framework is a structure of ideas or concepts and how it is put together. A theory is reasoned statement or groups of statements which are supported by evidence, meant to explain some phenomena. Kombo and Tromp, (2006); Grant and Osanloo (n.d); Sreekumar (2023) explain a theoretical framework as a collection of interrelated ideas grounded on theories that guides the researcher in understanding a phenomenon. It assists the researcher plan, conduct the research, analyze and interpret findings of study. Theories that relate to the study are Information Technology Implementation Model (IT Implementation Model) and Unified Theory of Acceptance and Use of Technology (UTAUT). The study was underpinned by Information Technology Model (IT Implementation Model).

2.2.1 Information Technology Implementation Model (IT Implementation Model)

Information Technology Implementation model (IT Implementation model) propounded by Kwon and Zmud (1987) is a six-stage model (Initiation, adoption, adaptation, acceptance, Routinization and infusion) that is based on Lewin's (1952) change model (Cooper and Zmud, 1990).

Application of ICTs in public university libraries has brought tremendous change to library operations, functions and services. The IT Implementation model was therefore adopted for this study due to its suitability in guiding the change agents.

ICTs are technologies implemented in public university library operations, functions and services to bring change from the manual way of offering services to provision of services with use of technology hence achieving effectiveness and efficiency in library service delivery.

A Study on library as change agents done by Battilana and Casciaro (n.d); Okuonghae, (2018); Makanga (2019) concur with Lewin's understanding on change process (Lewin, 1952) where they identify "system implementation as a change process and system designers as change agents." The relevance of the model is recognized from the explanation of organization, introduction of new technology together with aspects of innovation and diffusion.

Okuonghae (2018) states that introducing the technology occurs over a long period of time and begins with learning the technology, adapting to it and new procedures imposed during introduction and final accomplishment of any implementation is based on target user acceptance within any given organization.

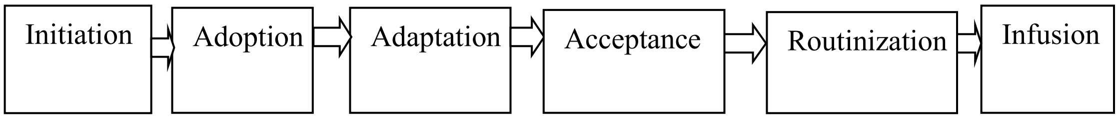

Figure 1.1: ***IT Implementation model*** **(Cooper and Zmud, 1990)**

2.2.1.1 Relevance of Implementation Model to this Study

The IT Implementation model holds significance for this study by advocating for organizational change through a step-by-step outline of requirements at each stage of implementation by different groups, such as library managers and users. Identified prospects in each construct of the model are embraced, while encountered challenges are addressed.

The provision of information services becomes achievable by embracing available prospects in every construct of the model, such as ICT policy, ICT infrastructure and available networks (Computer hardware, software, LAN, etc), ICT knowledge, skills and training of library managers and users, user characteristics, and available resources like funds. Existence of these prospects enables the effective use of technology in providing information services.

Initiation Stage:

Kwon and Zmud (1987); Okuonghae (2018); Makanga (2019) assert that in initiation stage, examining of the technology is done by organization in order to reveal prospects and challenges for improvement and necessary requirements needed like: ICT policy(s) and regulations together with ICT knowledge; skills and training of library managers, organizational internal and external background like: ICT infrastructure and available networks; characteristics of user community (Job tenure, education, and resistance to change are examined).

Initiation stage applies to this study by outlining essential requirements that corresponds with what the study intends to investigate from Research Question (RQ) 2, 4, 5 like: Available ICT policies, ICT Infrastructure and other networks, ICT knowledge, skill and training and challenges encountered in initiation of the technology.

Adoption Stage:

Rogers (1962); Sarosa (2007) state Adoption stage as complete utilization of the technology since library managers have a commitment to implement, decision to adopt and commitment to use the technology. Successful implementation results from guaranteed negotiations, organizational backing and availing of suitable resources (Cooper and Zmud, 1990).

Gullivan (2001); Mark and Poltrock (2004) outlined adoption in three levels such as: Individual, work group and organizational level adoptions. Adoption is termed a critical stage where resources such as: funds for technology implementation, for purchase of ICT infrastructure (computer hardware, software, internet, among others) are required for adoption of the technology (Statnikova, 2005).

Adoption stage applies to this study in that, in Research Question (RQ) 1: the status of ICT use in the provision of information services at Maseno library. To support the RQ for successful adoption to occur, availing of resources by organization was necessary.

Adaptation Stage:

Under adaptation stage, organizational procedures are revised while others are introduced, users are trained, trailability is done, technology is used by both library management and users, and management support and user participation are observed and detected.

This stage is relevant to what RQ 2, 3, 4, 5 seek to find. For example, RQ 2: ICT Policies and other regulations can be revised while other ICT policies and regulations can be introduced; RQ 3: ICT infrastructure can also be revised or implement a new ICT infrastructure suitable and a compatible one to provision of information services. RQ 4: As technology is applied, new services emerge due to ICT usage and finally, there is user training that RQ 5 seeks to find ICT knowledge, skill and training.

Acceptance Stage:

Users employ technology for the first time at this stage, evaluate and make decisions on its performance using the following constructs as measures for evaluation:

Task technology fit: The fitness of the technology is evaluated against the varying user needs.

Perceived usefulness: (PU) It is believed a user has knowledge on how the adopted technology would improve his job performance.

Relative advantage: It is a characteristic of an innovation that has an effect on individuals' opinion of the innovation prior to adoption and effect on the rate of adoption.

System quality: It is the degree to which a system is user friendly as viewed by individual users in their ease of use (Davis, 1989).

This stage supports RQ 1, 4, 5. For example, in RQ1: On the status of use of ICT in the provision of information services at Maseno University Library. It is through employing technology by users that the researcher is able to determine the status of use; RQ 4: On the services provided as a result of use of ICTs is also determined after both library staff and users employing the technology and evaluating its use; RQ 5 on ICT knowledge, skill and training is concluded when technology is employed by library staff and users.

Routinization Stage:

The technology under Routinization stage is seen as a normal occurrence within the organization and also as a result of organization's governance system which is accustomed to accounting for the application of the technology.

This stage relates to RQ1: On the status of ICT use in the provision of information services at Maseno University library; RQ 4 on services provided at Maseno University library as a result of ICT utilization in provision of information services; and RQ 5: On ICT knowledge, skills and training of both library staff and users. Both groups require ICT knowledge, skill and various trainings to enable them operate the technology which in this stage is a normal activity. At this stage both library managers and users apply the technology for their day -day activities in provision of information services since the technology is a usual custom within the organization.

Infusion Stage:

Infusion stage deals with improved organizational success obtained from complete utilization of the adopted technology in support of operational activities within the organization. This stage relates to all RQs 1 – 5; On the status of ICT use in the provision of information services at Maseno University library, on ICT policies and regulations guiding use of ICTs in provision of information services at Maseno University library; on ICT infrastructure that support provision of information services at Maseno University library; on services provided at Maseno University library as a result of ICT utilization in provision of information services and on ICT knowledge, skills and training of library staff and users in ICT utilization in provision of information services at Maseno University library.

2.2.1.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a technology acceptance model formulated by Venkatesh et al, (2003). UTAUT is an empirically validated model that combines eight (8) competing major models and theories of technology acceptance and their extensions (Theory of Reasoned Action (TRA); Technology Acceptance Model (TAM); Motivational Model (MM); Theory of Planned Behaviour (TPB); Technology Acceptance Model (TAM)/ Theory of Planned Behaviour (TPB); Model of Personal Computer utilization (PC); Diffusion of Innovation (DOI); Social Cognitive Theory (SCT). These models focus on user acceptance of information technology; thus providing little discussion on institutional change, particularly in public university libraries, as noted by Dulle and Minishi-Majanja (2011) and Momani (2020), indicating limited explanations on ICT adoption in public university libraries.

In conclusion, theoretical frameworks and models are vital in research as they clarify ideas and perspectives, reveal gaps or inconsistencies in knowledge, and ultimately advance scholarly inquiry while enhancing the quality of research outcomes

2.3 Review of Related Literature

Review of related literature is defined by Ekwelem (2019); Kouser and Popat (2022) as the comprehensive identification and evaluation of current resources containing related data pertaining to the research topic.

2.3.1 ICT Use in Public University Libraries

Public university libraries are state funded libraries found in public institutions of higher learning specifically in universities and support learning, teaching, research and community services (Oyedun, 2007; Wawire and Messah, 2010; Qutab, Bhatti and Ullah, 2014). However, the manual handling of vast information generated by these university libraries has presented challenges, prompting calls for the adoption of Information and Communication Technology (ICT) to streamline operations and enhance information service delivery (Nair (ed), 1995; Omoniwa, 2001; Islam & Islam, 2006; Kakkar, 2006; Odero-Musakali and Mutula, 2007).

The integration of ICTs has ushered in significant positive changes in public university library functions and services, facilitating the transition from paper-based to computerized systems and enabling access to online resources such as e-journals, e-books, and e-databases together with other online data bases like e-theses, institutional repository (IR), e-past papers (Okojie, 2010; Odongo, 2011; Ezecheta, 2022). Similarly, Omosor's (2014) study on effect of technology on librarians in academic libraries in Nigeria that adopted descriptive survey research with purposive sampling that concurs with studies by Krubu and Osawaru (2011), Ekwelem (2019), Wangari (2021) revealed that technology brought transformation to libraries as realized by both library managers and users. Adeleke and Olorunsola, (2010); Bhoi, (2017); Kouser and Popat (2022) state that utilization of ICTs has permitted easy access to electronic journals and other online educational materials from foreign universities hence satisfying knowledge needs of their users. Similarly, Elisha (2006) concurs by outlining uses of ICTs in academic libraries as supporting Video conferencing, Distance Learning, access to online resources on the internet (e-journals, e-books, e-magazines, e-publishing among others), use of CD-ROM for literature searches and access to local network data bases on LAN or WAN.

Library managers and users have embraced these changes, forcing ICT to advance tasks, minimize errors, and cater user needs effectively (Omosor, 2014; Kiprotich, 2016; Kamau, 2018; Wangari, 2021; Guto and Wasike, 2022). Moreover, the implementation of ICT has enhanced security measures, utilizing devices such as CCTV and RFID to prevent theft and pilferage (Bhoi, 2017; Abba, 2019; Akor, Ekere, and Akor, 2019; Nyakweba et al, 2021; Guto and Wasike, 2022).

Application of ICT at Maseno university library has changed library operations, functions and services that were initially performed manually are executed using ICTs such as: Acquisitions, cataloguing classification, Online Public Access Catalogue (OPAC), part of circulation services, online information (e-resources, e-books, e-data bases, e-theses, e-past papers) as a result of internet, WiFi, connectivity (Maseno university library report, 2001; field data, 2018)

ICT utilization in public university libraries as discussed in this study has brought tremendous change that has realized several if not all operations, functions and services performed using ICTs. Services that were initially performed manually in public university libraries are now executed using ICTs hence effective and efficient service delivery to users. KENET (2015) affirms in a paper presentation in Nairobi in April 2015, communicating the value of ICTs using their e-readiness indicators and portal to directors and university vice chancellors. They highlighted how higher education institutions, especially the Kenyan university library community, should prepare to adopt ICTs for their learning, teaching, research, and managerial purposes.

The mission of public university libraries as stated by (Kaufman, 2005; Wadas, 2017; Corrall, 2022) report that university mission statement normally established in strategic plan of each institution is a roadmap for the library to enhance its resources in order to support the university mission of offering excellence in learning, teaching, and research. Commission for University Education (CUE, 2014) states the need for university libraries to clearly indicate their mission, vision and objectives as stated in Standard LIBR/STD/01. The standard states that a 'university library shall develop elaborate vision, mission and objectives affiliated with those of the university.' Despite the transformative impact of ICTs, the core vision, mission, and objectives of public university libraries remain unchanged.

Explored studies globally and regionally highlight positive transformations facilitated by ICTs in public university libraries as discussed here in, addressing hindrances to complete implementation is crucial. Some hindrances are outlined as: Absence of ICT policy, Meager infrastructure, Inadequate resources (funds, equipment, and skilled personnel); Inadequate ICT facilities and resources, breakdown of available lCT equipment, High costs of ICT facilities, Unstable, unreliable, and high cost of internet connectivity, Loss of data during transfer from manual to digital format as supported by studies done by Kavulya, 2004; Bhoi, 2015; Hanchate, and Sawant, 2018; Wengua, Rotich, Kogos, 2019; Essien, et al 2022; Wangari, 2021; Guto and Wasike, 2022; Adamu, and Ajayi, 2023; among other studies done on application of ICTs in public university library both globally and regionally. Nair (ed) (1995) further points out challenges such as: Varied nature of collection, organization and services within individual libraries, difficulty in handling explosion of information using manual techniques.

The research gap identified in this theme are the hindrances to complete implementation of ICT in public university libraries that the research aims to bridge in order to assist library management and mother institution achieve full ICT implementation for enhanced information service provision as supported by studies done by Kavulya (2004); Odongo (2011); Bhoi (2015); Okiy (2010); Nazim (2015); Essien et al (2022); Konlan (2022).

2.3.1.1 ICT Based Application Services in Public University Libraries

Application of new technologies in public university libraries has transformed library operations, functions and services by both the library managers and users as demonstrated by studies such as those by Adebayo, Ahmed and Adeniran (2018); Wangari (2021); Chore (2023). Studies by Vijayakumar and Vijayan (2011) further assert that ICT based application and services have evolved which are being used in public university libraries to support the process of knowledge capturing, storing and sharing. These services vary among libraries based on the types of resources and users serviced. The advent of the World Wide Web (WWW) and the use of internet and WiFi have notably enhanced the provision of online information and other digital services (Islam & Islam, 2006).

At Maseno University Library, the utilization of ICT in information service provision as revealed by Maseno university library report (2001), and supported by studies conducted by Oketunji (2000), Perera and Chandra (2010), Ebunuwele, Ola, and Uduebor (2014), and Shukla and Sialai (2015), has resulted in the delivery of various services outlined below:

i. Internet and Wifi: Internet as an important ICT tool in the library enables provision of online information such as: E-resources (e-journals, e-books, e-theses, e-past papers, etc); Institutional Repository (IR); Online Public Access Catalogue (OPAC); Technical reports; online databases; online bibliographic data bases; communication tools (email, Instagram, YouTube); library websites (Chisenga, 2004; Perera and Chandra, 2010; Bhoi, 2017; Mwai, Kiplagat and Gichioya, 2016) assert that almost all public university libraries outsourced internet services from KENET at a subsidized fee.

ii. Library functions: Acquisitions, Classification, cataloguing, circulation services, management reports, etc can be performed in an effective and efficient manner due to utilization of ICTs (Islam & Islam, 2006; Bhoi, 2017; Adebayo, Ahmed and Adeniran, 2018).

iii. Local Area Network (LAN): The library's LAN network interconnects all computers within the building in one place for easy sharing of information (Walmiki, 2009).

iv. Reprographic services assist users reproduce copies of documents on demand for their learning, study and research from the rare copies available in the library as supported by Vijayakumar and Vijayan (2011); Mishra and Mishra (2011); Adebayo, Ahmed and Adeniran (2018). This is a global service offered widely by libraries as alleged by Nwankwo et al, (2020)

v. Stock taking: Utilization of ICTs has enhanced stock taking and verification in the library. The process assists the librarians ascertain the number of lost books within the library since reports can be easily generated through the available software (Nazim, 2015; Bhoi, 2017)

vi. Database Search Guide: Searching and retrieval of online resources or from data bases is faster due to use of ICTs. Database searching guidance is done through individual library

> website. Researchers are using databases enormously for their learning, teaching and study work as well as for exploration of varieties of research problems (Mishra and Mishra, 2014).

A study by Hanchate and Sawant (2018) on ICT-based library services with reference to university libraries in rural areas revealed the availability of basic ICT equipment and technology in many studied libraries. Examples of rendered ICT-based services include Online Public Access Catalogue (OPAC), reprographic service, databases, etc. Essien et al. (2022), in their study on the effects of ICT use on library service delivery; A Comparative approach from two Universities also reported how the studied libraries positively influenced library services provided within their premises.

Vijayakumar and Vijayan. (2011), Hussaini, Haruna, and Muhammad (2021) and Nyakweba, et al (2021) assert that ICT- based application and services used in supporting the process of knowledge capturing, storing and sharing in public university libraries have since evolved. Hence public university libraries have opted to using advanced commercial library software that has recently emerged such as: Koha, CDS-ISIS, AMLIB, Library soft, Winisis and Liberty 3. Micheni and Murumba (2014); Otieno (2016); Chukwueke (2022) further affirm that due to budgetary constraints in public university libraries, open-source software would be ideal for libraries wanting to digitize their library functions, processes and services.

Although application of ICTs in public university libraries are noted to have brought positive change that enabled provision of information services using available ICTs in some libraries, several recognized hiccups hinder complete implementation of ICTs as identified by Adebayo, Ahmed and Adeniran (2018); Guto and Wasike (2022); and supported by other studies by Kamba, (2011), Ghuloum and Ahmed (2011), Odongo (2011), Nazim (2015). These challenges include insufficient funding, absence of ICT policies, inadequate infrastructure (network services), High costs of ICT equipment and facilities, inadequate ICT personnel, inadequate ICT facilities and equipment, high cost and unstable internet, irregular power supply, among others, varying from one library to another.

The research gap identified in this theme pertains to the hindrances preventing the complete implementation of ICT in public university libraries. This research aims to bridge this gap to assist library management and the parent institution in achieving full ICT implementation for enhanced information service provision.

2.3.2 ICT Policies and Regulations in Provision of Information Services

Policies are principles, rules, and guidelines officially formulated or adopted by an organization, business, or government to reach its long-term goals (Cambridge Advanced learner's dictionary, 2008; Wies, 1994). ICT policies, therefore, are documents that outline rules, regulations, guidelines, and procedures followed by an institution or business to protect its ICT equipment, facilities, and resources from threats.

Elly et al. (2004) emphasize the need for modern librarians, together with policymakers, to develop ICT operational policies appropriate for Africa's ICT infrastructure frameworks. They further opine the need for formulating ICT policies that articulate the libraries' vision and mission for the suitable integration of ICT facilities in public university libraries. A study by Atanda and Ogar (2019) on promoting best practices through ICT policies in the provision of information services in Nigeria stated the importance of library managers reviewing library policies and programmes to accommodate the introduction of ICT obligations, hindrances, and other challenges. Elly et al. (2004), citing Marcum (1997) and Riggs (1997), emphasize that application of ICTs in public university libraries has brought both opportunities and challenges in the way libraries operate. They further state that changes have been noted in various areas of libraries, such as services, policies and infrastructure.

These studies shed light on specific challenges within public university libraries regarding the formulation and implementation of ICT policies. Oyovwe-Tinuoye, Omeluzor, and Ijiekhuamhen (2021) highlight lack of policies controlling ICT training for librarians. This deficiency can lead to stagnation and inadequate ICT skills among library staff, hindering their ability to effectively utilize technological resources to support information services.

Similarly, Nyakweba et al. (2021) emphasizes the importance of having comprehensive collection development policies that incorporate ICT equipment and facilities. Such policies are crucial for guiding the acquisition, management, and utilization of digital resources within public university libraries, aligning them with the standards set by regulatory bodies like the Commission of University Education (CUE), International Organizations for Standardizations (ISO), among others

These findings highlight the urgent need for public university libraries to address gaps in their ICT policies. By establishing clear guidelines for ICT training and integration within library operations, institutions can empower their staff with the necessary skills to adapt to technological advancements and enhance service delivery. Additionally, integrating ICT considerations into collection development policies ensures that libraries can effectively manage and influences digital resources to meet the evolving needs of their users and adhere to regulatory requirements.

The connection between national ICT policies and the need for specific policies within public university libraries is crucial for ensuring effective information service delivery.

Kenya's National ICT policy, as outlined by the Ministry of Information, Communication and Technology (2019), sets the tone for both public and private ICT development within all sectors in the country including education where libraries are found. This policy likely addresses various aspects of ICT infrastructure, accessibility, and usage guidelines to propel Kenya's digital growth.

When it comes to specific institutions like public university libraries, having their own ICT policies becomes essential as supported by Muhammad’Rabiu (2021) citing Heaton (2006) emphasizing that library ICT policy provides direction to library staff and users on ICT usage in improving provision of information services. Without such policies, there can be inconsistencies and potential misuse of ICT resources and equipment.

Maseno university library annual report (1999) reveals the existence of the procurement process as one of the policies existing within the ICT directorate and Finance (procurement department) that guides library ICT operations, functions, and services. This policy, formulated by the Ministry of Information, Communication, and Technology, aids in the procurement and disposal of ICT products and services by outlining the requirements for each ICT equipment and facility, from purchase to disposal (Public Procurement Oversight Authority: Public Procurement Manual, 2009; OECD/Asian Development Bank, 2009). The Ministry of Information and Communications (2006) states the need for each institution, organization, or nation to formulate individual ICT policies. However, the implementation of these policies poses challenges that are similar in organizations in both developed and developing countries.

The absence of proper ICT policies in many public university libraries as reviewed in the literature herein particularly in underdeveloped countries, is a significant issue as supported in a study by Khan (2016), citing Kamba (2011), affirming that ICT is not widely spread or utilized in African institutions of higher learning, mainly due to poor communication networks and inadequate ICT policies. It reflects a gap in governance and guidance that could hinder the libraries' ability to influence ICTs for improved service provision.

This study therefore highlights the gap and emphasizes the importance of establishing strong ICT policies and regulations within public university libraries. By addressing this gap, public university libraries can better harness the potential of ICTs to enhance their services, improve accessibility to information, and ultimately contribute to the academic and research endeavors within their respective institutions.

2.3.3 ICT Infrastructure Supporting Provision of Information Services Hardware

Hardware is considered a major ICT requirement in the implementation of ICTs in public university libraries, including Maseno university library, as supported by Tiwari and Sahoo, (2013), Wengua, Rotich and Kogos (2019), Wangari (2021), Adamu and Ajayi (2023). At Maseno university library, available hardware includes computers, internet, servers, printers, scanner, bar code readers, land line telephones, CD-ROM, photocopier machine and Uninterrupted Power Supply (UPS). These hardware components have facilitated the provision of information services to library users (Maseno University Library Report, 2001; Field Report, 2018).

Nonetheless, a study by Sivakumaren, Geetha and Eyaprakash (2011) on ICT facilities in university libraries revealed insufficient hardware, software, internet bandwidth and other ICT facilities in the ten (10) universities studied in India.

Software

The success of ICT application depends of the preferred software and its compatibility to hardware, on library ICT objectives, on support from system developers, user friendliness, revision period of system, available modules to be supported by system, and capacity to aid bibliographic records in public university libraries (Devi and Raghuveer, 2014). Public university libraries have opted and settled on Library Management System Software (LMS) since it simplifies day to day operations within the library by managing the library functions. KOHA Software has been the most preferred in university libraries as Otieno, (2016); Mwai, Kiplagat and Gichoya (2016); Chukwueke (2022) state advantages of KOHA as: flexibility, speed, cost effective and solid information security.

Nebeolise and Osuchukwu's (2014) study on selecting appropriate software for automating and managing academic libraries in Nigeria highlights the need for university libraries to have valuable and dependable software compatible with existing computers. They cite Tiamiyu (2000), who alleges that most university libraries in developing countries depend solely on computer system vendors for selecting both hardware and software due to lack of knowledge, skill and expertise in library automation.

Kari and Baro (2014), in their study on the use of library software in Nigerian university libraries, reported significant software undertakings that necessitated universities to migrate from one software to another due to numerous challenges, such as inadequate funds, lack of ICT skills among some library staff, occasional system failures due to insufficient skills, inadequate ICT training, and a shortage of manpower.

Finally, Kari and Baro (2014) cite Pressman (2001), stressing that the success of computer software lies in meeting user needs, long-term usability, ease of modification, and user-friendliness. The study established a number of software used by Maseno university library such as: CDS-ISIS, Softlink liberty 3 and finally KOHA together with anti-virus software which was compatible to available hardware for provision of information services (Maseno university library report, 2001).

ICT Networking Infrastructure and Facilities

Devi and Raghuveer (2014) assert that networking is essential in libraries to interconnect computers, peripherals, and switches, enabling the sharing of information. Through such a network, information can be distributed among interconnected users.

The provision of information services in public university libraries is significantly supported by various networks and ICT tools. According to the Maseno University library report (2001) and field data (2018), the available networks that support information services include the Local Area Network (LAN), Campus Wide Network (CWN), computers, servers, printers, and photocopiers, the Intranet, Internet, and scarce WiFi. Devi and Raghuveer, 2014; Ani, Esin, and Edem (2005), citing Gallimore (1996), emphasize the critical role of networks as ICT tools that facilitate the provision of information services in libraries. They highlight the importance of flexible networks that can offer extensive and varied services to both library staff and users, stressing the necessity of networking among public university libraries to enable weaker libraries to benefit from stronger ones.

Islam and Islam (2006) underscore the importance of networking as the interconnection of computers and other communication devices, which enables the instant transfer of data between locations. Walmiki (2009) supports this view by detailing the advantages of a campus LAN, which provides electronic access to information sources and services. Through a campus LAN, users can recommend and request loans, reserve information resources, and search the Online Public Access Catalogue (OPAC) from any convenient location. Additionally, browsing the internet is possible from various service points within the university, and managers can share student data such as names, admission numbers, years of study, and courses studied.

Despite several public university libraries having procured hardware, compatible software, and necessary networks and facilities to support the provision of information services, there is a notable gap in the acquisition of appropriate ICT infrastructure, particularly in developing countries. This gap results from insufficient funds, a shortage of skilled ICT personnel, inadequate training for library staff, and, crucially, the selection of the correct software compatible with the available equipment and facilities. Kari and Baro (2014) report that selecting software packages suitable for the type of resources and users has led library staff to frequently transfer from one software to another. This shortfall significantly hinders the provision of information services in public university libraries. Studies by Adeleke and Olorunsola (2010) and Nyakweba (2021) highlight ICT facilities as a major constraint faced by public university libraries. Additionally, Adebayo, Ahmed, and Adeniran (2018) identify a shortage of ICT facilities, such as computers, in many African libraries, where challenges in providing adequate information services are prevalent

2.3.4 Services Provided as a result of ICT Utilization in Provision of Information Services

Great change is realized in public university libraries due to incorporation of ICTs to traditional procedures, functions and services as supported by Islam & Islam (2006); and Shaikh (2019). According to Wawu (2019) and Essien, et al (2022) ICT use enables librarians perform day – day duties in an effective and efficient manner in offering services like: Acquisition, technical services (cataloguing, classification); circulation; Online Public Access Catalogue (OPAC); interlibrary loan; reference service; document delivery; among others. Similarly, Bhoi (2017) concurs with Studies done by Adebayo, Ahmed and Adeniran, (2018); Essien, et al (2022) stating various services that have resulted due to ICT usage in public university libraries such as: Social media (face book, blogs, twitter, etc) for faster communication; Security of library resources (Closed Circuit Television -CCTV); RFID Technology); Resource sharing (sharing of information materials by libraries); Integrated Library System Software (ILMS) enables: Acquisition, cataloguing, classification, stock taking and verification, Online Public Access Catalogue (OPAC); reference service, interlibrary loan and reprographic service that enables copying of some pages from the rare books or those in demand.

Wawu (2019) alleges that the use of ICT facilities, such as the World Wide Web (WWW), has enabled internet connectivity in libraries, allowing access to information from diverse resources without boundaries for both library staff and users. Wawu (2019) cites Ani, Esin, and Edem (2005) alleging that the application of ICT with appropriate hardware and software has enabled the wide gathering of diverse information globally by library staff to meet user needs, store, and distribute relevant information. Similarly, Kude (2016) outlines some ICT-based user services that have resulted from computer usage, internet connectivity, the WWW, intranet, and extranet, together with other new technologies that have facilitated access to ICT facilities and online information. Some ICT-based user services include remote access to online information resources (e-journals, e-databases, e-theses, etc.).

The Maseno University library report (2001) outlines services resulting from ICT utilization at Maseno University library, which include:

i. Library housekeeping activities (Acquisition, cataloguing, classification, storage and OPAC. Use of ICTs has partially facilitated library housekeeping activities and related services provided in an effective and efficient manner.

ii. Availability of computers with internet connectivity enables provision of online information such as: E-resources (e-journals, e-books); e-theses, e-past papers, e-data bases, library website, etc; Communication tools (email, YouTube, Instagram).

iii. Institutional Repository (IR): Use of ICTs enables the university create a platform that collects, preserves, and disseminates scholarly articles, and copies of theses and dissertation of the mother institution's researchers and faculty members.

iv. Online Public Access Catalogue (OPAC): Use of ICT has facilitated the generation of OPAC which is an online database holding all library resources.

vii. Local Area Network (LAN): Use of ICTs in the library enables library's LAN network that interconnects all computers within the building in one place for easy sharing of information by all library sections. For example, acquired resources are forwarded to the technical section for online cataloguing and online classification and data entry.

viii. Reprographic services that assist users reproduce copies of documents on demand for their learning, study and research from the rare copies available in the library is possible with use of ICTs. Reprographic service has curbed book theft and pilferage by library users.

ix. Stock taking: Utilization of ICTs assisted in stock taking and verification of stock to ascertain encountered loss. The process can be done in an effective and efficient manner and thus saving time.

x. Database Search Guide: Searching and retrieval of online resources or from data bases is faster and possible due to utilization of ICTs in the library. Database searching guidance is done through individual library website. Researchers are using databases enormously for their learning, teaching and study work as well as for exploration of varieties of research problems (Mishra and Mishra, 2014)

Although the study specifies services resulting from ICT utilization in public university libraries, a gap is realized as some services still operate manually. For instance, parts of circulation functions are not fully automated, the security of library resources is done manually, and most library services such as reference services and information desk queries are answered verbally (Maseno University report, 2001; field report, 2018). This is supported by Shaikh (2019); Abdelrahman (2009); Seyed and Tajafari (2012) purporting those libraries in underdeveloped countries have lagged behind in adopting advanced technologies.

2.3.5 ICT Knowledge, Skills and Training of Staff and Users in Provision of Information Services

2.3.5.1 ICT Knowledge

A Study by US National Higher Education ICT Initiative (2003); Sherpa (2017); Amushigamo, Hidengwa and Herman, (2018) defines ICT knowledge as: the ability to use digital technology, communication tools, and /or networks appropriately to solve information problems. It also includes the ability to use technology as a tool to research, organization, evaluation and communication of information and the possession of a fundamental understanding of ethical/legal issues surrounding the access and use of information (Islam and Islam, 2006). Alam & Noor (2009); Achugbue, Uwaifo and Igun (2015) assert that it is essential for organizations to determine its employee's ICT knowledge or skills because knowledge of previous experiences may influence organizations.

Topics on ICTs were integrated as a unit within the course of Library Science, as supported by a study by Makori, Odini, and Ojiambo (2013). They cited Kenyatta University (2010) and Moi University (2010), affirming the increased integration of ICT courses into the Library and Information Science (LIS) curriculum within the universities offering Library and Information Science (LIS) Curriculum/Courses.

Yusuf (2014) reveals that librarians require extensive knowledge of scholarly and shared action sources so as to assist users in their search strategies. Broke (2004) cited internet knowledge as a vital skill needed by digital librarians to communicate, exchange ideas, answer clients through email, without geographical boundaries. Librarians and patrons interact through chat and instant messages, quarries from clients are obtained and solution(s) given through this medium. Librarians should also be knowledgeable on the following areas of ICT interest:

i. Blogs or Web Blogs: are important cites used by readers to place topics of interest that are later commented on in order to continue with discussion(s).
ii. Wikis: Are utilized for group work on documents, shared projects, or for large communities that come together since it allows editing, updating, or can be improved by anyone (Oyedun, 2005) as cited in (Burch 2004).
iii. Basic Knowledge of a Personal Computer (PC): (Nash, 2009) outlines librarians required skill like: file folder structure knowledge (retrieval of documents, organizing, navigating, saving, deleting items, among others).
iv. Networking Knowledge: Essential computer literacy has necessitated ongoing migration to advanced use of internet known as network literacy.

v. Hardware Knowledge: It is essential for librarians to familiarize with hardware parts, their functions as fixed in CPU like: Keyboard, mouse, monitor, barcode, scanners, and Uninterruptable Power Supply (UPS). Knowledge of other hardware such as: projectors, printers and having ability of identifying PC problems is vital.

vi. Software Knowledge: It is necessary for librarians to possess knowledge of both system software and application software since applications are developed to complete exact tasks. For instance, instructors are aided by Microsoft office products in their quest of teaching and learning (Kumar, 2004).

The study established that Maseno University library staff had acquired additional ICT knowledge through hands-on day-to-day service delivery using ICTs as supported by (Maseno University library report, 2001).

2.3.5.2 ICT Skills

Yusuf (2014) indicates that specific IT skills vary from one library to another and also by departments within a library, further asserting that these skills will inevitably change over time. Oliver and Towers (2000), Mbagwu (2020), and Shastri and Chudasma (2022) argue that in contemporary tertiary education, there is a need for basic computing skills and understanding, which lead to the development of generic skills used in instructional media and information sources (Nash, 2009).

According to O'Connor et al (2001), Shastri and Chudasma (2022), workers must master many new skills, including vocabulary and fluency required to understand technological concepts and exploit technology as they work, in order to adapt to technological changes. Shastri and Chudasma (2022) further disclosed the importance of advancing technology, such as the widespread internet and explosive growth of e-resources and online information, which calls for library professionals to gain new ICT skills and techniques to assist in disseminating information to library users. This is supported by Appiah, Konlan, and Asiedu's (2018) study, which states the importance of staff acquiring certain computer skills in various ways to enable them to use computer technology effectively.

Murray (2007) stresses the importance of information literacy skills in all disciplines, learning environments, and education levels, as these skills enable learners to master content and become self-reliant (Onyancha and Minishi-Majanja, 2009). Yusuf (2014) outlined necessary and essential skills required by librarians in the advancement of new technology that aid in the provision of information services, such as programming skills, system administration skills, hardware skills, and software configuration skills, among others.

However, Ellis (2001) and Susan (2011) allege a severe skills gap in the information technology industry, where the majority of staff do not prioritize developing their skills and competencies in their work environment. A study by Shastri and Chudasma (2022) cited findings by Babu et al. (2007), which indicate the need to enhance library professionals' ICT skills to handle new technologies and meet varying user needs.

2.3.5.3 ICT Training

The success of ICT adoption in any university library is centered on the training of both staff and users, which familiarizes them with the knowledge and skills necessary for utilizing ICTs in the provision and access of information services (United Nations, 2013). Besides users being ignorant of the usefulness of ICT-offered services, they also resist migrating from traditional systems to computerized services. Makori, Odini, and Ojiambo (2012) reveal that universities are advocating, embracing, and integrating ICT in education and training at all levels of knowledge and learning. Similarly, Susan (2011) cites Jain, Kaur, and Babbar (2007), affirming the growth of library and information science education, which has equally influenced the growth of library professionals due to the Library Science course that started as early as 1911. Susan (2011) further states that universities in India offer library and information science education at different levels, from diploma to PhD. At all these levels of higher education, enormous change has been realized as a result of incorporating ICT into traditional ways of teaching and learning.

Anunobi (2011) remarks that knowledgeable staff support others by training them. Training by the software vendor was also provided for library staff, from which the best was selected for automating the library as well as teaching the rest of the staff. Similarly, a study by Shastri and Chudasma (2022) cites Ahmad et al. (2020), whose findings revealed the need for training library professionals at regular intervals to enable them to efficiently and effectively perform their duties using new technologies. Mfengu's (2023) study on library and information science education and training emphasizes the need for librarians to train users in information, digital, and ICT literacy to respond to Sustainable Development Goal 4 (SDG), which emphasizes inclusive and equitable quality education and the promotion of lifelong learning opportunities for all (United Nations Sustainable Development Goals, 2021).

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Mfengu's (2023) study on library and information science education and training: skills and competencies for the new World order, emphasizes the need for librarians to train users in information, digital and ICT literacy in order to answer back to Sustainable Development Goals 4 (SDG) that gives emphasis to inclusive and equitable quality education and promotion of lifelong learning opportunities for all (United Nation Sustainable Development Goals, 2021).

Mbagwu (2020) states the need for staff keeping a breast with new technologies by attending continuous ICT training programmes in order to enhance service provision, improve capability and expertise. Mbagwu (2020) further cited (Koneru, 2006) emphasizing importance of training in order to bridge knowledge gap so as to achieve efficiency in provision of information services.

Islam and Islam (2006); Okiy (2010) cited Omekwu (2003); Mbagwu, (2020), outlining required ICT competencies of librarians as: basic knowledge of computers; search engines skills; internet facilities/communication skills; e-mail; internet navigator tools; web browsers / web file formats; database software's; Internet development and management.

Despite Maseno university library staff and users having some ICT knowledge, skill and training, embracing application of ICT in their housekeeping functions and other library operations in their quest to access and use information services, there was still need for both parties to undergo training and retraining in order to keep abreast with the changing technologies. The study therefore identified inadequate ICT knowledge, skill and training gap as existing in both library staff and users in provision of information services using the available ICTs.

2.3.3.4 Information Literacy in ICT

Rockman (2004) defines information literacy as a term used in place of user education, bibliographic instruction, skills instruction, and other previously coined descriptions.

Naik and Padmini (2014) purport that as a result of information explosion output and information sources, it was necessary to equip staff and users with information literacy in ICT to assist them in accessing required information in their field of study. Ali and Katz (2010); O'Connor, et al (2001), ACRL (2000) state a summary of ICT literacy framework as follows:

Define: Understand and articulate the scope of an information problem in order to facilitate the electronic search for information.

Access: Collect and/or retrieve information in digital environments. Information sources might be web pages, databases, discussion groups, e-mail, or on-line descriptions of print media.

Evaluate: Judge whether information satisfies an information problem by determining authority, bias, timeliness, relevance, and other aspects of material

Manage: Organize information to help you or others find it later.

Integrate: Interpret and represent information, by using digital tools to synthesize, summarize, compare, and contrast information from multiple sources

Create: Adapt, apply, design, or construct information in digital environments.

Communicate: Disseminate information tailored to a particular audience in an effective digital format. Similarly, Nwankwo et al (2020) alleges that ICT literacy for librarians equips them as information professionals in making suitable use of ICTs in housekeeping functions like: acquisition, cataloguing, classification, circulation, retrieval and dissemination. It includes library staff possessing ICT skills in using computers in their day –to-day activities in a web based and on-line setting. Nwankwo et al (2020) further outlines four areas of ICT skills and expertise of users such as: Ability to operate personal computer; ability to use available software, ability to use the internet and various communication devises; and ability to use World Wide Web (WWW) in accessing and using information.

Dhiman (2007) reveals different programs offered by different libraries when offering information literacy to users. Example of Mysore Library Network (MYLIBNET) is given with various organized programmes for the benefit of information science professionals.

The study revealed insufficiency of ICT knowledge, skill and training among library staff which is also identified by studies mentioned here that was noted as similar cases in other developing countries. It is a research gap that the research intends to fill by giving recommendations that would assist both library managers and the management of the mother institution.

2.3.6 Benefits of ICT Utilization in Provision of Information Services

Adoption of ICTs in public university libraries aimed to replace traditional systems earlier used in performing library housekeeping activities (acquisition, cataloguing, classification, circulation services, etc) and other library operations (Essien et al, 2022; Qutab, Bhatti and Ullah, (2014)

Bhoi (2017); Mamdapur, Duragannavar, and Manjuath (2018); Hogue (2023) outline some ICT benefits in public university libraries as:

i. Automation of library functions and operations is possible with available Computers with compatible software that necessitates automation of library manual functions and operations like acquisition, cataloguing, classification, circulation, reference services, serial control, among others.

ii. Availability of internet in libraries assists in provision of up-to- date information in any theme/topic sought (Adebayo, Ahmed and Adeniran, 2018)

iii. Efficiency in library operations and services: Nwankwo (2006); Oketunji (2000); Akintunde (2004) affirm that application of ICTs to library operations assists in provision of efficient information services, utilization of network operations and housekeeping activities.

iv. Provision of speedy and easy access to information**:** Dike (2000); Patel (2018) reveal that ICTs assist in locating and sorting out relevant information resources from amass of irrelevant one. Essentially, retrieval of current information is possible using ICTs (Adebisi, 2009; Uwaifo, 2010). Similarly, immediate downloads of e-books are possible as categorization of online databases (Federal Communications Commission: Historical Periods in Technology, 2004).

v. Video conferencing (Video Conference): Video conferencing permits people in different locations to hold meetings at the same time (Mishra and Mishra, 2014). Public university libraries use ICTs for video conferencing and distance learning, conducting library user orientation and student exchange programs for students at remote places (Offorma, 2000; Elisha, 2006).

vi. Increased use of electronic resources**:** Vijayakumar and Vijayan (2011); Nazim, (2015) affirmed use of ICTs as enabling ICT based information services such as: access to in-house developed databases, access to e-resources (e-books, e-journals, e-databases,) and web-based reference services. Digitization of local content from sources like: Theses and Dissertations, rare books, and newspapers among others as supported by Jagboro's, (2007) study stating that libraries involved in an African-wide project of digitizing Theses and Dissertations from institutions through the Association of African Universities known as Database of African Theses and Dissertations (DATAD) project.

vii. Remote access to library resources: Omekwu and Echezona (2008); Hoque (2023) affirm that library services were not confined to specific operating hours but rather accessed services in libraries beyond their own, beyond their country and continent (Patel, 2018). Millions of users can access same resource at the same time from any location. Adebayo, Ahmed and Adeniran, (2018) affirm enhanced collaboration facilitated by ICTs among researchers irrespective of their location.

viii. Electronic Security Systems: Application of ICTs in public university libraries has boosted security of information sources in the library through use of various electronic security systems such as: CCTV, RFID, electromagnetic (EM) and Biometrics depending on the type of users and the kind of information resources (Mamdapur, Duragannavar and Manjunath, 2018)

ix. Storage Capacity: Ashikuzzaman (2014) states that ICTs store more information, saves space and reduces paper work.

2.3.7 Challenges Faced in ICT Use in Public University Libraries

Great significance is realized in public university libraries as a result of ICT adoption and incorporation into library processes, functions and services. Nonetheless, encountered challenges as exposed by Emmanuel and Sife, (2008); Adeleke and Olorunsola (2010); Ekwelem (2019); Nyakweba, 2021; etc) such as:

Limited financial resources are reported as a major challenge. Funds are major driving factor in application of ICTs in public university libraries. Purchase and maintenance of ICT equipment and facilities, subscription of various online databases including e-journals and e-books, payment of software licenses, ICT skilling and upskilling of library staff and users as reported by Chisenga (2000); Chisenga (ed)(2004); Ani, Esin, and Edem (2005); Okiy (2005); Kavulya (2006); Emmanuel and Sife (2008); IPSOS MORI Social Research Institute (2009); Okiy (2010); Siddike, Munshi and Sayeed (2011); Kamba, (2011); Gwang (2011); Vijayakumar and Vijayan (2011); ICT Innovation Fund Report (2012); Gould and Gomez (2010); Business Daily Newspaper (2014, June 12th); among others.

Meagre infrastructure networks and facilities such as: Absence of ICT policy, Unstable, unreliable, and high cost of internet connectivity, costly ICT equipment and facilities, inadequate number of PCs, poor communication networks and Constant changes of hardware and software in the market are hindrances to adoption of ICTs in public university libraries as revealed by: Rosenberg (2005); Manda (2006); Emmanuel and Sife (2008); Kamba (2011); Afolabi and Abidoye (2012); Nazim (2015). Inadequate ICT trained personnel is cited as a hindrance to ICT adoption in public university libraries as stated by: Minishi-Majanja (2007); Odero-Musakali and Mutula (2007); Emmanuel and Sife (2008); Kamba (2011); Ghuloum and Ahmed (2011); Nyakweba, 2021; Guto and Wasike, (2022); among others.

Organizational cultures and sub-cultures such as: educational background, values and beliefs, institutional affairs, regional distribution and political dynamics are a challenge to ICT adoption in libraries as purported by Huang, et al, (2003); Hagenaars (2007); Odero-Musakali and Mutula (2007); Amutabi (2009); Gould and Gomez (2010); Haliso (2011) among others.

Digital literacy skill entails having the knowledge, skills and behavior's required to effectively use digital devices such as: desktops, smartphones, tablets, laptops, iPads for purposes of communication (Subaveerapandiyan, Sinha, Emeka, 2022).

The study identified inadequate digital literacy skill among librarians in public universities that hindered full applications of ICTs in libraries (Martzoukou and Elliot, 2016; Subaveerapandiya Sinha, Emeka, 2022; Chukwueke and Idris, 2023).

Another challenge encountered by public university libraries was the availability of tailor-made ICT policies that each library formulated to guide their users and manage digital resources. These tailor-made policies were often not relevant to the available ICT resources or user needs, and they were neither revised nor kept up to date. (Garg, 2013; Pwani University, (n.d).

2.3.8 Measures for Improved Use of ICTs in Public University Libraries.

Availability of adequate funds as a measure for improved use of ICTs in public university libraries is important as supported by studies done by Afolabi and Abidoye (2012); Tiwari and Sahoo (2013) emphasizing the significance of state funding public university libraries in order to assist in purchase of technological facilities and equipment (computers, hardware and software, servers, etc). Funds are also required in automation of library services; maintenance and repair of equipment; ICT training and retraining of staff and users among others.

Development of workable ICT policies and Infrastructures as reported by Ministry of Information and Communications (2006); Elisha (2006) stating the importance of institutions, organizations or nation formulating their own ICT policies. Libraries should strive to have stable internet connectivity and high bandwidth for effective and efficient service using ICTs as supported by Odongo's (2011) study that affirms developing countries like Kenya are aided by donors such as Kenya Education Network (KENET) who provide Universities with affordable and efficient bandwidth.

Emmanuel and Sife (2008); Adebayo, Olayinka, and Adeniran (2018); Mbagwu (2020) reports the importance of library ICT Knowledge, Skill and Competencies that assist in managing ICT facilities and networks. Therefore, they advocate importance of training and retraining of all library staff of different cadre through different kinds of ICT trainings to equip them in using various ICTs for provision of information services,

2.3.9 Gaps from Literature

Table 2:1 Gaps from literature review and how they are addressed through the Constructs

Research Gap	How the gap is addressed (objectives)	Research question	Theoretical Framework (IT implementation – six stages)
Inadequate ICTs in the library used for provision of information services. Makori (2009); Odongo(2011); Kamba (2011)	Assess the status of ICT use in the provision of information services at Maseno University Library	1. What is the status of ICT use in the provision of information services at Maseno University library?	**2nd stage (adoption stage)** The library is committed**,** gets organizational backing like providing required resources, implements innovation, takes up, follows and uses ICTs in provision of information services **3rd stage (Adaptation)** Development, installation and maintenance of the innovation occurs. Training of staff and users is done and technology is applied in provision of information services **4th stage (acceptance stage),** users employ the technology, evaluate using measures in-order to make decisions on its performance
Absence of ICT policy in the library. The library operated on alternative ICT policies that were not directly related to provision of information services. Minishi- Majanja (2007); Okiy (2010); Ngimwa & Adams (2011)	Examine the ICT policies and regulations governing the use of ICTs in the provision of information services at Maseno university library	2. How do ICT policies and regulations guide the use of ICTs in the provision of information services at Maseno University library?	**1st Stage (initiation stage)** Requires availability of policy(s) that guide implementation of the technology. Policies and regulations guide implementation, management of the mother institution and that of library
Meagre ICT infrastructure that is not entirely supporting provision of information services. Kamba (2011); Afolabi and Abidoye (2012); Nazim (2015)	Examine the ICT infrastructure that supports the provision of information services at Maseno University Library.	3. Which ICT infrastructure supports provision of information services at Maseno University library?	**2nd stage (adoption stage)** Commitment towards implementation of current technology is ensured (computer hardware, software, networks, internet, etc) that aid ICTs in provision of current information service like e-resources, institution repository, e-data bases among others are availed and organizational support in providing required resources.

Inadequate services provided as a result of application of ICTs in the library. Odongo (2011) Okonoko and Eruvwe (2021); Essien et al (2022);	Establish services provided at Maseno University library as a result of ICT utilization in provision of information services.	4. Which services are provided at Maseno University library as a result of ICT utilization in provision of information services?	**1st Stage (initiation stage)** Requires availability of policy(s) that guide implementation of the technology. **2nd stage (adoption stage)** Commitment towards implementation of current technology is ensured and organizational support of providing needed resources **3rd stage (Adaptation)** Advance by mounting the technology, Training of staff and users is done and technology is applied in provision of information services **4th stage (acceptance stage),** users employ the technology, evaluate using measures in-order to make decisions on its performance **5th stage (Routinization stage)** use of technology becomes a normal and supported activity in the organization and aids ICTs in provision of information services
Insufficient ICT knowledge, skill and training among library staff ad users that could not support provision of information services. Moruf & Olaojo (2020); Mbagwu (2020); Konlan (2022)	Establish ICT knowledge, skills and training of library staff and users in ICT utilization in provision of information services at Maseno University library.	5. What ICT knowledge, skills and training do library staff and users possess in the utilization of ICTs for the provision of information services at Maseno University library?	**2nd stage (adoption stage)** The library is committed**,** gets organizational backing to implement innovation. **3rd stage (Adaptation)** Training of staff and users is done and technology is applied in provision of information services **4th stage (acceptance stage),** users employ the technology, evaluate using measures in-order to make decisions on its performance **5th stage (Routinization stage)** use of technology becomes a normal and supported activity in the organization and aids ICTs in provision of information services **6th stage (Infusion stage)** improved organizational success is obtained from complete utilization of adopted technology in support of operational activities within the organization.

2.10 Chapter Summary

The chapter presents an introduction and outlines theoretical frameworks and models that inform ICT use. It reviews related literature from both developed and developing countries on ICT utilization in public university libraries, covering policies and regulations, infrastructure, services enabled by ICT, staff and user knowledge, skills and training, benefits, challenges, and measures for improved ICT application in information service provision. The chapter concludes with a summary.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

According to Creswell (2014) research methods involve the forms of data collection, analysis and interpretation that researchers propose for their studies. Welman and Kruger (2001) also clarify research as the application of various methods and techniques to obtain knowledge by using objective methods and procedures.

This chapter outlines the procedures and methods used to collect data for the study. It covers the research approach, design, study population, sampling techniques, data collection instruments, validity and reliability, methods of data analysis, and ethical considerations, and concludes with a chapter summary.

3.2 Research Approach

Research approaches are plans and procedures that span from broad assumptions to detailed methods of data collection, analysis, and interpretation (Creswell, 2014). They enable researchers to strategize in gathering relevant data through qualitative and quantitative methods, and are generally categorized into three components: qualitative, quantitative, and mixed methods. These constructs guide a study from overarching assumptions to specific data collection techniques (Williams, 2007; Creswell, 2014; Taherdoost, 2022)

According to Bryman (2012), the qualitative approach generates non-numerical data through participants' explanations, focusing on attitudes, opinions, behaviors, experiences, words, and images. In this study, data is obtained through interviews, focus group discussions, observations, and documentary review. Creswell (2008) notes its suitability for uncovering the unexpected and discovering new avenues of understanding. According to Veal (2006), qualitative research assumes that individuals directly involved in a situation are best suited to explain and describe their experiences and feelings in their own words. It emphasizes allowing participants to express themselves freely, without undue mediation or constraints from the researcher's framework.

Creamer (2018) highlights a key strength of the qualitative approach—its ability to provide a deeper, intuitive understanding of the research setting that cannot be achieved through statistical Burke, Snyder, and Rager (2009) distinguish qualitative and quantitative approaches by noting that qualitative research identifies previously unknown processes, explains how and why phenomena occur, and explores their effects, while quantitative research focuses on measuring known phenomena. Similarly, Kothari (2004) emphasizes that a key characteristic of qualitative research is its attempt to understand people through their own descriptions of their world analysis or numerical data, as used in quantitative research.

Williams (2007) notes that the quantitative research approach uses questionnaires to generate statistics, enabling the collection of extensive data from many participants. This data—comprising numbers, percentages, and frequencies—can be efficiently processed using computers, saving time and resources. Similarly, Eyisi (2016), citing Bryman (2001), emphasizes that quantitative research relies on numerical data in both collection and analysis.

The quantitative approach gathers primary data through closed-ended questionnaires and structured interviews. In this study, it was used to collect and analyze information on participants' use of ICTs in providing information services at Maseno University Library.

3.2.1 Mixed Methods Approach

Creswell (2009) and Dawadi, Shrestha, and Giri (2021) assert that the mixed methods approach combines elements of both qualitative and quantitative research, which are often considered incompatible. Each approach employs distinct designs that may be based on different philosophical assumptions and theoretical frameworks. Taherdoost (2022) asserts that the core assumption of mixed methods research is that combining qualitative and quantitative approaches yields a more comprehensive understanding of a research problem than either approach alone.

The study adopted a mixed methods approach through a concurrent exploratory design to examine ICT use in delivering information services within Kenyan public university libraries, focusing on Maseno University as the case study. Guided by a pragmatic worldview, the research integrated both qualitative and quantitative data to effectively address its questions (Creswell, 2014; Maarouf, 2019). According to Creswell (2014), Murphy and Davidshofer (1991), Patton (1990), Cherryholmes (1992), and Rai (2018), pragmatism emphasizes practical application and supports an inquiry process that combines the strengths of qualitative and quantitative methods.

Guest and Fleming (2015) state that the mixed methods approach offers a comprehensive understanding of a phenomenon by integrating qualitative and quantitative data. They further affirm, along with Williams (2007), that mixed methods are particularly suitable when research seeks to describe, explain, and evaluate.

Qualitative data for this study was collected from key informants, including deans and heads of departments, librarians' in-charge of sections, the University Librarian, the ICT Director, and the Finance Officer. Data was collected through interviews that facilitated the exchange of ideas and experiences on the topic. Using both qualitative and quantitative methods was considered appropriate for assessing ICT use in providing information services at Maseno University Library.

Rai (2018) and Skamagki et al. (2022) affirm that mixed methods research enables the concurrent collection and analysis of qualitative and quantitative data, with emphasis later placed on integrating the findings at a single stage of the research process.

3.3. Research Design

Research design aims to obtain answers to research questions within qualitative, quantitative, and mixed methods approaches (Jansen and Laurie, 2016). The research design provides the researcher with insights on how to conduct the study while ensuring that the research questions are answered effectively (Khanday and Khanam, 2019). The study employed an exploratory survey design within a case study. Exploratory designs are particularly useful for gaining initial insights into a phenomenon (Yin, 2014; Hassan, 2024).

3.3.1 Exploratory Survey Design

Exploratory surveys aim to investigate and understand the phenomenon under study (Lau, 2017; DeCarlo, 2021). They are used to gather preliminary insights, often through questionnaires or interviews. This approach is flexible and helps identify patterns, issues, or hypotheses.

Survey design facilitates gathering information from a larger population and allowed collection of data through respondents' responses to structured questions. This design also accommodates various instruments of data collection. The study included respondents such as undergraduate students, deans and heads of departments, librarians in charge of sections, the university librarian, ICT director, and finance officer.

3.3.2 Case Study Research Design

A Case study research design is a qualitative research approach used to generate a detailed and intensive understanding of an issue or phenomenon in a certain system such as: person(s), group, location, organization (company), or event (Coombs, 2022; Creswell, 2014). There are six types of case studies—descriptive, explanatory, exploratory, intrinsic, instrumental, and collective.

An exploratory survey design was suitable for Maseno University due to its rural setting and its innovative use of ICT to address socio-economic and technological needs through ICT integration in education, making an exploratory case study necessary. According to Singh (2006) and Coombs (2022), an explanatory case study provides initial insight in to how and why a phenomenon occurs, helping researchers' gain deeper understanding by focusing on explanation. This approach can assist organizations in identifying prospects and challenges, with its emphasis on the case as the primary focus further supported by Yin (1994) and Creswell (2013). Similarly, Berg (2004) emphasizes that a case study is a methodological approach, not just a data collection technique, as it integrates multiple procedures including field studies, interviews, documents, and participant observation.

Simons (2009) notes that case study research often integrates qualitative and quantitative methods to provide detailed contextual knowledge. Guided by this approach, the present study examined the use of ICTs in delivering information services at Maseno University Library. In addition to the explanatory case study design, an exploratory survey was employed to capture multiple perspectives on ICT use within the library. This combination enhanced the robustness of the study by providing both contextual depth and broader insights. Triangulation of data in exploratory surveys and case studies is evident, as surveys yield measurable results that can be compared with qualitative narratives. This process enhances validity and reliability by demonstrating whether different methods lead to similar conclusions.

3.4 Study Population

Creswell (2014) defines population as an entire group of individuals, events, or objects with some common observable characteristics. The target population consists of individuals or participants with the specific attributes of interest and relevance sought by the researcher (Lavrakas, 2008). This study targeted a population comprising service providers (librarians in charge of sections), institutional management and policymakers (Deans and heads of departments) at Maseno University, who are thought to be using ICTs in the provision of information services.

Records from the students' admissions office and personnel registry indicate that there were (3,207) undergraduate students in the 2017/2018 academic year, derived from 1st to 4th years respectively, while the university academic board reported a total number of (52) deans and heads of departments. Key informants chosen comprised of: librarians in charge of sections (8), the University Librarian (1), the ICT Director (1), and the Finance Officer (1). Only permanent staff were chosen by the researcher by identifying and singling them out since staff on contract, temporary, or casual basis were bound to leave employment at any time due to their short-term engagement. This approach ensured inclusion of individuals who had a stable and ongoing role within the institution.

The table below indicates the target population:

Table 3.1: Population Distribution of Respondents

Category	Number of individuals
Undergraduate students	3207
Deans and Heads of Departments	52
Librarians' In-charge of sections	8
University librarian	1
University ICT director	1
Finance Officer	1
Total	**3270**

Source: Students admissions office and Personnel registry (2018)

3.5 Sampling Techniques and Sample Size

3.5.1 Sampling Technique

According to Singh and Masuku (2014), sampling involves taking a small portion of the population that could provide the requested information. van Haute (2021) highlights the relevance of sampling technique in a study as assisting the researcher obtain the target population since sample study gives the required information from the entire population.

Taherdoost, (2016); Bhardwaj. (2019) categorized sampling techniques into two: Probability and non-probability which in turn have several sub types techniques. Probability sampling technique is composed of simple random, stratified random, cluster sampling, systematic sampling and multi-stage sampling. Non-probability sampling include: Quota sampling, Snowball Sampling, Purposive or Judgement sampling and Convenience Sampling.

The study employed simple random sampling and purposive sampling to determine the sample size. The undergraduate students were stratified into four groups (1st, 2nd, 3rd, and 4th year) after which simple random sampling was applied to select participants from each group, as this method provided every student with an equal and fair chance of being selected. Similarly, Kerlinger (1973) noted that simple random sampling is the easiest method for extracting a research sample from a large population.

Purposive sampling, a non-probability method common in mixed methods, was used to select key informants including deans and heads of departments, librarians' in-charge of sections, the University Librarian, the ICT Director, and the Finance Officer, based on the researcher's judgment, as supported by Simons (2009) and van Haute (2021).

3.5.2 Sample Size

A sample size is a subset of the target or accessible population that has been procedurally selected to represent the whole (Kothari, 2009). According to studies by Yin (2004); Creswell (2008); Sarfo et al, (2021) among other researchers, they depicted that the choice of a smaller percentage, such as 5%, 10%, etc.; is generally based on experimental design rather that a specific cited methodology. This approach is justified when dealing with large populations, considering the specific research content, the aims of the study, and the characteristics of the population.

Simple random sampling was employed after stratifying undergraduate students into four groups (1st - 4th year), ensuring each individual had an equal chance of selection. The researcher therefore employed 5% to each stratified group to determine the sample size from the population of undergraduate students as indicated below:

Table 3.2: Sample Size for Students

Group	**Target Population**	**Sample Size**	**Percentage (%)**
(**Questionnaires**) Undergraduate students	3207	160	5%

By applying 5% to the target population, the sample size for the qualitative analysis was determined. This proportion was considered adequate, as it balanced manageability with representativeness and ensured diversity across the four stratified groups, thereby enhancing the validity and reliability of the findings.

In this regard, the researcher applied 5% to the target population to determine the sample size. For the undergraduate student population of 3,207, the calculation was as follows:

5/100 X Population

5/100 X 3207 =160.35

Therefore, Sample size for undergraduate students is approximately 160 students.

Table 3.3: Sample Size for all sampled groups

Group	Target population	Formula	Sample size
(Questionnaires) Undergraduate students	3207	5%	160
(Interviews) Deans and Heads of departments	52	Saturation	---
Librarians in charge of sections	8	Census	8
University Librarian	1	Census	1
Director ICT	1	Census	1
Finance Officer	1	Census	1
TOTAL	**3266**		

(Source: Field data, 2018)

Each group of respondents outlined in the table above made the following contributions to the study.

Undergraduate students were selected as respondents because their learning and research goals align with the institution's academic mission, and as regular library users, they rely on its resources to achieve these objectives.

Deans and heads of departments were included as respondents because their teaching and research and policy makers' roles are central to meeting learners' needs.

The librarians in charge of sections were selected as respondents because they oversee the library's daily operations and ensure user needs are met in support of their academic goals.

Apart from being the head of the library department, responsible for its smooth running and overseeing all personnel and resources, the University Librarian was also considered a policy maker.

The ICT Director was selected as a respondent in the capacity of a policy maker, since the directorate oversees all ICT-related matters within the university.

The Finance Officer was also considered a policy maker, in addition to being responsible for budget allocation within the university.

3.6 Data Collection Instruments

According to Albertine (2009), a research instrument is a device used to collect data to achieve research findings. This study employed a mixed methods approach, integrating elements of both qualitative and quantitative approaches. The data collection tools used included questionnaires, interview schedules, documentary analysis, and observation. Yin (2009) asserts that rich information is obtained through the use of interviews and observation methods as data-gathering instruments within the qualitative approach.

3.6.1 Questionnaire

Willis (2008) states that questionnaires enable researchers to explore topics and obtain first-hand information that may be uncomfortable for informants and interviewees to share. Open-ended questions were developed to allow undergraduate respondents to freely express their opinions about the study's topic.

The research instrument was designed to address questions on the use of ICTs in providing information services in public university libraries, focusing on Maseno University Library. It aimed to collect adequate data from undergraduate students and incorporated elements from the literature review showcasing how ICTs are applied in delivering information services and managing library operations.

3.6.2 Interview Schedules

According to Kumar (2011), an interview schedule or guide is a written list of questions, which can be either open-ended or closed-ended, prepared for use by an interviewer in a person-to-person interaction. The researcher is able to probe the interviewee where necessary in face-to-face interviews, thereby producing rich data.

By use of interviews, the researcher gathered non-verbal indications and respondents were able to seek clarification before answering questions (Hussey & Collis, 2003). To obtain rich qualitative data about the phenomenon under study, the researcher used an interview schedule with semi-structured questions to gather insight from Deans and heads of departments from each school. Semi-structured interviews, is known as most common type of interview schedule used in qualitative social research as supported by (Dawson, 2009).

This tool allowed the researcher to directly interact with the respondents, who were in a crucial position of guiding students in their learning and research topics there by helping the students achieve their academic goals within the institution.

The list of questions was derived from the research questions related to ICT use in the provision of information services at Maseno University Library given that the library supports learning, teaching and research. The researcher booked an appointment with each dean and their individual heads of department through the Deans secretaries who in turn informed the researcher of the agreed date of the appointment. The researcher on the appointment date of each school, met the dean and the respective heads of department of that school and held face - face interview with them. During the interviews, the researcher was able to probe unclear areas by seeking clarification to enable an in-depth analysis of the phenomenon under study.

Other respondents interviewed were: librarians in charge of sections (8) responsible for overseeing the day-to-day operations of library services. They were considered crucial in providing essential information regarding ICT use in the provision of information services within the library. Additionally, the University Librarian, Finance Officer, and University ICT Director were chosen as key informants representing policy makers and institutional management. Their participation aimed to gather insights into their perspectives, involvement, challenges, and suggestions regarding ICT use in providing information services at Maseno University Library.

The compiled interview schedules included predominantly open-ended questions, allowing the interviewer flexibility to introduce new questions during the interview or to probe further based on the participants' responses.

This approach facilitated a more dynamic and in-depth exploration of the questions related to the use of ICTs in provision of information services at Maseno University Library. Other questions within the interview schedule that were presented to both the librarians in charge of sections and the University Librarian aimed to gather information on the following areas: Status of ICT use in the provision of information services at Maseno University Library.

ICT policies and regulations governing the use of ICTs in the provision of information services in the library; ICT infrastructure supporting the provision of information services in the library; ICT knowledge, skills, and training of library staff and users in ICT utilization; Services provided at Maseno University Library as a result of ICT utilization in the provision of information services; Challenges encountered in the use of ICTs in providing information services; Proposed measures for improving the use of ICTs in providing information services. These questions were designed to elicit comprehensive insights into various aspects related to ICT usage and its impact on information service provision at Maseno University Library.

3.6.3 Documentary Sources

It was necessary for the researcher to examine documentary sources to uncover documented experiences regarding the status of ICT use in the provision of information services at Maseno University Library. This assessment enabled the study to examine various factors that have influenced or hindered ICT use in the provision of information services.

A range of documentary sources were utilized including: Library annual reports; Strategic plan documents; Registers for access and use of e-resources, computers, and laptops; Minutes of meetings attended by the University Librarian; Previous research studies on the application of ICTs in libraries.

By examining these sources, the researcher aimed to gain insights on the status of ICT integration in information service provision at Maseno University Library, as well as to identify areas for improvement and further research.

3.7 Data Collecting Procedures

The researcher sought permission from the relevant authorities before undertaking the actual study at Maseno University library. The research being for academic purpose, the researcher obtained a letter from Moi University's School of Information Sciences (Appendix VIII) which the researcher used to write to National Commission for Science, Technology and Innovation (NACOSTI) to obtain a research permit (Appendix IX) authorizing the concerned institution to allow the researcher to conduct research for academic purposes. Authorization letter was presented to the University librarian at Maseno University, who subsequently granted permission for the researcher. Dean of students Maseno University was also consulted to seek permission to collect data from undergraduate students who were contacted through their campus and class representatives. Other authorities consulted were campus director and in-charge librarian (Kisumu campus) where piloting was done to test the validity and reliability of the instruments.

Questionnaires enabled the researcher to reach a larger sample within a limited time frame (Kombo and Tromp, 2009). Questionnaires were constructed for undergraduate students and coded as (US). For example, (US) 1, 2, 3, and 4 represented years 1 to 4, respectively. The coding ensured that all the sampled groups were captured. The questionnaires consisted of two sections. Section A dealt with categories such as US

(1), while Section B required answers to the following research questions: Status on the use of ICT applications in the library; ICT policies and regulations governing the use of ICTs in the library; ICT infrastructure supporting the provision of information services in the library; ICT knowledge, skills, and training of library staff and users in ICT utilization in the library; Services provided as a result of ICT utilization in the library; Challenges encountered in the utilization of ICTs in the provision of information services in the library; Measures for improving the use of ICTs in the provision of information services at Maseno University Library.

The questionnaires for undergraduate students were sorted according to each code for easier distribution. The researcher collaborated with library staff and individual class representatives, who assisted in both distributing and collecting the filled questionnaires. Once completed, the filled questionnaires were returned to the library staff, from whom the researcher retrieved them.

The list of questions incorporated in the interview schedule was derived from the research questions related to the use of ICTs in the provision of information services in the library, given that the library supports learning, teaching and research. The researcher booked an appointment with each dean and their individual heads of department through the Deans secretaries who in turn informed the researcher of the agreed date of the appointment.

On the appointment date, the researcher met the deans and the respective heads of department of that school and held face -face interview with them. During the interviews, the researcher was able to probe unclear areas by seeking clarification to enable an in-depth analysis of the phenomenon under study. The researcher was able to gather rich qualitative data about the phenomenon being studied.

Additionally, the University Librarian [UL], Finance Officer [FO], and Director ICT [DICT]were chosen as key informants representing policy makers and institutional management. Their participation aimed to gather insights into their perspectives, involvement, challenges, and suggestions regarding the use of ICTs in providing information services at Maseno University Library.

The compiled interview schedules consisted predominantly of open-ended questions, allowing the interviewer the flexibility to introduce new questions during the interview or to probe further based on the participants' responses.

This approach facilitated a more dynamic and in-depth exploration of the questions related to the use of ICTs in the provision of information services at Maseno University Library.

3.8 Validity and Reliability of data Collection Instruments

Validity and reliability are essential features in the selection of research instruments, as they are crucial for accurate data collection (Taherdoost, 2016).

3.8.1 Validity of Data Collection Instruments

Blumberg et al (2005) and Robson (2011) assert that validity refers to the extent to which a measuring instrument accurately measures what it is intended to measure. The relevance of validity in a data collection instrument is to ensure right questions are asked to and understood by the respondents, thereby confirming the accuracy and appropriateness of the data collected in a study by reflecting the representativeness of the sample (Saunders et al, 2009). The study adopted a type of face validity determined by a review of the items, which also helps Stakeholders or the institution gauge whether the instruments measures what they are intended to measure. Empirical validation was sought by sharing the data collection instruments with supervisors, and their feedback was incorporated to enhance the instruments.

Face validity also involves the review and determination of items for statistical analysis, allowing anyone to provide their opinion on whether or not the test measures what it is intended to measure (Harris, 2013; Kubai.2019). Validity is relevant because apart from guaranteeing accuracy of results, it ensures internal consistency of the study together with avoiding bias by capturing the data without distortion. The validity of the data collection instruments, including the questionnaire and interview schedule, was achieved through the design of questions that ensured adequate coverage of the research questions.

By carefully structuring the questions to align with the study's objectives and research questions, the instruments were able to effectively gather relevant and comprehensive data related to ICT use in the provision of information services at Maseno University Library. This approach helped ensure that the data collected accurately addressed the research objectives and provided valuable insights into the phenomenon under study.

3.8.2 Reliability of Data Collection Instruments

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials (Mugenda, 2008). The consistency is checked a cross time; across different observers; and across parts of the test itself. Reliability therefore intends to measure whether the questions in the study get same type of response consistently.

Kubai (2019) affirms that reliability is associated with internal consistency, which means that the same feature or construct is measured consistently by different respondents. There are different methods of testing reliability such as: inter-observer reliability, Test-retest reliability, parallel form's reliability and internal consistency reliability.

The study used internal consistency reliability to confirm that the instruments measured the same underlying construct across different respondents. After which the researcher adopted a pilot study to test internal consistency and ensure reliable data collection on ICT use at Maseno University Library.

3.9 Pilot Study

The instruments for data collection in this study which were: questionnaires and interview schedules were tested for their accuracy and their degree to measure up to what they are intended to measure.

A pilot study was conducted at Kisumu Campus library, one of Maseno university's campuses, the research instruments (questionnaires and interview schedules) were tested. The pilot study involved 10 participants, including (5) undergraduate students who completed the questionnaires, and (3) dean and heads of departments (1) campus librarian, and (1) ICT technician who were interviewed. This process helped refine the instruments and ensure their effectiveness in gathering data for the study on the use of ICTs in providing information services at Maseno University Library.

In the pilot study, responses were scrutinized to ensure that questions were correctly understood and that the answers aligned with the questions asked. Any ambiguous questions were re-phrased based on feedback received, and the order of questions were adjusted accordingly. These steps were taken to refine the questionnaire and ensure clarity and consistency before it was administered to the anticipated participants in the main study on the use of ICTs in provision of information services at Maseno University Library.

Before the research was conducted, errors within the instruments, such as grammatical errors and the order of questions, were identified and corrected. Additionally, user feedback on the use of ICTs in provision of information services at Maseno University Library was obtained during the pre-testing phase of the data collection instruments. This feedback helped refine the instruments and ensure their effectiveness in gathering accurate and relevant data for the study.

3.10 Data Presentation and Analysis

This study involved both descriptive analysis and thematic analysis that enabled the researcher provide a comprehensive understanding of the use of ICTs in provision of information services at Maseno University Library, by integrating both quantitative and qualitative insights. Guest et al (2012) asserts that data analysis involving both descriptive analysis and thematic analysis can be explained as below:

Quantitative data (Questionnaire) was collected from questionnaire edited, coded, classified and summarized for analysis. Quantitative findings were later presented using tables, pie charts, frequencies and graphs. The researcher was able to illustrate trends and patterns in the data related to the use of ICTs in provision of information services as a result of the visual demonstrations.

Qualitative data (interview schedule) including texts, narratives and verbatim responses from interview schedules were analyzed thematically. Thematic analysis involved identifying themes, patterns and categories within the qualitative data. This process enabled the researcher gain a deeper exploration of the participants' perspectives, experiences, and perceptions regarding use of ICT in provision of information services in the library.

Editing was done to Quantitative data to ensure accuracy, consistency and uniformity of data in-order to facilitate data entry; coding and tabulation and preparing data for analysis. Quantitative data derived from open - ended questionnaires, face to face interviews and documentary sources respectively was analyzed mathematically using percentages; numbers and statistical tables for ease of understanding. Additionally, excel was utilized to generate and manipulate graphs and pie charts based on the analyzed data. Integration of both numerical and visual methods of data analysis enabled the study reveal effective quantitative results hence complete research findings achieved.

3.11 Ethical Considerations

Ethics are norms for conduct that distinguish between acceptable and unacceptable behavior (Resnik, 2007). Ethical issues such as: consent, privacy and confidentiality had to be upheld by the researcher.

Before the commencement of the study, the researcher assured participants that all information provided in the questionnaires and interview recordings would remain confidential. Participants were informed that the data collected would be used strictly for research purposes and would not be disclosed elsewhere.

To maintain anonymity, respondents were instructed not to provide any identifying details such as their name, registration number, PF number, or cell phone number.

These measures helped participants feel secure and confident in sharing honest and uninfluenced responses, knowing that their privacy and confidentiality were strictly protected. In addition to upholding ethical standards, this approach also contributed to obtaining more genuine and reliable data for the study.

Permission for data collection was obtained through a letter from Moi University's School of Information Sciences, which the researcher used to secure a NACOSTI research permit authorizing the institution to allow the study. The request letter was presented to the Maseno University Librarian, who granted permission for the study. The Dean of Students also approved data collection from undergraduate students, who were reached through their campus and class representatives.

Other authorities approached for permission included the Campus Director and the In-Charge Librarian at Kisumu Campus, where the pilot study was conducted to test the validity and reliability of the instruments.

3.12 Chapter Summary

This chapter focused on methodological analysis, detailing the various approaches to research methodology: Qualitative, Quantitative, and mixed methods approach. The other key components covered were: Research design, Location of study and study population, sampling techniques and sample size, instruments for data collection, pilot study, test for validity and reliability, data presentation and analysis, and finally ethical considerations.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

4.1 Introduction

This study examines use of ICTs in provision of information services in public university libraries in Kenya: A Case study of Maseno University library, Kenya and proposes possible measures for improvement. Qualitative and quantitative data was collected by use of questionnaires and interview schedule from a sample size of (160) derived from undergraduate students. The study was guided by the Information Technology (IT) implementation model, a six-stage model propounded by Kwon and Zmud (1987). This model was based upon Lewin's (1952) change model that viewed system implementation as a change process and system designers as change agents (Copper and Zmud, 1990).

Qualitative data was analyzed thematically while quantitative data was presented in tables and texts. Hence, the chapter will present, analyze and interpret data obtained from the instruments used in the study based on the research questions that guided the study as outlined below:

1. What is the status of ICT use in the provision of information services at Maseno University library?
2. How do ICT policies and regulations guide the use of ICTs in the provision of information services at Maseno University library?
3. Which ICT infrastructure supports provision of information services at Maseno University library?
4. Which services are provided at Maseno University library as a result of ICT utilization in provision of information services?

5. What ICT knowledge, skills and training do library staff and users possess in the utilization of ICTs for the provision of information services at Maseno University library?
6. What recommendations can be proposed to ensure the proper utilization of ICTs in the provision of information services at Maseno university library?

4.2 Response Rate

The study targeted a sample size of 196 respondents from undergraduate students who were given questionnaires; while the rest of the target groups that were interviewed like deans and heads of departments (interviewed to saturation), librarians in charge of sections; university librarian; director ICT; and finance officer were interviewed to the point of saturation as shown in the Table below:

Table 4.1: Response Rate

Category of Respondents	Sample size	Response rate
Undergraduate students	160	148
Deans and Heads of Departments	Saturation	20
Librarians' In-charge of sections	8	8
University librarian	1	1
Director ICT	1	1
Finance officer	1	1
Total		**179**

(Source: Field data, 2018)

Table 4.1 shows category of respondents of study.

4.3 Description of Respondents

Undergraduate students comprising of first years to fourth years academic year 2017/2018 were selected as respondents to the study because their goal of learning and research align with the institution's academic mission. As bona fide users of the library, they utilize its resources in order to achieve these objectives. They were therefore better positioned to provide clarification on the topic under study.

Deans and heads of departments were considered as respondents due to their roles in teaching and research among others, aimed at meeting the learner's needs as supported by studies done by Ferretti and Eisenman, (2010); Munna and Kalaman (2021). Studies done by Bouhnik and Deshen (2014); Wah So (2016); Mzomwe (2018); Communication tools like email, WhatsApp, Smartphone's, among others; support teaching and learning in higher education by permitting speedy access of notes and assignments from academic staff to learners. Bouhnik and Deshen (2014); assert that WhatsApp as a feature has ability to enhance communication within groups. Video conferencing and e-learning was vital for distance learning and student exchange programme for those at remote places.

Deans and heads of departments were regarded as respondents due to their use of ICTs in accessing information resources especially use of e-resources (e-journals, e-books, e-data bases, among others) subscribed by the library. Use of ICTs by teaching staff to reach their respective students through online teaching as well as aiding them in doing their research projects warranted the researcher to take teaching staff as respondents of the study.

The four key informants (librarians in charge of sections, University librarian, Finance officer, and Director ICT) were part of the respondents chosen for this study. Librarians' in-charge of sections are library professionals charged with overseeing personnel and resources in each section. Smooth running of library operations and services are guaranteed in these sections though amidst challenges in sections operating manually due to lack of ICTs. Provision of information services to users is possible due to available internet and WiFi in the library. This ICT infrastructure aids in effective and efficient operations and services to users. Librarians' in charge of sections were considered as respondents due to their position in day to day operations and service delivery to users.

The University librarian [UL] being the head of library services, personnel, resources and as a policy maker was in a better position to respond or react to any concerns from the researcher. Finance officer [FO] was regarded as a respondent due to his position as the controller of all finances in the institution and policy making. He was in a position to deliberate budget matters towards the library. Director ICT was deemed fit as a respondent due to his position as the head of ICT and one that controls all ICT matters within the university. Nevertheless, the three key informants (University librarian, director ICT and Finance officer) played policy makers role within the university a long side as selected policy makers).

4.4 The Status of ICT use in the Provision of Information Services at Maseno University Library

The first research question sought to assess the status of ICT use in the provision of information services at Maseno University library.

It was therefore necessary to assess the status of ICT use in the provision of information services in the library in-order to achieve relevant information relating to its use. Data was collected using questionnaire, interview schedules and documentary sources.

4.4.1 Library Sections Equipped with Different Types of ICTs

Responses from respondents interviewed such as section librarians and the University Librarian [UL] on the status of ICT use in the provision of information services at Maseno University Library reported that:

> *'The library had adopted some ICTs, albeit minimally. Computers constituted the majority of the equipment and were distributed across most sections of the library'.*

The interviewed respondents, specifically the section librarians responsible for (Circulation and Technical section) together with the University Librarian [UL] reported that:

> *Several computers were installed in the circulation section and connected to the internet, thereby facilitating users' access to information for study and research.*
>
> *The technical section, among others, was equipped with a limited number of computers that supported staff in classification, cataloguing, and OPAC functions.*

The University librarian [UL] reiterated the following

> *In sections without computers, operations were conducted manually, as ICTs were deemed unnecessary. For example, at the information desk, where enquiries were addressed verbally*

Responses from the questionnaires distributed to undergraduate students [US] indicate that the library had acquired computers, internet, and Wi-Fi, which were vital for their study and research. Similarly, documentary sources, such as records of purchased equipment found in the librarian's office, indicated that computers comprised the majority of ICTs acquired. Other ICTs, including scanners, photocopiers, and servers, were purchased when the existing ones get obsolete or breaks down.

Table 4.2: Library Sections Equipped with Different Types of ICTs

Library Sections	Comp	Scanner	Printer	Photocopier	Bar Code Reader	Server	RFID Tag Reader	Saphire Bar Code
Circulation	20	1	1	1	4	0	0	0
Reference	3	0	0	0	2	0	0	0
Periodical/Serial	0	0	0	0	0	0	0	0
Technical	10	0	1	1	0	0	0	0
Acquisition	1	1	0	0	0	0	0	0
Information desk	0	0	0	0	0	0	0	0
Bindery	1	0	0	0	0	0	0	0
ICT section	3	0	0	0	0	2	1	1
Total	**37**	**2**	**2**	**2**	**6**	**2**	**1**	**1**

(Source: Field data, 2018)

Interview and questionnaire responses as stated above together with documentary sources obtained from the librarians' office and corroborated by field data in table 4.2, reveal the inappropriate establishment of ICT applications in the library. Various sections within the library had no ICT in place, with computers being the only major tools available as indicated in table 4.2

This is in line with a study by Chisenga (ed) (2004) on use of ICTs in public universities in Africa stating that most public universities in Africa had inadequate ICT facilities.

In the IT Implementation model underpinning this study, the 2nd stage (Adoption) specifies the commitment to implement innovation, emphasizing both the decision to adopt and the commitment to use (Cooper & Zmud, 1990). 3rd stage (Adaptation) involves the development, installation, and maintenance of the innovation, training of staff and users, and the application of technology in providing information services. The 4th stage (Acceptance) reflects users' employment of the technology in service provision, accompanied by evaluation measures to assess performance, supported by organizational decisions and adequate funding Sarosa (2007) and Ambayo (2021) concur with Cooper & Zmud (1990), affirming that adoption represents the full use of innovation.

4.4.2 ICT Application in the Library

Questionnaire responses from undergraduate students [US] indicated that the library had adopted ICT, primarily through computers, with internet and Wi-Fi access available. Respondents further noted that personal gadgets could be used to access information remotely, eliminating the need to visit the physical library.

Interview with section librarians, specifically, (ICT and Circulation sections) further revealed that:

> *'The application of ICT in the library is considered reasonable, with management providing several computers connected to the internet. Additionally, Wi-Fi coverage was observed both within the library and its surrounding areas. Therefore, easy access of required information/resources is achieved'.*

Additionally, they stated that:

> *'Both library staff and users have access to online information resources for study, teaching, and research, facilitated by the library's computers and personal gadgets'.*

An interview with the University librarian [UL] on ICT application in the library revealed that:

> *'ICT application in the library is moderate, as the availability of computers, internet, and Wi-Fi connectivity enables users to access online information for study, teaching, and research. Additionally, staff are able to perform tasks more effectively and efficiently'.*

Study findings indicate the adoption of a limited number of ICTs in library operations and services with computers, internet, Wi-Fi, and communication tools being the main tools. The presence of Wi-Fi facilitated extensive use of digital gadgets within the library and its environs. This aligns with Soni (2019) and Prakash (2022), who affirm the growing use of mobile technology in library services, noting that academic libraries are increasingly adopting mobile technologies to connect with readers.

Studies by Antidius (2018), Dawadi et al. (2021), Wangari (2021), and Konlan, Florence, and Kojo (2022), using a mixed-method approach, revealed that ICT application in academic libraries has positively influenced operations and services. Functions once handled manually are now performed through technology, providing more effective and efficient access to information services from any location at any time.

In the IT implementation model, a six-stage change framework by Cooper and Zmud (1990), the 4th stage (Acceptance) entails users employing technology in the provision of information services, accompanied by evaluation measures to assess its performance.

4.5 ICT Policies and Regulations Governing Use of ICTs in Provision of Information Services at Maseno University Library.

The second research question sought to examine ICT policies and regulations governing use of ICTs in provision of information services at Maseno University library.

Findings from interviews with the Directorate of ICT [DICT] specified the following concerning ICT policies governing use of information services:

> *'The ICT policy formulated by the Directorate of ICT governs all university departments that use ICTs. In turn, the Directorate of ICT is guided by government ICT policies. The utilization of a unified ICT policy ensures consistency and uniformity across all departments within the university'.*

Findings from interviews with the University librarian [UL] when asked to comment on library ICT policy had this to say:

> *'All matters of ICT within the library were governed by the ICT policy formulated by the Directorate of ICT, since the library lacked its own ICT policy. The Directorate of ICT, in turn, is guided by the National*

> *ICT Policy Guidelines (2019), the Kenya Gazette (2020), and the Kenya Information and Communication Act (1998)'.*

Findings from interviews with the finance officer [FO] when asked to comment on library ICT policy reported that:

> *'The library ICT is guided by the information technology and procurement process policy'.*

Table 4.3: Available policies guiding use of ICTs in provision of information services in the library

Available policies	Library	ICT dept	Finance (Procurement dept)
Library ICT policy	x	✓	
Maseno University ICT policy(s)	x	✓	
National ICT policy guidelines & standards	x	✓	✓
Information Technology & procurement process	x		✓

(Source: Field data, 2018)

An interview with the Finance officer [FO] revealed that the University directorate of ICT where the library ICT falls is guided by the Information Technology and Procurement process in Kenya as also supported in a study done by (Kiragu, 2012).

Interview responses, supported by field data in the table 4.3, reveal the absence of ICT policies within the library. Similarly, the findings highlight the non-existence of a specific library ICT policy to guide staff and users in providing information services. Instead, the library relies on policies formulated by the Directorate of ICT, which oversees all ICT matters within the university but does not tailor them to the library's information services, functions, or procedures.

In the 1st stage (Initiation stage) of the IT implementation model, organizations assess technology for improvement, guided by policies and regulations that direct its use across the university, library, and by users.

Ngimwa and Adams (2011) found that Kenyan libraries lag in adopting innovative technologies due to the absence of ICT policies. Okiy (2010), supported by Minishi-Majanja (2007) and Ngimwa and Adams (2011), also identifies the lack of ICT policies as a major barrier to ICT use in libraries.

4.6 ICT Infrastructure in Place to Support Provision of Information Services at Maseno University Library

The third research question sought to establish the ICT infrastructure in place supporting provision of Information services at Maseno university library. (Merriam-Webster dictionary, new ed. 2022) defines Infrastructure as resources (such as personnel, buildings or equipment) required for an activity or the underlying foundation or basic framework of an organization.

4.6.1 ICT Tools and Equipment Available in the Library

In an interview, the University Librarian [UL] when asked about available ICT tools and equipment to support ICT use in the library, responded as follows:

> *'The library has important tools like the internet, WiFi, and computers, therefore, provision of information services especially online services, search engines, online communication sites like e-mail, fax, and face-book make provision of information services effective and efficient'.*

Additionally, the University Librarian [UL], reported that:

> *'Some ICT tools were unavailable and minimally provided due to a limited budget and the high cost of technologies such as the Electronic Security System (ESS) and CCTV cameras, which are essential for managing the security of information resources'.*

The interviewed respondents, specifically librarian's in-charge (ICT sections and Circulation section) reported that:

> *'The library acquired several ICT tools for use in its various sections, with the most important being computers, internet, and Wi-Fi. These tools enable access to online resources and support the fast and effective provision of information services'.*

In an interview, the Director of ICT [DICT], when asked about the available ICT tools and equipment in the library, stated that the library's ICT resources are divided into hardware (computers, peripherals, storage devices) and software, with some hardware already in place.

Table 4.4: ICT Tools and Equipment Available in the Library

ICT Equipment/Resources	Available	Partially available	Not available
Computers	✓		
Internet	✓		
Wifi	✓		
Bar code readers		✓	
E-Resources	✓		
Library Management System		✓	
OPAC	✓		
Servers	✓		
CCTV			✓
Electronic Security System			✓
Hardwares		✓	
Uninterupted Power Supply (UPS)		✓	
Scanners		✓	
Local Area Network (LAN)	✓		
Wide Area Network (WAN)	✓		
Video cassettes/Audio cassettes/ CD-ROM		✓	
Photocopier		✓	
Library land line phones		✓	

(Source: field data, 2018)

Interview responses, corroborated by field data in Table 4.4, reveal the library's efforts to adopt ICT despite constraints such as limited budget allocations, which have resulted in inappropriate adoption. This is supported in a study done by Vijayakumar and

Vijayan (2011) pointing out disadvantages of ICTs among others as: insufficient funds and operational costs that keep exceeding year by year.

In the IT implementation model the (5^{th} stage - Routinization stage), use of ICTs in the organization is recognized as a normal activity. The technology is no longer viewed as a strange performance.

Elisha (2006), Adeleke and Olorunsola (2010), and Krubu and Osawaru (2011) assert that ICTs facilitate easy access to electronic journals and other educational materials that meet users' knowledge needs. They further state that the use of information technology accelerates tasks and enhances the efficiency of library operations and services if appropriately adopted.

4.6.2 Library Management System (LMS) in Place and its Performance

In an interview, the Finance Officer [FO], when asked about the allocation of funds to support ICT use in the library, responded as follows:

> *'Budget allocation to the library is normally affected by the normal budget cuts by the government to universities. Therefore, budget allocation to the library is negligible and hence cannot acquire all library ICTs at ago'.*

The interviewed respondents, specifically the section librarians responsible for the (Circulation and Technical sections) reported that:

> *'Over the years, the library has made several attempts to implement a Library Management System (LMS) software, but it repeatedly crashed'.*

Documentary sources obtained from the University Librarians' [UL] office, particularly regarding purchased library ICTs, indicated that several library management system software packages were acquired alongside free open-source options.

Table 4.5: Library Management System (LMS) in Place and its Performance

Period (Years)	Library Management System (LMS)	Performance
1990- 1997	Manual operations (No LMS in place)	Stable operations
1998 -2006	Manual + CDSISIS	Software Crashed
2007-2009	Manual +Softlink liberty 3	Software Crashed
2010- 2017	Manual + online resources	Stable operations
2018- date	Manual + KOHA	Operating partially/Transition ongoing alongside manual operations

(Source: Field data, 2018)

Table 4.5 indicate outcome of the library management system in place and period under use. Library Management System (LMS) is an essential infrastructure needed to manage operations and housekeeping functions of the library.

Interview responses, documentary sources obtained from the librarian's office, and field data in Table 4.4 disclose the library's efforts to adopt a Library Management System (LMS) as one of its ICT tools. However, the system repeatedly crashed, resulting in data loss.

The theory of IT Implementation model (Copper and Zmud, 1990) that supports this study, under the 2nd stage (adoption stage) ensures commitment towards implementation of the technology. Shukla and Sialai (2018); Nzioki (2021) concur with Ambayo (2021) by stating reasons for poor ICT infrastructure in college libraries as lack of sufficient funds and inadequate library staff together with Library ICT skilled staff. ICT-skilled personnel are essential for the implementation of ICT infrastructure, as their expertise enables them to advice on the appropriate systems necessary for the provision of information services.

4.7 Services Provided at Maseno University Library as a Result of ICT Utilization in Provision of Information Services

The fourth research question required to examine the services provided at Maseno University library as a result of ICT utilization in provision of information services.

4.7.1 Computerized Library Operations and Services

An interview with the librarian in-charge (Circulation) reported that:

> *'The library management opted to prioritize automation of essential services and processes in order to effectively serve its users'.*

In an Interview with the librarian in-charge (technical section) disclosed that:

> *'It was necessary to prioritize the automation of essential sections such as classification, cataloguing, and Online Public Access Catalog (OPAC), since these sections are key to ensuring the proper organization of resources in the library and thereby facilitating easy access for users'.*

In an interview, the University Librarian [UL] when asked to comment on computerized library operations and services revealed that:

> *'Computerized library operations and services are key in essential sections, enabling both staff and users to access information services and library procedures effectively and efficiently'.*

An interview with deans and heads of departments disclosed that:

> *'Computerized library operations and services were vital, as they assisted us (deans and heads of departments) in sending catalogue lists to the librarian for purchase of required materials. These services also enabled access of e-journals and e-books, which are usually current, to obtain notes for teaching and research'.*

In additional, they reported that:

> *'Computerized operations and services facilitated practical classes with students through internet connectivity. As a result, deans and heads of departments were able to use teaching aids such as projectors to support teaching'.*

Responses from questionnaires given to undergraduate students (US) revealed that the library had computerized its operations and services, enabling access to online resources such as e-journals, e-books, e-databases, and other digital materials for study and research. Students further noted that these computerized services also allowed them to use social sites.

Table 4.6: Computerized Library Operations and Services

Library sections	Fully Automated	Partly Automated	Not Automated
Cataloguing	✓		
Classification	✓		
Acquisitions		✓	
Circulation		✓	
Library catalogues (OPAC)	✓		
Reference			✓
Periodical/Serial			✓
Bindery		✓	
Information desk			✓
Electronic Security System			✓
CCTV cameras			✓

(Source: Maseno Uni. Library, 2018)

Interview and questionnaire responses supported by field data in the table 4.6, affirm that Computerized operations and services were applied only to essential functions such as cataloguing, classification, and the Online Public Access Catalog (OPAC). These functions were crucial because they ensured the proper organization of library resources and facilitated easy access for users as a result of the systematic arrangement.

However, it was observed that important ICTs such as: Electronic Security System (ESS) and CCTV Cameras were not implemented and yet these are among the most useful facilities for the security of information resources.

The findings can be interpreted as showing the library's attempt to computerize its essential housekeeping functions.

ICTs have transformed libraries by shifting from paper-based to computerized systems. Computerization, particularly through OPAC, enables quick access to collections and provides unrestricted access to online resources anytime and anywhere, eliminating geographical barriers (Okojie, 2010, Chalukya, 2019).

Obaseki (2011) and Muniraja (2021) emphasize that successful library computerization requires adequate collections, planning, funding, hardware, user-friendly software, training, maintenance, networking, and conversion of existing collections.

The 2nd stage (Adoption stage) in the IT Implementation model signifies organizational commitment to innovation across individual, group, and organizational levels. It requires adequate resources—funding, ICT infrastructure, and support—and is critical for securing the involvement of IS users and management.

4.7.2 Available Electronic Resources and Data Bases

Electronic resources (also known as e-resources) are materials in digital format accessible electronically. Examples are: electronic journals (e-journals), electronic books (e-books), online data bases (Pawar and Moghe, 2014)

Electronic resources are materials that are accessed by use of computers, personal computer, main frame or handheld mobile device. They are accessed locally or remotely via the internet (Velmurugan, 2013)

E-resources facilitate provision of information services by: enabling accurate, efficient, up to date information to users; faster communication, quick information retrieval, an information source can be sought by several users at the same time, e-resources can be searched quickly, users spend less time on searching, access and using the e-resources, e-resources can be stored in huge amount, they are most current.

End users are able to swiftly acquire new innovations since dissemination of information is done in less time with the help of communication tools like email, data transfer among others; library operations such as: circulation, acquisition, serial control, cataloguing, documentation, information retrieval, resource sharing, library management, library budget and finance control are all possible with the aid of ICTs; ICTs provides networking and liaison with other libraries to enable resource sharing while most integrated library automation systems are providing web enabled online catalogue [Web OPAC] (Velmurugan, 2013; Pawar and Moghe, 2014; Kenchakkanavar, 2014)

In an effort to further establish available electronic resources and data bases that have resulted from application of ICTs in the library, respondents who were: undergraduate students, deans and heads of departments, librarians' in-charge of sections, University librarian, director ICT and finance officer unanimously revealed available electronic resources and databases as indicated in table 4.7.

Table 4.7: Available Electronic Resources and Databases

Available ICT resources and databases	No.	Percentage (%)
Theses and Dissertations	500	26
Proposals	500	26
E-journals	47	2.5
E-books	8	0.4
Conference/Seminar papers/	120	6.3
Journal Articles	720	37.9
TOTAL	**1895**	**99.1**

(Source: Maseno University library, 2018)

Table 4.7 shows electronic resources and data-bases in place as a result of utilization of ICTs in the library. Apart from e-resources (e-journals 47(2.5%) and e-books 8(0.4%) subscribed by the library, other resources are as follows: E-theses and Dissertation 500(26%), proposals 500(26%) Conference/seminar papers 120(6.3%) and journal articles 720(37.9%) are all found online and can be accessed and utilized by users at any time without any geographical location.

In the IT implementation model (Copper and Zmud, 1990) that supported this study, the 5th stage (Routinization stage) points out use of technology as being a normal and supported activity in the organization. Studies done by Adedoyin and Soykan, (2020); and Ambayo, (2021) allege that routinization is integration of the technology in to daily activities within the organization. They further state that universities routinize online learning great in order to motivate the learners' actions.

Study finding reveal emergence of several services as a result of utilization of ICTs like internet and WiFi connectivity. Important internet-based services like: Acquisition of library documents, Circulation, access to e- resources (e-journals, e-books, e- data bases,), Bibliographical information service, and Online Public Access Catalogue

(OPAC) emanated as a result of adoption of ICTs. These services have resulted to enhanced utilization of information resources and immense use of personal gargets.

4.8 ICT Knowledge, Skills and Training of Library Staff and Users in ICT Utilization in Provision of Information Services at Maseno University Library

The fifth research question sought to establish ICT knowledge, skills and training of library staff and users in ICT utilization in provision of information services.

To assess the ICT knowledge, skills and training of staff and their area of specialization the University Librarian [UL] was interviewed and reported that:

> *'Library staff had received training in the field of library science at different levels, ranging from certificate to master's degrees'.*

Documentary sources, such as staff appraisal forms and personal files obtained from the University Librarian's (UL) office, supported the responses provided by the university librarian. These sources clearly showed the educational background of each category of staff.

An interview with Director ICT [DICT] when asked what efforts he has made to ensure library staff are ICT knowledgeable, skilled and trained in library ICT related issues; had this to say:

> *'The University established a training unit within the School of Informatics, where staff are encouraged to undertake training during their free time. Occasionally, the ICT Directorate organizes in-house training sessions for library staff'.*

Study findings revealed that library staff lacked ICT knowledge, skills, and training in ICT facilities and equipment. From the records obtained from the University Librarian's office, library staff had received training in the field of library science at different levels, ranging from certificate to master's degrees. However, only one staff member had specialized training in ICT at the master's level, one at the degree level, and one at the diploma level.

In the IT implementation model that underpins this study, the first stage (Initiation) requires the organization to possess the skills, knowledge, and training necessary to examine the technology, identify potential hindrances or opportunities for improvement, and proceed with implementation.

ICT training and the development of the 21st-century librarian require that in-service training include instruction on the use of ICT in delivering information services in academic libraries (Moruf and Olaojo, 2020; Konlan, Florence, and Kojo, 2022)

4.8.1 Library Staff ICT Knowledge

The dictionary meaning of knowledge is the range of one's information, understanding or expertise acquired through experience or education; the theoretical or practical understanding of a subject (Merriam-Webster dictionary, 2022)

Based on the above definition and findings from an interview with the University Librarian (UL), together with documents obtained from the UL's office, it is evident that the knowledge gained through education, combined with the daily experience of service delivery to users and hands-on practice with available ICTs, has made library staff ICT knowledgeable.

Alam and Noor (2009) emphasize that evaluating employees' ICT knowledge and skills is crucial, as prior experience can shape organizational decisions on ICT adoption.

The 1st stage (Initiation stage) of IT implementation model requires organizations to have the expertise to evaluate technology, detect errors or opportunities, and move forward with implementation.

Mani, Vijayalakshmi, and Thirumagal (2019) highlight that ICT knowledge is crucial for students and staff, as it drives e-resource usage, supports effective handling of ICT facilities, and is necessary for implementation, maintenance, and housekeeping activities in libraries.

4.8.2 Library Staff ICT skills

The dictionary meaning of skill is the ability to do something well; because one has practiced it; expertise (Cambridge Advanced Learner's Dictionary, 2008)

An interview with the librarians' in-charge (ICT) reported that:

> *'More practical training (in-house) or seminars was necessary to enable acquire skill that was not gained during education'*

Further probing of University librarian [UL] on how purchase, installation, maintenance and repair of library ICTs are carried out in the library? Had this to say:

> *"Purchase, installation, maintenance and repair of library ICT equipment is done by staff from the directorate of ICT and severe damages are handled by out sourced services by directorate of ICT.*

Further probing Director ICT [DICT] on what effort he has made in managing maintenance and repair of ICT equipment in the library; [DICT] said:

> *'Directorate of ICT has a schedule for carrying out repairs and maintenance of ICT equipment within the library together with other departments within the university. ICT/systems librarian can liaise with staff from directorate of ICT in-order to acquire in-house knowledge, skills and training.*

Study findings indicate library staff had skills acquired from in-housing trainings and on job training as they perform their daily duties. This therefore was not adequate to enable them handle ICT matters in the library.

The IT implementation model that underpins this study in the 1st stage (initiation stage) requires the organization to have skills; knowledge and training to enable them identify errors and opportunities for improvement and hence continue employing the technology.

A survey study done by Bajpai and Madhusudhan (2019) points out that library staff have several ways of acquiring skills. Some of these are: on-job training, workshops/ seminars/ conferences, short courses, formal education among others.

4.8.3 Library Staff and Users' Training

4.8.3.1 Library Staff Training

The dictionary defines training as the process of bringing a person or people to an agreed standard of proficiency, by practice and instruction (Collins advanced dictionary, 2008)

Responses from librarians' in-charge of sections on which area of study they had specialized in as indicated on table 4.9.

Table 4.9: Library Sections and Course Done by Librarians In-Charge of Sections

Library section	No. of librarian(s) in -charge	Course done	Level attained
Information Desk	1	Library Science	Degree
Circulation section	1	Library Science	Masters
Cataloguing	1	Library Science	Masters
Classification	1	Library Science	Masters
Reference	1	Library Science	Degree
Serial/Periodical	1	Library Science	Degree
Africana	0	none	none
Bindery	1	Library Science Conservation & preservation (Option)	Higher Diploma
ICT	1	ICT course	Masters

(Source: Field Data and Univ. Librarian's office, 2018)

Study findings together with documentary sources sought from the University librarian's office are as indicated in table 4.9. The responses from both librarians' in charge of sections and University Librarian [UL] interviewed affirmed that librarians' in charge of sections attended educational training in library science courses at different levels.. Nevertheless, they have also gained skills in their day-to-day service delivery to users.

4.8.3.2 Library users' training

According to this study, library users are categorized as: Undergraduate students, deans and heads of departments, librarians in charge of sections and Policy makers. As library users' they may be experienced or inexperienced in using the library for their study, teaching and research purposes.

Table 4.10 therefore shows responses from four groups of library users citing programmes that have been offered to enable them get easy access to information services in the library.

Table: 4.10: Library User Groups, Program Offered ad Required Information Needs.

User group	Program offered	Required information needs
Undergraduate students	-User Awareness -Library Orientation/library Instruction -Bibliographical Instructions -Information Literacy -Individual help/interest Profiling	-Study -Project work -General
Deans and heads of departments	-Library Orientation/library Instruction -Bibliographical Instructions -Information Literacy -Access and use of e-resources -Individual help/interest Profiling	-Teaching -Research
Librarians' in charge of sections	Training options can be divided into: 1. External 2. Internal External -Conferences/seminars/Workshops (Some can be virtual) -Short courses -Educational training - Invite speakers to talk to staff - Trained by Vendors of databases --Trained internally sponsored by university Internal -Trained by peers, by other library employees -Hands on training	-Knowledge on how to handle different kinds of users -Skills on how to access and use various types of information resources. -Information on how to handle the paradigm shift from traditional libraries to digital libraries using computerized services.
Policy makers	-Conferences/seminars/workshops -Educational training -in-house training	-Information on how to formulate Policies and regulatory frameworks -Information on decision making

(Source: Field data, 2018)

Study findings indicate the groups of users, the programs offered to each group, and the specific information needs of each particular group. Studies done by Lewis and Wilkinson (2006); Adeleke and Olorunsola (2010); Chalukya, (2015) on training needs and programs of library users, the authors assert that it is the responsibility of the library staff to offer quality information services together with educating library users on effective and efficient use of library resources through user training and different programmes.

In the IT Implementation model that underpins this study, in the (3^{rd} stage, Adaptation stage), users are trained and prepared through various training programmes; new procedures and Information Technology (IT) applications and use. Trialability is later done to establish if users have adapted to use of technology. The training programs and procedures enable users be acquainted to use of technology in accessing information services in the library in order to meet each individual user needs.

4.9 Challenges Encountered by staff and Users in Using ICTs for Provision of Information Services at Maseno University Library and Proposed Strategies for Improvement

Challenges listed on table 4.11 were outlined by respondents who were: Undergraduate students, deans and heads of departments, librarians' in charge of sections, University Librarian, Director, ICT and Finance Officer.

Table 4.11 Challenges, Proposed Strategies and Remark(s) by Respondents

Challenges Encountered	Proposed measures	Remark of Respondents
Absence of library ICT policy(s)	Formulate an operational library ICT policy(s) to work a long side government policies. Ensure existing strategies are regularly revised and updated	Put in place a tailored, up-to-date library ICT policy to guide both library staff and users in provision of information services and other procedures.
Insufficient Funds allocated to the library	Prioritize funds allocation to the library by university management	Funds are a driving factor of several activities within the library. Funds are required for: 1. Obtaining necessary ICT legal requirements and documents such as licenses; 2. Purchasing and setting up of an enhanced ICT infrastructure 3. Purchase of library software 4. Purchase, installation, storage, maintenance and repair of ICT equipment 5. Maintain subscription of e-resources, 6. Payment of internet and wifi 7. Training and re-training of library staff and users.
	It is the library's obligation to solicit for ICT gifts and donations.	In-order to supplement the meager finances from the mother institution, it is the responsibility of the library management to solicit for ICT gifts and donations from non-governmental organizations (NGOs) such as: World Bank, United Nation (UN), International Federation of Library Associations (IFLA), Kenya Education Network (KENET), Kenya Library and Information Services Consortium (KLISC) and any other organizations willing to offer gifts and donations of ICTs related to provision of information services.
Meager ICT infrastructure	Purchase a robust ICT infrastructure to be used in the library	Put in place enhanced, up-to-date well maintained ICT infrastructure within the library that supports provision of information services to library users. This will enable continuous effective and efficient provision of information services.
Inadequate ICT facilities and resources	Provide more ICT facilities and resources Enough funds allocation to library by mother institution more	1. Priority should be given to purchase of library ICTs before funds are diverted to other matters within the library.

		2. The library management to solicit for ICT gifts and donations from NGOs and other well wishers
Absence of library ICT skilled personnel	Recruit library ICT skilled personnel	1. The library management should ensure recruitment of library ICT personnel with knowledge, skills and training in library ICTs. 2. Library staff should be facilitated to undergo short courses on ICTs related to provision of information such as: In-house training, seminars, conferences, workshops and other refresher courses on ICTs
Breakdown of available ICT equipment	1. Ensure proper maintenance of the available ICT equipment 2. Carry out regular service to ICT equipment (hardware) 3. Replace obsolete ICTs with current ones in market.	1. Library ICTs should be strictly handled by knowledgeable, skilled and trained Library ICT personnel to avoid reckless handling by any other staff who have no knowledge of operations of these ICTs. 2. Replace worn out and obsolete equipment with modern technologies to avoid necessary break down/malfunctioning
High costs of ICT facilities	Solicit for partnership to ensure collaboration with likeminded partners to support funding of ICT facilities.	Allocation of enough ICT funds to library to enable purchase of new technologies as well as meet their cost of maintenance.
Unstable, unreliable, and high cost of internet connectivity	Increase bandwidth, repair any technical errors and ensure there is no hitch with network configuration and high charges by Internet Service Providers (ISPs) to be lowered.	Put in place bandwidth accessed via fibre optic cable together with that accessed via satellite.
Loss of data during transfer from manual to digital format	Migration of data should be done from manual to digital in order to fully utilize ICTs alone.	Migration of information from manual to digital should be handled by library staff with knowledge, skill and training in ICTs to avoid loss of data and other errors.

(Source: Field data, 2018)

The findings indicate a number of challenges pointed out by respondents as tabulated on table 4.11. The existence of these hindrances in the library has delayed the rapid adoption of ICTs for the provision of information services.

According to the IT implementation model which is a six-stage change model (copper and Zmud, 1990) the first stage (initiation) which is the first phase of implementation of the technology. Under this phase it’s the obligation of the organization to observe the technology in-order to discover hindrances and opportunities for improvement.

Studies by Shastri and Chuasma (2021); Essien et al (2022); allege that full adoption of ICTs in academic libraries has been jeopardized by the several hindrances encountered as listed on table 4.11.

4.10 Chapter Summary

Results of findings, analysis and presentations on use of ICTs in provision of information services at Maseno University Library were presented using tables, frequencies, and words derived from answers to research questions.

Data was collected from different groups derived from Maseno University community but specifically presumed to be library clientele together with library staff who are informants. These groups comprised of: Undergraduate students [US], deans and heads of departments, librarians’ in-charge of sections, University Librarian [UL], Director ICT [DICT] and Finance Offer [FO].

The findings obtained from the interviewed respondents such as deans and heads of departments, librarians’ in –charge of sections, University Librarian [UL], Director ICT [DICT], and Finanace officer [FO]; Questionnaires distributed to undergraduate students [US] together with documentary sources obtained from the University Librarians [UL] office specified Maseno University library having made an attempt to adopt new technology in operations and services offered in the library. Various benefits like: internet and WiFi connectivity resulting to effective and efficient services offered. Other benefits included: extensive use of personal gargets as a result of WiFi; enhanced use of online information, utilization of e-resources (e-journals, e-books, e-data bases, e-past papers) and Institutional Repository (IR).

However, a number of hindrances were outlined such as: Absence of library ICT policy, inadequate ICT facilities, and limited finances channeled to the library by mother institution, insufficient ICT infrastructure, and inadequate library ICT skilled personnel, breakdown of available ICTs, High costs of ICT facilities, erratic power supply and migration from manual to digital.

Finally, respondents suggested probable measures such as: Formulating operational library ICT policy(s), Prioritization of funds allocation by the mother institution, the library to solicit for ICT gifts and donations from NGOs and well-wishers, putting in place a quality ICT infrastructure, recruiting library ICT skilled personnel, carrying out regular service to ICT equipment (hardware)/ replacing obsolete ICTs with current ones in the market, soliciting for partnerships to ensure collaboration with likeminded partners to support funding of ICT facilities, ensuring full migration from manual to digital is done in order to have full utilization of ICTs.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of findings, conclusions, and recommendations of the study conducted at Maseno University Library. The purpose of the study was to investigate the use of ICTs in provision of information services in public universities: A Case study of Maseno University library, Kenya, and to propose measures for improvement. This study employed a mixed methods approach, specifically a concurrent exploratory design and applied a survey design within a case study framework. The following research questions were adopted for the study and were used as the organizing themes for this chapter:

1. What is the status of ICT use in the provision of information services at Maseno University library?
2. How do ICT policies and regulations guide the use of ICTs in the provision of information services at Maseno University library?
3. Which ICT infrastructure supports provision of information services at Maseno University library?
4. Which services are provided at Maseno University library as a result of ICT utilization in provision of information services?
5. What ICT knowledge, skills and training do library staff and users possess in the utilization of ICTs for the provision of information services at Maseno University library?
6. What recommendations can be proposed to ensure the proper utilization of ICTs in the provision of information services at Maseno university library?

5.2 Summary of Findings

The information obtained was reviewed alongside available literature concerning the use of ICTs in the provision of information services in both developed and developing countries. Data from respondents, including undergraduate students, deans and heads of departments, librarians in charge of sections, the University Librarian, the Director of ICT, and the Finance Officer, were gathered using questionnaires, interview schedules, and documentary sources. The study posits that improving ICT utilization at Maseno University Library depends on identifying and addressing the factors causing poor usage**.** Both library management and university management must play active roles in tackling these challenges to enhance the delivery of information services. The study findings are summarized below for each research question and presented in the following section:

5.2.1 Status of ICT use in Provision of Information Services at Maseno University Library

The first research question assessed the status of ICT use in the provision of information services at Maseno University Library. The study identified several deficiencies in ICT application in the library such as: absence of a library ICT policy, insufficient funds allocated to the library for purchase of the ICT facilities and equipment, inadequate ICT infrastructure and resources, inadequate library ICT-skilled personnel, frequent breakdowns of available ICT equipment, unstable and unreliable internet connectivity, and loss of data during the transfer from manual to digital systems.

Although the use of ICTs was marred by several hiccups, the research study established numerous benefits of utilizing the available ICTs in the provision of information services such as: the availability of computers connected to the internet providing library services, internet and WiFi accessibility in the library and its environs, and access to online resources (e-journals, e-books, e-databases, e-theses, e-past papers). In addition, the study revealed the consistent use of computers, as evidenced by documentary sources obtained such as the computer access register, alongside the extensive Information for study, teaching, and research accessed and utilized at users' convenience. Moreover, social platforms such as email, Facebook, and search engines like (Google and Chrome) are readily available owing to internet and Wi-Fi connectivity.

Despite the adoption of ICTs in the library, study findings established that significant challenges continued to hinder their full utilization in management and information service delivery. The findings disclosed that ICT use was attempted but constrained by the limited availability of ICT resources, internet, and Wi-Fi connectivity. The library provides a limited number of computers with internet access, though bandwidth and connections may be restricted.

5.2.2 ICT Policies and Regulations Governing the Use of ICTs in the Provision of Information Services at Maseno University Library

The second research question sought to examine the ICT policies and regulations governing the use of ICTs in the provision of information services at Maseno University Library. The study findings revealed the absence of a library ICT policy and other regulatory frameworks managing the use of ICTs in the provision of information services.

The study findings further ascertained that whole ICT operations within Maseno University were guided by ICT directorate policies together with government ICT policies like the National Information, Communications, and Technology (ICT) Policy (Ministry of Information, Communications, and Technology, Kenya, 2019); Kenya

Gazette; National ICT Policy Guidelines (2020); and the Public Procurement Oversight Authority (PPOA) (2009).

The findings revealed that the policies formulated by the ICT directorate were not tailored to the provision of information services or other library operations and procedures.

5.2.3 ICT Infrastructure in Place that Supports Provision of Information Services at Maseno University Library

The third research question sought to examine the ICT infrastructure that supports the provision of information services at Maseno University Library. ICT infrastructure, including equipment and systems such as hardware, software, networks, and websites, are technologies that support the provision of information services in libraries.

The study established that the available ICT facilities and equipment—such as Library Management Software (LMS), computers, printers, servers, scanners, photocopiers, barcode readers, and landline telephones together with available infrastructure positively impacted library management and the provision of information services, although their availability was limited.

The study revealed that some important ICT tools, such as the Electronic Security System (ESS) and CCTV cameras—which are essential for managing the security of information resources—were not implemented.

The study found that several purchased and implemented Library Management Software (LMS) systems frequently crashed, causing data loss and forcing a reversion to manual operations. The study further revealed that KOHA software later implemented had not resulted in full automation, as data migration was slow and manual services persisted.

5.2.4 Services Provided at Maseno University Library as a result of ICT Utilization in Provision of Information Services.

The fourth research question sought to establish the services provided at Maseno University Library as a result of ICT utilization in the provision of information services. The findings specified availability of computerized operations and services such as cataloguing, classification, and Online Public Access Catalogue (OPAC). These operations and services aided the proper arrangement of library resources, enabling easy access.

The findings revealed that the library's essential housekeeping functions—such as acquisition, circulation, and bindery services—were only partially computerized, while other operations continued in a blended format combining automated and manual processes.

The Study findings further indicate that the computerization of key modules, including cataloging, classification, and the Online Public Access Catalogue (OPAC), brought significant improvements to the library. These include the shift from paper-based to digital operations, more efficient service delivery, easier error correction, faster access to collections via OPAC, and expanded access to online resources beyond geographical boundaries.

The study findings indicated that availability of internet and wifi aided in the access of online resources like (e-journals, e-books, e-data bases) together with search engines, social cites among others

The findings also disclosed that essential ICT tools, such as Electronic Security Systems (ESS) and CCTV cameras, were not implemented despite their importance in safeguarding information resources.

5.2.5 ICT Knowledge, Skills and Training of Library Staff and Users in ICT Utilization in Provision of Information Services at Maseno University Library

The fifth research question aimed to establish the ICT knowledge, skills, and training of library staff and users to determine their competence in using ICTs in the provision of information services.

The study revealed that library staff possessed varying levels of knowledge, skills, and training, acquired through on-the-job training, in-house training, and formal education. Library staff were found to have primarily received training in library science courses at various levels, ranging from certificate to master's degrees as confirmed by documentary evidence from the University Librarian's office and responses from the University Librarian during interviews.

The study further highlighted inadequate ICT knowledge, skills and training among library staff in using ICTs for provision of information services.

The study findings indicate that reviewed documents, such as staff files from the librarians' office, along with responses from the University Librarian, highlighted the varied training levels of library staff, ranging from certificate to PhD.

The study findings point out that among the eight librarians in-charge of sections, only one librarian had completed an ICT course, while the others had pursued training in library science Generally, the study findings point out a notable absence of ICT training among the staff and users specifically aimed at the provision of information services and other library procedures.

5.2.6 Challenges Encountered by Staff and Users at Maseno University Library when Using ICTs in Provision of Information Services and Proposed Measures for Improvement

In conclusion, the research study identified challenges encountered by both library staff and users, and subsequently proposed measures for improvement in utilizing ICTs for the provision of information services. The study findings revealed several challenges and recommended strategies suggested by respondents as indicated below:

i. Absence of library ICT policy(s)
ii. Insufficient Funds allocated to the library by mother institution
iii. Inadequate ICT facilities and resources
iv. Absence of library ICT skilled personnel
v. Malfunctioning ICT equipment and facilities and Obsolete ones
vi. High costs of ICT facilities and equipment
vii. Unstable, unreliable, and high cost of internet connectivity and low band width
viii. Loss of data during transfer from manual to digital format

Respondents identified several hindrances within the library that impeded the rapid adoption of ICTs in the provision of information services.

In response, strategies were proposed to address these challenges, which are outlined below:

i. Formulation, implementation, and update of a working library ICT policy
ii. Prioritization of funds allocation to library by the mother institution

iii. Allocation of adequate funds for purchase of ICT facilities and resources
iv. Recruit library ICT skilled personnel
v. Carry out regular service to ICT equipment (hardware) and replacement of obsolete ICTs with current ones in market.
vi. Soliciting for partnership with like-minded partners to ensure collaboration in order to support funding of ICT facilities
vii. Increase bandwidth, repair any technical errors and ensure there is no hitch with network configuration and high charges by Internet Service Providers (ISPs) to be lowered.
viii. Migration of information from manual to digital should be handled by library staff with knowledge, skills and training in ICTs to avoid loss of data and other errors.

5.3 Conclusion

The conclusion was drawn from the study findings, which were discussed in the order of the research questions stated in Chapter one as follows:

The study findings pointed out minimal adoption of ICTs within the library with most ICTs consisting of computers connected to the internet. The library management prioritized essential operations and services, hence resulting in a blended approach that combined manual and online processes.

The findings revealed the absence of a library tailored ICT policy to guide library staff and users in provision of information services and other library procedures. Instead the library relied on the ICT directorate policies that worked alongside the government ICT policies which was not tailored to library operations, functions and user needs.

The study findings disclosed the library's ICT infrastructure as modest and included internet, Wi-Fi, and tools supporting online resources, cataloging, classification, and OPAC. Nevertheless, key tools such as an Electronic Security System (ESS) and CCTV cameras were missing, affecting the security of information resources.

The study findings highlighted the continued reliance on manual operations despite previous efforts to implement different Library Management Systems (LMS). Challenges established included: Breakdown of available tools, high costs of ICT equipment and resources, unreliable and expensive internet, and data loss during the transition from manual to digital formats.

The findings revealed the insufficient ICT knowledge, skill and training among the library staff and users. Majority of library staff had trained in Library and Information Science course at different level but not specifically in ICT courses related to provision of information services and other library functions and procedures.

The study findings further ascertained that library computerization though minimal increased information usage among patrons and staff, enhanced demand for information access, and improved the ability to update and correct information. It enables quick communication through social platforms, improved storage, and facilitated easy manipulation and acquisition of information. Furthermore, it allows access to information from any location at any time, eliminating the need to visit the physical library. Computerization has significantly enhanced the effectiveness and efficiency of library services enabling the access and use of e-resources (e-journals, e-books, e-theses, etc) among other online resources, data bases as well as social sites.

5.4 Recommendations

The following recommendations were made based on the findings and conclusion of this study.

1. Allocation of Funds: The university management is tasked with the responsibility of guaranteeing the allocation of sufficient funds, considering the high cost of ICTs, while ensuring that the library purchases the necessary equipment for effective provision of information services.
2. Solicit for Gifts and donations: Library management and ICT Directorate is tasked with soliciting ICT gifts and donations from like-minded partners, such as non-governmental organizations like the World Bank, the United Nations (UN), the Kenya Library and Information Services Consortium (KLISC), the Kenya Education Network (KENET), and any other organizations willing to contribute ICT gifts and donations to support the provision of information services.
3. Ensuring Constant Calibration of ICT Equipment: It is the responsibility of the library management, the university ICT directorate, and the university management to ensure regular improvements to the library's ICT equipment, maintaining compliance with required standards and functionalities. This will help prevent frequent malfunctions of these facilities and equipment.
4. Formulate, implement, and update a tailored library ICT policy: It is the responsibility of library management to engage experts in policy formulation, such as the University Librarian, University ICT Director, University Finance Officer, and a representative from the university management, to develop effective, practical, and up-to-date library ICT policies and guidelines related to the provision of information services.

5. Ensuring Stable Network and Fast Internet Connectivity: It is the responsibility of the library management in collaboration with the director of ICT to prioritize a stable network and faster internet connectivity within the library.
6. ICT knowledgeable, skilled and trained personnel: It is the responsibility of the university management and library management to recruit ICT knowledgeable, skilled, and trained ICT personnel oversee the function of library ICTs in the provision of information services.
7. Constant upgrades and maintenance of ICT Infrastructure: It is the responsibility of the library management, in collaboration with the university ICT directorate, to ensure regular improvements to the library's ICT equipment as well as guaranteeing the replacement of obsolete ICTs with emerging technologies in the market.
8. Skilling and Re-skilling of Staff and Users: The university management and the library management are responsible for ensuring the continuous training and retraining of both library staff and users through ICT short courses like: in-house training, seminars, conferences, workshops, and other refresher courses.

5.5 Contribution and Originality of the Study

This study makes several contributions and demonstrates originality in several aspects as follows:

Contextual Relevance: The study conducted at Maseno University Library, offers insights into specific challenges, opportunities, and practices related to ICT utilization in a public university library setting. This contextual approach allows for a deeper understanding of the issues and offers targeted recommendations for improvement.

The case study methodology enabled a detailed examination of Maseno University's library system, providing a comprehensive analysis of ICT use in information service provision. This approach allowed the researcher to gather rich qualitative data, capturing the benefits and complexities of the phenomenon. Similarly, the study emphasizes the importance of establishing workable, up-to-date, and relevant library ICT policies and guidelines tailored to the needs of public university libraries like Maseno University. By highlighting the significance of policy formulation and implementation, the research contributes to discussions on best practices for integrating ICTs into library operations and services.

The research identifies and addresses challenges and opportunities related to the use of ICTs in information service provision. These insights contribute to the existing body of knowledge by shedding light on the specific hindrance's faced by public university libraries in leveraging ICTs effectively and suggesting possibilities for improvement.

Finally, the study proposes practical recommendations, based on the findings, to enhance the use of ICTs in providing information services at Maseno University Library. These recommendations can serve as a guide for library management, the parent institution, and policymakers in similar institutions, ultimately contributing to practical improvements in public university library service delivery.

5.6 Suggestions for Further Research

Although this research is hoped to provide insights into matters on use of ICTs in the provision of information services in public university libraries: A case study of Maseno University Library, further research on the topics related to utilization of ICTs in the provision of information services in public university libraries should be carried out that include but not limited to:

1. Hindrances encountered in automation of public university library services due to the changing technologies and current world trends. Studies on challenges of

automation of library services are necessary due to these on-going changes in technology.

2. Effects of information literacy on utilization of ICT resources and services in public university libraries. In view of this, research in information literacy on computerized services for users to derive maximum benefits in public university libraries needs to be carried out.
3. Effective library management software that can accommodate all library operations and services. An evaluation of available library management software can be done to ascertain the most suitable one to adopt for provision of information services in public university libraries

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APPENDICES

Appendix I: Introductory letter

Dear Respondent,

I am a Master of Philosophy student at the department of Library and Records Management, and Information studies, (Library studies option), school of Information Sciences, Moi University.

This study intends to conduct research on **Use of Information and Communication Technologies (ICTs) in provision of Information Services in Public university libraries in Kenya: A Case study of Maseno university library, Kenya.** Consequently, the study proposes strategies to significantly improve the library by addressing the current challenges faced in utilizing ICTs for the provision of information services. Please answer all questions honestly. Your responses will be treated as confidential and will be used solely for research purposes to enhance the library's services in support of the University's mission as a teaching, learning, and research institution. This survey is intended for academic purposes only.

Thank you.

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Appendix II: Questionnaire for undergraduate students

Greetings

Introduction

This research intends to examine the **use of Information and Communication Technologies (ICTs) in provision of information services in public university libraries: A Case study of Maseno university library, Kenya.** You are requested to provide honest and precise information. Responses to these questions shall be treated with the uttermost confidentiality.

Please tick the most appropriate

Section A

Background information

1. Please tick the most appropriate

   Year [1] [2] [3] [4]

2. Gender?

   Male [ ] Female [ ]

Section B:

1 a) How available and adequate are ICTs in the library?...
..………………………………………………………………………………
……

b) Comment on the status of ICT application in the library?

………………………………………………………………………………
………………………………………………………………………………
…………

4 a) Is there a library ICT policy and other legal frameworks governing use of ICTs in the provision of information services in the library?...
.....

b) Are there any restrictions on use of ICTs including personal gargets in the provision of information services in the library? [Yes] [No]

If yes, state some……………………………………………………………

5 a) State some infrastructure in place supporting use of ICTs in the provision of information services?...

....………………………………………………………

…………………………………

b) In your opinion is the infrastructure adequate and appropriate? [Yes] [No]

If No, state

why…………………………………………………………………….

…………………………………………………………………………………….

6 a) What ICT knowledge, skill and training do you possess in utilization of ICTs in provision of information services in

library?...

………………………………………………………………………………….

b) Did you undergo any training in use of ICTs in provision of information services?

[Yes] [No]

If No, state why…………………………………………………………..

c) In your opinion how adequate is the ICT knowledge, skill and training of library staff in utilization of ICTs in provision of information

services?...

………………………………………………………………………………….

7 a) What services are provided as a result of utilization of ICTs in provision of information services in the

library……………………………………………………………………….

…………………………………………………………………………………

b) What is your opinion about services provided by the library as a result of utilization of ICTs…………………………………………

………………………………………………..………………………

8 a) State challenges encountered in use of ICTs in the provision of information Services?..

…………………………………………………………………………….

b) Suggest way(s) of improvement in use of ICTs in the provision of information services in the library……………………………………………………………………………

…….

……………………………………………………………………………………

………

Appendix III: Interview Schedule for Deans and Heads of departments

Introduction

This study intends to examine the **use of Information and Communication technologies (ICTs) in provision of information services in public university libraries in Kenya: A Case study of Maseno University library, Kenya.** You are requested to provide answers to these questions based on your teaching and research service(s) provided to undergraduate students and period worked in the university as a teaching staff. The answers shall be treated with uttermost confidentially.

1. How long have you worked for Maseno university as a teaching staff?.
2. Do you normally visit the library to use library resources? [Yes] [No]

   b) If No, where do you get your reference materials and notes for teaching?.

3. As a tutor required to educate learners, are you satisfied with the resources available in the library especially ICTs? [Yes] [No]

   b) If No, state whyAre you aware of existence of an ICT policy in the library? [Yes] [No]

   b) If No, state why

5.) What is your opinion about the status of ICT services offered by the library in relation to Supporting teaching and research?

6.) Do your students utilize the library ICTs for study, learning and research? [Yes] [No]

b) If No. why?.

7.) What are some challenges encountered in your quest to achieve your goal of providing quality teaching and research using ICTs in the library for provision of information services

8.) Propose measures for improved use of library ICTs in support to teaching and research.

Appendix IV: Interview Schedule for Librarians In-Charge of Sections

Greetings

Introduction

This study intends to investigate the **use of Information and Communication technologies (ICTs) in provision of information services in public university libraries in Kenya: A Case study of Maseno University library, Kenya.** You are requested to provide answers to these questions based on your service(s) to users and period worked in the library. The answers shall be treated with uttermost confidentially.

1. How long have you worked for Maseno university library?
 b) State your work station/section.
2. Are ICTs available in the department/section you are working in? [Yes] [No]
   If yes, which ones, how many?
   b) Comment on the status of available ICTs in the provision of information services?
3. Do you have any ICT knowledge, skills and training in ICT usage for provision of information services?:
   b) Specify the skills and training gained

4. Were you trained on library ICTs and the existing library software in the library?
 [Yes] [No]
 b) If Yes specify

4. Is there any policy guiding use of ICTs in the provision of information services in the library? [Yes] [No]

b) If No. How are ICT matters in the library operated?

5. What services are provided in the library using ICTs?
6. a) What infrastructure is in place supporting use of ICTs in the provision of information services?
 b) How adequate is the infrastructure that supports use of ICTs in the provision of information services?

7. What challenges are encountered in use of ICTs in the provision of information services?

b) Propose measures for improvement on use of ICTs in the provision of information services

Appendix V: Interview Schedule for University Librarian

Greetings

Introduction

This research intends to investigate the **use of Information and Communication Technologies (ICTs) in provision of information services in public university libraries in Kenya: A Case study of Maseno university library, Kenya.** You are requested to provide honest and precise answers based on your position in the library. Responses to these questions shall be treated with maximum confidentiality.

1. How adequate are funds channeled towards ICTs in the library?
2. Do you have any budget for ICT and its related services, such as hard wares; soft wares, repairs, etc apart from the total library budget provided to the department?
3. Are the available ICTs in the library adequate to handle provision of information services? [Yes] [No]

b) If No. what are your plans as head of department?

4. Is it ok for the library's ICT matters such as ICT policy, legal issues, ICT repairs to operate within the ICT directorate? [yes] [No]

b) If No. what effort have you done to ensure that the library has its own relevant, up to date formulated ICT policy that supports provision of information services?

5.) Comment on the status of the available ICTs in the library in use for provision of information services

5. Comment on the library staff and users' knowledge, skills and training in using ICTs in Provision of information services?

6. What challenges do you encounter as a head of department and policy maker in ensuring total utilization of ICTs in the provision of information services in the library?

7. As a policy maker within the University, what can you propose as a way forward of improving the use of ICTs in the provision of information services in the library?

Appendix VI: Interview schedule for key informants and policy makers

(Director ICT and Finance officer)

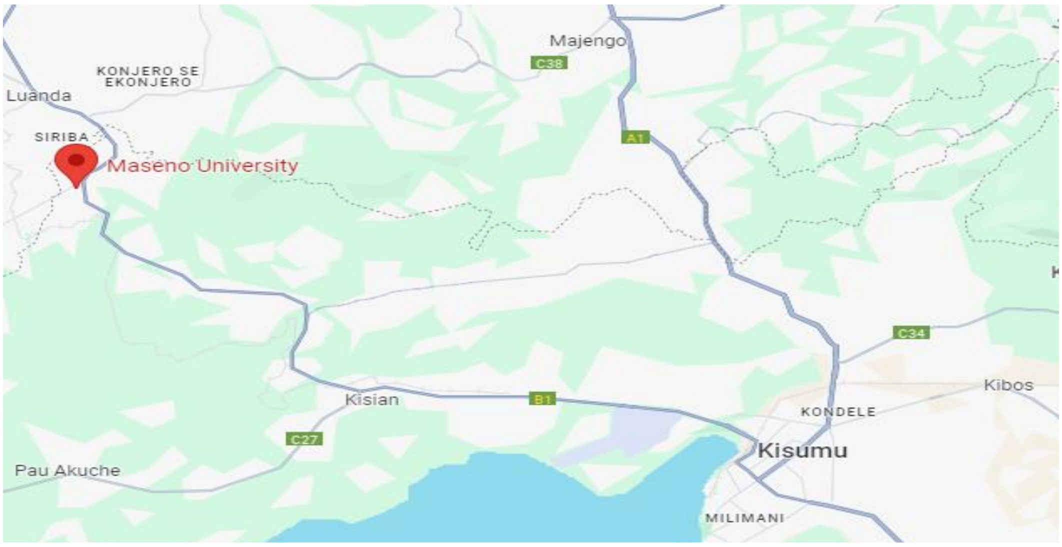
Greetings

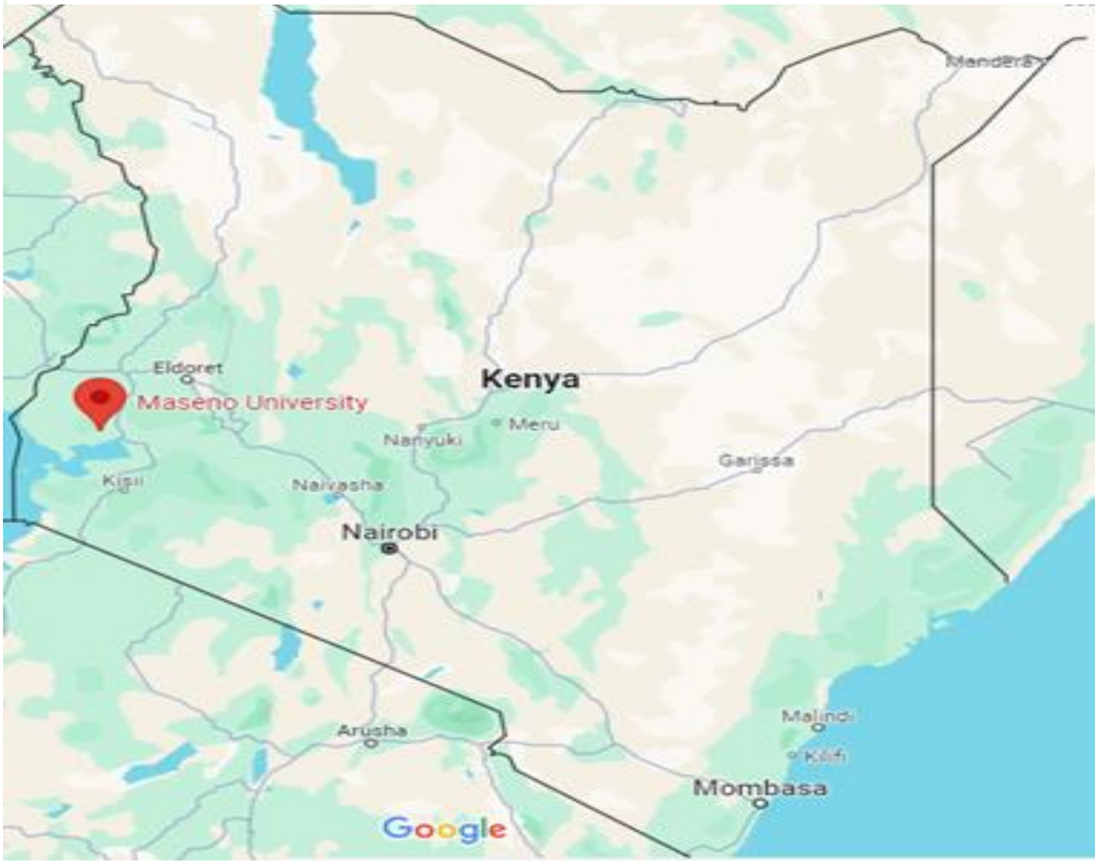
Introduction

This research is intended to investigate **use of Information and Communication Technologies (ICTs) in provision of information services in public university libraries in Kenya: A Case study of Maseno university library, Kenya.** You are requested to provide precise and honest answers to these questions based on your work position. Responses to these questions will be treated with uttermost confidentiality.

1. What is your position in the University?
2. How often do you use the library services?
3. Are you aware of the availability of ICT resources and services in the library?
4. How adequate are funds channeled towards ICTs in the library?
5. Do you have any budget for ICT and its related services? (h/w, s/w, repairs/maintenance) (probe if its separate or …)
6. Is it ok for the library's ICT issues to operate within the directorate of ICT?
7. What is your opinion about the library staff and users' knowledge, skills and training in ICT usage for provision of information services?
8. As key informants what challenges do you encounter when using ICTs in the provision of information services in the library?
9. As a policy maker within the University, what measures can you propose as a way forward of improving use of ICTs in the provision of information services in the library?

Appendix VII: Map showing the location of Maseno University





Appendix VIII: Authorization letter from School

MOI UNIVERSITY
SCHOOL OF INFORMATION SCIENCES
DEPARTMENT OF LIBRARY, RECORDS MANAGEMENT AND INFORMATION STUDIES

REF: IS/MPHIL/040/011 17th October, 2024

The Executive Secretary,
NACOSTI,
P.o Box 30623,
NAIROBI.

RE: RESEARCH PERMIT: JENIFER L OSERE (IS/MPHIL/040/011)

The above named is a master of Science student in the Department of Library, Records Management and Information Studies, School of Information Sciences, Moi University.

Ms. Osere is intending to carry out research work entitled *"Use of Information and Communication Technologies (ICTs) in public University Libraries in Kenya: A case study of Maseno University Library.*

We are kindly requesting you to issue her with a research permit to enable her proceed with her research.

Yours sincerely,

MOI UNIVERSITY
17/10/24

DR. DUNCAN AMOTH
CHAIR, DEPARTMENT OF LIBRARY,
RECORDS MANAGEMENT & INFORMATION STUDIES

/DA

Appendix IX: National Commission for Science, Technology (Research Permit)

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR
SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **699546**

Date of Issue: **11/November/2024**

RESEARCH LICENSE

This is to Certify that Ms.. JENIPHER IWORETE OSERE of Moi University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kisumu on the topic: USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) IN PROVISION OF INFORMATION SERVICES IN PUBLIC UNIVERSITY LIBRARIES IN KENYA: A CASE STUDY OF MASENO UNIVERSITY LIBRARY, KENYA. for the period ending : 11/November/2025.

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Appendix X: Plagiarism Awareness Certificate

SR809

ISO 9001:2019 Certified Institution

THESIS WRITING COURSE

PLAGIARISM AWARENESS CERTIFICATE

This certificate is awarded to

JENIPHER OSERE

IS/MPHIL/040/11

In recognition for passing the University's plagiarism

Awareness test for Thesis **entitled: USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) IN PROVISION OF INFORMATION SERVICES IN PUBLIC UNIVERSITY LIBRARIES IN KENYA: A CASE STUDY OF MASENO UNIVERSITY LIBRARY, KENYA with** similarity index of 5% and striving to maintain academic integrity.

Word count:37713

Awarded by

Prof. Anne Syomwene Kisilu

CERM-ESA Project Leader   Date: 13/03//2025