

**THE INFORMATION AND COMMUNICATION TECHNOLOGIES IN
ENHANCING INFORMATION SERVICE DELIVERY AT PROTESTANT
INSTITUTE OF ARTS AND SOCIAL SCIENCES LIBRARY, HUYE-RWANDA**

BY

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**A Thesis Submitted to the School of Information Sciences in Partial Fulfilment of
the Requirements for the Award of the Degree of Master of Science in Information
Sciences (Library and Information Studies), Department of Library, Records
Management and Information Studies**

MOI UNIVERSITY

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JULY, 2016

DECLARATION

DECLARATION BY CANDIDATE

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DEDICATION

This thesis is dedicated to my wife Véronique MUKANKUSI; to our children Claudette NIWEMWUNGERI, Claudine IRADUKUNDA, Pascaline ISHIMWE and Hope IRAKOZE; to my brothers and sisters for their great support and encouragement in my studies.

ABSTRACT

Information and Communication Technologies (ICTs) play an important role in enhancing library operations and information service delivery. The Protestant Institute of Arts and Social Sciences (PIASS) library in Huye, Rwanda has made fairly good investment in ICTs in library operations and services over the years. However, despite this effort, a past study indicates that the use of ICTs has not brought about optimum benefits to information service delivery at the library. The aim of this study was to investigate the ICTs in supporting information service delivery at the PIASS library and to propose strategies for improvement. The objectives of the study were to: establish the status of ICT infrastructure at the PIASS library; examine the adequacy of the use of ICTs in the delivery of information resources and services through the available ICTs; evaluate the level of ICT skills and training among library staff and users at the PIASS library; establish the challenges faced in the use of ICTs in information service delivery at the PIASS library; and suggest strategies for better utilisation of ICTs in information service delivery at the PIASS library. The study was informed by Diffusion of Innovation Theory developed by Rogers. The study employed mainly a qualitative research design with some aspects of quantitative techniques. Stratified random sampling and purposive sampling were used to select a sample of 100 which included 80 students, 14 academic staff, 3 library staff and 3 PIASS management staff. An interview schedule and questionnaires were used to collect data from the respondents. Qualitative data were analyzed and presented thematically while quantitative data were analyzed in descriptive statistics including percentages and frequencies and were presented through the use of tables and charts. The findings revealed that ICTs play a significant role in enhancing information service delivery at the PIASS library but their effectiveness has been hampered by inadequate ICT tools, information resources and skills among library staff and library users. The study concludes that the contribution of ICTs to the quality of information service delivery can be improved through the adoption of better strategies in their utilisation. The study recommends formulation of suitable ICT policies and guidelines, development of ICT infrastructure, and establishment and provision of ICTs centred users' education and training programme.

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ACRONYMS AND ABBREVIATIONS

ADEPR	: Association of Pentecostal Churches in Rwanda
ARDI	: Research for Development and Innovation
ASCE	: American Society of Civil Engineers
BFTW	: Bread for the World
CCTV	: Closed-circuit television
CD	: Compact Disc
CD-Rom	: Compact Disc Read-Only Memory
CDS-ISIS	: Computerized Information Service /Integrated Scientific Information System
CLCF	: Centrale de la Littérature Chrétienne Francophone
DBMS	: Database Management Systems
Dr.	: Doctor
DVD	: Digital Video Disc or Digital Versatile Disc
EAR	: Anglican Church in Rwanda
Ed.	: Edition
Eds.	: Editors
EM	: Electro-Mechanical
EMLR	: Free Methodist Church in Rwanda
EPR	: Presbyterian Church in Rwanda
Et al.	: And Others
ETD	: Electronic Thesis or Dissertation
EUP	: Edinburgh University Press
FDS	: Faculty of Development Studies
FED	: Faculty of Education

FTRS	: Faculty of Theology and Religious Studies
HINARI	: Health Internetwork Access to Research Initiative
HSS	: Humanities and Social Sciences collection
HST	: Henry Stewart Talks
ICT	: Information and Communication Technology
ICTs	: Information and Communication Technologies
ILL	: Interlibrary Loan
INASP	: International Network for the Availability of Scientific Publications
IT	: Information Technology
JSTOR	: Journal Storage
KNLS	: Kenya National Library Service
LAN	: Local Area Network
LIS	: Library and Information Sciences
MARC	: Machine-Readable Cataloguing standards
MBs	: Mega bytes
Mr.	: Mister
Ms.	: Miss
MTN	: Mobile Telephone Networks
NICI	: National Information Communication Infrastructure
OARE	: Online Access to Research in the Environment
OPAC	: Online Public Access Catalogue
OSS	: Open-source software
PDF	: Portable Document Format
PhD	: Doctor of Philosophy
PIASS	: Protestant Institute of Arts and Social Sciences

Pp.	: Pages
Prof.	: Professor
RCIP	: Regional Communications Infrastructure Program
RDB	: Rwanda Development Board
Revd	: Reverend
RF	: Radio Frequency
RFID	: Radio Frequency Identification
RSC	: Royal Society of Chemistry
RUSA	: Reference and User Services Association
SDI	: Selective Dissemination of Information
STM	: Sciences, Technology and Medicine
UEBR	: Union of Baptist Churches in Rwanda
UEM	: United Evangelical Mission
UNESCO	: The United Nations Educational, Scientific and Cultural Organization
UNICEF	: United Nations Children's Fund
UPS	: Uninterruptible Power Supply
WAN	: Wide Area Network
WINISIS	: WINISIS is a Windows version of the CDS/ISIS system which is maintained and developed by UNESCO
WIPO	: World Intellectual Property Organization
WLAN	: Wireless Local Area Network
WWW	: World Wide Web

ACKNOWLEDGEMENT

There are many people I would like to acknowledge that contributed to the success of the completion of my Master's thesis. First I thank God almighty for his protection. I also wish to express my gratitude to the Protestant Institute of Arts and Social Sciences (PIASS) which, in collaboration with the Anglican Church in Rwanda (EAR), Kigeme Diocese, recommended me to do Masters Studies. I sincerely thank the United Evangelical Mission (UEM) for their financial support to my Masters studies. I would like to acknowledge and thank the PIASS management for their financial support and for allowing me to conduct my research and for providing assistance requested, especially the PIASS members of staff and students. I wish to thank my supervisors: Prof. Cephas ODINI and Ms. Emily NG'ENO who were more than generous with their proficiency and valuable time. I thank them for their contribution and their helpful support. I express my gratitude to Mr. Amoth DUNCAN for his valuable time and encouragement. I also need to express my gratitude and deep appreciation to Prof. Benoit GIRARDIN, Revd Catherine DAY, Revd Faith LUGAZIA, Revd Celestin NSENGIMANA, Revd Juvenal RWAMUNYANA, Dr. Isaïe Nzeyimana, Mr. Samuel NGABONZIZA, Ms. Annonciatte KABEGA, Mr. Abel DUFITUUKIZA, and Mr. Richard MUGISHA for their support and help to get admission to the School of Information Sciences, Moi University. I wish to acknowledge and thank all lecturers and all administrative staff of the School of Information Sciences, Moi University for their encouragement and emotional support during my study. I am grateful to many persons who shared their memories, experiences and time. I must acknowledge as well friends, students, and librarians who assisted, advised, and supported my research and writing efforts.

CHAPTER ONE

INTRODUCTION AND BACKGROUND INFORMATION

1.1 Introduction

The world today is abuzz with the talk and application of Information and Communication Technologies (ICTs). Governments all over are encouraging organizations to introduce ICTs due to e-governance services such as: e-administration which helps to improve government processes, e-citizens and e-services which help to connect citizens to government, and e-society which helps government to build external interactions (Heeks, 2008). Libraries are not left behind.

The development in information technology has brought changes in the way in which information is created, collected, organized, stored, retrieved, transferred and maintained in libraries and information centres (Mishra, 2008). According to Large (2006), ICTs have also changed the way libraries select, acquire, organize and deliver information.

Use of ICTs in the library reduces human action and saves physical space, costs and multiple users can access the same information sources or database in the library at the same time. Use of ICTs is beneficial to students, librarians, faculty members and administrators for various reasons. ICTs in the library helps administrators complete the objectives and mission of the institution. Libraries have used technology in general and computers in particular since the 1960s, to perform a wide range of administrative, public, and technical service tasks (Saffady, 1989). Thus, the importance of ICTs is not necessarily in the technology itself but in its ability to enable more access to information

and communication. Where ICTs have been implemented it has proved to have many advantages including enhancing effective, proficient and valuable library information service delivery.

1.2 Background of the Protestant Institute of Arts and Social Sciences (PIASS)

The Protestant Institute of Arts and Social Sciences (PIASS) is a private higher learning institution accredited by the Government of Rwanda. It has two campuses: PIASS Huye Campus which is the main campus and PIASS Karongi Campus which started in April 2014. PIASS Huye Campus is located in Butare town, District of Huye, Southern Province, and PIASS Karongi Campus is located in Rubengera Sector, Karongi District, and Western Province of Rwanda.

The PIASS is a Christian Institution owned by five main Rwandan Protestant Churches, namely Presbyterian Church in Rwanda (EPR); Union of Baptist Churches in Rwanda (UEBR); Free Methodist Church in Rwanda (EMLR); Anglican Church in Rwanda (EAR): Diocese of Kigali, Butare, Kigeme, Byumba, Shyira and Shyogwe; and Association of Pentecostal Churches in Rwanda (ADEPR) (PIASS, 2014).

Today PIASS Huye Campus has three faculties, namely the Faculty of Theology and Religious Studies (FTRS), the Faculty of Development Studies (FDS) and the Faculty of Education (FED) and 7 departments with a student population of 752 in the 2014-2015 academic year. PIASS fosters knowledge and development with an interdisciplinary approach as well as innovative research. It aims to provide Rwandan society and churches with well trained personnel who are inquisitive, solution oriented, committed, and equipped with the intellectual tools, skills and ethical values that enable them to meet

society's needs in a changing and pluralistic world. The language of instruction changed from French to English to fit the national policy and better integrate regionally and worldwide (PIASS, 2014).

1.2.1 The PIASS library, Huye Campus

Each PIASS campus has a library. The PIASS Library, Huye Campus, was established in 1970 when the School of Theology was opened while the library of PIASS Karongi campus was established in April 2014. PIASS Huye campus has a bigger and better established library. The library of PIASS Karongi Campus is not as well established. Since 2010, the library of PIASS became directorate of Library and Information and Communication Technology. It offers not only library information services but also information and communication technology services.

1.2.1.1 Vision

The vision of the PIASS library is to be a user centred, focused and competitive academic library (PIASS, 2014).

1.2.1.2 Mission

The mission of the library of PIASS is to satisfy information needs, promote effective access and utilisation of information available in the library in order to improve information resources and services, and to cooperate with other academic libraries (PIASS, 2014).

1.2.1.3 Objectives

1. Work closely with users in order to know their needs and interests;

2. Provide current library materials and electronic databases that support the academic curriculum;
3. Collect library materials in all formats and update all collections to meet the needs of PIASS's programs;
4. Provide access to library resources and services via web pages and online resources;
5. Ensure that the resources available are current, appropriate and accessible;
6. Promote access to information effectively and efficiently;
7. Evaluate information and its sources critically;
8. Develop information technology in the library;
9. Promote online and international information research and access (PIASS, 2014).

1.2.1.4 Information resources

The PIASS library is a small building which has a sitting capacity of 100. This space is not enough considering that the number of students has increased from 30 in 2010 to 752 currently.

PIASS, therefore, intends to expand the library in order to meet the standards of Higher Learning Education in Rwanda. In this proposed new library, there will be both adults and children sections within the library in addition to academic section. Each part will have a computer laboratory for research.

The PIASS library has a total collection of 25,774 materials distributed as 17,446 published books, 290 undergraduate theses, 9 PhD theses, 8,020 copies of printed journals, and 31 links of electronic books and electronic journals.

1.2.1.5 Staffing

Since the colonial era, growth of effective and efficient libraries, archives and education of Library and Information Science staff in Rwanda had been very slow. The same situation continued even after independence in 1962. However, the genocide of 1994 proved to be a turning point. This meant that educating library staff could not be a priority as other sectors such as health were given more priority in as much as nearly all the sectors of the economy were staffed with people who had low academic qualifications. The need to have organized records and archives has been recognized and the need for qualified library and information science personnel is being felt more than ever before. The future of libraries is bright because of the positive attitude that most administrators are having for functional libraries (Olaka, 2009).

The majority of the workers in the PIASS library do not have enough training or professional experience in the field of library and information studies. The library was managed by a voluntary lecturer selected by the institution from other lecturers.

The PIASS's directorate of library and ICT has three (3) permanent staff members who include the Director of Library and ICT who has a bachelor's degree in Theology and a training of two months in Library and Information Studies. He is doing his master in Library and Information Studies at the School of Information Sciences at Moi University in Kenya. He supports the library activities during holidays; an Assistant Librarian who has a diploma in theology and training of two months in Library and Information Studies. She works during the day and she is now doing her bachelor's degree in Education at the PIASS, evening program; and a technician who has a bachelor's degree in Information

and Communication Technology. Those staff members are supported by 6 undergraduate students: 2 for evening and 2 for the weekend in library; 1 for evening and 1 for weekend in the computer lab.

1.2.1.6 Source of funds

The main source of PIASS library funding is from the general budget of the institution while some money comes from overdue fines, charges for lost books, donations from individuals and sponsors namely Church in Action (Kerk-in-Actie in Germany), United Evangelical Mission (UEM), Bread for the World (BFTW), Close the Gap, Centrale de la Littérature Chrétienne Francophone (CLCF), World Vision, Presbyterian Church in America, the United Nations Children's Fund (UNICEF), and the Ministry of Education in Rwanda.

Adequate funding by universities should be considered a basic necessity for the effective development of academic libraries. The true measure of the adequacy of the library grant lies in its ability to finance a service which meets the needs of its users (Fowowe, 1988). It is in this regard that the library assisted by those different sponsors has been constructed and equipped with books, infrastructure and electronic equipment. The budget for books and ICT tools in the PIASS library is estimated to 15 million Rwandan Francs per year.

1.2.1.7 Information services

PIASS library provides electronic information services adapted to new technologies in order to meet needs of library users. These services take into account the information-

seeking behaviours, the information needs, and the service expectations of the members of PIASS community.

1.2.1.8 Use of ICTs at the PIASS library

Information and Communication Technology (ICT) is a diverse set of technologies used internally and externally to gather, communicate, create, disseminate, store and manage information. ICTs include, but are not limited to, computers, Internet, printers, scanners, radio, television, telephone, software, cellular phones, networks and network devices (KNLS, 2009). The PIASS library views ICTs as a useful tool in provision of high and quality education. The library is fully committed to maintaining a strong backbone of information to support the research and communication needs for both students and staff.

In its endeavour to modernize the services and meet the current user needs, the PIASS library acquired its first computer in the year 1990. In 1999, the first computer lab with 3 computers was opened. In 2005, computers in the computer lab increased from 3 to 15. From 2009, there have been 2 computer laboratories with 20 computers for each lab and with Internet connection including Local Area Network and Wireless Local Area Network. It helps users of PIASS library to do research using the Internet.

The PIASS library accessed the Internet from 2005 using Rwandatel (Rwandatel is the incumbent telephone company in Rwanda. Rwandatel is, and always has been, wholly-owned by the government of Rwanda) phone line, MTN (Mobile Telephone Networks) in 2012 and, the optic fiber since January 2014 up to date.

The library uses CDS/ISIS for Windows (WINISIS), Version 1.5 since 2002 up to date. CDS/ISIS is an advanced non-numerical information storage and retrieval software developed by UNESCO in 1985 to satisfy the need expressed by many institutions, especially in developing countries, to be able to streamline their information processing activities by using modern (and relatively inexpensive) technologies (UNESCO, 2011). This library software is used to catalogue and retrieve information only.

In the PIASS library, there is no electronic library security system in order to protect library property against theft and other incidents that can be destructive to library properties. This lack of electronic library security system affects both directly and indirectly the quality of information service delivery because it is not easy to replace stolen materials for different reasons like lack of money at the time it is needed, or may be the materials are not again available in the market at the time replacement is to be done.

1.3 Statement of the problem

The academic library has been described as the “heart” of the learning community, providing a place for students and faculties to do their research and advance their knowledge. The librarians provide numerous services to the users, addressing their diverse needs, characteristics, and interests (Simmonds and Andale, 2001).

Information and Communication Technologies assist librarians to undertake routine activities such as circulation, acquisition, reference services, OPAC, Internet, cataloguing, interlibrary loan, and current awareness services. In addition, Information and Communication Technologies (ICTs) help in storing much information in reduced

space with extensive provision of different access points. The use of computers in libraries helps to generate different kinds of statistics and reports. ICTs facilitate speedy library operations, services, and access to and delivery of information. This is affirmed by Ngugi (2012) that Information and Communication Technology in the library exists to produce support and facilitation to users.

Rwanda has registered significant progress in the deployment of world-class ICT infrastructure that is now connecting Rwandans to global networks. The national fiber optic backbone network that is connecting Rwanda to international sea cables facilitated and increased affordability and access to Internet across the country. The Government of Rwanda has implemented numerous ICTs in education initiatives and it is interconnecting Rwanda's institutions of higher learning and linking them to global education and research networks. These initiatives are transforming and improving library information service delivery in Rwanda (NICI, 2015).

However, like other developing countries, numerous challenges still hinder Rwanda's ICTs development. Those challenges include unavailability of enough power, limited access to finance, inadequate international bandwidth, inadequate ICT skills, low ICT awareness and usage, nascent private sector, inadequate information security, and limited interoperability of government systems (NICI, 2015).

The Protestant institute of Arts and Social Sciences (PIASS) library in Huye, Rwanda has made fairly good investment in ICTs in library operations and services over the years. However, despite this effort, the use of ICTs has not brought about optimum benefits to information service delivery at the library. Both librarians and users face a lot of

challenges due to inadequate ICT infrastructure, human resource skills and computer literacy. This study investigated the Information and Communication Technologies (ICTs) in enhancing information service delivery at the PIASS library and proposed fair strategies that can be used to improve information service delivery at the library.

1.4 Aim of the study

The aim of the study was to investigate the Information and Communication Technologies (ICTs) in enhancing information service delivery at the PIASS library and propose strategies that can be used to integrate ICTs in improving the quality of information service delivery at the library.

1.5 Objectives of the study

The objectives of the study were to:

1. Establish the status of ICT infrastructure at the PIASS library;
2. Examine the adequacy of the use of ICTs in the delivery of information resources and services through the available ICTs;
3. Evaluate the level of ICT skills and training among library staff and users at the PIASS library;
4. Establish the challenges faced in the use of ICTs in information service delivery at the PIASS library;
5. Suggest strategies for better utilisation of ICTs in information service delivery at the PIASS library.

1.6 Research questions

Research questions were as follows:

1. What is the current status of ICT infrastructure at the PIASS library?
2. How adequate is the use of ICTs in the delivery of information resources and services through the available ICTs?
3. What is the level of ICT skills and training among library staff and users at the PIASS library?
4. What are the challenges faced in the use of ICTs in information service delivery at the PIASS library?
5. What strategies can be adopted for better utilisation of ICTs in information service delivery at the PIASS library?

1.7 Assumptions of the study

The study was guided by the following assumptions:

1. Inadequate utilisation of ICTs has impacted negatively on information service delivery at PIASS library;
2. Full utilisation of ICTs has been hindered by various factors including inadequate ICT infrastructure and ICT knowledge and skills among library staff and users;
3. It is possible to reverse the situation regarding ICT utilisation at PIASS library by putting in place appropriate strategies to improve the utilisation of ICTs and information service delivery at the institute.

1.8 Significance of the study

The significances of the study are: theoretical significance, practical significance, policy formulation significance and personal significance.

The theoretical significance of this study is that it constitutes a new contribution to the general body of knowledge relating to ICTs utilisation in library operations and information services, not only in the PIASS library, but also in libraries in general.

The practical significance of this study is that the findings are likely to promote the role of ICTs in library operations and information services at the PIASS library and provide practical solutions and recommendations based on field findings.

In policy formulation significance, this study will help the PIASS library management to develop policies which can be used to improve the quality of utilisation of ICTs in library operations and information services in order to meet the needs of the users. This will help the PIASS library to be innovative and competitive in using new technologies. It will also help library staff in service delivery and library users' satisfaction and to use suitable strategies to improve service delivery at the PIASS library.

In personal significance, this study will assist the researcher to add more knowledge in academic library circle. This study is likely to help the researcher to get skills and abilities which will help him to develop innovative capabilities in using ICTs in library operation and information services in order to improve service delivery to users.

1.9 Scope and limitation of the study

1.9.1 Scope of the study

The scope of the study was the investigation of the Information and Communication Technologies (ICTs) in enhancing information service delivery at the PIASS library, Huye, Rwanda. This study was based on the library of PIASS, Huye campus. Respondents in this study were PIASS management staff, library staff, academic staff and students. PIASS management staff members were selected because they were key informers. Academic staff and students were selected because they are the main library users. Thus, all these groups contributed significantly to the realisation of this study.

1.9.2 Limitation of the study

Verbatim quotes are a major characteristic of qualitative reporting. Although, the literature is increasingly debating the use of quantitative approaches in presenting data collected qualitatively. The study presented quantitative data using tables, charts and percentages which may have lost some of value added attributes of qualitative reporting.

1.10 Definition of operational terms

Databases: A database is a collection of information that is organized so that it can easily be accessed, managed, and updated. In a library, databases can be retrieved according to types of content: bibliographic, full-text, numeric, and images (Rouse, 2014).

Electronic Resources: Electronic resources refer to any information sources that the library provides access to in an electronic format. In academic libraries, electronic resources include: electronic journals, electronic newspapers, electronic books, electronic mails, online databases, audiovisual resources, and digital repository (Moore, 2011).

Information Communication Technology (ICT): It refers to technologies that provide access to information through telecommunications. It is similar to Information Technology (IT), but focuses primarily on communication technologies. This includes the Internet, wireless networks, cell phones, and other communication mediums (Prasad and Prasad, 2013).

Internet: According to Leiner, Kahn, Postel et al. (2009) the Internet is a world-wide broadcasting capability, a mechanism for information dissemination, and a medium for collaboration and interaction between individuals and their computers without regard for geographic location.

Library Management System: Library Management System is the Online Public Access Catalogue (OPAC) which includes all the print and non-print holdings of the library. It also includes software, audio visuals and computers. The Library Management System is based on a MARC record (Broering, 2007).

Multimedia Resources: As the name implies, multimedia is the integration of multiple forms of media. In libraries, multimedia uses computers to present text, audio, video, animation, interactive features, and still images in various ways and combinations made possible through the advancement of technology (Loretto, 2014).

Social Media: As argued by Rouse (2014) social media is the collective of online communication channels dedicated to community-based input, interaction, content-sharing and collaboration. Websites and applications dedicated to forums, micro-blogging, social networking, social bookmarking, and wikis are among the different types of social media.

1.11 Chapter summary

This chapter has provided an introduction and background information on the Information and Communication Technologies (ICTs) in a library to enhance service delivery. It also gives an overview of PIASS in general and the library of PIASS in particular: library history and background, vision, mission, objectives, information resources, staffing, source of fund, information services, and use of ICTs in the PIASS library. The statement of the problem, aim of the study, objectives of the study, and research questions are outlined to give a view of what that study intended to find out. The assumption and significance of the study are expressed. The scope and limitation of the study and definition of terms are also outlined.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

According to Boote and Beile (2005), a literature review is an evaluative report of studies found in the literature related to a selected area of study. The review should describe, summarize, evaluate and clarify this literature. It should give a theoretical basis for the study and help the researcher to determine the nature of his own research. A literature review goes beyond the search for information and includes the identification and articulation of relationships between the literature and the field of research. While the form of the literature review may vary with different types of studies, the basic purposes remain constant: provide a context for the research; justify the research; ensure the research hasn't been done before; show where the research fits into the existing body of knowledge; enable the researcher to learn from previous theory on the subject; illustrate how the subject has been studied previously; highlight flaws in previous research; outline gaps in previous research; show that the work is adding to the understanding and knowledge of the field; and help refine, refocus or even change the topic. This chapter discusses the theoretical framework and reviews literature on library, Information and Communication Technologies, information and service delivery.

2.2 Theoretical framework

According to the University of Southern California (2014), theories are formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge, within the limits of the critical bounding assumptions. The theoretical framework is the structure that can hold or support a theory of a research

study. The theoretical framework introduces and describes the theory which explains why the research problem under study exists. The theoretical framework must demonstrate an understanding of theories and concepts that are relevant to the topic of the research paper and that will relate it to the broader fields of knowledge in the class undertaken.

By virtue of its application nature, good theory in the social sciences is of value precisely because it fulfils one primary purpose: to explain the meaning, nature, and challenges of a phenomenon, often experienced but unexplained in the world in which we live, so that we may use that knowledge and understanding to act in more informed and effective ways (University of Southern California, 2014).

A theoretical framework is used to limit the scope of the relevant data by focusing on specific variables and defining the specific viewpoint (framework) that the study has to take in analyzing and interpreting the data to be gathered, understanding concepts and variables according to the given definitions, and building knowledge by validating or challenging theoretical assumptions (University of Southern California, 2014).

This study has looked at a theory that can help to understand the application of Information and Communication Technology in library and information services. Application of ICTs to library operations and information services is based on the Diffusion of Innovation Theory developed by Rogers (2003).

2.2.1 Diffusion of innovation theory

In this study, the researcher has adopted the Diffusion of Innovation developed by Rogers, because it is applicable to the use of information and communication technology in library operations and information services.

Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Diffusion is a special type of communication concerned with the spread of messages that are perceived as new ideas. The four main elements in the diffusion of new ideas are the innovation, communication channels, over time, and the social system (Rogers, 2003).

2.2.1.1 Innovation

Innovation is an idea, behaviour, or object that is perceived as new by an individual or organization. According to Rogers (2003) the attributes of an innovation are one important explanation of the rate of the adoption of an innovation. How the adopter perceived characteristics of the innovation has impacts on the process of adoption. The variance in rate of adoption is explained by five attributes:

1. **Relative advantage:** the degree to which an innovation is perceived as better than the idea it supersedes. The underlying principle is that the greater the perceived relative advantage of an innovation, the more rapid its rate of adoption;
2. **Compatibility:** the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters;

3. **Complexity:** the degree to which an innovation is perceived as difficult to understand and use;
4. **Trialability:** the degree to which an innovation may be experimented with on a limited basis. If an innovation is trialable, it results in less uncertainty for adoption;
5. **Observability:** the degree to which the results of an innovation are visible to others. The easier it is for individuals to see the results of an innovation, the more likely they are to adopt.

In addition to these five perceived attributes of an innovation, such other variables as the type of innovation-decision, the nature of communication channels diffusing the innovation at various stages in the innovation-decision process, the nature of the social system in which the innovation is diffusing, and the extent of change agents' promotion efforts in diffusing the innovation, affect an innovation's rate of adoption. Rogers (2003), notes that the type of innovation-decision is related to an innovation's rate of adoption. Innovations requiring an individual-optional innovation decision are generally adopted more rapidly than when an innovation is adopted by an organization.

2.2.1.2 Communication channels

Communication is the process by which participants create and share information with one another in order to reach a mutual understanding. The communication process involves: (a) innovation, (b) an individual or unit of adoption that has knowledge of, or experience using the innovation, (c) another individual or unit that does not have the knowledge of, or experience with the innovation, and (d) a communication channel

connecting the two units. The communication channels used may be: (a) mass media (such as radio, television, newspapers which enable one or a few individuals to reach an audience of many), (b) interpersonal (such as face-to-face exchange), or (c) interactive communication (via Internet). The communication channels used to diffuse an innovation also may influence the innovation's rate of adoption. The relationship between communication channels and the attributes of the innovation often interact to slow down or speed up the rate of adoption. If an inappropriate communication channel were used, such as mass media channels for complex new ideas, a slower rate of adoption resulted (Rogers, 2003).

2.2.1.3 Time

According to Rogers (2003), a time dimension is involved in diffusion in the innovation-decision process, innovativeness, and the rate of adoption. The innovation-decision process is based on a 5 step process through which an individual (or other decision making unit) passes from first knowledge of an innovation: (i) knowledge, (ii) persuasion, (iii) decision, (iv) implementation and (v) confirmation. Individuals vary in the length of time required to pass through the innovation-decision process. Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system. There are 5 adopter categories on the basis of their innovativeness: (i) innovators, (ii) early adopters, (iii) early majority, (iv) late majority, and (v) laggards. The rate of adoption is the relative speed with which an innovation is adopted by members of a social system.

2.2.1.4 Social system

A Social System is a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. A Social System requires a structure, opinion leaders, innovation-decisions and consequences. A system that has structure is patterned by arrangements of the units in a system, which gives stability and regularity to individual behaviour in a system. An opinion leader is the degree to which an individual is able to influence informally other individuals' attitudes or behaviour in a desired way with relative frequency. There are three main types of innovation-decisions have three main types: (i) optional innovation-decision: choices to adopt or reject an innovation that are made by an individual independent of the decisions of other members of the system, (ii) collective innovation-decision: choices to adopt or reject an innovation that are made by consensus among the members of a system, and (iii) authority innovation-decision: choices to adopt or reject an innovation that are made by relatively few members in a system who possess power, status or technical expertise. Consequences are the changes that occur to an individual or a social system as a result of the adoption or rejection of an innovation (Rogers, 2003).

2.2.2 Application of diffusion of innovation theory to the study

The strength of the Diffusion of Innovation Theory is the ability of Rogers to review thousands of studies, which is a plus to the theory. Despite the explained strength of this theory, the weaknesses go a long way in reducing the power of the theory. One of such is that the Diffusion of Innovation Theory is linear and the source dominated because it sees the communication process from the point of view of the elite who has decided to diffuse information or an innovation. This theory also underestimates the power of the media.

Regardless of its weaknesses, the Diffusion of Innovation Theory has relevance in this present age and will not likely lose its relevance in thousands of years to come. Rogers successfully integrates a vast amount of empirical research; no wonder, the theory is still relevant in the present day's situation. This is because new innovations/ideas are a daily occurrence and of course will continually be diffused so that people can adopt them (Ayodele, 2012). As affirmed by Deiss (1999), libraries are responsible for creating innovative information systems for the dissemination and preservation of information and new knowledge regardless of format.

The Diffusion of Innovation Theory is applicable in library operations and information services using ICTs. Library staff members, in academic libraries, are expected to develop innovative and anticipative facilities in order to facilitate the process of scientific research. They need not only professional information skills but also ICT skills in order to facilitate and support users to find solutions to their actual and immediate problems. They need to be innovative in order to compete with other similar institutions which offer the same services. This theory was updated in 2003 and it is applicable to this study because it is matching well all its objectives. Thus, communication channels helped the researcher to develop the objective one concerning ICT infrastructure and objective two concerning adequacy of information resources and services. Innovation helped the researcher on how to be innovative in developing strategies (objective five) in order to overcome challenges faced when using ICT tools (objectives four). The social system helped the researcher in ICT skills among library users and library staff (objective three). And lastly, over time helped the study in objective four because library staff must be

informed about what is happening around them concerning new technologies in order to provide a good and quality information service delivery to library users.

2.3 Information and Communication Technologies (ICTs) in libraries

With the invention of Information and Communication Technology, libraries now use various types of technologies in order to enhance the services they render to users. Everyday new technological advances affect the way information is handled in libraries and information centres. The impacts of new technologies are felt by libraries in every aspect, including computing technology. Computing technology, communication technology and mass storage technology are some of the areas of continuous development that reshape the way that libraries access, retrieve, store, manipulate and disseminate information to users (Krubu and Osawaru, 2011).

According to the same source, ICTs have impacted on every sphere of academic library activity especially in the form of the library collection development strategies, library building and consortia. ICTs present an opportunity to provide value-added information services and access to a wide variety of digital based information resources to their clients. Furthermore, academic libraries are also using modern ICTs to automate their core functions, implement efficient and effective library cooperation and resource sharing networks, implement management information systems, and initiate ICTs based capacity building programmes for library users.

Information and Communication Technologies (ICTs) have brought unprecedented changes and transformation to academic libraries. ICTs provide more efficient and effective library and information services such as OPAC, users' services, reference

services, bibliographic services, current awareness services, document delivery, interlibrary loan, audio visual services and customer relations. They offer convenient time, place, and cost effectiveness, faster and most-up-to-date dissemination and end users involvement in the library and information services process. ICT is characterized on information services by changes in format, contents and method of production and delivery of information products (Singh, 2013).

Emergence of the Internet as the largest repository of information and knowledge, changed the role of library and information science professionals from intermediary to facilitator, new tools for dissemination of information and shift from physical to virtual services environment and extinction of some conventional information services and emergence of new and innovational web based (Krubu and Osawaru, 2011).

According to Salman and Olanrewaju (2005), a modern library cannot be imagined without the application of computers. In the library and information centres computers can be used for effectively performing efficiently all sorts of jobs from the procurement of the reading materials to their organization and use. So, it can serve as a remedy for all the existing problems of libraries and information centres. But, until now computers have been used successfully in the following areas of library services: circulation, reference/referral, ordering/acquisition, OPAC, Internet/CD-ROM, cataloguing/classification, interlibrary loan, current awareness services, research, and communication.

2.4 Information services delivered through ICTs

According to Reference and User Services Association (RUSA) (2000), libraries create, maintain and provide access to information to users using information and communication technologies; and educate users on how to access that information. The goal of information services is to provide the information wanted by the user. Information service should anticipate as well as meet user needs. It should encourage user awareness of the potential of information resources to fulfil individual information needs. Information services delivered by the library can include circulation, reference or referral, ordering or acquisition, OPAC, Internet, cataloguing and classification, interlibrary loan and current awareness services. This study has shown that PIASS library does not fulfil these user needs.

2.4.1 Circulation services

The circulation is a flow of document which should be controlled by library operations in order to serve users in the best possible way with the available materials in the library. The circulation services are related to charge or check out where a system automatically retrieves the patron's record and checks the borrower's eligibility to borrow materials. They are also related to discharge or check-in where a system reads the barcode and clears the record from the computer's memory unless the item is overdue. Circulation allows staff to determine the location of each book in the collection, to identify who has the material and when it is due, to keep track of requested items, and to retrieve statistics. Automated circulation services help to make the flow easy to control and to improve the quality of service given to the customer (Moore and Mirza, 2006).

2.4.2 Reference services

Reference services exist to help users access the holdings and services in the library both actively and passively. On the first level, the digital library is intended to provide optimum information access to users of varying skills and personalities. Reference librarians do play an important part during the development phase of digital libraries. The nature of complex information tools and systems will always develop faster than will self-help components and interfaces, making personal assistance of experts necessary for the full use of the newest and most powerful information resources (Han and Goulding, 2003).

In a library, electronic reference, e-reference, services are Internet-based question and answer services that connect users with experts in the information sources in a variety of subject areas through web forms and/or e-mail. E-reference can be interpreted to cover support via direct contact with reference librarians through e-mail, telephone, video-conferencing, and dedicated pages on the World Wide Web. E-reference provides an extra choice for users, and may take some of the load off a busy reference desk, although it does not lessen the overall workload for the library. The growing use of the Internet for information storage, retrieval and communication is perhaps the most significant development shaping library and information services today (Johnson, Reid and Newton, 2011).

2.4.3 Current awareness services

Current awareness services serve to keep up-to-date with the most recent publications and developments in the field of researcher (Pay, 2014). Current-awareness service is used to

inform the users about new acquisitions in their libraries. It is guidance on resources for keeping researcher up-to-date. This can be done using electronic mail, social media postage. Libraries can use display boards and shelves to draw attention to recent additions (Encyclopaedia Britannica, 2014). This is vital for researchers and users to be kept up-to-date with the most recently published information available in the library.

2.4.4 Selective dissemination of information services

According to Howe (2014), Selective Dissemination of Information (SDI) is a current awareness system which alerts users to the latest publications in their specified field (s) of interest. SDI refers to tools and resources used to keep a user informed of new resources on specified topics. Electronic lists of selected books can be accessed through library websites, communicated to users through E-mails and through social media. The library keeps the users aware of e-journals, databases and other electronic resources, to promote their use.

2.4.5 Ordering/Acquisition

Ordering or acquisition is the activity of selecting, ordering, paying and acquiring materials from a seller to the library. The selection of materials can be made by the computer. According to Mandarin (2014), automated acquisitions is a tracking and purchasing application that automates serials receiving, routing, claims, and reports, as well as the acquisitions needs of today's libraries. Fast, automated purchasing methods take the place of time-consuming manual purchasing and receiving procedures. Automatic fund calculation and entry replace error-prone manual accounting. Automated purchase orders, records, and reports eliminate inconvenient paper files.

Any library which is a part of online computerized Library Management System has access to catalogue entries and bibliographic data of all the libraries in the system. These databases can be used as a selection tools to purchase new documents for the particular library in question. The ordering and acquisition are routine jobs in the library and for a single time ordering it requires repetitive operation by different sections. These repetitive operations and the requisite checking can very well be done by the application of the computer system (Badan, 2011).

2.4.6 Cataloguing

The computerized cataloguing system operates with high speed for performing routine and repetitive jobs. Besides, in the cataloguing unit, a computer can also be used in various other ways such as producing book plates, book pockets, book cards, and spine labels. It can also produce a variety of records, card catalogues in the book form, and printed catalogue as by products (Buragohain, 2011).

2.4.7 Online Public Access Catalogue (OPAC)

An Online Public Access Catalogue (often abbreviated as OPAC or simply library catalogue) is an online database of materials held by a library or group of libraries. According to Rouse (2014) an OPAC is an online bibliography of a library collection that is available to the public. With the arrival of the Internet, most libraries have made their OPAC accessible from a server to users all over the world. Users search a library catalogue principally to locate books and other material available at a library. The OPAC search form allows searching by any combination of author, title, subject/keyword, date

or format. Staff and onsite researchers may contact the library reference desk face-to-face by phone or via e-mail to confirm availability of retrieved materials.

2.4.8 Interlibrary loan

Interlibrary Loans (ILL) service supports lecturers and student in their research. The ILL service helps staff and students to borrow or obtain materials from other libraries and that is not owned by their library. In this order, when a user has a need, he submits his request to the library which will borrow the item on his behalf. According to Beaubien (2007), ILL services supplement libraries' collections by obtaining materials needed for research that are not available at a user's home institution. Research and academic libraries place ILL requests on behalf of faculty, staff, and students for items usually to obtain material out of the scope of the collection or to support a specialized research interest of one of their users. Electronic interlibrary loan concerns exchange of audiovisual items, microfilms items, electronic journals, and electronic books.

2.4.9 Scanning, printing and photocopying in the library

The library must provide a variety of scanning, printing and photocopying services for users. The library offers journal articles or chapters of books or books which are not allowed to be borrowed by students or staff members. In some libraries, those services are free and in others users are asked to pay for printing, copying and scanning. There must be in the library printing, photocopying and scanning services. According to Trinity College Dublin (2015), the printing, scanning and photocopying services assist users to select what materials may be photocopied, scanned, and printed throughout the library or computer lab if he is not able to take note.

As noted by the University of Ulste (2013), photocopying services help to make copies when there are limited printed books, journals and magazines that may be stored for delivery to a specific cohort of students enrolled in a course of study or to help academic staff in preparation of courses. In this case, library staff members are approved to undertake this work for library users. This service not only helps the university but also helps the academic staff make teaching materials more readily available to students.

According to the University of Greenwich (2013), the library operates a scanning service for library users. This means articles from journals and chapters from books can be scanned and delivered as PDF files to be included in a virtual learning environment.

2.4.10 Internet services

The Internet represents one of the most successful tools in research and development of information retrieval. The Internet has already had a major impact on how people find and access information, and now the rising popularity of e-books is helping academic libraries improve reading habits. In this changing landscape, academic libraries are trying to adjust their services to these new realities while still serving the needs of patrons who rely on more traditional resources. The availability of free computers and Internet access now rivals book lending and reference expertise as a vital service of libraries (Zickuhr, Rainie and Purcell, 2013).

The library provides users with access to the Internet connectivity as well as web browser like Internet Explorer, Mozilla Firefox, Opera, Safari or Google Chrome. The connectivity to the Internet may be by cable or wireless where users can use their own laptops and smart phones to browse Internet websites. It must also provide an office

application suite containing Word, Excel, PowerPoint, and Publisher in order to perform their daily activities on the computer. The vast network of information and resources available on the Internet enables the library to provide information services beyond the confines of its own collection. Staff members must be available to introduce library users to Internet searching. Library users may also consult basic Internet resources identified by reference staff members (City of San Diego, 2014). In addition to this, those who have their laptops must be connected to wireless in order to work where they are without a need to visit the library or computer lab for accessing the Internet.

2.4.11 Electronic resources

Electronic resources refer to those materials that require computer access, whether through a personal computer, mainframe, or handheld mobile device. They may either be accessed remotely via the Internet or locally. Some of the most frequently encountered types are: Electronic journals, Electronic books, Full-text databases, Indexing and abstracting databases, Reference databases (biographies, dictionaries, directories, and encyclopaedias), Numeric and statistical databases, Electronic images, and Electronic audio/visual resources (Johnson, Evensen, Gelfand, et al., 2012).

2.4.11.1 Electronic books

The library provides access to a variety of electronic books and texts to its users. An electronic book is a book-length publication in digital form, consisting of text, images, or both, readable on computers or other electronic devices (Kluver, 2013). According to Rouse (2005), an eBook is an electronic version of a traditional print book that can be read by using a personal computer or by using an eBook reader. Users can purchase an

eBook on diskette or CD, but the most popular method of getting an eBook is to purchase a downloadable file of the eBook from a Web site to be read from the user's computer or reading device.

2.4.11.2 Electronic thesis

As asserted by Hopkins (2014), an electronic thesis or dissertation (ETD) is a digital version of a dissertation that is available to the public via the Internet. Thesis and dissertations must be posted on website by the library in electronic format in order to assure easy and fast access and long-term preservation.

2.4.11.3 Electronic journals

Electronic journals, also known as e-journals, and electronic serials, are scholarly journals or intellectual magazines that can be accessed via electronic transmission. In practice, this means that they are usually published on the Web. Many electronic journals are listed in directories such as the Directory of Open Access Journals, and the articles indexed in bibliographic databases and search engines. Some electronic journals are online-only journals; some are online versions of printed journals, and some consist of the online equivalent of a printed journal, but with additional online-only (sometimes video and interactive media) material. In most instances, e-journals provide online access to the full text of their component articles, often as PDF documents (Rakeshr, 2014).

As with print journals, electronic journals require a long-term commitment from the library in terms of financial resources and human resources to acquire and maintain them. As more and more scholarly journals become available in electronic as well as print

versions, the library must decide whether to maintain both versions or cancel the print when the online version becomes available (Nimai, Kanika and Tapas, 2010).

2.4.11.4 Electronic mail (e-mail, chats)

According to Vicomsoft (2014), Electronic mail or e-mail, in short, is the term given to an electronic message, usually a form of simple text message that a user types at a computer system and is transmitted over some form of computer network to another user, who can read it. Electronic mail is one of the most popular uses of the Internet. Once the user has an e-mail account he can send an electronic message to just about anyone else with an electronic mail account as long as he knows their e-mail address. Electronic mail is used by library staff in communication with users of library. The library can also communicate to users using social media networks.

2.4.12 Online databases

According to Rice (1985), an online database is a machine-readable file of organized information with which the user interacts by means of a terminal connected to the computer housing the file. The terminal may be wired directly to the computer or it may communicate with it via a telecommunications network. The important feature of the online mode is that the user interacts with the information in the computer, sending and receiving messages in an almost instantaneous time frame. In a library, databases include books, journals, graphics or images, charts, such as photos, paintings or maps. These elements of databases are very important for academic libraries in this time where we are in the digital era and they can be accessed using key words.

2.4.13 Multimedia resources

Multimedia is the integration of multiple forms of media. In libraries, multimedia uses computers to present text, audio, video, animation, interactive features, and images in various ways and combinations made possible through the advancement of technology. Multimedia can be accessed through computers or electronic devices and integrates the various forms together (Loretto, 2014).

2.4.13.1 Audio visual resources (audio, film, video)

Audio visual resources are multimedia resources which contain sound clips, and video clips taken in different fields of interest by the library. In a library, some of the audio visuals come with books and others are alone, depending on what they are containing. A library, in the age of digital era, must offer to its users the databases which provide access to sound recordings or audio visual resources like music, video and film.

According to Aina and Adekanye (2013), audio-visual resources/materials are part of a cultural heritage, carrying a huge amount of information that needs to be preserved for future use. They are the product of advanced technology, some of which require special equipment to operate. Non-printed resources can be grouped into three (that is, audio, visual and audio-visual). The rich variety of media expressions in society should be reflected in the services offered to users by the libraries. Teachers need various kinds of information for teaching and research for the purposes of impacting knowledge in students and self development. The audio-visual resources have their unique roles to play in teaching and learning situation and so must be made readily available and accessible especially at the resource centres like library.

2.4.13.2 DVD player, cassettes

DVD, sometimes explained as "digital video disc" or "digital versatile disc, is a digital optical disc storage format. It is a digital disc on which images, sounds, or data may be recorded for reproduction by a DVD player connected as to a television, stereo, or computer (ToKnow, 2014). In libraries, there are documents which are stored on DVD, CD-Room, and floppy in different formats. The library must be equipped with multimedia tools in order to help users to benefit from digital information and services which may be accessed by them.

2.4.13.3 Social media and communication channels

Social media is becoming an integral part of life online as social websites and applications proliferate. Most traditional online media include social components, such as comment fields for users. In a library, social media is used to market, promote, and connect to current users and to communicate to users (Rouse, 2014). The most social media used in library is Facebook which is a popular free social networking website that allows registered users to create profiles, upload photos and video, send messages and keep in touch with friends, family and colleagues. In this order, Facebook is used in a library to market, promote, and connect to current users and to communicate to users and to get feedback from users of the library.

Communication channels are the means through which people in an organization communicate (Williams 2014). According to BusinessDictionary.com (2014), an electronic channel of communication is a medium through which a message is transmitted to its intended audience, such as print media or broadcast (electronic) media.

Communicating data from one location to another requires some form of pathway or medium. These pathways, called communication channels, use two types of media: cable (twisted-pair wire, cable, and optic fiber cable) and broadcast (microwave, satellite, radio, and television). Cable or wire line media use physical wires of cables to transmit data and information. It is in this order the Internet can be accessed using a computer, using local area network or wireless. In a library, users may access information using television, or get access to information using Internet through computers.

2.5 Library automation

Information Communication Technologies have converted the world into a global village and libraries, as part of this age, should make use of these technological advancements in achieving its goals. This means that traditional libraries should change into well-equipped interconnected digital libraries. The so-called “Information Revolution” has made libraries around the world to adopt new philosophies and technologies in order to enhance good service delivery (Okeagu and Okeagu, 2008).

Since the 1960s, libraries have used Information and Communication Technology in general, and computers in particular, to automate a wide range of administrative, public, and technical service tasks. The current state of computer applications are in the work of: circulation control, descriptive cataloguing, acquisitions, and serials control (Saffady, 1989). Librarians must adapt to this change and acquire skills in using automated Library Management Systems (Lourdes, 2006) because it is essential for efficient functioning of the library and saving library staff and library users’ time.

According to Faisal and Surendran (2008), library automation may be defined as the application of computers to perform traditional library housekeeping activities such as acquisition, circulation, cataloguing, and reference and serials control. Automation is used to reduce the amount of staff time devoted to repetitive activities that must be done in any properly functioning library.

Library automation is used to denote the various activities related with the location, acquisition, storage, update, manipulation, processing, repackaging or reproducing, dissemination or transmission or communication, an improving the quality of products and services of library and information centres. It enhances the speed, productivity, adequacy and efficiency of the library professional staff and saves the manpower to avoid some routine, repetitive and clerical tasks such as filing, sorting, typing and duplication checking (Abbas, 2014).

Automating libraries and information centres is the process which restructures their functions and reinvents their services. By keeping a database as the basis, automation converge new technologies of information storage and retrieval with traditional housekeeping operations. An automated library serves the teaching and learning community more effectively (Faisal and Surendran, 2008).

2.5.1 Software used in library automation

According to Ngugi (2012), modern information technologies have brought dramatic changes in today's library management and user expectations. Libraries and information centres software have been developed frequently and librarians use different software packages to automate library operations and information services.

2.5.1.1 Proprietary software

Proprietary software or closed source software is computer software licensed under the exclusive legal right of the copyright holder with the intent that the licensee is given the right to use the software only under certain conditions, and restricted from other uses, such as modification, sharing, studying, redistribution, or reverse engineering. Usually the source code of proprietary software is not made available. The Linux Information Project (2005) defines Proprietary software as software that is owned by an individual or a company and almost always major restrictions on its use, and its source code is almost always kept secret. It is necessary to have the source code in order to be able to modify or improve a program.

2.5.1.2 Non-proprietary software

Non-proprietary software, which is generally the same as open source software, is free software available at no cost to everyone, and it can be used by anyone for any purpose and with only very minimal restrictions.

According to Cory (2010), non-proprietary software is software that has no patent or copyright conditions associated with it. Non-proprietary software is publicly available software that can be freely installed and used. It also provides complete access to its source code. Open-source software (OSS) is computer software with its source code is made available and licensed with a license in which the copyright holder provides the rights to study change and distribute the software to anyone and for any purpose. Their software remains free of charge and they make money helping others install, use, and troubleshoot it.

2.6 Library website

A website is a collection of web pages or documents that are accessed through the Internet. In a library, a web page can contain any type of information including text, images, animation and sound. In a library we find library website and library web portals. Most libraries and information centres offer services using websites. Libraries have found that they can achieve their goals better by means of using websites and that they can have more successful communication with their users and understanding their needs (Nooshinfard and Ziaei, 2011).

Lancaster (1982) talked about a paperless society several decades ago. In today's electronic environment, the value of having access to information is greater than having access to physical space. Users have less reason to visit the library, since they can access resources without going to the library. This brings up two important issues: the diverse needs of academic users for library resources and the importance of user awareness of library resources. Timeliness and accuracy are also important. One of the tools in achieving these things is the library website. Websites are a key way to advertise. Academic librarians can help with the needs of different groups in the academic community, including students, teachers, and research scholars. In academic libraries, it is possible to design a website with the help of advanced technologies and computers which can be a powerful marketing tool (Nooshinfard and Ziaei, 2011).

2.7 Library web portals

A portal is a Web site or Web service that provides information content to serve a specific community (Sadeh and Walker, 2011). Content linked in library portal is

superior to the open access content available on the Web. In the library area, a web portal is a website that offers access to a broad array of resources and services of libraries such as e-journals, online databases, Web OPAC, new additions and any other static information about library services (Kanamadi and Kumbar, 2006). Web portals include wide-reaching online services as well as services targeted at very specific communities interested in, say, cancer research.

Library portals typically provide a gateway to an institution's resources by listing them for users and creating a direct link to the native interface of each resource. A library portal serves as an integrated interface to a wide variety of digital resources and web-based library services. Web portals are also important tools for users to access and utilize library and information services over a network. An informative home page provides the users with helpful information about the library, its collection, and services. In addition, library portals also host links to important Internet resources useful for the parent organization (Sadeh and Walker, 2011).

2.8 Electronic library security system

Libraries are the "heart" of the learning community, providing a place for students and faculty to do their research and advance their knowledge (Osayande, 2011). They are institutions set up to cater for the educational, cultural, research, recreational and information needs of their users. Libraries have the main objectives of being entrusted with the selection, acquisition, organization, storage and dissemination of information to their patrons (Ogbonyomi, 2011). However, academic libraries face a number of security challenges with their collections (both print and non-print). As such, securing and

protecting the collections can help libraries provide an effective service in response to the information needs of the university community. Collection security implies the need for libraries to provide, maintain and secure their collections to ensure longevity, accessibility and effective provision of services to users (Maidabino and Zainab, 2011).

Libraries face several incidents such as theft of physical materials like books, computer materials (like mouse, keyboards, hard disk), laptops, handbags, and notebooks; alteration of data; vandalism, mutilation, defacement, and arson, are problems regularly encountered by the materials of these libraries (Ogbonyomi, 2011). Other forms of breaches include non-return of items by borrowers, theft of library tools, personal theft (from staff and users), verbal and physical abuse against staff and users, and vandalism against library buildings, tools and stock destruction, all of which can directly or indirectly affects the provision of library services (Maidabino and Zainab, 2011). It is difficult to replace materials that are stolen from libraries or mutilated as such materials may be out of print or the library may not have the money to purchase a replacement copy (Osayande, 2011).

Suggested measures to reduce these problems include tightening security at library entrances and exits, expulsion of students involved in theft and mutilation, provision of multiple copies of heavily used text, reducing the cost of photocopying, and periodic searching of students hostels and staff offices. Another factor is the human aspect of library security involves creating the right atmosphere for greater security awareness amongst library staff, users and the university community at large (Maidabino and Zainab, 2011).

The traditional ways of manually checking patrons' bags are both inefficient and not user-friendly. A better way to deal with security in academic libraries is to embrace the electronic security systems. That will better ensure an effective security of library materials from theft, mutilation, or other forms of crimes (Osayande, 2011). Some electronic library security systems used in library are computer security, security gates, and closed-circuit television (CCTV), also known as video surveillance.

Computer security relates to securing computing systems against unwanted access and use, information security also includes issues such as information management, information privacy and data integrity. Information security in a library would include personnel security and policies, antivirus, steps taken for effective backups, and the physical integrity of computing facilities. Many libraries have long relied on electromagnetic security gates that alarm when triggered by sensitized magnetic strips within books (Harwell, 2014) like EM (Electro-Mechanical), RF (Radio Frequency) systems, and RFID (Radio Frequency Identification) which is the latest technology to be used in library theft detection systems (LibBest, 2014).

Closed-circuit television (CCTV), also known as video surveillance, is used as library security system to act as a deterrent, reducing the likelihood of theft or damage to a library's collections or property, and of aggressive or inappropriate behaviour towards staff, clients and visitors (State Library, 2013).

2.9 Library ICT literacy

The explosion of information communication technologies (ICTs) has rendered manual-based Library Management System in academic, research, special and public libraries

less relevant. This is because using and implementing information communication technologies in the library depends largely on the librarian's attitude and knowledge toward the current digital age (Khademizadeh, 2012).

According to Haneefa and Shukkoor (2010), there is a growing concern about library professionals' insufficient level of ICTs literacy. The necessary ICTs literacy skills for library professionals in the emerging knowledge driven society are continuously changing. Library professionals must learn and adopt new information technologies in order to meet users' needs in this digital era. They have to raise their level of knowledge of new information technologies through continuing education programs, professional training, and through revisions in their library. However, application of ICT is posing a particular challenge to library professionals in developing countries. Despite the high penetration rate of ICT and exponential growth of Internet, library staff and users in PIASS lack the necessary ICT literacy skills.

2.9.1 ICT training for library staff

The role of a librarian is continually evolving to meet social and technological needs. A modern librarian may deal with the provision and maintenance of information in many formats, including: physical books; electronic resources; magazines; newspapers; audio and video recordings; maps; manuscripts; photographs and other graphic material; bibliographic databases; and web-based and digital resources. A librarian may also provide other information services, including: computer provision and training; assistive technology for people with disabilities; and assistance locating community resources. Today's expectation of librarians is as an information provider, assisting in search using

modern information technologies for fast and good information delivery, making the library a resource centre with all the audio-visual equipment necessary to make information retrieval quick and fast (Prins and de Gier, 1995).

Library and information workers should promote more creative activities using ICT tools. Also, local academic institutions should offer more courses in this domain. By so doing, librarians will thus enhance the importance of the library profession (Liam, 2009). Library staff must be motivated to be ready and able to take an interest in customers and their concerns, and to achieve high quality in their work (Kumbar, 2004). Librarians must be updated in order to help users to face challenges caused by new technologies.

As argued by Abdelrahman (2009), the current rapid developments in the field of information and communication technology (ICT) have changed significantly the nature of work in academic libraries and other types of libraries as well. These rapid changes have brought about new types of libraries and services. The poor performance in a library profession may be attributed to a number of factors, one of which is the lack of appropriate in-service training and continuous educational programs for the information professionals and library staff in academic libraries, and the lack of ICT training opportunities available for the Library staff.

2.9.2 Users training

Library and Information Services are being transformed by technology and they have to adapt to these changes to meet their users' changing needs and growing expectations. Rapidly developing information and communication technology are creating new opportunities and challenges for traditional libraries (Sharma, Singh and Kumar, 2009).

There is a need of training of librarians and users in order to help them to face those challenges.

2.10 Information need and seeking behaviour

Information seeking is a broad term, which involves a set of actions that an individual takes to express his information needs, seek, evaluate and select information, and finally uses it to satisfy his information needs. Various factors, like purpose for information, channels and sources of information and barriers to information, affect the information seeking behaviours of an individual or a group of individuals. Scholars, students and faculty actively seek current information from the various media available in libraries like encyclopedias, journals and electronic media. There are many factors which determine individual information seeking behaviours. These factors include the time spent in search of information, knowledge about information sources, and the way of expressing this information need (Kumar, 2013).

Things have changed, though: information has been proliferating, along with formats for containing it, technologies for accessing it, and expectations for obtaining it immediately. Now, to meet changing user needs, libraries must be proactive in finding out what those needs are and adapting their resources and services according to new technologies (Thorin and Hinton (eds.), 2006).

Technology has enabled librarians to give better service than ever before. Libraries must be encouraged to be innovative and to use the ICT tools they have at their disposition to reshape library activities to better serve users (Montanelli and Stenstrom (eds.), 1999).

2.11 Challenges in ICT utilisation in library operations and information services

The rapid implementation of information technology in our society has changed and continues to change in all areas of life. ICT facilitates the information storage, retrieval, acquisition, searching, viewing and information handling. The main function of ICTs is availability of the right information to the user at the right time for appeasing his thirst of knowledge. ICTs have brought dramatic changes to the traditional ways of the library profession and practice, both challenging and full of opportunity at same time (Qutab, Bhatti and Ullah, 2014).

A lot of academic information can be received using electronic resources, both inside and outside the library. This may be the reason why they are more popular compared to other resources. However, academic libraries face the problem of inadequate infrastructure, inadequate human resource skills, and the problem of funding. These challenges may discourage users from using electronic information sources. From this, the success of online searching depends on the ability of users or information specialists to perform the search in the best possible way (Iwhiwhu, 2012).

2.11.1 Inadequate library ICT infrastructure

ICT infrastructure includes policies, human resources skills and training, facilities and equipment. According to Ngugi (2012), library operations and information services require a lot of ICT tools like computers, telecommunication facilities, storage devices, photocopiers, printers, barcode machines, software, and access to Internet with enough bandwidth. PIASS library does not have facilities which help in library operations and information services. CDSISIS used by PIASS library does not have all modules required

for library operations and information services like acquisition, circulation, and serial control. There is a need of improving the quality of ICT infrastructures which include policies, human resources skills and training, facilities and equipment; e-readiness; computer literacy for library staff and library users; information resources online; and ICT fully equipped to deliver services as required.

2.11.2 Inadequate ICT skills

Information and digital literacy competencies are needed for an individual to effectively partake in the ICTs based information society. Information literacy is defined as a set of abilities requiring individuals to: determine the extent of information needed; access the needed information effectively and efficiently; evaluate information and its sources critically; incorporate selected information into one's knowledge base; use information effectively to accomplish a specific purpose; understand economic, legal, and social issues surrounding the use of information; access and use information ethically and legally; manage and maintain information; have knowledge of using different information resources; organize information; provide the means of access to information; search for information; and gather, evaluate and use information. Information literacy spans a wider skill set than computer skills. Consequently, for people to operate effectively in an information world, they need to develop skills for searching, evaluating and managing information (Mutula and van Brakel, 2006). Librarians are faced with problem of selecting library software because of inadequate technical skills.

2.11.3 Inadequate funds for ICT infrastructure

Finance is a major resource for organizational effectiveness and without it nothing, meaningful can be achieved. It should be borne in mind right from the onset that computerization of library operations, like acquisition and circulation control, is an expensive venture. The problem of funding is the major constraint of ICTs application in libraries (Iwhiwhu, 2012).

Acquisition of Information and Communication Technology (ICT) tools and facilities such as computers, servers, software, photocopiers, electronic journals, electronic books, paying online services like e-journals and digital libraries, requires enough funding for libraries. Most of these ICT facilities and services are very expensive, which makes a library choose not to enhance its modern technology fully, resulting in the prevalent of inefficient and outdated library information resources and services (Yaya and Adeeko, 2016).

2.11.4 Inadequate library ICT policies and guidelines

A library policy is a carefully designed, broadly stated, written guideline for the actions and decisions of the library. It is a governing principle formally adopted by the library board. A library's policies should be consistent with its mission. This may include: policy objectives; ensure provision and maintenance of infrastructural facilities necessary for ICTs development in library; promote and support the systematic, relevant and sustainable development of ICTs; embark on extensive educational and training programs to provide adequate supply of qualified ICTs personnel in library; well defining priorities in application of ICTs in library; and establish structures for effective implementation of

ICTs strategies (Kundishora, 2014). The purpose of ICT policies is to provide strategic direction and guidance for sustainable and systematic application of ICTs in library.

2.12 Chapter summary

This chapter has presented the literature review concerning diffusion of innovation theory and its application to the present study; Information and Communication Technologies (ICTs) in libraries; information services delivered through ICTs; library automation; institutional and digital repositories; electronic readiness; ICTs literacy; information need and seeking behaviour; and challenges in ICTs utilisation in library operations and information services. The literature was fairly good because as in Rwanda there is not much literature regarding the use of ICTs in libraries, the study attempted to fill that gap.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

According to Kothari (2004), research methodology is a way to systematically solve a research problem. It may be understood as the science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them. It is necessary for the researcher to know not only the research methods and techniques but also the methodology. This chapter explains the research methodology used in this study.

3.2 Research design

According to Kothari (2004), a research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose. In fact, the research design is the conceptual structure within which research is conducted. According to Burns and Grove (2009), a research design constitutes the blueprint for the collection, measurement and analysis of data. As such, the design includes an outline of what the researcher has to do, from writing the hypothesis and its operational implications to the final analysis of data. Parahoo (2006) defines a research design as a plan that describes how, when and where data are to be collected and analyzed.

Research design can be thought of as the logic or master plan of a research that throws light on how the study is to be conducted. It shows how all of the major parts of the research study like the samples or groups, measures, treatments and programs among

others, work together in an attempt to address the research questions. Research design most fundamentally affects the internal validity of research, that is, the ability to draw conclusions about what actually causes any observable differences in a dependent measure. Generally a good research design minimizes bias and maximizes the reliability of the data collected and analyzed. Similarly, a design which yields maximum information and provides an opportunity for considering different aspects of a problem is considered to be the most appropriate efficient design. Thus the question of a good design is related to the purpose or objective of the research problem and also with the nature of the problem to be studied (Migwi, 2012).

This study is a survey. A survey is defined as a brief interview or discussion with individuals about a specific topic. The term survey is often used to mean collect information. In survey research, the researcher selects a sample of respondents from a population and administers a standardized questionnaire to them (Education Portal, 2014).

This study used a qualitative approach with some aspects of quantitative techniques. According to Migwi (2012), in qualitative research, the data are analyzed using techniques of textual or thematic analysis. It describes either explicitly or implicitly, the purpose of the qualitative research, the role of the researcher (s), the stages of research, and the method of data analysis (Trochim, 2006). The quantitative approach applies statistical techniques using percentages, tables and charts to recognize overall patterns in the relations of processes (Rhodes, 2013).

Thus, the study used the qualitative approach because it sought to understand how users of the PIASS library appreciate the role of ICTs in enhancing service delivery to them. The researcher collected data from several persons who have experienced the use of ICTs in information services. The study then analyzed the data by reducing the information to significant statements or quotes and combined the statements into themes. Following that, the study developed a textual description of what users of the PIASS library are experiencing. The study also used descriptive statistics including percentages and frequencies and presented data through the use of tables and charts in order to draw conclusion and to define outcomes of research.

3.3 Target population

According to Yount (2006), a population consists of all the subjects you want to study. A target population is the population from which a researcher wants to generalize the results of the study for the entire group of individuals, events or objects having a common observable characteristic. The target population is the entire group a researcher is interested in the group about which the researcher wishes to draw conclusions.

The target population of the study is 852 distributed in 4 groups as follows: Management staff are 15, namely: Vice-chancellor, Academic Deputy-Vice-Chancellor, Director of Resources and Assets management, Director of Research, Director of Quality Assurance, Deans are 3, and Heads of Department are 7; library staff are 3; teaching staff are 82; and students are 752 including 6 students helping in library and computer labs. The study population is summarized in the table 3.1:

Table 3.1: Study population

Category	Population
Students	752
Academic Staff	82
Library staff	3
PIASS management staff	15
Total	852

3.4 Sample techniques

A sample is a portion or subset of a population; it's the small group that is observed (Ary, Jacobs and Razavieh, 2002). Kothari (2004) defines sampling as the selection of some part of an aggregate or totality on the basis of which a judgment or inference about the aggregate or totality is made. Sample size determination is the act of choosing the number of observations or replicates to include in a statistical sample. The sample size is an important feature of any empirical study in which the goal is to make inferences about a population from a sample. According to Kothari (2004) the sample size refers to the number of items to be selected from the universe to constitute a sample. The study used stratified random sampling and purposive sampling.

3.4.1 Stratified random sampling

According to Investopedia (2014), stratified random sampling is a method of sampling that involves the division of a population into smaller groups known as strata. In this study, the strata are formed based on members' shared attributes or characteristics which are: PIASS management staff, academic staff, library staff and students. These groups are selected based on their different interests in using the PIASS library and this helped to make sure that all groups were represented.

In this regard, the study divided the target population into 4 groups. The first group is the group of administrative management who are decision makers. Administrative staff members are the ones who decide on the activities of the library. The second group is teaching staff who must have enough information concerning the PIASS library in order to direct and guide students on which materials are available to use. The third group is made by library staff. They are ones who follow day to day activities of the library. They are well placed to know how ICT is used in the library and what challenges they face in information delivery at PIASS library. The last group was made up of students. The members of this group stood to benefit the most from library operations and information services.

3.4.2 Purposive sampling

Purposive sampling, also known as judgmental, selective or subjective sampling, is a non-probability sampling technique where the units investigated are based on the judgment of the researcher. In the purposive sampling technique, the researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience (Tongco, 2007). This sampling technique helped the researcher to get enough of the needed information.

3.4.3 Sample size

According to Gay and Airasian (2003), when there is a large population, the sample size should be between 10 % and 20 % of the whole population. And on this statement, Grinnell and William (1990) added that a 10 % sample is sufficient for the study. According to Kothari (2004), the size of sample should neither be excessively large, nor

too small. It should be optimum. An optimum sample is one which fulfils the requirements of efficiency, representativeness, reliability and flexibility. Thus, the sample size of this study is 100 and it represents 11.73 % of the target population, distributed in 4 groups of PIASS library users: PIASS management, academic staff, library staff and students. In fact, 3 out of 15 administrative staff members and all 3 library staff members were selected to be part of the sample size based on the census. A census attempts to contact every individual in the entire population or a group of population (UNAIDS/WHO, 2003). This means that collection of data concerned every member of these groups. In the teaching staff, 2 lecturers by departments (there are 7 departments) have been selected. From the group of students, 2 students in a class of less than 20 students and 4 students in a class of 20 students and more have been selected in each level or class from 7 departments. To this it has been added 4 out of 6 students helping in the library and the computer labs.

The sample size is summarized in the table 3.2:

Table 3.2: Target population and sample size

Faculties	Departments		Levels	Number	Sample size	
Faculty of Theology and Religious Studies	Theology		Level 1	14	2	
			Level 2	11	2	
			Level 3	8	2	
			Level 4	0	0	
			Level 5	18	2	
Faculty of Development studies	Peace		Level 1	8	2	
			Level 2	6	2	
			Level 3	18	2	
			Level 4	0	0	
			Level 5	13	2	
	Rural Development		Level 1	31	4	
			Level 2	41	4	
			Level 3	54	4	
			Level 4	0	0	
			Level 5	65	4	
Faculty of Education	Applied pedagogy	Geography and History	Level 1	28	4	
			Level 2	46	4	
			Level 3	44	4	
			Level 4	43	4	
			Level 5	0	0	
		Kinyarwanda and English		Level 1	35	4
				Level 2	41	4
				Level 3	25	4
				Level 4	0	0
				Level 5	0	0
	Education Planning and Management		Level 1	0	0	
			Level 2	0	0	
			Level 3	24	4	
			Level 4	0	0	
			Level 5	49	4	
	Education Business Studies		Level 1	55	4	
			Level 2	37	4	
			Level 3	38	4	
			Level 4	0	0	
			Level 5	0	0	
Total of students				752	76	
Students helping in Library and Computer labs					4	
Library staff				3	3	
PIASS Mgmt staff				15	3	
Academic Staff				82	14	
Great Total				852	100	

3.6 Data collection methods

Primary data collection is an important piece of many research projects. Using proper techniques ensures that qualitative data are collected in a scientific and consistent manner. In data collection, researchers typically rely on the following methods for gathering information: survey or questionnaires, interviewing in depth, observing directly, analyzing documents or document review, focus groups, (data) extraction, and secondary data sources (Marshall, 2006). The main instruments for data collection of this study were questionnaires and interview schedules.

3.6.1 Questionnaires

Questionnaires are forms which are completed and returned by respondents. The questionnaire can be a written document that is completed by the person being surveyed, an online questionnaire, a face-to-face interview, or a telephone interview. Using surveys, it is possible to collect data from large or small populations (Education Portal, 2014).

The advantages of questionnaires are: practical; large amounts of information can be collected from a large number of people in a short period of time and in a relatively cost effective way; it can be carried out by the researcher or by any number of people with limited affect to its validity and reliability; the results of the questionnaires can usually be quickly and easily quantified by either a researcher or through the use of a software package; it can be analyzed more scientifically and objectively than other forms of research; when data has been quantified, it can be used to compare and contrast other research and may be used to measure change; and positivists believe that quantitative data can be used to create new theories and / or test existing theories (Popper, 2004).

The disadvantages of questionnaires are that they are argued to be inadequate to understand some forms of information; there is no way to tell how truthful a respondent is being; the respondent may be forgetful or not thinking within the full context of the situation; the respondent may read differently into each question and therefore reply based on their own interpretation of the question; there is a level of researcher imposition, meaning that when developing the questionnaire, the researcher is making their own decisions and assumptions as to what is and is not important, therefore they may be missing something that is of importance; some people feel more comfortable responding to a survey than participating in an interview (Popper, 2004). The questionnaire has been used in teaching staff and students groups where the study used both open and close questions. Out of 94 (100 %) questionnaires distributed, 82 (87.23 %) were returned. The 12 questions not returned did not affect the results because that response rate was enough satisfactory for the study.

3.6.2 Interview schedule

An in-depth interview is an open-ended and discovery-oriented method which helps to obtain detailed information about a subject of study from a stakeholder. It is a qualitative research method which allows the interviewer to deeply explore a respondent's point of view, experiences, feelings, and perspectives on a subject (Guion, Diehl and McDonald, 2013). The advantages of interviews are that they are useful for gaining insight and context into a topic and they allow respondents to describe what is important to them. In addition, they are useful for gathering quotes and stories. The disadvantages of interviews are that they are susceptible to interview bias, are time consuming and expensive compared to other data collection methods and they may seem intrusive to the respondent

(Witkin and Altschuld, 1995). The interview was used for PIASS management staff and library staff. All library staff 3 (100 %) and all PIASS management staff members 3 (100 %) were interviewed.

3.7 Test for validity and reliability

According to Shuttleworth (2014), the principles of validity and reliability are fundamental cornerstones of the scientific method. Reliability is a necessary ingredient for determining the overall validity of a scientific experiment and enhancing the strength of the results. Kothari (2004) defines reliability as concerned with securing consistent results with repeated measurements of the same person and with the same instrument. We usually determine the degree of stability by comparing the results of repeated measurements.

Validity encompasses the entire experimental concept and establishes whether the results obtained meet all of the requirements of the scientific research method (Shuttleworth, 2014). Kothari (2004) defines it as the extent to which a test measures what we actually wish to measure.

To ensure that the study is reliable and valid, a pilot study of five (5) individuals was done at the PIASS library where the researcher did a follow up on how respondents understood questions from the questionnaires and interview schedules and corrected identified mistakes before distributing questionnaires to the respondents.

3.8 Data collection procedures

In a research design, data collection procedure is one important consideration. Data collection procedures answer the who, when, and how of the research proposal or research project (HubPages, 2014). After defending the proposal, the researcher got a letter from the department of Library, Record Management and Information Studies, in the School of Information Sciences at Moi University and the Permission from the PIASS where the study was conducted, before collecting data. The respondents were then asked to fill in questionnaires and to respond to interviews.

3.9 Data presentation, analysis and interpretation

According to Nazeel (2014), data analysis is the process of developing answers to questions through the examination and interpretation of data. The basic steps in the analytic process consist of identifying issues, determining the availability of suitable data, deciding on which methods are appropriate for answering the questions of interest, applying the methods and evaluating, summarizing and communicating the results.

After collecting data, the researcher analyzed the responses. Data were presented and interpreted in a narrative with a few tables, charts and percentages for ease of comprehension. The researcher arranged ideas in a logical order and in order of relevance or importance. He used the tables, charts and percentages by discussing the information in the text where necessary and took care that the overall format contributed to the clarity of the data in the tables in order to prevent misinterpretation (Nazeel, 2014).

3.10 Ethical considerations

Western Australian Centre for Health Promotion Research (2010) argues that researcher must observe the following ethical consideration: Informed consent, voluntary participation, avoid harm, keep confidentiality, keep anonymity and only assessing relevant components.

Informed consent means that the person participating in the evaluation is fully informed about the purpose of research. Voluntary participation means that participants in the research are free to choose to participate or not to. Harm can be both physical and/or psychological and therefore can be in the form of: stress, pain, anxiety, diminishing self-esteem or an invasion of privacy. It is imperative that the research process does not in any way harm participants (Western Australian Centre for Health Promotion Research, 2010).

Confidentiality means that any identifying information is not made available to, or accessed by anyone but the researcher. Confidentiality also ensures such identifying information is excluded from any published documents. Anonymity is a stricter form of privacy than confidentiality, as the identity of the participant remains unknown to the researcher. Only assess those components that are of relevance to the research being conducted (Western Australian Centre for Health Promotion Research, 2010).

Thus, in this study, the study respected the following ethical considerations:

1. Respondents participated in the study voluntarily and were fully informed about the aims and objectives of the study;
2. Texts belonging to other authors that were used in any part of this study were fully referenced;

3. The questionnaires and interview schedules did not contain any degrading, discriminating or any other unacceptable language that could be offensive to any members of the sample group;
4. The questionnaires and interview schedules were designed to collect information directly related to the study and has been used for this study only;
5. The study respected individuals' rights to confidentiality and privacy so that the identity of respondent has been kept anonymous and data have been used for academic purpose only.

3.11 Chapter summary

The chapter presented the methodology adopted by the study. It covered the research design, the population, sampling technique used to find the sample size of the study, the data collection methods, test of validity and reliability, data collection procedures, data presentation analysis and interpretation, and ethical consideration.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the data collected through interviews and questionnaires based on the research objectives. It provides the analysis of data and presents results using tables, percentages, and charts. The data presented has been analyzed, interpreted and discussed based on the research objectives. The following themes have been developed in this chapter: response rate, demographic data of faculties, establishment of the status of ICT infrastructure at the PIASS library, examination of the adequacy of information resources and services delivered by the PIASS library through the available ICTs, evaluation of the level of ICT skills and training among library staff and users at the PIASS library, establishment of the challenges faced in ICTs and information services usage at PIASS library, suggested solutions to challenges proposed for better utilisation of ICTs in information service delivery at the PIASS library and chapter summary.

4.2 Response rate

The sample size of this study was 100 respondents selected from the population of 852 distributed in four groups which are PIASS management staff, academic staff, library staff, and students. The summary of response rate according to groups is shown in the table 4.1:

Table 4.1: Target population, sample size and response rate

Categories	Study Population	Sample Size	Response Rate	Percentage
Students	752	80	70	87.5
Academic staff	82	14	12	85.7
Library staff	3	3	3	100
PIASS management staff	15	3	3	100
Total	852	100	88	88

The whole point of conducting research is to obtain useful, reliable, and valid data in a format that makes it possible to analyze and draw conclusions about the total target population. Although there is no agreed-upon minimum response rate, the more responses a researcher receives, the more likely it is that he will be able to draw statistically significant conclusions about the target population (Thayer-Hart, Dykema, Elver et al., 2010). Babbie (1990) suggested that a response rate of 60 % is good; 70 % is very good, and according to Track Marketing Group (2002) a response rate of about 75 percent or more is a typical target range for a scientific sample. As shown in table 4.1, the response rate was 88 (88 %) and it was satisfactory for the study.

From table 4.1, the group of students and academic staff were issued with questionnaires because they are the main users of PIASS library. Library staff members were selected because they are specialists of information service delivery at PIASS library. PIASS management staff members were selected because they are a group of decision makers for that library.

The questionnaires were distributed to students according to their faculties, departments and classes or levels. The academic staff members were contacted based on their

availability in each faculty and in each department, and 94 questionnaires were distributed to academic staff members and students. Out of 94 (100 %) questionnaires distributed, 82 (87.23 %) were returned.

The researcher prepared interview schedules for library staff and PIASS management staff. All library staff 3 (100 %) and all PIASS management staff members 3 (100 %) were interviewed.

4.3 Demographic data of faculties

The study wanted to be informed on the participation rate by faculties. The summary of demographic data of faculties is shown in figure 4.1.

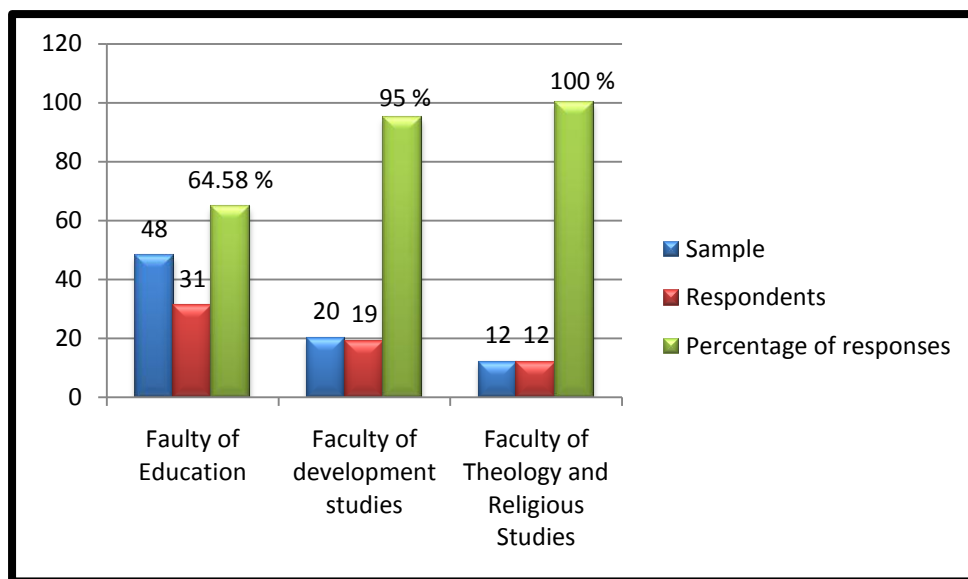


Figure 4.1: Demographic data of faculties

The Study was informed that the faculty of theology and religious studies has a participation rate of 12 (100 %) response rate, the faculty of Development Studies 19 (95 %) response rate and the faculty of education 31 (64.58 %) response rate. The figure 4.1

shows that the faculty of theology and religious studies had highest participation rate followed by the faculty of development studies and the faculty of education respectively.

The faculty of theology and religious studies maximized the participation because its students are on conventional programmes and they stay in the PIASS hostels and are available during the day, evenings and weekends. Most of the students in the faculty of development studies work in the urban area. Although they are enrolled in evening programmes and weekend programmes, it is easy for them to move from their place to PIASS. Despite that, their availability is not similar to that of the faculty of theology and religious studies. Most of the students from the faculty of education come from rural areas. Some of them are enrolled in evening programmes while others on weekend programmes. They form the biggest number of users and most of them stay outside the PIASS campus because there are not enough hostels to accommodate them all. Their availability is not easy because they are in and out of the campus.

4.4 The status of ICT infrastructure at PIASS library

The first objective of the study intended to find out the availability and the status of ICT infrastructure at PIASS library.

4.4.1 ICT tools available in PIASS library

ICT tools used by respondents are summarized in table 4.2.

Table 4.2: ICT tools used by respondents

ICT Tools	Frequency	Percentage
Computers	82	100
Projectors	82	100
Internet	82	100
Microphones	19	23.17
Speakers	19	23.17
Television sets	15	18.29
DVD Players	9	10.97
CD Players	8	9.75
DVD Equipment	5	6.09
Cassette player	4	4.87

Table 4.2 presents responses from questionnaires from students and academic staff (n = 82) where 82 (100 %) affirmed that they use computers, projectors and Internet. Computers are used both by students and academic staff for daily academic work and projectors are used in class by both lecturers and students because they are used for teaching. The Internet is used in research where students and lecturers visit many websites for academic and personal work and antivirus is important for students and lecturers because it protects computers that they are using in their daily academic work. Among the respondents, 19 (23.17 %) affirmed that they use microphones, 19 (23.17 %) said that they use speakers, 18 15 (18.29 %) stated that they use television sets, 9 (10.97 %) said that they use DVD players, 8 (9.75 %) confirmed that they use CD players, 5 (6.09 %) declared that they use DVD equipment, 4 (4.87 %) agreed that they use cassette player. CD players, DVD equipment and cassette players are used by few users because users are not aware that those ICT tools are available in the library. The television set is used by students who stay in hostels only. Speakers and microphones are used by choir

members and are also used during conferences and public lectures but they are not used frequently.

The responses from questionnaires were supported by the responses from library staff and PIASS management staff who were interviewed. The ICT tools available at the PIASS library as affirmed by library staff are shown in the table 4.3.

Table 4.3: ICT tools available at the PIASS library

ICT Tools available in the PIASS library	Number
Computers (desktops and laptops)	44
Projectors	12
DVD and CD player	1
Cassette player	1
Microphones	4
Television sets	1
Internet	8 switches, 8 access points
DVD equipment	1
Speakers	2

According to library staff, there are 44 computers distributed as follows: Its two computer labs have 20 computers each, in the reading room of the library there are 2 computers for book search and retrieval, there is one laptop in the librarians' office and one computer in the technician's office. Many computers have Windows 7 as the operating system and others have Windows XP. All computers are installed with Microsoft Office 2007 or 2010 applications suite containing Word, Excel, PowerPoint, and Publisher in order to perform their daily activities on the computer. In those computers, there is also WINISIS which helps users to retrieve library materials. All computers are protected by Kaspersky Internet security which is updated yearly. The computer labs are used for teaching, research and communications and they are open

depending on the availability of students who help in supervision in their free time. The use and role of computers in the library has been underlined by Salman and Olanrewaju (2005) when they stated that computers have been used successfully in the following areas of library services: circulation, reference/referral, ordering/acquisition, OPAC, Internet, cataloguing/classification, interlibrary loan, current awareness services, research, and communication. Unfortunately, in the PIASS library, the study found that computers are not fully utilised in an attempt to enhance information service delivery as needed.

The study found that there is a television set in the students' hostels which helps students to be up to date with news and or information from around the world. They browse through all channels provided by Star Media decoder during their free time and there is a monthly subscription to these channels. Star Media introduces and offers in Rwanda the first digital television system that receives digital television programs and provides affordable broadcasting media services to enable all people of Rwanda to have access to this developmental technology. The digital broadcasting services offered by Star Media are in line with the Rwanda Government vision of the year 2012 which aimed at digitalizing the broadcast media, and made contributions that helped to transform Rwanda society from analogue to digital broadcasting. The digitalization process required upgrading of domestic television receivers' sets in order to receive digital television program (StarTimes, 2011). Using DVD players and cassette players, students are able to watch videos and films borrowed from the library or borrowed from video shops which are very educational and informative.

According to library staff, the PIASS library has 2 fixed and 2 wireless microphones connected to speakers and mixer. All of them help the users in communication particularly during the PIASS library workshops and generally in the PIASS ceremonies, conferences, and entertainment. This shows that they are very important in enhancing information service delivery in PIASS library.

The study found that the PIASS library has 12 projectors used for teaching, conferences, and workshops. All respondents affirmed that there are not enough projectors because each class or level needs to use one in teaching. The total classes for three faculties are 24 classes but only 8 classes are during the day in the faculty of theology and religious studies. The faculty of education and the faculty of development studies offer evening and weekend programmes. There is a problem especially on Fridays where 16 classes for evening and weekend programmes are together on the campus and are expected to share 12 projectors. This has a negative impact on the library information service delivery.

The study revealed that in the PIASS library there is a DVD player used to play DVD and CD for the projection of audiovisual materials. The DVD player is also used as an external DVD player for those computers without the DVD player for PIASS in general and for the PIASS library users in particular. According to respondents, it is not all users who need to use DVD and CD players. Also others are not aware that those tools are available in the PIASS library.

The study found that the PIASS library is connected to the Internet which is provided to its users using optic fiber. This was affirmed by Njuguna (2011) that Internet network in Rwanda comes from optic fiber which is connected to the undersea cable system through

two major regional links, including one from Mombasa in Kenya, through Uganda and another undersea cable from Dar-es-Salam helped by Rwanda Development Board (RDB) in its Regional Communications Infrastructure Program (RCIP) which is designed to improve the regional communications infrastructure and increase the deployment of e-government in Southern and Eastern Africa. The RCIP Rwanda project had increased the availability of broadband to public and private schools, health centres and local government administrative centres (NICI, 2015) and the PIASS library is among them.

The library staff and PIASS management staff members supported the existence of the Internet and responded that all the computers are connected to the Internet and those who have laptops are connected to the wireless network wherever they are on the PIASS campus, including students' hostels. Thus, the types of computer networks available at the PIASS library are Local Area Network (LAN) and Wireless Local Area Network (WLAN). LAN helps the communication through PIASS staff and students using cables network which has a bandwidth of 5 Mega bytes (5 MBs). LAN is a good tool in enhancing information service delivery because every computer in the library, in computer labs and in offices is connected to that LAN, making access to library services more timely and promptly. As affirmed by Singh (2001) Internet is playing an important role in transforming the library system and the way in which we view the library resources and the library services. Internet provides links to various library sites, specializing in almost every topic and they can be accessed directly from any part of the world. As the libraries are going web based more and more libraries are becoming accessible via libraries web pages.

According to the library staff, there are 8 access points supplying WLAN. Each building has an access point including the students' hostels. Those who have laptops and smart phones have access to WLAN wherever they are in the PIASS campus. As it is shown in table 4.2 and as affirmed by respondents to interviews, most users of WLAN are lecturers because very few students have laptops. As affirmed by Bluesocket (2006), libraries share many of the same goals in developing and launching wireless systems, only the reasons may be more in tune with enhancing community and patron services than sharpening a competitive edge. A library's core business is to manage large amounts of information and make that information easily accessible to a wide range of people. So, a wireless network would seem to be a natural solution since it creates additional doorways and channels for that flow of information. These same wireless networks can also be used by libraries as frameworks to support other evolving technologies that may be on their 'wish list' of expansion possibilities for internal networks and services.

Library staff and PIASS management staff said that there is no WAN in the PIASS library which limits the communication with other libraries in order to share resources. WAN is very important in a library because it help libraries to share information resources and services. Most multi-branch library systems eventually create a private WAN. These WANs often do carry Internet traffic for staff and patrons at the branches (Techsoup, 2015).

The study revealed that the network helps users to access all needed information around the world. Users have access to available electronic journals, electronic books, doing research using Google and other search engines, using electronic mail in communication,

chatting and entertainment like watching movies, listen to music, watching TV and accessing any needed information using LAN and Wireless. Using World Wide Web, users are also able to access to electronic resources like e-books, e-journals and other needed resources. This clearly demonstrates that the Internet enhances information service delivery in the PIASS library. This is confirmed by Rao and Babu (2001) when they say that the World Wide Web (WWW) has revolutionized the way people access information, and has opened up new possibilities in areas such as digital libraries, virtual libraries, scientific information retrieval and dissemination. Not only the world is becoming interconnected, but also the use of Internet and Web has changed the fundamental roles, paradigms, and organizational culture of libraries and librarians as well. In the library, the WWW provides timely and rich information compared to the static and stable print collection.

Both responses from questionnaires and interviews show that in the PIASS library there are no photocopiers, no scanners and no library security system. The absence of these ICT tools has a negative impact on the information service delivery in the PIASS library. The library must provide a variety of scanning, printing and photocopying services for users because the library offers journal articles or chapters of books or books which are not allowed to be borrowed by students and other library users.

The study revealed that there is no library security system and as argued by Ogbonyomi (2011), when there is no library security system, the library faces several incidents such as theft of physical materials like books, computer materials (like mouse, keyboards, hard disk), laptops, handbags, and notebooks; alteration of data; vandalism, mutilation,

defacement, and arson. The absence of the library security system in the PIASS library affects negatively the library information service delivery.

4.4.2 The status of ICT tools available in the PIASS library

The respondents were asked to give the status of the available ICTs in the PIAS library based on their daily experiences. This question was asked because ICT infrastructure can be available and accessible but inadequate. This is why the study attempted to measure the degree to which the PIASS library may be ready, willing to obtain benefits which arise from ICTs and how ready it is to partake in electronic activities in order to face challenges brought by new technologies. The status of ICT tools in the PIASS library are summarized in the table 4.4.

Table 4.4: Status of ICT tools available at the PIASS library (n = 82)

Status of ICT Infrastructure	Enough	Not Enough	Very Good	Good	Bad
Number	31	51			
Adequacy			13	55	14
Availability				42	40
Accessibility				39	43
Functionality			21	48	13
Internet network			24	45	13
Availability of power				60	22

4.4.2.1 Availability and adequacy of ICT infrastructure and information resources

Table 4.4 presents the summary of responses from questionnaires and interviews concerning the status of ICT tools available in the PIASS library. The responses from questionnaires by students and academic staff (n = 82) showed that 32 (37.80 %) affirmed that the number of ICT tools is enough, while 51 (62.19 %) stated that their number is not enough. Among the respondents, 13 (15.85 %) confirmed that their

adequacy is very good, 55 (67.07 %) declared that their adequacy is good and 14 (17.07 %) affirmed that their adequacy is bad, 42 (51.21 %) stated that their availability is good while 40 (48.78 %) confirmed that their availability is bad. Some 39 (47.56 %) respondents declared that their accessibility is good while 43 (52.43 %) affirmed that their accessibility is bad.

Although the respondents said that the ICTs in the PIASS library are accessible, they also noted that there are some challenges which slow down their accessibility. These challenges which limit the accessibility to ICT tools included few opening hours of computer labs and shortage of computers from which library users can access the Internet and available e-resources, few projectors, regular power cuts and lack of a powerful enough generator to provide the power required for powering the computers and projectors when power goes off. They also mentioned lack of enough space to provide proper ICT tools, lack of maintenance of ICT infrastructure, blockage of computer by putting unknown user names and passwords, and poor Internet network for some computers.

These challenges limit not only the accessibility to ICT tools, but also the electronic information resources that affect library information service delivery negatively. This is because there are five criteria which help to measure e-readiness, as stated by Mutula and van Brakel (2006) and Mostert and Olorunfemi (2013) and these include ICT tools availability which include ICT tools, Internet network, library information resources, and library ICT policy and guideline; ICT tools availability; level of adequacy of ICT for users; and utilisation of ICT tools.

Twenty-one (25.60 %) respondents stated that their functionality is very good, 48 (58.53 %) confirmed that their functionality is good and 13 (15.85 %) declared that their functionality is bad. Among the respondents, 24 (29.26 %) affirmed that the Internet network is very good, 45 (54.87 %) stated that Internet network is good and 13 (15.85 %) confirmed that Internet network is bad. According to the respondents, the Internet works well during morning and evening. In the afternoon, the network is bad and sometimes unavailable. Some 60 (73.17 %) respondents declared that the availability of the power is good while 22 (26.82 %) said that the availability of the power is bad.

The above results have been supported by responses from interviews of the library staff and PIASS management staff. According to library staff, the number of ICT infrastructure is not enough. The available ICT tools are in relatively good condition but they are not adequate. They are moderately available and there is a need to improve their accessibility. The study revealed that there is good quality of ICT functionality but there is need for maintenance services. Internet connectivity is good but there is a need to make it better by improving bandwidth. They also supported that disruptions through power cuts should be improved because it has a negative impact on information service delivery.

4.4.2.2 ICT accessibility and utilisation of information resources at the PIASS library.

The study also intended to know the level of current utilisation of ICT tools, information resources and services at the PIASS library. The responses from questionnaires by students and academic staff revealed that 43 (52.56 %) of ICT tools are fully used while 39 (47.43 %) affirmed that they are not fully used as it is shown in the figure 4.2.

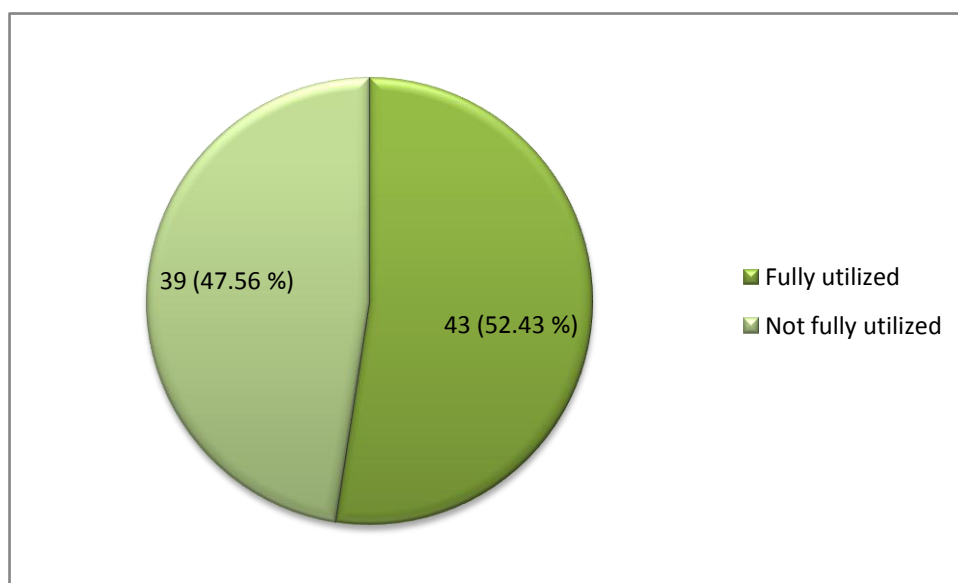


Figure 4.2: Level of utilisation of information resources and services at the PIASS library

The difference between the responses for the full utilisation and the responses for the absence of full utilisation is not big. It means that there are some which are fully used and others which are not fully utilized. These responses from questionnaires by students and academic staff were supported by responses from interviews from library staff and PIASS management staff. As affirmed by library staff and PIASS management staff some ICT tools are overused, especially computers and projectors and the Internet. Other ICT tools are not used because of the lack of awareness and poor marketing of their availability to users.

As affirmed by both responses from questionnaires and interviews computer labs are not fully utilized. There are few hours of working in computer labs because those responsible for the computer labs are students and the labs are open when the students are free. This means that when they are busy, the computer labs are closed and cannot be accessed and

utilized. They also affirmed that electronic information resources and services are not fully used because users are not aware that they exist at the PIASS library or users do not know how to access and use them or do not know their relevance. This was also affirmed by NICI (2015) that most Rwandans are still not aware of the available ICTs and their benefits.

4.4.2.3 ICT policies and guidelines at the PIASS library

The results from interviews with library staff and PIASS management staff (n = 6) revealed that there are no ICT policies and guidelines as affirmed by 5 (83.33) while 1 (16.66 %) responded that they do not know if there are ICT policies and guidelines in the PIASS library as it is shown in the figure 4.3.

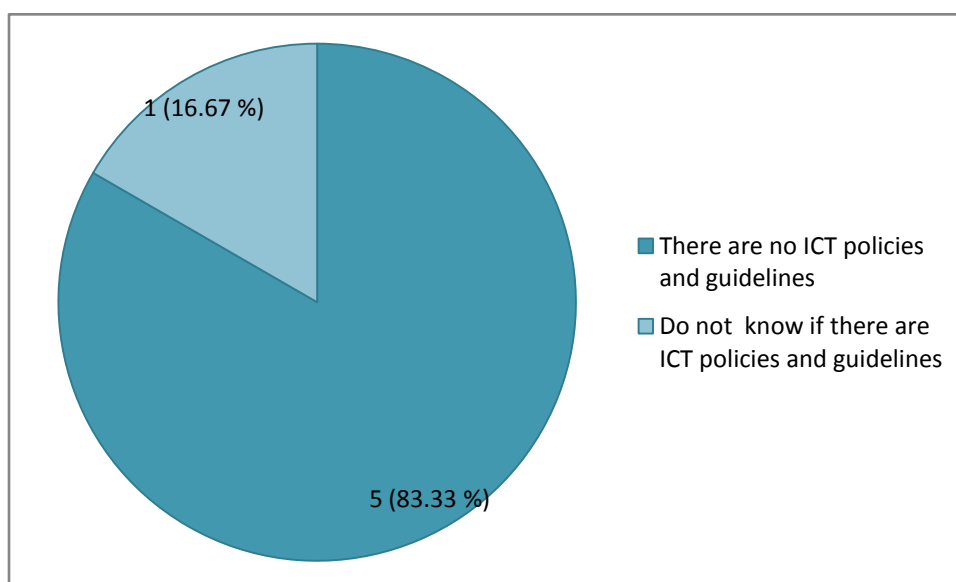


Figure 4.3: ICT policies and guidelines at the PIASS library

As shown in figure 4.3, there are no clear ICT policies and guidelines which ensure provision and maintenance of infrastructural facilities necessary for ICT development in the PIASS library, extensive educational and training programs to provide an adequate

supply of qualified ICTs personnel in library. The lack of ICT policies and guidelines has a negative impact on information service delivery. The PIASS library needs to have well defined priorities in application of ICTs in the library and to establish structures for effective implementation of ICT strategies. The ICT policies and guidelines will help to provide strategic direction and guidance for sustainable and systematic application of ICTs in the PIASS library and will help to enhance information service delivery because the purpose of ICT policy is to provide strategic direction and guidance for sustainable and systematic application of ICTs in library (Kundishora, 2014).

4.5 The adequacy of information resources and services delivered by the PIASS library through the available ICTs

The study sought to know the adequacy of information resources and services delivered by PIASS library. Information resources and services available in the PIASS library, as revealed by the study, can be summarized in the table 4.5

Table 4.5: The use of ICTs in the delivery of information resources and services through the available ICTs

the use of ICTs in the delivery of information resources and services through the available ICTs	Frequency	Percentage
Internet services	82	100
Electronic mail (E-mail, Chats)	63	76.82
Web based Resources	55	67.07
E-journals	53	64.63
Online databases	53	64.63
E-books	44	53.65
E-thesis	24	29.26
Audiovisual Resources	10	12.19
Audio Resources	8	9.75
Films Resources	8	9.75
Video Resources	7	8.53
Multimedia resources	4	4.87
Cassettes	2	2.43

Table 4.5 presents responses from questionnaires and interviews concerning information resources and services delivered by the PIASS library through the available ICTs. The responses from questionnaires by students and academic staff (n = 82) where 82 (100 %) affirmed that they get Internet services from the PIASS library, 63 (76.82 %) said that they use e-mail and chats as electronic mails, 55 (67.07 %) stated that they use web based resources, 53 (64.63 %) stated that they use e-journals and online databases, 44 (53.65 %) affirmed that they use e-books. Other information resources and services are used below 50 % because library users do not know their relevance or their existence. Responses from questionnaires by students and academic staff were corroborated by those from interviews and are discussed in the following points:

4.5.1 Electronic resources

The study found that electronic resources available in the PIASS library are electronic books (e-books), electronic thesis, electronic journals (e-journals), audio-visual resources, audio resources, electronic mail (E-mail), films resources, video-resources, web based resources, and library database as it shown in the table 4.5. The PIASS library has the essentials of what should be in the library as electronic resources because some of the most frequently encountered resources are: electronic journals, electronic books, full-text databases, indexing and abstracting databases, reference databases, numeric and statistical databases, electronic images, and electronic audio/visual resources (Johnson, Evensen, Gelfand et al., 2012). Electronic resources are very important in a library in this digital era.

4.5.1.1 Electronic books

An electronic book is a book-length publication in digital form, consisting of text, images, or both, readable on computers or other electronic devices (Kluver, 2013). The study found that the PIASS library, in collaboration with International Network for the Availability of Scientific Publications (INASP), has links of electronic books accessed by its users via electronic transmission using the Internet. These electronic books are accessed using directories or advanced searching using key words in the indexed bibliographic databases on the website where electronic books are posted. Some of the e-books provided online are accessed as full text and frequently as Portable Document Format (PDF) documents. The PIASS library has also books on DC and DVD that can be readable by computer devices. The kind of e-books owned by the PIASS library are in accordance with what many authors stated that must be in the library. The Library

provides access to a variety of electronic books and texts to its users. E-books are very important in enhancing information service delivery because they save time and sometimes information from an e-book is up to date.

4.5.1.2 Electronic thesis

The study found that the PIASS library is providing electronic theses. Since the beginning of the year 2015, every student who submits the final thesis must also provide an electronic format of his/her thesis in Portable Document Format (PDF) and the user who wants to have access to them can do so. By the end of the year all new theses submitted will have an electronic copy online on the library link on the PIASS website. This is in an agreement with Hopkins (2014) when he argued that an electronic thesis or dissertation (ETD) must be in a digital version and available to the public via the Internet. Theses and dissertations must be posted on websites by the library in electronic format in order to assure easy and fast access and long-term preservation to enhance information service delivery.

4.5.1.3 Electronic journals

The study found that the PIASS library has 31 links (see appendix VI) of electronic journals accessed by its users via electronic transmission using the Internet. These electronic journals are accessed using directories such as the Directory of Open Access Journals in INASP, or searching using key words in the indexed bibliographic databases on the website where electronic journals are posted. Some of these e-journals provide online access to the full text articles and frequently as PDF documents. PIASS library is

in good line because in most instances, e-journals provide online access to the full text of their component articles, often as PDF documents as observed by Rakeshr (2014).

As affirmed by library staff, most of these Electronic journals are made available by the PIASS Library in collaboration with International Network for the Availability of Scientific Publications (INASP) and World Intellectual Property Organization (WIPO). These e-books and e-journals are playing a very big role in enhancing library information delivery to PIASS library users by giving them actual and up to date information in the time needed. Unfortunately, some of e-resources are not known by users hence there is need to market library e-resources and make them known by users in order to be accessed and used fully. This will help to improve the quality of information service delivery.

4.5.1.4 Electronic mail (e-mail, chats)

The study found that every library user is asked to provide to the PIASS library staff an e-mail account. Electronic mail is used by library staff in communication with users of the library. This was supported by Vicomsoft (2014) when he argues that electronic mails are able to exchange electronic messages, usually a form of simple text message that a user types at a computer system and is transmitted over computer network from one user to another user. Electronic mail is one of the most popular uses of the Internet by the PIASS library users because it is used by library staff in communication with library users and vice versa. The library also communicates to users using social media chatting such Facebook and Whatsapp. E-mails enhance information service delivery in reservations, enquiries, promotional services of new books and new information resources attached to Library Management System.

4.5.1.5 Online databases

Apart from electronic books and electronic journals, the study found that the PIASS library does not have other online databases. According to Rice (1985), online databases are very important for academic libraries in this time when we are in the digital era and they can be accessed using key words. Online databases enhance information service delivery. Thus, the PIASS library needs to introduce a number of online databases in order to help users to benefit from them.

Despite having a website, the PIASS library does not have an online Library Management System. Its Library Management System which is WINISIS offers only search and retrieval of information services and cataloguing services which cannot be accessed online. It is not able to provide library information services like circulation services, reference services, current awareness services, selective dissemination of information services, ordering/acquisition services, OPAC, and interlibrary loan. The lack of these library information services contributes to the inadequacy of information service delivery in the PIASS library.

4.5.1.6 Multimedia resources

The study found that multimedia resources available in the PIASS library are audio visual resources, social media and communication channels. This was supported by Loretto (2014) who said that in libraries, multimedia uses computers to present text, audio, video, animation, interactive features, and images in various ways and combinations made possible through the advancement of technology. Multimedia can be accessed through computers or electronic devices and integrates the various forms together.

The study found that in the PIASS library there are documents which are stored on DVD, CD-Rom, cassettes, and floppy disks in different formats: audio, visual and audio-visual, images, sounds, or data recorded for reproduction by appropriate ICTs materials for example television, computers and projectors. Some of the audio visual resources come with books and others are alone depending on what type of information they contain. They are used by lecturers for teaching and research for the purposes of impacting knowledge to students and for self development. This was supported by Aina and Adekanye (2013) who noted that the audio-visual resources have their unique roles to play in teaching and learning situation and so must be made readily available and accessible especially at the resource centres like library. The PIASS library must improve the number and the quality of multimedia tools in order to help users access and benefit from digital information and services contained in multimedia tools.

4.5.1.7 Library website

The study has shown that the PIASS library does not have its own website. It is linked to the PIASS website and the whole website is managed and updated by the library technician. This website helps the PIASS library to offer different services to its users like e-journals, e-books, and other communications as it has been confirmed by Nooshinfard and Ziaei (2011) that most libraries and information centres offer services using websites that can help achieve their goals better, and also help have more successful communication with their users in an attempt in understanding their needs and providing appropriate information services.

4.5.1.8 Web portals, intranets and extranet available in the PIASS library

The PIASS library has a web portal for e-books and e-journals on the PIASS website and users can access these electronic resources. The PIASS library portal has 31 links of websites offering free access of e-books and e-journals. This confirms what has been affirmed by the literature review that in the library area, a web portal is a website that offers access to a broad array of resources and services of libraries such as e-journals, online databases, Web OPAC, new additions and any other static information about library services (Kanamadi and Kumbar, 2006). Unfortunately, the PIASS library does not have web OPAC because they do not have an online Library Management System. In this regard, to enhance information service delivery, there is need, for the PIASS library, to implement online library management system which responds to the information needs of users in a timely manner. The study found that intranet is available at the PIASS library and used by PIASS staff only in sharing of information, files from the PIASS library server. Extranet helps the PIASS library users to access and use information, and communicate with others around the world through World Wide Web using Internet.

The use of the Internet in the PIASS library is summarized in the table 4.6.

Table 4.6: Internet services in the PIASS library

Use of Internet	Number	Percentage
Communication (electronic mail)	82	100
Research	63	76.82
Information and news	41	50
Entertainment	19	23.17
Teaching	7	8.53

Responses from questionnaires by students and academic staff (n = 82) show that 82 (100 %) said that the Internet is used for communication, 63 (76.82 %) affirmed that the

Internet is used for research, 41 (50 %) argued that the Internet is used for information and news access, 19 (23.17 %) noted that it is used for entertainment and 7 (8.53 %) attested that it is used for teaching.

As affirmed by library staff, the PIASS library provides to its users access to the Internet connectivity. According to City of San Diego (2014), the vast network of information and resources available on the Internet enables the library to provide information services beyond the confines of its own collection, especially web based resources, e-books and e-journals. This role of Internet services has been affirmed by Zickuhr, Rainie and Purcell (2013) when they stated that the library provides users with access to the Internet connectivity as well as web browser like Internet Explorer, Mozilla Firefox, Opera, Safari or Google Chrome. As affirmed by the PIASS library staff, those who have their laptops and smart phones are connected to wireless in order to work where they are without the need to visit the library or computer lab to get access to Internet. Staff members must be available to introduce library users through orientation and users education to Internet searching.

Library networking has an impact on library information service delivery in the PIASS library. The good status of connectivity has improved the quality of library information service delivery in those domains. The Internet represents one of the most successful tools in research and development of information retrieval. The Internet has already had a major impact on how people find and access information, and now the rising popularity of e-books is helping academic libraries reading habits. In this changing landscape, academic libraries are trying to adjust their services to these new realities while still

serving the needs of patrons who rely on more traditional resources (Zickuhr, Rainie and Purcell, 2013).

4.5.1.9 Electronic services missing in the PIASS library

4.5.1.9.1 Scanning, printing and photocopying in the PIASS library

The study found that there are no printing, scanning and photocopying services for the PIASS library users. Students and other library users have to go outside the institution to get such services. In the library, there are some books which are not allowed to go out of the library and others are on short loan. Such books need to be photocopied in order to help users to get the information needed from them in order to use it outside the library without problems. According to Trinity College Dublin (2015) the printing, scanning and photocopying services assist users to select what materials may be photocopied, scanned, and printed throughout the library or computer lab if the user is not able to take notes from the material that is not allowed to go out the library in order to use it later.

4.5.1.9.2 Electronic library security system

The study found that the PIASS library does not have electronic library security system. This is a big problem because securing and protecting the collections help academic libraries provide an effective service in response to the information needs of the university community. According to Maidabino and Zainab (2011), collection security implies the need for libraries to provide, maintain and secure their collections to ensure longevity, accessibility and effective provision of services to users. When there is no library security system, the library is exposed to several incidents such as theft of physical materials; alteration of data; and other forms of breaches include non-return of

items by borrowers, theft of library equipment, theft of personal items like laptops, bags and other property for staff and users, verbal and physical abuse against staff and users, and vandalism against library buildings, equipment and stock destruction, all of which can directly or indirectly negatively affects the provision of library information service delivery.

4.6 The level of ICT skills and training among library staff and users at the PIASS library

The study had to find out the level of ICT skills and training among library staff and users at the PIASS library. The results of the study are shown on the table 4.7 and table 4.8.

4.6.1 Level of ICT skills and training among library staff

Table 4.7: Level of ICT skills and training among library staff (n = 82)

The level of ICT skills and training among library staff	Frequency	Percentage
Above average	8	9.75
Average	44	53.65
Below average	32	39.02

Table 4.7 presents responses from questionnaires by students and academic staff (n = 82). The study found that the PIASS library staff members have average skills and that they are adequate in general because 44 (53.65 %) stated that the level of their ICT skills and training is average, only 8 (9.75 %) said that the level of ICT skills and training by library staff is above average and 32 (39.02 %) noted that their level of ICT skills and training is below average.

Table 4.8 Level of adequacy of ICT skills and training among library staff (n = 82)

The level of adequacy of ICT skills and training among library staff	Frequency	Percentage
Adequate	47	57.31
Not adequate	24	29.26

As it shown in the table 4.8, same 47 (57.31 %) affirmed that library staff have adequate ICT skills and training, 24 (29.26 %) said that they are not adequate in their quest for ICT skills and training. This was supported by responses from interviews with library staff and PIASS management staff.

The study found that the Director of the library and ICT has a Bachelor's degree in theology, and has undergone an intensive training of two months in library studies before being deployed in the PIASS library. He was trained on how to use WINISIS and on-job training in ICTs in general but not ICTs applied to libraries. These include Internet networking and use, windows system, maintenance and exploration, use of Microsoft office which includes word, Excel, power point, publisher, and access. The Director of library and ICT participated in a workshop organized by World Intellectual Property Organization (WIPO) on how to access and use e-books and e-journals from Research4Life including Research in Health (HINARI), Access to Global Research in Agriculture (AGORA), Online Access to Research in the Environment (OARE) and Research for Development and Innovation (ARDI). At the time of this research he was persuing masters studies in information sciences (library and information studies) in Moi University, Eldoret, Kenya.

One librarian has a diploma in theology and has had an intensive training of two months in library studies before working in the PIASS library. She got training on how to use

WINISIS and on-job training on ICTs in general as a course and now she is undertaking a Bachelor's degree in education. The Director of library and ICT and one librarian have attended a workshop organized by International Network for the Availability of Scientific Publications (INASP) on how to access and use e-books and e-journals. The PIASS library technician is a holder of a bachelor in ICTs but he does not have any training in library or knowledge in ICTs applied to a library. From the foregoing it is clear that the PIASS library staff needs to be trained on ICTs applied to library in order to improve the quality of information service delivery to library users and in order to be innovative and ready to overcome challenges faced by users in using new technologies in library. Prins and de Gier (1995) underline that today's expectation of librarians is as information providers, assisting in searching using modern information technologies for fast and good information delivery, making the library a resource centre with all the audio-visual equipment necessary to make information retrieval faster. Abdelrahman (2009) adds that the poor performance in the library profession may be attributed to a number of factors, an important one of which is lack of appropriate in-service training and continuous educational programs for the information professionals and library staff in academic libraries, and lack of ICT training opportunities available for the Library staff. The PIASS librarians must be updated in order to help users to face challenges caused by new technologies and thus improve the quality of information service delivery.

4.6.2 Level of ICT skills and training among the PIASS library users

The study found that the level of ICT skills and training among the PIASS library users is as shown by the table 4.9.

Table 4.9: Level of ICT skills and training among the PIASS library users

Level of ICT skills and training among the PIASS library users skills	Frequency	Percentage
Enough Skills	23	28.04
No enough skills	59	71.95

Table 4.9 presents responses from questionnaires by students and academic staff (n = 82) where 23 (28.04 %) affirmed that PIASS library users have enough skills for exploring and using all library ICT tools in provision of library information services available at library because library staff have to offer orientation and user education on the use of ICTs hence able to utilise them. Of the PIASS library users, 59 (71.95 %) do not have enough ICT skills and training to explore and use library ICT tools in provision of information services offered to them because they lack the necessary orientation and user education on how to access information using ICT tools.

This information regarding library users' skills and training was supported by interviews from library staff and PIASS management staff when they said that students have in their curriculum the modules related to information studies which are module in study skills, research methodology and general ICTs. The lecturers teaching those modules have no adequate knowledge of library studies. Unfortunately, they do not contact librarians when they are teaching ICT skills in order for librarians to assist them teach students how to access and use library information using ICT tools. Librarians try to help students who go to the library and computer labs on how to access and use library information resources and services by use of ICT tools. This means that library users training program curriculum, orientation and user education is poorly planned, structured and implemented.

For lecturers and other PIASS staff, the study found that they are not trained on how to access and use library information services. However, the library staff, in collaboration with PIASS management, had put in place in-service training of one hour a week on ICTs, library information services, access and use library database using WINISIS, e-books and e-journals for all PIASS staff. Unfortunately lecturers do not attend the training, making delivery of information services to them a big challenge. As said by Sharma, Singh and Kumar (2009), Library and Information Services are being transformed by technology and they have to adapt to these changes to meet their users' changing needs and growing expectations. Rapidly developing information and communication technologies are creating new opportunities and challenges for traditional libraries. There is a need to train librarian and users in order to help them face those challenges.

4.7 Challenges faced in the use of ICTs in information service delivery at the PIASS library

The study sought to know challenges experienced by PIASS library users when they are using available ICTs at the PIASS library. The challenges are summarized in table 4.9.

Table 4.10: Challenges faced in the use of ICTs in information service delivery at the PIASS library

Challenges faced in the use of ICTs in information service delivery at the PIASS library	Frequency	Percentage
Few number of computers	82	100
Few number of projectors	82	100
Small library	78	95.12
Lack of photocopiers	77	93.90
Inadequate library management system	75	91.46
Inadequate ICT training for library users	69	84.14
Inadequate ICT training for library staff	60	73.17
Few library staff	60	73.17
Frequent power cut	53	64.63
Lack of printers	51	62.19
Few operating hours for computer labs	44	53.65
Limited information resources	40	48.78
Low Internet connectivity	30	36.58
Lack of automatic generator	19	23.17
Lack of scanners	19	23.17
Lack of library security system	15	18.29
Inadequate maintenance of ICT tools	11	13.41

Table 4.9 presents responses got from questionnaires by students and academic staff (n = 82) where the study found that there are challenges from inadequacy of ICT infrastructure in general because 82 (100 %) affirmed that there are a few number of computers and small number of projectors, 78 (95.12 %) confirmed that the library is small, 77 (93.90 %) declared that there is inadequate photocopiers, 75 (91.6 %) said that there is an inadequate Library Management System and 53 (64.63 %) said that argued that there are frequent power cuts. Other challenges found by the study are related to the library staffing, ICT skills and training among library staff and library users because 69 (84.14 %) stated that there is inadequate ICT training for library users, 60 (73.17 %) said that there are few library staff and that there is inadequate ICT training for library staff.

Responses from questionnaires were supported by interviews with library staff and PIASS management staff and together with the results from table 4.9 challenges faced when using ICT tools in the PIASS library were grouped in: inadequate library ICT infrastructure, inadequate ICT skills among library staff and users, limited funds for ICTs infrastructure, and inadequate ICT policies and guidelines. This was supported by Qutab, Bhatti and Ullah (2014) when they said that ICTs have brought dramatic change the traditional ways of library profession and practice, both challenging and full of opportunity at same time. They face the problem of inadequate infrastructure, human resource skills, and problem of funding. These challenges may discourage users from using electronic information sources. From this, the success of online searching depends on the ability of users or information specialists to perform the search in the best possible way (Iwhiwhu, 2012).

4.7.1 Inadequate library ICT infrastructure

Responses from questionnaires and interviews revealed that PIASS library does not have facilities which help in library operations and information services. There are inadequate ICTs facilities, for example small number of computers and projectors compared to the number of library users. There was also lack of photocopiers, printers, scanners, in addition to low Internet connectivity. There was also frequent power cuts, and lack of an automatic generator to remedy the situation. Computer and other ICT tools need to be maintained and antivirus needs to be updated on time. Library staff added that there is a lack of a barcode printer and barcode reader. In Rwanda, the inadequacy of ICT infrastructure is not limited to the PIASS library only and this is affirmed by NICI (2015), who states that numerous challenges still hinder Rwanda's ICT infrastructure

development. Access and cost of electricity is a major constraint. As Rwanda strives to increase electricity generation, ICTs can be leveraged to consolidate Rwanda's energy sources in order to enable sustainable energy generation, transmission and distribution. Rwanda still does not have sufficient international bandwidth. Being landlocked, the country is very dependent on neighbouring countries for connectivity, which greatly increases connectivity costs.

According to library staff and PIASS management staff, the PIASS library lacks an online Library Management System which has all library information services modules to help library users to benefit from the system. The library staff members believe that CDSISIS used by PIASS library does not have all modules required for library operations and information services like acquisition or ordering services, reference services, current awareness services, circulation services, selective dissemination of information services, OPAC, interlibrary loan and serial control. According to the PIASS library staff, lack of online Library Management System has a negative impact on the information services provided by librarians because they expend a lot of time repeating routine activities like updating library data from WINISIS, using copy and paste from one computer to another. Borrowing and returning of library items is not computerized but uses traditional users' cards. This has a negative impact on library information services because it is not easy for the library staff members to know who has borrowed which books. Librarians have to check every user's card to know which user has borrowed which book and the task is demanding.

Library staff members agree with the responses from questionnaires as they affirmed that in the PIASS library, there is limited number of information resources online, and there is need to increase the number of electronic books, electronic thesis, electronic journals, online Library Management System, audio and audiovisual resources, and other web based resources. In addition to not being enough, the electronic resources are not available for some areas of the study in faculties' departments.

Responses from interviews and from questionnaires show that in the PIASS library there is a problem of space because the library is very small and cannot accommodate all users in addition to accommodating ICTs facilities needed to be used in library. Library staff observed that there is mixing of research activities and teaching activities in computer labs because there are few computer labs compared to the user population. The library staff noted that beginner students in ICT study sometimes delete by mistake useful documents and if there were not backups, the documents will be lost or the format might change. This has a negative impact on library information services delivery because it implies that when there are lectures, research activities cannot be possible yet both sets of users need to be satisfied.

Salman and Olanrewaju (2005) affirm that a modern library cannot be imagined without the application of computers. ICT infrastructure is very important in libraries and need to be enough and in good quality because computing technology, communication technology and mass storage technology are some of the areas of continuous development that reshape the way libraries access, retrieve, store, manipulate, protect and disseminate information to users (Krubu and Osawaru, 2011).

4.7.2 Inadequate ICT skills among library staff

The study found that the PIASS library staff members have problems of facing new technologies challenges related to ICTs services because of inadequate technical skills. There is inadequacy appropriate in-service training and continuous educational programs for PIASS library staff and library users. PIASS library staff members are not updated in order to help users to face challenges caused by rapid changes which have brought about new types of information services. This observation supports the NICI (2015), that Rwanda has insufficient skilled personnel in the ICTs field to drive ICTs development.

The inadequacy of enough knowledge among library staff has a negative impact on the knowledge of users and consequently information services cannot be efficiently delivered. There is a need of training the library staff in order to help them face those challenges. In order for people to operate effectively in an information world, they need to develop skills for searching, evaluating and managing information (Mutula and van Brakel, 2006).

4.7.3 Inadequate ICT skills among library users

The study found that PIASS library users do not have adequate skills to explore all library information services using ICTs in particular. As affirmed by interviews, PIASS students have in the curriculum the module of research methodology and the module of Information and Communication Technology in each faculty. Not one of these modules has any unit concerning how to access and use library information services in general and library information services using ICTs. In this context, it is not easy for the library staff to find time to teach students how to access and use library information services using

ICTs because all is planned by faculties and they need also to finish their program as planned. Librarians have to wait for those who went into the library asking for services and teach them how to access and utilize information services accessible in the library using ICTs. Those who do not go to use the library did not get any training from librarians and technicians, meaning that orientation and user education is not adequate.

Singh, Singh and Devi (2009), acknowledge that the library as a resource centre is an indispensable component of today's education system in which it is supposed to play a major role in rendering information services to different group of users. The quality of these services depends on the efficiency of knowledge retrieval methods and tools adopted by the libraries as well as skills and awareness of the same among the users are also a major factor in extracting the advantage of resource centre. Because of technological advancement, most of the common users seem to be unaware and uncomfortable to the existing and emerging techniques and methods.

4.7.4 Inadequate library staffing

Both responses from questionnaires and interviews revealed that the PIASS library has inadequate staffing. In fact, the study found that PIASS library does not only have staff with low library skills but they are also very few compared to information services to be delivered in the library. There are only two librarians and one technician. The library staff members are responsible for all the services in the library and consequently are neither effective of efficient in their work because of workload. Librarians are helped by two students during evenings and two during weekends because there are many users to be served.

The PIASS library technician only works during day time and is the one in charge of all ICTs in the whole institution. Computer labs are attended to by two students during their free times, depending to their timetable in classes. This has a negative impact to users who need to be assisted technically when librarians and technician are not there especially during evenings and weekends. Sometimes there is a lack of personnel who can help and assist in case of a problem. Those students do not have enough skills to help library users to get information services they require because they are neither trained to be librarians nor technicians. They also have their duties to attend to as students hence this makes users ill-equipped to explore the library information services. Students spend a lot of time in searching information and yet do not have the knowledge about information sources, accessing and using the available information in the library. Okafor (2011) posits that failure to have access to information has numerous consequences like duplication of research work, frustration, low morale and low productivity in research and teaching.

4.7.5. Limited funds for ICT infrastructures

Responses from interviews revealed that in PIASS library there are inadequate funds for ICT infrastructure. Finance is a major resource for organizational effectiveness and without it nothing meaningful can be achieved. The problem of funding is the major constraint of ICT application in Rwanda in general, and at the PIASS library in particular because, as noted by NICI (2015), there is a limited access to finance for ICTs development in Rwanda. As a private higher learning institution, PIASS relies on school fees of students, which cannot meet all the financial needs, like paying staff salaries, developing infrastructures, buying furniture, and training staff. Acquisition of ICTs facilities, equipment and facilities such as computers, servers, software, photocopiers,

electronic journals, electronic books, paying online services like e-journals and digital libraries, requires adequate funding for libraries. It needs to be supplemented by aid from outside which is not easy to find. Inadequate funding for ICT infrastructure in a library results in the prevalent of inefficient and outdated library information resources and services (Ngugi, 2012).

4.7.6 Inadequate library ICT policy and guidelines

Responses from interviews revealed that there is no policy which ensures provision and maintenance of infrastructural facilities necessary for ICTs development in the PIASS library. There are no policy objectives which ensure provision and maintenance of infrastructural facilities necessary for ICTs development in library; promote and support the systematic, relevant and sustainable development of ICTs. There are no extensive educational and training programs to provide an adequate supply of qualified ICTs personnel. There are no well defined priorities in application of ICTs in library and no structures for effective implementation of ICTs strategies. Development of ICT policies and guidelines will help to provide strategic direction and guidance for sustainable and systematic application of ICTs in the PIASS library and will help to enhance information service delivery because the purpose of an ICT policy is to provide strategic direction and guidance for sustainable and systematic application of ICTs in the library (Kundishora, 2014). The PIASS library needs to have well defined priorities regarding the application of ICTs in the library and to establish structures for effective implementation of the ICTs strategies.

4.7.7 Inadequate reading culture among library users

The study revealed that there is a lack of a reading culture and very limited time for some users. The study found that some library users do not have a reading culture. They use syllabus and handout given by lecturers and do not visit the library. To do assignments and other class work, they just use information from the Internet without reading books from the library. For this, they do not want to use WINISIS, which will get them to read books. According to Rubin (2002), reading is a total integrative process that starts with the reader and includes the affective, perceptual, and cognitive domains. Poor reading skill can make a student to develop a poor attitude toward school and can create self-esteem problems later in life while good reading habits help develop a steady and constructive mind. Libraries provide access to reading materials through which students can gain and improve their skills. Libraries help introduce the use of reading for information, pleasure, passing examinations, and personal growth through lifelong learning. Libraries provide materials that offer more extensive and varied information than classroom study alone. Students who read are likely to have background knowledge, familiarity with new topics or subjects, and thus, find learning easier and interesting (Aina, Ogungbeni, Adigun et al., 2011).

4.8 Suggested solutions to challenges experienced when using ICTs at the PIASS library

The study had to know the ways by which the PIASS library can improve its information service delivery in order to face the above noted challenges. The summary of responses is presented in the table 4.10.

Table 4.11: Suggested solutions to challenges experienced when using ICTs at the PIASS library

Solutions suggested to challenges experienced when using ICTs at the PIASS library	Frequency	Percentage
Increase the number of computers	82	100
Increase the number of projectors	82	100
Building of big library	78	95.12
Provide photocopiers	77	93.90
Provide adequate library management system	75	91.46
ICT training for library users	69	84.14
ICT training for library staff	60	73.17
Increase the number of library staff	53	64.63
Provide printers	50	60.97
Increase operating hours of the computer labs	42	51.21
Increase number and quality of information resources	38	46.34
Increase Internet connectivity	28	34.14
Provide an automatic generator	18	21.95
Provide scanners	17	20.73
Provide a library security system	13	15.85
Maintenance of ICT tools	9	10.97

Table 4.10 presents responses got from questionnaires by students and academic staff (n = 82) where the study found that solutions proposed are linked to improvement of ICT infrastructure in general because 82 (100 %) proposed to increase the number of computers and the number of projectors, 78 (95.12 %) proposed to build a big library, 77 (93.90 %) suggested the provision of photocopiers, 75 (91.46 %) said that there is a need of up to date Library Management System, and 50 (60.97 %) recommended the provision of printers. Among respondents, 38 (46.34 %) said that there is a need to increase the number and quality of information resources, 28 (34.14 %) recommended to increase Internet connectivity, 17 (20.73 %) said that there is a need of scanners, 13 (15.85 %) proposed to provide a library security system, and 9 (10.97 %) recommended to maintain ICT tools.

Other solutions proposed by the study are related to improvement of library staffing, ICT skills and training among library staff and library users because 69 (84.14 %) noted that there is a need of ICT training for library users, 60 (73.17 %) said that there is a need of ICT training for library staff, 53 (64.63 %) said that there is a need to increase library staff.

These responses from questionnaires were supported by responses from interviews from library staff and PIASS management staff. Suggested solutions by the PIASS library users, based on table 4.10, can be grouped in the following points which are to improve the quality and the number of infrastructure, train library staff, train library users on how to access and use library information resources, develop library policies and guidelines, increase funding for library, and increase the number of staff in order to satisfy information need and seeking behaviour of PIASS library users.

4.8.1 Improve the number and the quality of library ICT infrastructure

According to findings, PIASS should provide, increase and improve the quality of ICT infrastructures including computers, projectors, printers, scanners, photocopiers and other ICT tools as needed by library users. Each class must have its own, fixed projector because connection and disconnection of projector increases rate of wear and tear. In addition, some students and some lecturers do not know how to connect and to manipulate them and sometimes they can change its settings which might spoil the projector. When the projector is fixed to one place, such problems will not happen.

The PIASS library must increase the quality of the Internet network. It must strengthen the capacity of a fast connection for Local Area Network (LAN) and increase the number

of connected computers, strengthening Wireless Local Area Network (WLAN) especially in students' hostels. The management of PIASS and library staff affirmed that they are working with Rwanda Development Board (RDB) in order to see how to increase the quality of the Internet network both LAN and wireless. There is a need of continuous maintenance of some ICT tools like computers and projectors with a regular checking by technicians on ICT tools, and update of antivirus.

The PIASS library must improve the quality for library information resources. It must introduce a sustainable online Library Management System which has all modules for library operations and information services. It must increase the number of electronic information resources like e-books, e-journals, audiovisuals, and diversify them depending on the courses taught in faculties because there are some missing resources in some area of faculties. Also, the PIASS library must have a link between itself and other libraries in order to share information resources and services.

The PIASS library is advised to handle electricity problem by providing a powerful and automatic generator. The study found that PIASS library has an Uninterruptible Power Supply (UPS) where computers are connected. When there is a power cut, users can work for 30 minutes before it goes down. This helps users to have time to save their work on a local disk or on their flash disks. PIASS also has a generator but it is not automatic. It needs to be turned on and off each time the power goes or comes. Sometimes the one who is in charge is not available and users are disturbed. This is why respondents suggested that PIASS must have a powerful and automatic generator.

There is a need of construction of other classrooms and computer labs so that the computer lab within the library is used for purposes of research only. The library must have enough computers for research which are not shared with teaching activities in order to enhance good service delivery to its users.

According to PIASS management and library staff, they are planning to get an online Library Management System which includes all library information services, including circulation services, reference services, current awareness services, selective dissemination of information services, search and retrieval of information services, acquisition services, cataloguing services, OPAC, and interlibrary loan services. This will help the PIASS library to enhance library information service delivery to its users. This online Library Management System will be fully operational with all library modules in the new library to be constructed. In this new library, there will be a part reserved for the public, composed of a section for children and a section for adults. The second part will be reserved for academic levels. Each part will have a computer laboratory for research. The PIASS library must have a library security system in order to secure and to protect library properties against theft and alteration of library data and other forms of breaches.

4.8.2 Adequate staffing and training of library staff

The study found that there is a need for PIASS library staff to be trained at a higher level in order to have requisite skills to be able to assist users in the library and computer labs to access and use information resources in the library. The PIASS library needs well skilled staff with well trained librarians who are able to face new challenges of new technologies in accessing and using information services in the library. The PIASS

library must build the capacity of the library staff through regular seminars, workshops and trainings related to the use of ICTs in the library and in library automation. This will update the library staff who will in turn provide better services to library users.

Respondents suggested that the PIASS library need to recruit more personnel who are professionally trained in ICTs. The PIASS library must increase the number of library staff. In the computer labs, there should be a permanent staff, specialized in ICT applied to the library because students who usually work in the computer labs do not have enough skills to help users and library staff. Respondents encourage the PIASS library staff to be more innovative and to use the ICT tools they have at their disposition to reshape library activities to better serve PIASS library users. According to Okafor (2011), this will be realized if the library staff are proactive in finding the needs of library users and by adapting their resources and services according to new technologies in order to meet those needs.

4.8.3 Provide training for library users

Respondents suggested that PIASS library staff should provide training for library users on ICTs based library skills. PIASS faculties must involve library staff in study skills and research courses modules. Some basic knowledge on the use of ICTs applied to library should be incorporated in study skills module as well as in research module or ICT module. This will enable students to know more about the ICTs applied to the library which in turn will help them to access and use information resources with ease. The library staff must train administrative staff and academic staff on how to access and use information resources and database of the library using ICTs. Sensitization should be

done for administrative and academic staff to participate in the usual training (in service training) for staff which is done every week by library staff for all PIASS staff members.

4.8.4 Develop library ICT policies and guidelines

Respondents suggested that the PIASS library has to elaborate ICT policies and guidelines and computer literacy programs. The PIAS library must plan how to make available ICT tools to users in order to improve the quality of library information service delivery. The PIASS library must develop policy objectives which ensure provision and maintenance of infrastructural facilities necessary for ICTs development in library; promote and support the systematic, relevant and sustainable development of ICTs. The PIASS library must develop extensive educational and training programs to provide an adequate supply of qualified ICTs personnel. The PIASS library must also develop well planned and structured users training program curriculum, orientation and user education, which must be implemented.

4.8.5 Increase the budget for ICT tools

PIASS should increase the budget allocation for providing ICT tools to the library in order to respond to library users' needs. It is important to note that printing, photocopying, scanning and binding services can be a source of funds for the library. The PIASS library should find outside sponsors for ICT infrastructure.

4.8.6 Encourage reading culture for users

Respondents suggested the need of helping the PIASS library users to access and use information from electronic library information resources by encouraging library users to use ICTs in their class work. A reading culture can be encouraged also by putting in place

strategies to market ICTs based library products and services so that users are attracted by them. According to Aina, Ogunbeni, Adigun et al. (2011) reading stimulates imagination, encourages quick learning, and expands horizons. It encourages imagination and curiosity. Reading enhances acquisition of skills for handling complex ideas or issues. The library has the responsibility of making information available in different formats to encourage reading culture among the library users. The library also considers the important role of the library in inculcating permanent literacy through reading and suggests what concerned stakeholders could do to promote reading culture.

4.8.7 Maximize the use of available ICT infrastructure and information resources

Respondents suggested to the PIASS library to increase operating hours in library and computer labs. The library ought to open computer labs and the library even during breaks because it is during breaks that students find time to visit the library. Users of computer labs must avoid the use of usernames and passwords in computers in order to help others to have access to them. To do this, there must be a permanent staff in the computer labs so that the labs are opened every time they are needed. This will help students in the library and computer labs to maximize their use. The library must maximize the use of the good Internet network from optic fiber by having and offering all library information services using the Internet in order to make research easier and quicker. This will help to save time for users when searching for information and the users will also be able to get up to date information. The library must do proper marketing of information services it offers in order to help users know their existence and in turn use them. As affirmed by NICI (2015), most Rwandans are still not aware of the available ICTs and their benefits. Therefore, the library staff members must take

initiatives to increase ICTs awareness among library users. They can use all social media available to communicate with users on the available information resources in the library.

4.9 Chapter summary

This chapter has presented the data collected according to objectives of the study. All objectives including establishment of the status of ICT infrastructure at the PIASS library, examination of information resources and services delivered by the PIASS library through the available ICTs, evaluation of the level of ICT skills among library staff and library users at PIASS, establishment of challenges faced in the use of ICTs in information service delivery at the PIASS library and suggest strategies for better utilisation of ICTs in information service delivery at the PIASS library have been successfully covered. The findings revealed that ICTs play an important role in enhancing library information service delivery at the PIASS library, despite challenges linked to inadequate library ICT infrastructure, inadequate ICT skills among library staff, inadequate ICT skills among library users, inadequate library staffing, limited funds for ICT infrastructure, inadequate ICT policies and guidelines, an inadequate reading culture among library users, and inadequate use of ICTs and information resources. Therefore, to address these challenges, suggested solutions by PIASS library users are to improve the quality of infrastructure, increase the number of qualified library staff, training library users on how to access and use library information resources, development of library ICT policies and guidelines, encourage the reading culture among library users, and maximize utilisation of available library ICT infrastructure in order to satisfy information need and seeking behaviour of PIASS library users and improve the quality of information service delivery at the library.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the findings of the study which is provided based on the problem statement, aim, objectives, research questions and assumptions of the study. In this chapter, conclusions, recommendations and suggestion for further research are also presented.

5.2 Summary of findings

This summary has been presented based on data presentation, analysis and interpretation in chapter four of findings which reflect the specific objectives and research questions of this study. The sample size of this study was 100 respondents selected from the population of 852 distributed in four groups which were PIASS management staff, academic staff, library staff, and students. Students and academic staff were selected because they are the main users of the library. Library staff and PIASS management staff were selected because they are key informers. The questionnaires were distributed to students according to their faculties, departments and classes or levels. The academic staff was contacted based on availability in each faculty and each department and 94 questionnaires were distributed to academic staff and students. Out of 94 (100%) questionnaires distributed 82 (87.23 %) were returned. The researcher prepared interview schedules for library staff and PIASS management staff. All library staff 3 (100 %) and all PIASS management staff 3 (100 %) were also interviewed. Thus, the response rate was 88 (88 %) which was considered satisfactory for the study.

The study found that ICTs play a significant role in enhancing information service delivery at the PIASS library despite the fact that the full utilisation of ICTs has been prevented by various factors including inadequate library's ICT tools, inadequate library information resources and services, inadequate ICT policies and guidelines, inadequate library human resource skills, inadequate library staffing, inadequate computer literacy and a poor reading culture among library users, inadequate use of available ICT infrastructure and information resources, and limited funds for ICT infrastructure. These inadequacies have impacted negatively on information service delivery at the PIASS library. It is possible to reverse the situation regarding ICTs utilisation at the PIASS library by putting in place appropriate strategies to improve the utilisation of ICTs and information service delivery at this institute's library.

5.2.1 The status of ICT infrastructure at the PIASS library

5.2.1.1 ICT tools available in the PIASS library

The study found that in the PIASS library, there are 44 computers where 40 are distributed in 2 computer labs and 2 in the library and 2 in offices. All computers are protected by Kaspersky Internet Security, which is updated yearly. The study revealed that the PIASS library has 12 projectors used for teaching, conferences, and workshops. The study revealed that there is a television set in the students' hostels which students use to follow news and get information from around the world. Also, by using DVD player and cassette player, students are able to watch videos and films borrowed from the library or borrowed from video shops. The study revealed that the PIASS library has 2 fixed and 2 wireless microphones connected to speakers and mixer. They help the users in

communication, especially during PIASS ceremonies, conferences, workshops and entertainment. The study has shown that in the PIASS library, there is DVD player used to play DVD and CD for the projection of audiovisual materials for users who do not have those facilities in their laptops and desktops. They help also to do reparation of computers which have DVD and CD drive problem. The study revealed that in the PIASS library there are no photocopiers, printers, scanners, or electronic library security system.

The study showed that the PASS library has both LAN and WLAN, which are provided to its users and that the two networks work well. The Internet network comes from optic fiber which is connected to the undersea cable system through two major regional links, including one from Mombasa in Kenya, through Uganda and another undersea cable from Dar-es-Salam helped by Rwanda Development Board (RDB) in its Regional Communications Infrastructure Program (RCIP) which is designed to improve the regional communications infrastructure and increase the deployment of e-government in Southern and Eastern Africa. All the computers are connected to LAN. LAN is a good tool in enhancing information service delivery. Those who have laptops and smart phone have access to WLAN wherever they are in PIASS including students' hostels and it is very helpful in service delivery. The network helps users to access all needed information around the world through World Wide Web. Users have access to available electronic journals, electronic books, doing research using Google and other search engines, using electronic mail in communication, chatting and entertainment like watching movies, listening to music, watching TV and accessing any needed information using LAN and WLAN. Library networking has a great impact on library information services in PIASS.

The good status of connectivity had improved the quality of library information service delivery in those domains.

5.2.1.2 The status of ICT tools available in the PIASS library

The study found that the number of computers and other ICT tools in the PIASS library were on a lower level compared to library user population. However, it was noted that what are available are in good conditions.

5.2.1.2.1 Availability and adequacy of ICT infrastructure and information resources

The study revealed that the number of ICTs facilities is not enough and that what is available is relatively in good condition, with some room for improvement. In the PIASS library there are 42 computers reserved for users. They are distributed in computer labs where there are 20 for each and 2 in library. Currently students' number is 752. This means that one computer is used by 17 students. Projectors are not enough. All respondents affirmed that they are not enough because on Fridays 16 classes for evening and weekend programs are together on the campus and they have to share 12 projectors. There are also frequent power cuts and not a powerful generator to provide an alternative to use computers and projectors. In addition, information service delivery is impacted by the lack of space to provide proper ICT tools, lack of maintenance of ICT infrastructure and the blockage of computers by putting unknown user name and passwords. However, the majority of the respondents indicated that they were mostly satisfied with the quality of the PIASS library infrastructure.

5.2.1.2.2 ICTs accessibility and utilisation of ICT tools and information resources at the PIASS library

ICTs in PIASS library information resources are accessed but there are some challenges mentioned by respondents which slow down their accessibility. Accessibility to the ICTs facilities is so weak based on the fact that the operating hours of computer labs are relatively limited. The majority indicated that their operating hours are based on the availability of students who help in the computer labs. The computer labs and the library are closed during breaks when users are free. Internet connectivity is good but there is a need to make it better because the Internet works well during the morning and evening. In the afternoon, the network is bad and sometimes unavailable. The level of power quality needs to be improved. These challenges limit not only the accessibility to ICT tools, but also accessing of electronic information resources that affects library information service delivery negatively. Some ICT tools are overused, especially computers and projectors and Internet resources like e-books, and e-journals. ICT tools are very few compared to the number of users and some of them miss what to use. Other ICT tools are underused because of the poor awareness and marketing of their availability to users; the low level of skills among users and few hours of operating the computer labs. There is a need to increase the number of ICT tools, working hours in the library and computer labs, and to increase marketing of available resources and services which will help to their full utilisation.

5.2.1.2.3 ICT policies and guidelines at the PIASS library

The results from the study revealed that there are no clear policies and guidelines at the PIASS library which ensure provision and maintenance of infrastructural facilities

necessary for ICTs development in the PIASS library. There are no extensive educational and training programs to provide an adequate supply of qualified ICTs personnel. Development of ICT policies and guidelines will help to provide strategic direction and guidance for sustainable and systematic application of ICTs in the PIASS library and will help to enhance information service delivery because the purpose of ICT policies is to provide strategic direction and guidance for sustainable and systematic application of ICTs in the library. The PIASS library needs to have well defined priorities in application of ICTs in library and to establish structures for effective implementation of ICTs strategies.

5.2.2 The adequacy of information resources and services delivered by the PIASS library through the available ICTs

This study sought to know if the PIASS library is fulfilling users needs according to the standards of services that an automated library must provide including circulation, reference or referral, ordering or acquisition, OPAC, cataloguing and classification, interlibrary loan and Current Awareness Services. The study showed that, despite having links to the PIASS website, the PIASS library does not have an online Library Management System. Its Library Management System, which is WINISIS, offers only search and retrieval of information services and cataloguing services. It is not able to provide library information services like circulation services, reference services, current awareness services, selective dissemination of information services, ordering/acquisition services, OPAC, and interlibrary loan. The lack of these library information services has made for an inadequate quality of information service delivery in the PIASS library. Using this Library Management System, books can hardly be searched on subject basis.

There is a need to copy the database from one computer to others and sometimes the library database is not updated on some computers.

The study found that the PIASS library provides to its users access to the Internet connectivity. Users use the following web browser depending to their choice: Internet Explorer, Mozilla Firefox, Opera, Safari or Google Chrome. The connectivity to the Internet uses cable or wireless. The vast network of information and resources available on the Internet enables the PIASS library to provide information services beyond the confines of its own collection especially web based resources, e-books and e-journals. The PIASS library has a web portal for e-books and e-journals on the PIASS website. The study found that the PIASS library has 31 links of electronic books and journals accessed by its users via electronic transmission using Internet.

The study found that the PIASS library is providing e-thesis. Since the beginning of this year (2015), every student who submits the final thesis must also provide an electronic format of his/her thesis in Portable Document Format (PDF). According to PIASS librarians, any user who wants can have access to them but they are not yet online. By the end of this year 2015 all new theses submitted will have an electronic copy online on the library link on the PIASS website.

Other information resources are e-mails and chats; CR-ROM databases which include audiovisual resources, audio resources, film resources and video resources; and web based resources. They are very useful in research activities, teaching, dissertation and academic works. The study found that printing, scanning and photocopying services are

not given to PIASS library users. Students and other library users have to go outside the institution to get such services.

5.2.3 The level of ICT skills and training among library staff and users at the PIASS library

The study had to know how ready the PIASS library staff members are in order to undertake library users need to help them face the new challenges in new technologies.

5.2.3.1 Level of ICT skills and training among library staff

The study found that the PIASS library staff members have the average skills in general, but with the need to improve certain areas. Therefore, the level of ICT knowledge among library staff is not adequate because they are not well trained for that either from formal training or informal training like workshops and in service training. The PIASS library staff needs to be trained on ICTs applied to library in order to improve the quality of information service delivery to library users and in order to be innovative and ready to partake the overcome of challenges faced by users in using new technologies in library.

5.2.3.2 Level of ICT skills and training among the PIASS library users

Concerning PIASS library users' skills, the study found that students have in their curriculum the module of study skills, the module of research methodology and the module of general ICTs which are related to information studies. Lecturers of those modules have no knowledge of library studies and do not contact librarians for help when they are teaching topics on how to access and use library information using ICTs. Users are not informed about the existence of some of the library based services like library data base using WINISIS, audio and visual resources, how to access and use electronic

books, electronic journals. Only students of the faculty of Theology and Religious studies have been trained on how to use ICTs in library operation and information services because they follow a day program and all of them live in campus. They are full time and they frequently visit the library and computer labs.

For lecturers and other PIASS staff, the study found that they are not trained on how to access and user library information services. The study found that the library in collaboration with PIASS management put in place in-service training of one hour a week on ICTs regarding library information services, including access and use library database using WINISIS, e-books and e-journals for all PIASS staff, but lecturers do not attend that training.

5.2.4 The challenges faced in the use of ICTs in information service delivery at the PIASS library

The study found that in the PIASS library there are many factors influencing inadequate information service delivery and barriers to information which affect the information seeking behaviours of library users: inadequate library ICT infrastructure, inadequate ICT skills among library staff and users, limited funds for ICT infrastructure, inadequate ICT policies and guidelines, inadequate reading culture for users, and inadequate use of available ICT tools.

5.2.4.1 Inadequate library ICT infrastructure

The study found that the PIASS library does not have facilities which help in library operations and information services. There are inadequate ICT tools, like the small number of computers compared to the number of users with needs. Some computers need

to be maintained and antivirus needs to be update on time. There is a lack of photocopiers, printers, scanners, barcode printer and barcode reader, frequent power cuts and lack of an automatic generator. Projectors are not enough compared to the number of classes in need. Another problem linked to infrastructure is the low and irregular Internet connectivity and some rooms in the students' hostels don't have wireless Internet connection. There is a need to make it better because according to the respondents, the Internet works well during morning and evening. In the afternoon, the network is generally slow and sometimes unavailable for some computers.

The study found that in the PIASS library, there is a lack of an online Library Management System which has all library information services modules to help library users to benefit from them. CDSISIS used by the PIASS library does not have all modules required for library operations and information services like acquisition or ordering services, reference services, current awareness services, circulation services, selective dissemination of information services, OPAC, interlibrary loan and serial control. The lack of online Library Management System has a negative impact on the information services to be given by the librarians because the PIASS library staff members spend a lot of time repeating routine activities like updating library data from WINISIS, using copy and paste from one computer to another. Borrowing and returning of library items services is not computerized but uses traditional users' cards. For now, librarians have to check every user's card manually to know which user has borrowed which book or other library material. It is not easy to do reports for them. Users need to be in the library or computer labs to have access to library database from WINISIS.

In the PIASS library, there are a very limited number of information resources online; these need to be increased, such as electronic books, electronic theses, electronic journals, audio and audiovisual resources. In the PIASS library, there is no library security system. Thus, the library is exposed to several incidents such as theft of physical materials; alteration of data; and other forms of breaches include non-return of items by borrowers, theft of library equipment, personal theft like laptops, bags and other property for staff and users, verbal and physical abuse against staff and users, and vandalism against library buildings, equipment and stock destruction, all of which can directly or indirectly affect negatively the provision of library information service delivery.

In the PIASS library, there is a problem of space because the library is too small to accommodate all users. In addition there is lack of space to accommodate all the ICTs needed to be used in the library. Further, the computer labs are used for both teaching and research which is a hindrance to their accessibility. This has a negative impact on library information services delivery because when there are lectures, research activities cannot be possible and all of them need to be fulfilled.

5.2.4.2 Inadequate ICT skills among library staff

The study revealed that the PIASS library staff has the problem of facing new technology challenges related to ICT services because of having inadequate ICT technical skills. There is the inadequacy of appropriate in-service training and continuous educational programs for the PIASS library staff. In fact, ICTs are used to perform many activities which need to have enough professional skills and capability to be done. The PIASS library staff members are not updated in order to help users to face challenges caused by

rapid changes which have brought about new types of library information services. The inadequacy of enough knowledge among library staff has a negative impact on the knowledge of users and consequently library information service cannot be efficiently delivered. There is a need of training of library staff in order to help them to face new technologies challenges.

5.2.4.3 Inadequate ICT skills among library users

The study found that PIASS students have in the curriculum the module of research methodology and the module of Information and Communication Technology in each faculty. Not one of these modules has any unit concerning how to access and use library information services in general and library information services using ICTs in particular. In this context, it is not easy for the library staff to find time to teach students information searching and retrieval using ICTs because all is planned by faculties and which are also against time to finish their program in the time planned. Library staff members have to wait for those who go into the library asking for services and teach them how to access and utilize information services accessible in the library using ICTs. Those who do not go to use the library or computer labs will hardly get any training from librarians and technicians because there is no well structured library ICT literacy program.

5.2.4.4 Inadequate staffing

The study found that the PIASS library does not only have staff with low skills but they are understaffed for the services to be delivered. There are two librarians and one technician. They are doing all the activities which ought to be done by many workers and it impacts on their efficiency and effectiveness because they are overloaded. One of the

librarians works full time, during the day and the other one works half a day and in the evening. Both of them do rotations for weekend services. The librarians are helped by two students during evening and two during weekend because that is when there are many users to be served.

The technician works day time and is in charge of all ICT matters in the whole institution. The computer labs are controlled by two students, one in the evening and another one on weekend, in their free times, depending to their timetable of classes. This means that when they are not free, the computer labs are closed and cannot be accessed and utilized. This has a very negative impact to users who need to be assisted when they have technical problems and librarians and technician are not there especially during evenings and weekends. Those students do not have enough skills to help users to get information services as required because they are not trained to be librarians or technicians and they have also their duties to perform as students. This makes users ill-equipped to explore all the library information services.

5.2.4.5 Inadequate funds for ICT infrastructures

Finance is a major resource for organizational effectiveness and without it nothing meaningful will be achieved. The study found that the problem of funding is the major constraint of ICT application in the PIASS library. As a private higher learning institution, PIASS relies on school fees of students which can not satisfy all the financial needs, like paying staff salaries, developing infrastructures, buying furniture, and training staff. Acquisition of ICT tools and facilities such as computers, servers, software, photocopiers, electronic journals, electronic books, paying online services like e-journals

and digital libraries requires enough funding for libraries. It needs to be supplemented by aid from outside, which are not easy to find.

5.2.4.6 Inadequate library ICT policies and guidelines

The study found that there are no well defined library ICT policies and guidelines which ensure provision and maintenance of infrastructural facilities necessary for ICTs development in the PIASS library. There are no policy objectives which ensure provision and maintenance of infrastructural facilities necessary for ICTs development in library; promote and support the systematic, relevant and sustainable development of ICTs. There are no extensive educational and training programs to provide an adequate supply of qualified ICTs personnel. Library users training program curriculum, orientation and user education are not well planned, structured and implemented. There are no well defined priorities in application of ICTs in library and no structures for effective implementation of ICTs strategies.

5.2.4.7 Poor reading culture for users

Other challenges regarding the use of ICTs in PIASS library are the lack of a reading culture and very limited time for some users to read. The study found that some library users do not have a reading culture. They use syllabus and handouts given by lecturers and do not visit the library. To do assignments and other class work, they just use information from the Internet without reading books from the library or without consulting e-books and e-journals from the library portal. For this, they do not want to use WINISIS, which will get them to read books.

5.2.5 Suggested solutions to challenges experienced when using ICTs at the PIASS library

The study asked respondents to suggest the ways by which the PIASS library can improve its information service delivery in order to face the above challenges. Suggested solutions by PIASS library users are to improve the number and the quality of ICT infrastructure, increase the number and train library staff, train library users on how to access and use library information resources, develop library ICT policies and guidelines, encourage reading culture among students, increase funding for library ICT infrastructure and full utilisation of available ICT tools and information resources in order to improve the quality of information service delivery.

5.2.5.1 Improve the number and the quality of ICT tools

According to the findings, PIASS library should improve the quality of ICT tools and increase the connectivity of the Internet, both LAN and WLAN, in order to help library users to have quick, updated and timely library information services. It is suggested that the PIASS library must introduce and sustain an online Library Management System which has all modules for library operations and information services. It must increase the number of electronic information resources. It is also suggested that the PIASS library must have links with other libraries in order to share information resources and services. The PIASS library is advised to solve the electricity problem by providing other reliable alternatives. The PIASS library must quickly complete the construction of a big library. The PIASS library must have a library security system. This will help the PIASS library to enhance the library information service delivery to its users.

5.2.5.2 Adequate staffing and training of library staff

It is suggested that the PIASS library should recruit more staff and train them on a higher level of qualification. The PIASS library must build the capacity of the library staff by regular seminars, workshops and trainings related to the use of ICTs in library and library automation. Respondents suggested that the PIASS library must have a permanent staff member specialized in ICT applied to library in the computer labs.

5.2.5.3 Provide training for library users

It is suggested that the PIASS library should provide training for library users on ICTs. Sensitization should be done for administrative and academic staff to participate in the usual training (in service training) for staff which is done every week by library staff to all PIASS staff members.

5.2.5.4 Elaborate library ICT policies and guidelines

It is suggested that PIASS library must have an elaborate ICT policies and guidelines and computer literacy programs. The library must also develop well planned and structured users training program curriculum, orientation and user education, which must be implemented.

5.2.5.5 Increase the budget for ICT tools

PIASS should increase the budget allocation for providing ICT tools. It is important to note that printing, photocopying, scanning and binding services can be sources of funds for the library. The PIASS library should find outside sponsors for ICT infrastructure.

5.2.5.6 Encourage the reading culture

Respondents suggested the need of helping PIASS library users to access and use information from Electronic library information resources by encouraging library users to use ICTs in their class works. A reading culture can be encouraged also by putting in place strategies to market ICTs based library products and services so that users are attracted by them.

5.2.5.7 Maximize the use of available ICT infrastructure and information resources

Respondents suggested to the PIASS library to increase operating hours in library and the computer labs. To do this, there must be a permanent staff person in the computer labs. The library must maximize the use of the good Internet network from optic fiber. The library must do proper marketing of information services it offers in order to help users know their existence and in turn use them. The library staff can use all social media available to communicate with users on the available information resources in the library.

5.3 Conclusion

This study set out to investigate the Information and Communication Technologies (ICTs) in enhancing information service delivery at the PIASS library and to propose strategies that can be used in order to improve information service delivery at the library. The objectives of the study were to: establish the status of ICT infrastructure at the PIASS library; examine the adequacy of information resources and services delivered by the PIASS library through the available ICTs; evaluate the level of ICT skills among library staff and users at the PIASS library; establish challenges faced in the use of ICTs in information service delivery at the PIASS library; and suggest strategies for better

utilisation of ICTs in information service delivery at the PIASS library. The findings revealed that ICTs play a significant role in enhancing information service delivery at the PIASS library but their effectiveness has been reduced by inadequate ICT tools, information resources and skills among library staff and library users.

The study concludes that the number of computers and other ICT tools were small in number compared to the library users' needs. The study concludes that what is available is in relatively good condition with some room for improvement. The study further concludes that ICT tools are moderately available and there is a need to improve their quality. The study observed that some ICT tools are overused, especially computers and projectors and Internet resources like e-books, and e-journals. However, other ICT tools are underused because of the poor awareness and marketing of their availability to users; the low level of skills among users and few hours of operating of computer labs. The study further deduced that there are no clear ICT policies and guidelines in the PIASS library which ensure provision and maintenance of infrastructural facilities necessary for ICTs development in the PIASS library.

The study notes that, despite having link to the PIASS website, the PIASS library does not have online Library Management System. Its Library Management System, which is WINISIS, offers only search and retrieval of information services and cataloguing services. It is not possible to provide library information services like circulation services, reference services, current awareness services, selective dissemination of information services, ordering/acquisition services, OPAC, and interlibrary loan. It was observed that the lack of these library information services has made inadequate the quality of

information service delivery in the PIASS library. The study concludes that open access databases which include e-books and e-journals are available in the PIASS library where 31 links of electronic books and journals accessed by its users via electronic transmission using Internet. The study notes that the PIASS library is providing electronic thesis; e-mails and chats; CR-ROM databases which include audiovisual resources, audio resources, film resources and video resources; and web based. The study further observes that printing, scanning and photocopying services are not given to the PIASS library users because students and other library users have to go outside the institution to get such services.

The study found that library staff has average skills in general, but need to improve in other areas. The study notes that there are no extensive educational and training programs to provide adequate supply of qualified ICTs personnel. Consequently, the PIASS library staff needs to be trained on ICTs applied to the library in order to improve the quality of information service delivery to library users and in order to be innovative and ready to partake the outcome of challenges faced by users in using new technologies in library. The level of library users' skills is still low and library users training program is not well structured.

The study discovered that there are challenges faced when using ICT tools in PIASS library; they include: inadequate library's ICT tools, inadequate library information resources and services, inadequate ICT policies and guidelines, inadequate library human resource skills, inadequate library staffing, inadequate computer literacy and poor reading culture among library users, limited funds for ICT infrastructure, and inadequate use of

available ICT infrastructure and information resources. The study concludes that the contribution of ICTs to the quality of information service delivery can be improved through the adoption of better strategies in their utilisation. Thus, the study recommends formulation of suitable ICT policies and guidelines, development of ICT infrastructure, and establishment and provision of ICTs centred users' education and training programme. The study has proposed strategies for better utilisation of ICTs in information service delivery at the PIASS library.

5.4 Recommendations

The study has made the following recommendations in order to enhance library information service delivery in PIASS library:

5.4.1 Improve the number and the quality of ICT infrastructure

The study recommends that the PIASS library should improve the number, the quality, the availability and the accessibility of library ICT infrastructure such as computers, projectors, photocopiers, normal and bar-codes printers, scanners, bar-codes readers, and finalize quickly the activities of building a new big library. The PIASS library should develop maintenance strategies of ICT tools for effective and efficient library information service delivery. Therefore, there is need for the PIASS library to acquire a Library Management System which has all the required library modules namely circulation services, reference services, current awareness services, selective dissemination of information services, search and retrieval of information services, acquisition services, cataloguing services, OPAC, and interlibrary loan services because the WINISIS which is used actually has only cataloguing module and information searching and retrieval.

In addition, the PIASS library should acquire an automatic and powerful generator and UPS in order to avoid loss of data and the damage of ICT tools when power goes off because library ICT tools are power dependent in order to work effectively and efficiently. Furthermore, there is need to increase the connectivity of the Internet, both LAN and WLAN, in order to help library users to have quick, updated and timely library information services. This also will help staff to upload data on Library Management System and library users to download web based information from library database and World Wide Web.

The study recommends that the PIASS library should acquire a library security system in order to secure and to protect library properties against theft and alteration of library data other forms of damages. The study recommends that the PIASS library should increase funding for library ICT infrastructure because acquisition of ICT tools and facilities requires enough funding for library and most of ICT facilities and services are very expensive. Inadequate ICT funding can make library not to enhance modern technology fully which results in the provision of inefficient and obsolete library information resources and services.

5.4.2 Maximize utilisation of available library ICT infrastructure

The study recommends that the PIASS library should promote reading culture among library users by marketing and creating awareness among library users about the availability of library ICT tools as well as electronic library information resources and services in order to maximize their access and use.

5.5.3 Increase the number of qualified library staff

The study recommends that the PIASS library should increase the number of well skilled library staff by training library staff using in-service training courses and formal educational programmes and by recruiting library staff well skilled so that they are able to provide all needed library information services.

5.5.4 Improve the training of library users

The study recommends also that PIASS library should train library users on how to access and use library information resources based on ICTs available in the library. Well developed ICTs literacy skills will help library staff to overcome challenges caused by new technologies, to be innovative and to match library information services with the users' information needs, seeking and behaviour. It will also help users to maximize the utilisation of ICT infrastructure available in PIASS library.

5.4.5 Develop clear library ICT policies and guidelines

The study recommends that the PIASS library should develop clear library ICT policies and guidelines in order to ensure provision, security and maintenance of library ICT infrastructure; to provide well defined priorities in application of ICTs in library; and establish structures for effective implementation of ICT strategies. ICT policies and guidelines will help to provide strategic direction and guidance for sustainable and systematic application of ICTs in the PIASS library and will help to overcome new technological challenges in order to enhance information service delivery.

5.5 Proposed strategy in order to enhance information service delivery at the PIASS library

The study confirmed the assumption that inadequate utilisation of ICTs has impacted negatively on information service delivery at PIASS library, that full utilisation of ICTs has been hindered by various factors including inadequate ICT infrastructure and ICT knowledge and skills among library staff and users, and that it is possible to reverse the situation regarding ICT utilisation at PIASS library by putting in place appropriate strategies to improve the utilisation of ICTs and information service delivery at the institute. Thus the study proposes the following strategies to be adopted by the PIASS library:

- 1. Set up ICT policies and guidelines committee:** This committee will have to exchange ideas and will help to perceive the consistence of the adoption of ICTs in PIASS library and how they will do in order to adopt them efficiently. This committee will have to set up library ICT policies and guidelines which will be followed in the adoption of ICTs in PIASS library.
- 2. Library ICT needs assessments:** Based on past experiences, existing requirements for application of ICTs in academic libraries and needs of the PIASS library based roles or advantages expected from their adoptions the committee will have to take decisions and communicate them to stakeholders what they have to do including information services based on users needs, ICT infrastructure which will help to fulfil those needs, staffing needed for the implementation (training and recruiting).

- 3. Evaluation of library ICT infrastructure available:** This consists of a deep investigation of strengths and weaknesses regarding existing ICT infrastructure: their quality, their availability and their accessibility. This will help to fill the gap between the needs and what exists in place.
- 4. The evaluation of ICT literacy between library staff and library users:** This will help to verify if the PIASS library has well skilled staff or not in order to plan according to what is needed.
- 5. Set a budget based on needs:** Based on information resources and services to be provided, ICT infrastructure requisite to fulfil those requirements, and staffing required for implementation, the committee will set down the budget needed and where it have to come from.
- 6. Set up priorities and a timeline:** The committee will have to set up priorities and timeline of what needs to be executed. The committee's members will have to define what to start up based on the order of priority among the followings: ICT infrastructure purchase and installation, staff training and workshops, staff recruitment, users training. Each priority will have a timeline assigned for its execution.
- 7. Implementation:** Implementation will be based on priorities and timeline assigned to each priority for its execution.
- 8. Monitoring and evaluation:** The committee will have to assign tasks to individuals who will monitor activities. This will make it easy to evaluate performances. The

results of these monitoring and evaluation will help to make decisions regarding amelioration, correction of errors, or revision of policies and guidelines.

5.6 Conclusion

This chapter discussed the summary of findings, conclusion, recommendations and suggestion for further research. The study found that the application of ICTs in PIASS library have made information service delivery effective and efficient in the PIASS daily activities, research activities, teaching, dissertation and academic works. However, the study found that the PIASS library staff and users are facing same challenges while applying ICTs in library information services and resources due to inadequate library ICT infrastructure, inadequate ICT skills among library staff and users, limited funds for ICT infrastructure, inadequate ICT policies and guidelines, and inadequate reading culture for users. The study recommends the need to improve the number and the quality of ICT infrastructure, maximize utilisation of available library ICT infrastructure, increase the number of qualified library staff, training library users on how to access and use library information resources, development of library policies and guidelines. The study proposed strategies to be adopted by the PIASS library in order to improve the quality of information service delivery.

5.7 Suggestion for further research

As this study focused on the role of ICTs in enhancing information service delivery in PIASS library, it has suggested that further research be conducted on the following areas:

- Similar study should be done in all libraries of private academic institutions in Rwanda;
- Investigation on a reading culture among students in the PIASS library;
- Investigation on staffing in libraries of private academic institutions in Rwanda

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APPENDICES

APPENDIX I

LETTER OF INTRODUCTION

NZEYIMANA Damien

Moi University,

School of Information Sciences,

Department of Library and Information Studies,

P.O. Box 3900,

Eldoret

December, 2014

Dear Respondent,

I am a Master's Student at Moi University, School of Information Sciences Department. I am carrying out a research on the Information and Communication Technologies (ICTs) in enhancing information service delivery at Protestant Institute of Arts and Social Sciences (PIASS) library, Huye, Rwanda. The purpose of this letter is to request you to kindly take a few minutes to complete this questionnaire. Information provided will only be used for this research and will be treated with the most confidence.

Thank you in advance.

Yours faithfully,

NZEYIMANA Damien

Student – School of Information Sciences

APPENDIX II

QUESTIONNAIRE FOR USERS OF THE LIBRARY (LECTURERS AND STUDENTS)

Please fill the space provided or tick with√

Identification

Faculty:

Occupation:

Section A: Status of ICT infrastructure in PIASS library

1. a. What types of ICT tools do you use for information services at PIASS library?

- (i)
- (ii)
- (iii)
- (iv)
- (v)

Please, extend the list if they are many

b. How can you evaluate the adequacy of ICTs available in PIASS library?

Status of Infrastructure	Enough	Not Enough	Very Good	Good	Bad
Number of hardware					
Adequacy of hardware					
Availability					
Accessibility					
Functionality					
Internet network					
Availability of power					

Justify you answer

2. a. What types of computer networks do you use in PIASS library?

- (i)
- (ii)
- (iii)
- (iv)
- (v)

b. For you what purpose do you use of the Internet networks?

- (i)
- (ii)
- (iii)
- (iv)
- (v)

Section B: Electronic Resources and services available in PIASS library

3. From the list of electronic resources given below, tick to show which you have access to in PIASS library

- (i) E-books
- (ii) E-thesis
- (iii) E-journals
- (iv) E-mail (E-mail, chats)
- (v) Online database system

Please, mention any other resources that have been not included above but you have access to

4. a. Does the library have a Library Management System? Yes No

b. If yes which one?

c. What are services does it provide from the followings?

(i) Circulation services

(ii) Search and retrieval of information services

(iii) Ordering/acquisition services

(iv) Cataloguing services

(v) Online Public Access Catalogue

Please give other services do you benefit from PIASS library if there are

.....

5. Do you think that all information services are fully utilized by users? Yes

No

Justify your answer

Section C: ICT literacy among library staff and library users

6. a. In your opinion, the levels of computer literacy skills and competencies of library staff at PIASS library fall in which category from the ones listed below?

(i) Above average

(ii) Average

(iii) Below average

b. Are the staff adequate? Yes No

7. Do you have enough skills to explore all PIASS library information services?

Yes No

If no, please explain why.....

8. a. Did you get any ICT literacy from library staff? Yes No

b. If not, please explain why?

Section D: Challenges faced when using ICTs in PIASS library

9. What challenges do you face when using ICTs in the library?

.....

Section E: Solutions to challenges faced when using ICTs in PIASS library

10. Suggest any ways by which PIASS library can improve the use of ICTs in library information service delivery.....

APPENDIX III

INTERVIEW SCHEDULE FOR PIASS MANAGEMENT STAFF AND LIBRARY STAFF

Questions must be ticked or filled in indicated place

Section A: Status of ICT infrastructure in PIASS library

1. a. What types of ICT tools are used for information services at PIASS library?

- (i)
- (ii)
- (iii)
- (iv)
- (v)

Please, extend the list if they are many

b. How can you evaluate the adequacy of ICTs available in PIASS library?

Status of Infrastructure	Enough	Not Enough	Very Good	Good	Bad
Number of infrastructure					
Adequacy of infrastructure					
Availability					
Accessibility					
Functionality					
Internet network					
Availability of power					

Justify your answer

C. Do you have ICT policies and guidelines for effective management of PIASS

library? Yes No

If yes which ones?

2. a. What types of computer networks are available in PIASS library?

- (i)
- (ii)
- (iii)
- (iv)
- (v)

b. For you what purpose is the use of the Internet networks?

- (i)
- (ii)
- (iii)
- (iv)
- (v)

Section B: Electronic Resources and services available in PIASS library

3. From the list of electronic resources given below, tick to show which are available in PIASS library

- (i) E-books
- (ii) E-thesis
- (iii) E-journals
- (iv) E-mail (E-mail, chats)
- (v) Online database system

Please, mention any other resources that have been not included above but is available

4. a. Does the library have a Library Management System? Yes No

b. If yes which one?

c. What services does it provide from the followings?

(i) Circulation services

(ii) Search and retrieval of information services

(iii) Ordering/acquisition services

(iv) Cataloguing services

(v) Online Public Access Catalogue

Please give others if there are:

5. Do you think that all information services are fully utilized by users?

Yes No

Justify your answer:

Section C: ICT literacy among library staff and library users

6. a. In your opinion, the levels of computer literacy skills and competencies of library staff at PIASS library fall in which category from the ones listed below?

(i) Above average

(ii) Average

(iii) Below average

b. Are the staff adequate? Yes No

c. What training/workshops/seminars have they attended in library automation?

7. Do users have enough skills to explore all PIASS library information services? Yes No

If no, please explain why.....

8. a. Do you have computer literacy programs to library staff and users?

Yes No

b. If not, please explain why?

Section D: Challenges faced when using ICTs in PIASS library

9. What challenges do you face when using ICTs in the library?

.....

Section E: Solutions to challenges faced when using ICTs in PIASS library

10. What do you plan to do in order to improve library operations and information services?

11. Suggest any other ways by which PIASS library can improve the use of ICTs in library information service delivery

APPENDIX IV

DATA COLLECTION RECOMMENDATION LETTER



MOI UNIVERSITY

DEPARTMENT OF LIBRARY, RECORDS MANAGEMENT AND INFORMATION STUDIES

Tel: (053) 43231
 Fax No. (053) 43292
 Telex NO: 35047 MOIVASITY
 E-Mail: hodlis@mu.ac.ke OR deanis@mu.ac.ke

P. O. Box 3900
 Eldoret
 Kenya.

REF: IS/MS/LIS/57/13

15th December, 2014

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

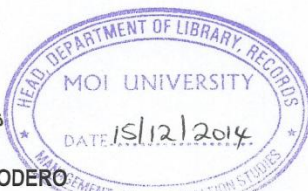
RE: DATA COLLECTION – NZEYIMANA DAMIEN (IS/MS/LIS/57/13)

The above named is a postgraduate student in the Department of Library, Records Management and Information Studies, School of Information Sciences, Moi University pursuing a Master of Science Degree in Information Sciences (Library and Information Studies option). He is carrying out a research programme entitled *"The Role of Information and Communication Technologies (ICTs) in Enhancing Information Service Delivery at Protestant Institute of Arts and Social Sciences (PIASS) Libray, Huye, Rwanda"* under the supervision of Prof. Cephass Odini and Ms. Emily Ng'eno.

The purpose of writing is to request you to kindly allow Mr. Nzeyimana to conduct the research in your organization beginning January, 2015 and request your staff to assist him collect the necessary data. The information given will be treated with utmost confidentiality and will be used only for the purpose of the research. We look forward to your continued support and co-operation.

Yours sincerely,

Damaris



DR. DAMARIS ODERO
 SENIOR LECTURER AND HEAD,
 DEPARTMENT OF LIBRARY, RECORDS MANAGEMENT & INFORMATION STUDIES.

DO/mn

APPENDIX V

RESEARCH AUTHORIZATION LETTER



PROTESTANT INSTITUTE OF ARTS AND SOCIAL SCIENCES (PIASS)

OFFICE OF THE VICE CHANCELLOR

P.O. Box 619 Butare - Phone: (+ 250)0252530619 Fax: (+250) 0252530298

Web site: www.piass.ac.rw Email: fathebu@yahoo.fr

8th January 2015

Damien NZEYIMANA
Moi University
P.O. Box 3900
Eldoret

RE : RESEARCH AUTORISATION

Following your application for authority to carry out research on “**the Role of Information and Communication Technologies (ICTs) in enhancing information service delivery at Protestant Institute of Arts and Social Sciences (PIASS) library, Huye, Rwanda**”, I am pleased to inform you that you have been authorized to conduct research at Protestant Institute of Arts and Social Sciences (PIASS) library from 12th January 2015.

On completion of your research, you are expected to submit two copies of your research thesis to the office of Deputy Vice-Chancellor for Academics.

Kind Regards

Prof. Benoit GIRARDIN

Vice-Chancellor

C.I.



- Deputy Vice-Chancellor for Academics
- Director of Library and ICT at PIASS

APPENDIX VI**OPEN ACCESS JOURNALS AVAILABLE AT THE PIASS LIBRARY**

1. American Institute of Physics journals
2. ASCE (American Society of Civil Engineers) Online Journals
3. Caliber
4. Cambridge Journals Online
5. Canadian Science Publishing
6. De Gruyter Library and Information Science Books
7. Duke University Press Journals
8. Emerald Management e-Journal Collection
9. EUP (Edinburgh University Press) Journals Online
10. Gale Virtual Reference Library
11. HST (Henry Stewart Talks) Libraries in a Digital Age
12. Institute for Operations Research and Management Sciences (INFORMS)
13. JSTOR (Journal Storage)
14. Liebert Online
15. Oxford Journals
16. Palgrave Macmillan Journals
17. Project MUSE books and journals
18. Royal Society Journals Online
19. RSC (Royal Society of Chemistry) Journals Archive
20. Sage Online Journals
21. Springer e-Journals

22. Springer Lecture Notes Series
23. Francis e-Bestseller Packages has been accepted
24. University of Chicago Journals
25. Wiley Online Library HSS (Humanities and Social Sciences collection)
26. Wiley Online Library STM (Sciences, Technology and Medicine)
27. World Bank World Development Indicators Online Database

The four Research for Life (or Research4Life) programs which are:

28. Access to Global Research in Agriculture (AGORA)
29. Health InterNetwork Access to Research Initiative (HINARI)
30. Online Access to Research in the Environment (OARE)
31. Research for Development and Innovation (ARDI)