

**UTILIZATION OF INFORMATION COMMUNICATION TECHNOLOGY
FACILITIES FOR RESEARCH OUTPUT AMONGST POSTGRADUATE STUDENTS:
THE CASE OF UNIVERSITY OF NAIROBI LIBRARY SYSTEMS**

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DECLARATION

This research project is my original work and has not been submitted for examination to any other university.

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DEDICATION

I dedicate this work to the Almighty God for all the blessings He has bestowed upon me and to my loving family and friends for their prayers, patience and encouragement during the entire study period.

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ABSTRACT

The study focused on utilization of information communication technology facilities for research output amongst postgraduate students at the University of Nairobi library systems. Objectives of the study were to assess the frequency of usage of information communication technology facilities by postgraduate students at the University of Nairobi library systems, establish the available information and communication technology facilities utilized for research output at the university of Nairobi library systems, establish the competence of information staff in support of information and communication technology services for research output and identify challenges faced by postgraduate students in utilization of information and communication technology facilities for research output and suggest possible solutions to the identified problems. The study utilized semi structured questionnaire as the major data collection instrument. Interview method and general observation was used whenever required to supplement the process and make the information more explicit. Target population of 124 students was selected for the study. Purposive sampling method was used to select the sample size of the study while the data collected was analyzed using statistical package for social sciences program. Findings from the study revealed availability of information and communication technology facilities in the university library systems hence internet services being the most frequently utilized by postgraduate students for research output. Slow connectivity, inadequate resources, security protocols, inefficient bandwidth were the major challenges to utilization of these facilities for research output amongst postgraduate students. Useful recommendations for eradicating these challenges militating against utilization of information and communication technology facilities for research output amongst post graduate students included; top management implementation of the scarce information and communication technologies for video conferencing technology, electronic learning software, smart card technology and exploration of cloud computing technology to maximize information and communication technology.

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LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---------------|--|
| CD-ROM: | Compact Disk Read Only Memory |
| E-Books: | Electronic books |
| E- Resources: | Electronic resources |
| ICT: | Information and Communication Technology |
| IR: | Institutional Repositories |
| LANS: | Local Area Networks |
| OPAC: | Online Public Access Catalogue |
| PCA: | Personal Computer Applications |
| RAM: | Random Access Memory |
| RFID: | Radio Frequency Identification |
| RT: | ReTweeting |

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter discussed background to the study, aim of the study, research questions, significance of the study, scope of the study, limitations of the study, and definition of operational terms.

1.2 Background to the study

Information and communication technology (ICT) has been applied to several facets of the world, these including education (schools), health (hospital), business (trade) and many others. The current rapid developments in the field of information and communication technologies have changed significantly the nature of work in academic libraries. These major changes have brought about new opportunities like digital library, hybrid library, electronic library, online cataloguing amongst others to improve resources management and services. Universities across the world have been adopting information and communication technologies based services in an effort to create conducive environment for students to engage in learning and gain access to information easier than ever (Dhanavandan, Esmail & Mani, 2008:69). Studies that have been carried out to assess the frequency of information communication technology facilities usage for research output by postgraduates of universities in developing and developed countries have concluded that the use of these technologies is below expectation resulting users have aesthetic view on the same (Adetimirin, 2012:130). The purpose of this research was to assess how these facilities used for research output in academic libraries by postgraduate students implies the need for information providers to pay the required attention to integrate technology solutions for research output. In particular, the study highlights the levels of accessibility, availability and use of information and communication technology in academic libraries, as well as limitations and challenges regarding research output.

Due to advancement of information and communication technologies (ICT), academic libraries have radically transformed today with consequently new roles to fulfill the incessantly -changing needs of information in order to remain relevant in 21st Century. Academic libraries exist to

support academic community; hence their development is always tied with the parent institution. Education system and academic institutions have been dramatically changed because of ICT revolution. Academic librarians cannot be isolated from this revolution but have to change accordingly. The old concept of book-oriented librarianship has long been taken over by user-centered librarianship. These libraries are established in “support of the mission of the parent institutions to generate knowledge, and people equipped with knowledge in order to serve the society and advance the well- being of mankind” (Raja, Ahmad & Sinha, 2009:701). Research has established as one of the main function of all academic libraries in universities. The mission of parent institutions is to generate knowledge, people with knowledge in order to serve the society and advance the well-being of mankind, therefore, whatever is important to the university must be important to the library and all planning activity needs to be geared towards this (Cox, 2010:120). Academic libraries must support the three main activities that are teaching, learning and research of the academic community, staff, students and researchers.

Moreover, Rowley (2008:80) has observed that postgraduate students make low level use of electronic information resources in the library. Most of these students are not aware of the kinds of information and services that are available, do not know the sources of this information and cannot locate and retrieve information through the use of these technologies because of being information illiterate and lack the technical knowledge. Research shows that there are countless publications on the use of information and communication technologies. Literature analysis of between the years 2000-2010 mainly focus on infrastructure and its integration into education. From 2010-2013, ICT issues mainly focused on usage patterns, gender characteristics, ease of use of the technology perception and intention of ICT usage its difficulties (Asiamah, 2011:15). Literature review by researcher indicates that several studies on utilization of information communication technology facilities have been conducted by scholars within some African universities like in Nigeria such as: Kolawole and Omolara (2010); Halima (2011), Isah (2010); Olatokunbo and Asiru (2011). In spite of the perceived availability of electronic information resources in the universities and their benefits to university education, their effective utilization by postgraduate library users have hampered by varying factors. As a result of the dynamic nature of information technologies there is need to discuss how in this digital era, ICT facilities have been used in academic libraries for research output.

Learning in the 21st century has radically changed with innovational new methods of teaching and learning such as Open and Distance Learning, learning management systems, M-Learning, online education venture, virtual campus and flipped Classrooms. All of these recent trends in education have immense effect on academic libraries and librarians. Academic libraries provide library services to support users' information needs in relation to e-learning, e-teaching and e-research by providing right information at the right time in the right format from wherever library users are. The purpose of this research was to assess how these facilities used for research output in academic libraries by postgraduate students implies the need for information providers to pay the required attention to integrate technology solutions for research output.

1.2.1 University of Nairobi Library Systems

University of Nairobi's vision is to be a world class university committed to scholarly excellence while, its mission is to provide quality university education and training and to embody the aspirations of the Kenyan people and the global community through creation, preservation, integration, transmission and utilization of knowledge. The core values include freedom of thought and expression, innovativeness and creativity, good corporate governance, team spirit and team work, professionalism, quality customer service and responsible corporate citizenship. (University of Nairobi Strategic Plan 2008-2013).

The vision, mission and core values of the University of Nairobi demonstrate the importance attached to research by the University. The University finds itself with the inherent role of providing leadership in the domain of higher education and research. This role however, has now to be fulfilled in the context of changing paradigms, characterized by limited resources, due to diminished capability of the exchequer to continue fully funding the needs of the universities. Against this background, the University commits itself to living up to the highest ideals of good governance, to seeking to be socially responsible, and to promoting and pursuing excellence in training and research. (University of Nairobi Strategic Plan 2005-2010).

Research at the University of Nairobi has been guided by the revised University of Nairobi Regulations Governing the Conduct of Research which were considered and approved by the resumed 297th Deans' Committee meeting held on 11th September, 2001. On 23rd August, 2005 at the 346th Deans Committee meeting, it was decided that a policy was required to guide research at the University of Nairobi and a committee of Deans was set up to oversee the process of developing a policy. The committee commenced its work on 14th September, 2005. While incorporating the provisions of the Regulations of 2001, the policy would guide the management of research within the university and enable coherent decision-making in matters of research. (University of Nairobi Strategic Plan 2005-2010).

The physical facilities of the university which include the laboratories, libraries and information communication technology infrastructure contribute towards providing an enabling and conducive environment for us to provide quality service. They need to be developed and improved to attain and exceed world class standards. (University of Nairobi Strategic plan 2008-2013). The vision of Jomo Kenyatta Memorial Library is to be a world class information centre in the provision, dissemination and preservation of knowledge. While the mission is to provide quality information services that will empower the university in carrying out its core activities of teaching, learning, research, community services, and consultancy to the highest international standards. The libraries' strategic objectives are to; manage library resources efficiently, provide contemporary library services that will enhance teaching, learning, research, and consultancy programmes at the University of Nairobi, enhance library facilities for improved information delivery and to improve security of users, library resources and staff.

In response to the university's drive to improve its research output, the library has adopted an open access policy to research articles and other academic materials produced by its staff. By placing all scholarly articles in an online 'digital repository', the University of Nairobi aims to increase the visibility of its research output and enhance collaboration with researchers in other parts of the world. (SciDev.Net's Sub-Saharan Africa desk)

1.3 Statement of the research problem

In this digital era, it is expected of every academic staff in universities to be computer literate and use information and communication technology to facilitate teaching, learning and other academic activities. With the availability of wide information and communication technology facilities including the internet, some information managers have a challenge in assisting postgraduate students locate and access these facilities leading to underutilization of these facilities by postgraduate students for research output. In addition, inadequate ICT staffs have also contributed to lack of access and utilization of information communication technology facilities at the university of Nairobi library systems. Although there are enormous benefits that are experienced in the utilization of information and communication technologies facilities for the research output, postgraduate students at the university of Nairobi still experience challenges in efficient and effective utilization of these facilities for research output. This could be due to inadequate resources, inadequate information technology expertise in the university of Nairobi library systems and lack of awareness on the availability of information and communication technology facilities for research output. These challenges have led to a low quality of research output by postgraduate students at the University of Nairobi to their dissatisfaction that the library systems were established to support. It is with a view of finding solutions to the problems encountered in utilization of information and communication technology facilities by postgraduate students at the university of Nairobi that the research was conducted.

1.4 Purpose of the study

The aim of the study was to assess utilization of information and communication technology facilities for research output amongst postgraduate students in the University of Nairobi library systems.

1.4.1 Objectives of the study

1. Asses the frequency of usage of Information Communication Technology facilities by postgraduate students at the University of Nairobi library systems.
2. Establish the available Information Communication Technology facilities utilized for research output in the university of Nairobi library systems.

3. Establish the competence of information staff in support of Information Communication Technology services for research output.
4. Identify challenges faced by postgraduate students in utilization of Information and Communication Technology facilities for research output
5. Suggest possible solutions to the identified problems.

1.5 Research questions

1. How frequently do the postgraduate students utilize Information and Communication Technology for research output at the university of Nairobi libraries?
2. What are the available Information Communication Technology facilities utilized for research output by postgraduate students?
3. How have these facilities and equipment contributed in research output at the University of Nairobi libraries?
4. How have the information staffs supported utilization of Information Communication Technology for research output by postgraduate students?
5. What challenges are faced by postgraduate students in utilization of these facilities for research output and what are the possible solutions to these challenges?

1.6 Assumptions of the study

- i. There are wide varieties of information and communication facilities at the university of Nairobi library systems under utilized for research output.
- ii. Information staff have not supported postgraduate students access the available facilities in the libraries.
- iii. Postgraduate students experience challenges utilizing information communication facilities for research output.

1.7 Scope of the study

The scope of this study was limited to Jomo Kenyatta Memorial and ADD libraries. Both libraries are utilized by postgraduate students of College of Architecture and Engineering. The study discussed the frequency of Information and Communication Technologies usage by postgraduate students in university libraries, available Information and Communication Technologies facilities utilized for research output in the university libraries, role and

competence of information staff in support of information and communication technology facilities for research output and challenges faced postgraduate students in utilization of these facilities for research output and solutions to these challenges.

1.8 Limitations of the study

The study did not cover the entire postgraduate students at the University of Nairobi but concentrated on the College of Architecture and Engineering with four schools namely; School of Built Environment, School of Arts and Design, School of Engineering and Institute of Nuclear Science and Technology. Postgraduate students from this college utilize ADD and Jomo Kenyatta memorial library for research output.

1.9 Significance of the study

The study will establish problems associated with the utilization of Information and Communication Technologies for research output amongst postgraduate students at the university of Nairobi library systems. The findings will contribute to the body of knowledge on utilization of information and communication technology facilities by postgraduate in university of Nairobi library systems. The study will amongst others, attempt to identify which of the variables presented play a significant role in the students' use of ICT facilities. It will also x-ray the problems associated with the use of these facilities and as such the result of the findings of this study will contribute to the body of knowledge on student's use of ICT facilities. And will also be beneficial to academics, researchers, students and professional interested in this area of study. Generally, if one can say that the use of information communication technology is a must for research output amongst postgraduate students then this study is imperative.

1.10 Operational terms and concepts

Academic library

A library that is attached to a higher education institution which, serves two complementary purposes to support the school's curriculum, and to support the research of the university faculty and students.

Facility

Is something such as a building or large piece of equipment that is built for a specific purpose, something that makes an action, operation, or activity easier.

Information and communications technology

Technology used to handle telecommunications, broadcast media, intelligent building management systems, audiovisual processing and transmission systems, and network-based control and monitoring functions.

Information staff

Information professional trained in library and information science, which is the organization and management of information services or materials for those with information needs.

Institute of Higher Learning

School that awards bachelor's degree or not less than a 2 year program that provides credit towards a degree.

Institutional repository

Online locus for collecting, preserving, and disseminating in digital form the intellectual output of an institution, particularly academic or research institution.

Library

Collection of sources, resources, and services, and the structure in which it is housed; it is organized for use and maintained by a public body, an institution, or a private individual.

Library systems

Enterprise resource planning system for a library that includes integrated library systems, electronic resources management systems, electronic repositories and resolvers.

Management

Organization and coordination of the activities of an enterprise in accordance with certain policies and in achievement of clearly defined objectives.

Postgraduate

Course of study or an academic program that occurs after a college degree has already been obtained.

Research output

Results in research reports, books and chapters in books, journal articles and conference papers.

Utilization

Ability to put into use, especially to find a profitable or practicable use for.

University library

Institution in which literary and artistic materials such as books, periodicals, pamphlets, prints, records and tapes are kept for reading, reference or lending.

1.11 Summary

This chapter discussed intensively the background of the study, aim, significance and assumptions of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses previous studies in the area of information communication technology usage by postgraduate students for research output. It criticized the past studies, outlined the information communication technology gap and how the present studies intended to benefit past studies by bridging the information communication technology gap.

2.3 Information communication technology in academic institutions

Academic libraries have for centuries played critically-important roles in supporting research in all subjects and disciplines within host universities and colleges, but the last decade has brought sea-change in relationships between researchers and libraries. Technological developments and availability of information resources online have changed how research is conducted, including the services that academic libraries provide to the research communities. Researchers and librarians have welcomed the benefits the changes have brought, adapting rapidly and seeking to exploit the potential to the full, for posterity or in the coming years (Research Information Network & Consortium of Research Libraries, 2009).

Technological innovation is not well grounded in academic libraries in Kenya though few academic libraries have integrated the necessary technology such as: ISIU Library, CUEA library amongst others (Makori,, 2009). There is therefore need for academic libraries in Kenya to integrate ICT solutions into their mainstream information products and services. These solutions include integrated information systems, digital systems, computing, radio frequency identification (RFID), local area network and wide area network that will enable students to access and utilize these integrated information systems for research output.

Asiamah (2011:9), defines Information and Communication Technology (ICT) as the umbrella term that includes any communication device or application, encompassing radio, television, cellular phones, computer and network hardware and software, satellite systems, as well as the various services and applications associated such as videoconferencing and distance learning.

Further, focuses on communication technologies that include the internet, wireless network, cell phones and telecommunication. Information and communication technology includes capturing, storage, communications and display technologies.

Capturing technologies implies input devices that collect and convert information into digital form. Such devices include keyboards, mice, trackballs, touch screens, voice recognition systems, bar code readers, image scanners and palm-size camcorders.

Storage technologies produce a variety of devices to store and retrieve information in digital form. Among these are magnetic tapes, floppy disks, hard disks, random access memory disks, optical disks such as compact disks-read only memory, erasable disks and smart cards (credit-card sized cards with memory and processing capacity for financial transactions or medical data). The processing technologies also create the systems and applications software that are required for the performance of digital information and communication technologies.

Communications technologies produce the devices, methods and networks to transmit information in digital form. They include digital broadcasting, integrated services digital networks, digital cellular networks, local area networks, wide area networks, such as the internet, electronic bulletin boards, modems, transmission media such as fibre optics, cellular phones and fax machines, and 10 digital transmission technologies for mobile space communications (the new low earth orbit satellite voice and data services).

Display technologies create variety of output devices for the display of digitized information. Such devices include display screens for computers, digital television sets with automatic picture adjustment, set-top boxes for video-on-demand, printers, digital video discs, voice synthesizers and virtual reality helmets.

In order to utilize the growing range of electronic resources, students must acquire and practice the skills necessary to exploit them. "For students using a variety of on-line databases, it is as though they were parking lot attendants, where every vehicle is not only a different make and model but has a different configuration" (Blandy & Libutti, 2011:11). As Dutton (2009:34) suggests, the skills required to maximize the potential of electronic resources are much greater

than those required for searching printed sources. These skills include a knowledge of the structure of the database and the instructions which must be input into the computer by the searcher, as well as an understanding of the ways in which the instructions are linked with one another. To this end, Brophy (2009:27) states users do not often appreciate the skills required to search these sources, stating they are deceptively easy to use. The ability to find and retrieve information effectively is a transferable skill useful for future life as well as enabling the positive and successful use of the electronic resources whilst at university. As Brophy argues, libraries must "reach a position where the acquisition of information skills is acknowledged as one of the key learning objectives for every student entering a university, so that no student leaves without being fully equipped to cope with the information intensive world - the information society - as an end-user" (Brophy, 2010:55)

There are several ways in which web experience can be defined and conceptualized. In general, web experience can be considered to be an act where users engage in applications that are often centered on web. In addition, web experience also can be defined in two different ways as perceived use and variety of use. "While perceived usage refers to the amount of time spent interacting with the web and the frequency of use, variety of use refers to the importance of use and the collection of web package/program use." (Igabaria, Guimares & Davis,2010:67). Essentially, the web would often be a tool for wider and more diverse use. Users are increasingly using the web for information retrieval, communicating etc. via electronic mail or online conferencing. In this study, the web experience refers to the experience of web usage, such as the experience of web/online packages, and the Internet.

Research is crucial to human knowledge and scientific advancement. Okonofua (2009:112), notes that research is essential to the university's mission for three main reasons. First, without research, teaching becomes old-fashioned, monotonous and static. Second, research helps the university provide special services to immediate community. Finally, it is only through research that university makes contribution to the growth and development of the nation. Indeed, it is through the production of graduates with new ideas that the university helps create innovations for the growth and development of industries and government, thereby promoting wealth and development.

2.4 Utilization of Information Communication Technology in University libraries

Information communication technology has increasingly become indispensable tools for development in academic libraries in the past two decades. In higher education, information communication technology have great influence in teaching, learning, research and other scholarly and professional activities through improved communication and access to information. In academic libraries, information communication technology has greatly simplified acquisition, organization, storage, retrieval, provision and usage of information and well based solutions have greatly influenced access to range of current information resources in academic libraries. To the contrary, adoptions of information communication technology in academic libraries have also brought challenges that must be overcome in order to increase effectiveness and efficiency in the provision of information.

Walmiki and Ramakrishnegowda (2009:7) studied information communication technology infrastructures in university libraries of Karnataka and found that most of the libraries lacked sufficient hardware, software facilities and did not have adequate internet nodes and bandwidth”. The campus local area networks were not fully extended to exploit the benefits of digital information environment. Ahmad and Fatima (2009:8) noted that researchers used variety of information communication technology services for research and further remarked that information communication technology facilities helped them find information, access information, manage, integrate, evaluate, create, and communicate information more easily”. It was recommended that training be organized to increase the use of these facilities. Adeleke and Olorunsola (2010:9) studied information communication technology and library operations found that information communication technology facilities were the major constraints facing libraries in research output. Shafi-Ullah and Roberts (2010:10) noted that ICT infrastructure were necessary to make provide a research culture in higher education institutions and recommended allocating funds for ICT infrastructure. Etebu (2010:11) studied ICT availability and found a situation that is not encouraging. Patil (2010:12) found that users were not trained to use ICT- facilities hence recommended an ICT training programme to increase the use of ICT facilities.

Today we have new methods of teaching and learning, such as: Open and Distance Learning (ODL), learning management systems, M-Learning, online education venture, virtual campus and Flipped Classrooms. All of these recent trends in education have immense effect on the academic libraries and librarians. Academic libraries provide library services to support users' information needs to support their e-learning and e-teaching and e-research by providing right information at the right time in the right format from wherever library users are.

2.4.1 Scholarly information communication

New scholarly communication comprises of digital scholarship, institutional repositories and open platforms which are developing at increasing pace, requiring libraries to be actively involved or left behind in sharing and disseminating intellectual outputs (Murphy, 2012:110). Aligned with knowledge search libraries services have formulated the new five laws of library science; Libraries serve humanity, respect all forms by which knowledge is communicated, use technology intelligently to enhance service, protect free access to knowledge, and honor the past and create the future. The five laws represent modern academic libraries. Libraries exist to serve humanity by equipping people with the right kind of knowledge to serve the society and thus advance the well-being of humankind.

Today there are various methods of scholarly communication and libraries are supposed to use all of them depending on the needs of its customers. As technology is the major drive to all the changes, librarians are supposed to explore and exploit technology to its optimum potential to enhance the provision of library services Librarians are supposed to be gurus of intellectual property protection and consult and advice the academia on related issue like copyright. Librarians have to maintain their traditional core values of the profession and at the same time manifest library services in new ways addressing the constantly changing needs of user communities (Murphy, 2012:112).

2.5 Information Communication Technology utilized for research output in university libraries

The evolution of information communication technology has led to digital realities where information sources are now digitized as manifested in e-book, e-journal-purchase, e-commerce and social medias that are now common in the western world. Through ICT libraries users can have access to variety of information available on computer networks and online services across the globe. Thus Omoniwa (2011:45) has posited that in the twenty-first century, globalization of information and the adoption of information technology will be the hallmark of great libraries. The size of libraries or their collections may not be the benchmark but rather accessibility to the major thrust of the library automation. For any library to derive maximum benefit in this information age, it has to be online.

An Institutional Repository (IR) is an online locus for collecting, preserving, and disseminating in digital form the intellectual output of an institution, particularly academic or research institution. In a university, this would include materials such as research articles, before undergoing peer review or pre prints; and digital versions of theses and dissertations. IR also includes other digital assets generated by normal academic life, such as the administrative documents, course notes, or learning objects.

Social media and networking are playing a significant role in academic libraries through various forums and in different ways, such as, current awareness, networking, community interaction and engagement, education, library promotion, outreach, knowledge creation and dissemination and so on. Social networking is becoming increasingly popular in library services. According to Penzhom (2010 p. 126),“whether from blogging or information sharing on the web, people are becoming less interested in validity of resources and more interested in working together through ideas on topics via commenting and reTweeting(RT) to solicit response-”. At the University of Toronto’s Rotman School of Management a growing community of international academics and young faculty has been using a mix of social media technologies including wikis, blogs and Twitter, to manage and share their research collection internally, to collaborate within their family of international research affiliates, and to communicate their research agenda and findings to academic community (Silk, 2010 p.113). Blogs are used to promote library services especially in academic libraries as they are the quickest and affordable means of communication.

Blogs are also used to interact with library users and collaborate with library instruction and library director blogs (O'Shea, 2008). Thus, academic libraries are using social networking for professional development as well as for outreach purposes. The rise of social media and digitized information is an opportunity to elevate the role of information professional. Hence social media forms part of the rich environment of scholarship within which researchers work in the 21st century, and a librarian who does not take the time to grasp these changing conceptions is doing herself and her patrons a disservice (Hicks, 2012: 190).

Internet technology has been used widely by academic institutions to search for academic materials relevant for their studies as well as visit other university websites. Internet Technology includes; social media and networking and online searching.

Online database searching is another reference tool in modern information system. It can be defined as computerized store for information, which is accessible through the host computer or across computer networks. This implies that the user can search a database from remote computer or terminals interactively through a system called online information retrieval system. The interaction in online searching is fully conversational as the computer or CD-ROM software will respond immediately to the question or commands, which can still be followed by further enquiries. The implication of the above is that online searching could be done using CD-ROM or searching directly from a networked computer. Online searching as a reference service is an important service especially as the electronic publishing of some important journals, magazines, e-books and other materials on the internet (which is growing on a geometrical progression). All these imply that ICTs are required for online searching.

Online public access catalogue is an important finding tool for information held in the library, as well as information that is held outside the library. It is the automated version of the author, title and subject catalogue cards. It makes retrieval of information faster and easier than when the catalogue cards are being searched. OPAC is most essentially needed for reference and circulation services. Most academic libraries have their OPAC accessible only at their premises while some still have theirs accessible through the internet.

The obvious implication of the exponential growth in the world production of documents and information is that no library can be self-sufficient in meeting the information needs of its users hence the need for resource sharing and information network. ICTs on the other hand, provides a platform for library network and also offers opportunity for resource sharing which is a device evolved by libraries to improve their services to users by broadening the base of information availability.

2.6 Professional competence in provision of ICT facilities for research output

Research has been defined as “creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and use of this stock knowledge to devise new applications” (Franscati Manula 2009:30). A key attribute of the leading knowledge societies is the value they give to research thus research in the social sciences and humanities provides insight into and solutions to our social, economic and political challenges. Bibliometric and informetric studies are widely used to inform policies and decisions in political, economic, social and technological domains that affect the information flow and use pattern within, between and outside institutions and countries. Although Library and Information Science (LIS) studies of this nature solves problems related to collection development, information retrieval, system design, user studies, management, and Knowledge organization, to name but a few in academic libraries, bibliometric studies are limited and those focusing on research output are even more so (Bahr and Zemon 2010).

The Canadian Association of Research Librarians (2010:4), argues that, while the essential role of an academic librarian has not changed, namely to bring together information seekers and information sources, changes in the environment and technology oblige libraries to reassess their role. The association identifies seven sets of competencies, all of which relate more or less directly to research support in an intense and constantly evolving environment (Canadian Association of Research Libraries 2010:3);

Interpersonal and leadership skills refer to the building of relationships between researchers and librarians. Webb, Gannon-Leary and Bent’s (2001:130) points out that, libraries cannot assume that researchers know about their services. He further states that, “While it is vital to listen to

researchers and ensure that the library responds to their needs, we must do more than listen and react. Many researchers are unaware of the potential services and resources available to them and will only ask for what they already know about. This ignorance could easily comprise the quality of the research output. How much better their research might have been if they had been better informed?" .This research study will, asses in detail the academic librarian's role therefore, providing insights useful in enhancement of services.

2.6.1 New roles of academic information staff

To survive in the digital environment, librarians are expected to be actively engaged in the exploration and implementation of new technologies. This change can be managed only by assuming new roles by academic librarians as follows: Technology savvy/experts by training in both using and training technology. By implementing a variety of digital web-based projects, initiatives and infrastructures, librarians preserve, extend, and facilitate access to information and knowledge comprising humankind's cultural, scientific and intellectual heritage (Belzile, 2010), Knowledge workers, Supporting study, not just storing books (Anyangwe, 2012), effective marketers, understanding all users and stakeholders, demonstrating their value as a pivotal in scholarly communications, knowledge gatekeepers as subject experts, networkers and knowledge brokers, digital content managers, (taxonomies, metadata, Dublin Core etc.) , good researchers both for personal and professional development, web designers, blended librarian.

2.6.2 Two schools of thought

Due to paradigm shift and emerging roles of academic librarians twenty-first century academic librarianship gave birth to two schools of thought: one regards librarianship as a dying profession and other consider librarianship as a dynamic profession.

Supporters of librarianship as a dying profession believe that librarianship is a dead-end career in twenty-first century and there is a negative association with the word 'library'. There is a belief that the concept of 'library' has certainly become blurred at the edges (Rossiter, 2012).Some believe that there is no place for libraries in the next century as all information will flow direct from its source to the user (Matthews, 2011).

Proponents of librarianship as a dynamic profession are of the view that library as a career is still viable and provide new opportunities and challenges. Google can bring you back 100,000 answers, a librarian can bring you back the right one” (Gaiman, 2013).

However, the profession is changing and evolving rapidly. One needs to be ready to change and rebrand the profession; (Adams, 2007). Adams (2007) further provides some examples of past efforts at rebranding Ms. Dewey (search engine) Lipstick Librarian (blog). To improve upon their traditional poor image, 21st century academic libraries have numerous opportunities such as social media, working with Academia, providing leadership with institutional projects, intensifying their traditional skills and participating in all academic activities.

2.7 Challenges encountered in ICT utilization for research output and possible solutions

As much as the emergence of Information and Communication Technologies has improved library services, it has faced challenges which include;

2.7.1 Challenges

To be up to date with the changing library trends and customer needs twenty-first century academic libraries are facing numerous challenges which include; transition from print to digital content, continuing education and training of library staff, intellectual capital management, Technological – trauma and infrastructure, Change management to respond to increasingly changing library community needs, adopting Just-in-case to just-in-time approach, continuous budget decline, negativity towards libraries because of other competitors, book keeping expert to research expert, multi-format data curation, new scholarly communication, growing demands for service and increased expectations, staff resistance to change and gaining and sustaining competitive edge over the competitors.

2.7.1.2 Funds for acquisition of ICT facilities and services

Academic libraries require sufficient funds to acquire modern ICT facilities such as computers, servers, scanners, photocopiers, software as well as paying for online and offline services such as e-journals and digital libraries. Most of these ICT facilities and services are very expensive and are at times purchased from developed countries.

A number of measures have been taken by academic libraries to overcome the problem of inadequate funds. First, the academic libraries have been constantly pressing for more funds from their parent universities and government. Second, the libraries have opted for open source software in library automation activities. Third, the library has sought alternative sources of funds mainly from donor agencies and lastly, the library has been able to automate key library activities, acquire computers and subscribe to e-journals.

2.7.1.3 Storage and preservation of electronic information resources

Electronic information resources include abstracting and indexing services, full text materials such as reference books, electronic journals, article delivery services and free resources on the Internet, CD-ROMs, digital libraries and other electronic databases. These electronic information resources can be accessed through electronic networks from intermediary information providers or mounted locally within the institution or within the library (Rana, 2009). While a lot of electronic information is available freely, electronic information resources for academic purposes require careful selection, acquisition, organization and should be made available, and preserved in ways that are different from traditional print materials. Keeping and handling CD-ROMs for example, is challenging, as they are used by students who actually not conversant with handling and using such facilities. In addition, conditions such as dust, heat and dampness have negative effects to CD-ROMs and other ICT facilities.

2.7.1.4 Maintenance and security issues

Frequent maintenance of ICT facilities is crucial to sustainability of any ICT services. It is imperative that there are qualified technical personnel for managing and maintaining ICT facilities and networks that the library system runs. However, many academic libraries have inadequate qualified and competent ICT personnel. Most traditional academic librarians have low ICT skills and sometimes have technology phobia.

This suggests that deliberate strategies are required in terms of staffing and training for sustainable management and maintenance of ICT services in libraries.

2.7.1.5 Information Literacy among library users

Academic library users need both computer and information literacy (IL) skills to effectively use the rapidly growing and changing information resources. However, many academic library users

think that knowing keyboard and mouse operations enables them to effectively utilize electronic information resources. Unfortunately this is not the case. A person who knows all computer hardware and software, and every keystroke may not be information literate at all. Although there are some overlaps between IL skills and computer literacy skills, these are two different concepts. Computer literacy skills relate to computer hardware and software (keyboard, mouse, printer, file management, word processing, spreadsheets, databases, Internet etc.), while IL focus on efficient and effective use of information sources to obtain required information. Lack of IL skills has been pointed out as one of the major causes of underutilization of electronic information resources in many academic libraries.

Experience shows that most library users (academic library staff, students and users from outside the university) lack adequate IL skills. Most users fail to use even the simplest library catalogue (OPAC) to locate books and other library material. As a result, many information resources like CD-ROMs, e-journals, and online databases available in the library remain underutilized. On the other hand, many library users complain that there are no relevant information in the library to meet their needs. Furthermore, observations made at the University of Nairobi reveal that most academic works (thesis, dissertations, Special projects, research reports, papers and teaching material) at the university have very old references. This implies that information users at the University of Nairobi lack the necessary skills and awareness to obtain and use up to date information most of which is made available electronically.

2.7.1.6 Low bandwidth

The higher the bandwidth, the more data can be transferred in bits per second. Whenever there are few data transferred in bits per second (low bandwidth), users get frustrated as it takes long to retrieve information from the internet. Low bandwidth is a problem common to many academic libraries. Low bandwidth makes Internet connectivity in the university extremely slow. Effects of low bandwidth are felt more in the library than other sections of the university, because of the need to download information resources.

2.7.1.7 Unreliable power supply

ICT facilities rely on electricity for their functioning. Academic libraries have taken a measure of purchasing a backup generator in order to combat the problem of unreliable power supply. The backup generator has solved the problem of unreliable power supply.

2.7.2 Possible solutions

To overcome the above challenges it is important to know library competitors to win over them and learn new skills and competencies to serve your user community with utmost dedication and prove your value to your parent organization and all the stakeholders.

2.7.2.1 Library competitors

They can be both local and external. Local are libraries/information centres, information consultancies, information agents, information brokers or any other service, which are in the same business. They can be a threat to your academic libraries by providing better services and facilities. External competitors are commercial information providers such as, Google, the best friend and first point of information seeking for almost every one. Open Access publishers with “Big Deal” packages are other external rivals that provide unrestricted access to journal articles. There are digital technologies like smart phones, tablets and other hand-held devices, which can provide twenty four hours services without using library services.

2.7.2.2 New skills & competencies

The familiarization with new gadgets and methodologies of locating and managing multi-formatted and digital information for vast majority of population requires guides and Information professionals can easily fit into these new roles with training. The leveraging of the available information to suit the needs of the clientele is always best done by the librarians and information professionals. In order to play new roles in twenty first century, it necessitates that academic librarians are equipped with new skills and competencies.

2.8 Knowledge gaps

Research shows that there are countless publications on the use of ICT. The literature that addresses this issue between the years 2000-2010 mainly focus on ICT infrastructure and how ICT have been integrated into education. From 2010-2013, the literature on ICT mainly focused

on usage patterns, gender characteristics, ease of use of ICT, perception and intention of ICT usage and usage difficulties of ICT facilities (Asiamah, 2011). Therefore, due to the dynamic information technologies there is need to discuss how in this digital era, ICT facilities have been used in academic libraries for research output.

Indeed, virtual libraries are now a major component of services provided by universities in western countries. There are open access resources available to researchers via their library Internet infrastructure (Bako, 2008). In Nigeria, more and more researchers are benefitting from their library's ICT infrastructure. For instance, the telecommunication giant MTN has established digital libraries in three prominent Nigerian universities: the University of Lagos, Ahmadu Bello University, and the University of Nigeria Nsukka (Mobile Telecommunication Network, 2009). According to Mosuro (2010), the role ICT plays in the library includes provision of unrestricted access to research information/data; the search for knowledge using different search criteria; reduction in travelling from one place to another in search of information; facilitating the communication of research information; allowing research collaboration among researchers in different locations; creating more services that the library renders to researchers; saves the time of the researcher in literature searching; and enhancing comfort in information seeking. In addition, Ajibola (2010) identifies the roles of ICT to include speed of access to information and cheap access to databases with multimedia capabilities. Also, ICT helps eliminate duplication of research, improves bibliographic control, helps with error reduction in data analysis, increases range and scope of research operations, leading to improved morale and prestige of researchers and reduction of research costs (Tiamiyu 2009).

ICT is the fundamental drive behind all changes. It has affected all walks of life whether education, culture, teaching, learning, research, scholarly communication, libraries and information centre, medical health, agriculture and so on. Everything is now dependent on ICTs and going electronic is a way forward in each sector, hence today we have telemedicine-agriculture, e-business, e-Government and so on. Digital technology has further transformed communication, learning, and work and most recently, cloud computing. According to Gens (2012) International Data Corporation (IDC) has predicted that 2013 will be a year of big jumps in small and medium-sized business cloud use and two

thirds of United State – based midsize firms will use cloud services in 2013, as opposed to just half in 2012. Consumers will begin to abandon PCs and embrace mobile devices for Internet use; mini tablets will turbocharge the mobile market and will spur a shift from textbooks to tablets; "Social everything" will create a huge integration challenge for enterprise IT (Gens, 2012). All of this advancement in ICT has huge impact on libraries and information profession. Academic libraries have adopted contemporary technologies to achieve the visible impact of technological applications.

2.9 Conceptual framework

The study variables identified included; the independent variable which is information and communication technologies facilities while the dependent variable was research output. Intervention variable will come in between the independent and dependent variable. ICT facilities which include digital library resources, laptops and Ipads, WIFI, internet facilities as well as OPAC will result into; increased number of reference materials, reduced number of plagiarized cases and quicker data analysis which in the dependent variable. However, the intervening variable between the independent and dependent variable will include irregular Power supply, slow connectivity, high cost of ICT facilities, WIFI not in range, high cost of ICT facilities, crowded networks, and security protocols.

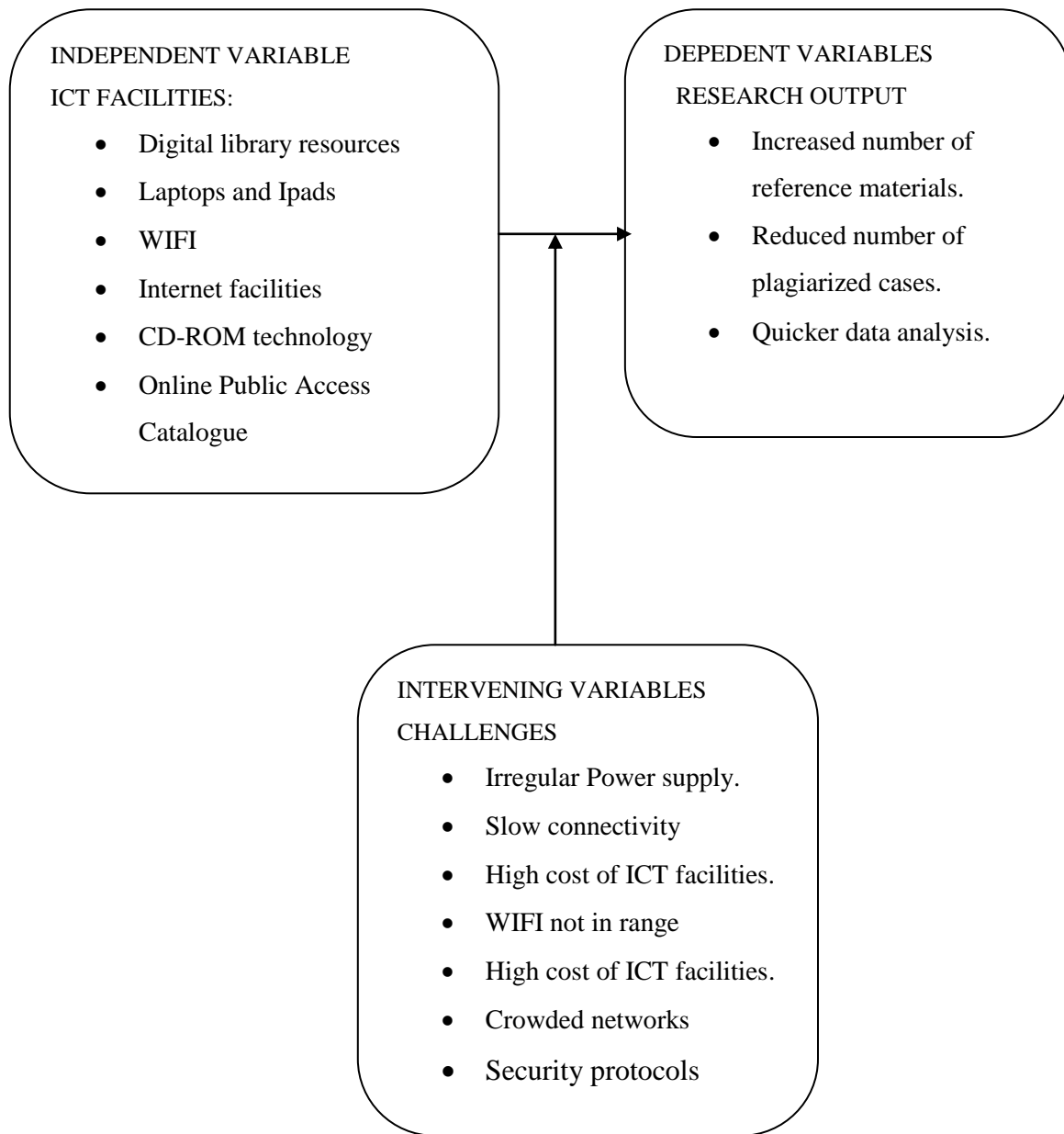


Figure 2.1: Conceptual framework

2.10 Summary

This chapter discussed the literature review relevant to the subject on the utilization of Information and Communication Technology facilities for research output among postgraduate students. It further explained the conceptual framework which presented the relationship between the independent variable which was the ICT facilities and the dependent variable which was the research output.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the methodology which was employed to collect the data for answering the research questions as well as achieving the research objectives. The chapter focused on research design, area of study, target population, sample and sampling techniques, data collection methods, research instruments, ethical consideration and data analysis and presentation.

3.2 Research design

The research design employed was case study which was appropriate because it allowed the researcher to get information on and describe a population of a particular outcome within University of Nairobi library systems. A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident (Yin, 2003:40). In addition, he states that a case research can be based on single or multiple case studies and by nature it can be exploratory, or descriptive. The research was limited to the postgraduate students of University of Nairobi, college of Architecture and Engineering because they had similar characteristics hence case study was appropriate.

Disproportionate Stratified sampling instrument was used where the researcher categorized samples into strata of school of the Built Environment, School of the Arts and Design, School of Engineering and Institute of Nuclear Science and Technology hence each strata had a different sampling fraction.

The study used both qualitative and quantitative approaches by aiming to gather an in-depth understanding of how postgraduate students at the university of Nairobi have utilized information communication technology for their research output.

3.3 Area of study

The study was carried out at the Jomo Kenyatta Memorial and ADD libraries respectively because College of Architecture and Engineering postgraduate students utilize these libraries for research output.

3.4 Target Population

The population of the study comprised of Postgraduate students of College of Architecture and Engineering of an approximate total of 250 students (University of Nairobi, Dean's office on 25th July, 2014 at 10.30am).

3.5 Sample and sampling techniques

This section describes the study sample size and how it has been arrived at.

3.5.1 Sample size

The sample size consisted of 124 questionnaires distributed to the respondents.

Table: 3.1 Sample Frame

| COLLEGE | SCHOOL | POPULATION (N) | SAMPLE SIZE (n) |
|---|--|----------------|-----------------|
| College of Architecture and Engineering | School of the Built Environment | 154 | 61 |
| | School of the Arts and Design | 10 | 9 |
| | School of Engineering | 74 | 43 |
| | Institute of Nuclear Science and Technology | 12 | 11 |
| | | | 250 |

3.5.2 Sampling techniques

Purposive sampling method was used to select respondents from each school who had similar characteristics. Babbie (2004 :20), Purposive sampling targets particular group of people with similar characteristics and entails a selection of population, elements on the basis of the researcher's judgment that they are a representative of the larger population of interest.

3.6 Data collection methods

The study collected data using self-administered questionnaires. The researcher was guided by the study objectives when constructing the data collection instruments.

3.6.1 Questionnaire

Semi structured questionnaires was given to respondents to fill and return to the researcher. Questionnaire was preferred in obtaining data from the vast population because it was economical and easy to administer as opposed to the other methods of data collection.

3.6.2 Interview schedule

The schedule was used to gather data intensively and extensively from postgraduate students from the four schools ; school of the Built Environment, school of Arts and Design, school of Engineering and Institute of Nuclear Science and Technology. In addition, it was also used to collect information that was directly observed or difficult to put down in writing and to clarify and elaborate the purpose of the research and effectively convince the respondents about the importance of the research. This was done to the students who were in their respective lecture halls and libraries.

3.6.3 Observation

Observation was made on some postgraduate students that were neither in the library nor the lecture halls, to supplement the data and make the information more explicit. These students were found in secluded places doing research using their laptops and their cell phones.

3.7 Research instruments

The study collected primary data which was gathered using semi-structured questionnaires where the respondents were issued with the questionnaires. Questionnaires were preferred because

according to Cox (2000), they were effective data collection instrument that allowed respondents to give much of their opinions in regard to the research problem. According to Festing (2007), the information obtained from questionnaires was free from bias and researchers' influence and thus accurate and valid data was gathered.

3.7.1 Pilot study

A pilot study also known as feasibility study was be conducted on a population of 10 students from each school to test logistics and gather information prior to the larger study in order to improve the latter's quality and efficiency. This was not done on the target population. A Pilot study can reveal deficiencies in the design of the proposed experiment and these can be addressed before time.

Pilot study was undertaken to test the data collection tool for understandability and acceptability by the participants. It is requires that that the pilot study should be based on subjects from similar population to that being examined in the survey but not in the same target population. For this study, the pilot was undertaken in four schools in the college of Agriculture and Veterinary Sciences. To undertake the pilot study, one research assistant was trained on how to administer the questionnaire, ethics and data confidentiality. The questionnaires were then administered by the trained research assistant and collected for review before data entry and analysis. Any inconsistencies, blank spaces or any other weak areas were corrected. The analyzed data was used to further improve the questionnaires as appropriate. Once the amended questionnaires were ready, they were taken back for re-administration to the same schools to be sure the instruments were effective in collecting the data. The chosen participants were explained to that data was only for pilot testing. The process helped to fine tune the research tools by giving feedback on their efficiency.

3.7.2 Validity and Reliability

Validity refers to how well a test measures what it is purported to measure. To uphold content validity, the study subjected its instruments to discussions with the supervisors who are professionals to ensure the instrument captures the relevant data to achieve the research objectives as well as answer the research question in the study. To avoid instrumentation as a threat to internal validity, the same research team was retained from pilot testing through the life cycle of the study to ensure uniform and consistent administration of questions. The instruments were also being taken through pilot testing to improve on the efficiency of the research instrument.

Reliability dealt with the quality of measurement thus it is the "consistency" or "repeatability" of the research measures. Mugenda (2008) states that reliability measures the degree to which a research instrument would yield the same result or data after repeated trials, is influenced by random errors that may arise from coding, ambiguous instructions, to interviewer and interviewee fatigue, bias among others. Reliability was done using pilot test. In this study, reliability testing was done by using test-retest method. The questionnaires were administered to selected four schools in the college of Agriculture and veterinary sciences at the University of Nairobi. The questionnaires were administered to the same schools after 2 weeks. Correlation between the test and the retest statistically was done determined using statistical package for social sciences (SPSS). According to Kathuri and Pals (1993) the acceptable correlation coefficient range is 0.70-0.90, in this study a Karl Pearson's correlation coefficient of 0.85 was obtained thus falling within the acceptable range. The Karl Pearson's formula was used

$$r = \frac{\sum (y-Y)(x-X)}{\sqrt{\sum (y-Y)^2 \sum (x-X)^2}}$$

r = Karl Pearson's coefficient of correlation

y= Values of the first test

x= Values of the retest

Y= Mean of the first test

X= Mean of retest

The researcher obtained a research permit from the Director of Information and Library Studies, University of Nairobi to collect data. A rigorous training was then conducted for the research assistants involving informed consent process, how to conduct the interviews, data confidentiality and research ethics. An introduction letter was attached to the questionnaire to seek permission from respondents to be included in the study. Questionnaires were administered directly to the respondents as the researcher did the monitoring and status evaluation of the process. Interview schedules were administered upon agreement.

3.7.4 Ethical considerations

Before the commencement of the study, the researcher provided accurate and complete information to research participants regarding the purpose of the study, in order to obtain their consent regarding participating in it. The research participants were informed of the voluntary participating hence there was no reward whatsoever. Clear instructions were given to the participants before being given the questionnaire to fill. Confidentiality between the researchers and the respondents will be maintained hence the recordings of the interviews and the information collected for data analysis will be used strictly for research purpose.

3.9 Data analysis and presentation

Quantitative data was analysed using both descriptive and inferential statistics. Descriptive analysis included relative frequencies and percentages. The Statistical Package for Social Sciences (SPSS) computer software was used for analysis to generate data array that was used for subsequent analysis of the data. SPSS has descriptive statistics features that assisted in variable response comparison and give clear indications of response frequencies. Descriptive statistics was used to summarize the data. These included percentages and frequencies. Tables were appropriately used to present the data that was collected for ease of understanding and analysis.

3.10 Summary

This chapter discussed the research methodology used in carrying out the study. Further, it highlighted the methods and instruments of data collection and procedures for administering the questionnaires in the field.

CHAPTER FOUR
DATA ANALYSIS, INTERPRETATION AND PRESENTATION

4.1 Introduction

This chapter presented the study findings questionnaire response rate, results on the assessment of utilization of information communication technology for research output among postgraduate students at the university of Nairobi libraries.

4.2 Questionnaire Response Rate

Table 4.1 shows that a total of 124 questionnaires were distributed for administration and 71 questionnaires were returned for analysis yielding a response rate of 57% which was commendable and acceptable by the researcher. The response rate was achieved as a result of an elaborate mobilization strategy which included discussions with the librarians, students, administrators, Information and Communication Technology officers in all the four sampled out schools. The research assistants administered questionnaires and waited for a period of two hours hence others students ended disappearing with them while others simply forgot about them and left them on their tables, this explains why the respondent rate reduced slightly.

4.1 Response Rate

| | | Schools | Sample distributed | No. of respondents |
|--|-------|---|--------------------|--------------------|
| College Architecture Engineering | of | Built Environment | 61 | 35 |
| | and | Arts and Design | 9 | 5 |
| | and | Engineering | 43 | 25 |
| | and | Institute of Nuclear Science and Technology | 11 | 6 |
| | TOTAL | | 124 | 71 |

4.3 Usage of information services

The study sought to establish the usage of information services in the university library systems. From the data collected, the details are explained in table 4.2 below, the findings shows that 38% frequently used library services, 47% occasionally while 15% never used library services for research output.

The results from the interview shows that the respondents occasionally used the library for research output but during examinations period, the students frequently use the library for academic and research work. This is also backed up by the fact that very few respondents interviewed were from the library while others were found in their respective lecture rooms doing their private study. This may be due to the students' possession of personal laptops and access to the wireless services anywhere within the university hence could easily internet facilities without any difficulties.

Table 4.2: Frequency of Library Usage

| | | Frequency | Percent |
|--|--------------|-----------|---------|
| | Frequently | 27 | 38 |
| | Occasionally | 33 | 47 |
| | Never | 11 | 15 |
| | Total | 71 | 100 |

The study also established the extend of use of library services by the various schools as indicated in table 4.3 below; school of Built in Environment had majority of students who used the library occasionally with a total of 35, School of Engineering had 25, then Institute of Nuclear Science and Technology with 6 and school of Arts and Design were 5. In addition, school of engineering and School of Built Environment had the highest number of 4 students who never use the library for research output.

Observably, school of Arts and design had very few students who frequently used the library, this is because they lacked interest in library usage, preferred doing their research work and studies in lecture halls and complained about having in adequate facilities for library usage. On the contrary, school of Built Environment had the most number of students who frequently used the library for their research output.

Table 4.3: Usage of Library Services by Various Schools

| | Respondents | Frequently used | Occasionally | Never | Total |
|-------------------------------|---|-----------------|--------------|-------|-------|
| Respondents' school of origin | School of built in environment | 13 | 18 | 4 | 35 |
| | School of Arts and Design | 1 | 3 | 1 | 5 |
| | School of engineering | 10 | 11 | 4 | 25 |
| | Institute of Nuclear Science and Technology | 3 | 1 | 2 | 6 |
| Total | | 27 | 33 | 11 | 71 |

The study sought to establish the usage of library services by various schools. The findings in table 4.4 shows that college of Architecture and Engineering students are computer literate whereby total of 35 had an average level, with 26 were at very high and 10 students were computer illiterate. Hence from a total of 71 respondents only 10 were computer illiterate, this indicates that students in that college are computer literate.

Observably, many students from these schools were computer usage because they were using the ICT facilities without the assistance of the librarian. From the interviews conducted, many respondents were computer literate hence had little or no difficulty in accessing the available ICT facilities in the library.

Table 4.4 Computer Literacy Levels Amongst Students in the Four Schools

| Computer literacy level | | School of Built Environment | School of Arts and Design | School of Engineering | Institute of Nuclear Science and Technology | Total |
|-------------------------|-----------|-----------------------------|---------------------------|-----------------------|---|-------|
| | Very High | 15 | 1 | 7 | 3 | 26 |
| | Average | 20 | 4 | 9 | 2 | 35 |
| | Low | 0 | 0 | 9 | 1 | 10 |
| Total | | 35 | 5 | 25 | 5 | 71 |

4.4 Usage of ICT facilities for Research output at the university library systems

The study sought to establish the usage of ICT facilities for research output, the findings show that 71% respondents agreed to usage of internet facilities for research output, while 53% denied using laptops and Ipads facilities for research output. The research findings agreed with those of Khan, Bhatti and Khan (2011 p.56) on postgraduates' frequency of ICT usage who reported that internet facilities were used mostly. It was also concluded that laptops and Ipads facilities were the least used ICT facilities by the postgraduate students for their research output.

Table 4.5: Frequency of ICT Usage by Postgraduate Students in the University Libraries

| ICT facilities | Yes | % | No | % | Total | % |
|---------------------------|-----|----|----|----|-------|-----|
| Internet facilities | 50 | 71 | 21 | 29 | 71 | 100 |
| OPAC | 35 | 50 | 36 | 50 | 71 | 100 |
| Digital library resources | 43 | 61 | 28 | 39 | 71 | 100 |
| Laptops and IPads | 44 | 62 | 27 | 38 | 71 | 100 |
| WIFI | 33 | 47 | 38 | 53 | 71 | 100 |
| E-mail facilities | 44 | 62 | 27 | 38 | 71 | 100 |

4.5 Available ICT facilities utilized for research output in the university library systems

Table 4.6 shows that six ICT facilities were available in the university libraries and were identified in as internet technology, OPAC, Digital library resources, laptops and I pads, WIFI facilities and Email facilities. Internet facilities were the frequently used facilities at a rate of 32% while laptops and Ipads facilities were the least used facilities at a rate of 4%. Observably, the majorities of the student have WIFI that have access to the internet via wireless network hence assist them for research output

In addition, the study showed that the six ICT facilities being used in the library under study were in good working conditions. The major challenge was that the respondents were the slow connectivity of the internet.

4.6 Available ICT Facilities Utilized for Research Output in University Libraries

| | Frequency | Percentage |
|---------------------------|-----------|------------|
| Internet facilities | 23 | 32 |
| OPAC | 7 | 10 |
| Digital library resources | 11 | 16 |
| Laptops & Ipads | 19 | 27 |
| WIFI | 3 | 4 |
| E-mail facilities | 8 | 11 |
| Total | 71 | 100 |

4.6 Role and competence of information staff in support of research output

Research findings shows that the respondents use the information staff assistance to utilize ICT facilities for research output in the following ways; orientation and induction of the students on how to use these facilities, seminars which are held twice in a semester to educate the students on the available ICT facilities as well as their usage. In addition, the respondents attested to the information staff assisting them access and use the ICT facilities as well as guiding them throughout the research period hence saving their time.

4.7 Competence of information professionals

Research findings depicts that 54% of postgraduate students occasionally use librarian's assistance to access ICT facilities while, 30% and 16% very often and never use librarian's assistance to access ICT facilities respectively. The findings states that the librarian assistance is rarely consulted by the students while accessing ICT facilities this may be because their ICT literacy level is high, alternatively it is because they assume the librarians will not help them as needed or the librarians are not ICT literate.

4.8 Challenges faced by Postgraduate students in utilization ICT facilities for research output

From the research, it was establishes that the major challenge to utilization of ICT resources by Postgraduate students was slow connectivity of the internet thus the problem raised here seemed to be facing many academic libraries in developing countries. WIFI not being in range was a problem encountered mostly by school of Arts and Design students whereas the other challenges included, low bandwidth, , overcrowding in one workstation, lack of skills in using online public Access Catalogues, lack of e-library to enable them access their resources from remote areas, lack of sufficient I/T staff, super weak network signal, restrictions in the library and security protocols.

4.9 Possible solutions to the challenges

The respondents were also asked to suggest possible solution to the various threats and challenges that inhibit the optimal utilization of these facilities in the library. Their suggestions were as follows; add more resources in the library whereby majority of students suggested equality in resource dispensation. Other solutions included; enhance the connection speed of internet and WIFI should be in range frequently, free internet facilities for students, sufficient Information staff to assist in access and usage of ICT facilities, have a high network signal and lastly, increase awareness and sensitization seminars on the available ICT facilities and ways of accessing them for utilization for research output.

4.9 Feedback on ICT utilization from respondents

Table 4.9 shows that the ICT usage from most students in the college of Architecture and Engineering has improved greatly with a rate of 47% while 13% responded to no improvement in their ICT usage. The results from the interview conducted shows that most respondents research output had greatly improved by using the available ICT facilities under study. Only one respondent attested to have a slight reduction in the usage of ICT facilities for research output.

4.10 Respondents Feedback on the Use of ICT Facilities for Research Output

| | Frequency | Percent |
|-------------------|-----------|---------|
| Greatly improved | 33 | 47 |
| slightly improved | 28 | 40 |
| No improvement | 9 | 13 |
| Slightly reduced | 1 | 1 |
| Total | 71 | 100 |

5.0 Summary

The findings of the study show that most postgraduate students rarely use the library for their research output although there are six available ICT facilities in good working conditions in the library that should be accessed and utilized for research output. On the other hand, the analysis of the results reveals that quite a lot of factors stand as challenges to the optimal utilization of ICT facilities in the university of Nairobi library systems. The entire population of the study generally accepted inadequate numbers of these facilities as well as slow connectivity of the internet as their major challenge. This collaborates with the Edoms(2009:223) finding in his work on the use of ICT facilities in information sourcing and retrieval where it identified inadequate number of facilities as well as slow connectivity of the internet as the major problem to ICT usage.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the study findings, conclusions, recommendations of the study, contribution to knowledge and suggested for future research. The aim of the study was to assess the utilization of information communication technology amongst postgraduate students in university of Nairobi library systems whereas the objectives included; assess the frequency of Information Communication Technology usage by postgraduate students in the university of Nairobi library systems, establish the available Information Communication Technology facilities utilized for research output in the university library systems, establish the competence of information staff in support of Information Communication Technology facilities for research output and identify the challenges faced by postgraduate students in utilization of Information and Communication Technology for research output and suggest possible solutions.

5.2 Summary of the findings

5.2.1 Frequency of ICT usage by postgraduate students

The first objective was to assess the frequency of usage of information communication technology by postgraduates' students in the University Library systems. The findings show that Internet facilities were the most used having a response rate of 71% whereas laptops and Ipads facilities were the least used having a response rate of 53%. These findings show that the respondents prefer the internet to all the other ICT facilities due to its efficiency and effectiveness and have also a wider coverage of information resources. However, laptops and Ipads were rarely used due their cost efficiency and technological knowhow by the students in using them for research output. Eden (2009:235) states that, the internet and WIFI are some of the modern facilities used to process and disseminate information because it is now the fastest medium for transferring and receiving information about ongoing researches, results of research and publications of all kinds.

5.2.2 Available ICT facilities utilized for research output

The second objective was to establish the available information communication technology facilities utilized for research output at the university of Nairobi library systems. The findings show that six available ICT facilities in the university libraries were identified as follows; Internet facilities, Online Public Access Catalogue, Digital library resources, laptops and Ipads, WIFI facilities, e-mail facilities. Observably, laptops and cell phones were also used for research output outside the library systems. The findings from the study show that there is availability of information and communication technology facilities utilized by the postgraduate students for their research output. Majority of the respondents noted that the advent of the internet had negated their need utilize the libraries for their research output. Further, the findings indicated there were inadequate IT staff to assist them access the ICT facilities.

5.2.3 Competence of information staff in support of ICT usage for research output

The third objective was to establish the competence of information staff in support of information communication technology facilities for research output. Findings show that the respondents established various competencies of information professionals which included; developing programmes that provided effective training in the use of e-resources, orientation and induction of students on using the ICT services for research output and organizing of seminars for students on access and utilization of ICT facilities for research output.

5.2.4 Challenges and possible solutions in encountered in ICT utilization for research output

The fourth objective was to identify the challenges faced by postgraduate students in utilization ICT facilities for research output and suggest possible solutions. Findings show that the major challenges faced by postgraduate students was slow internet connectivity with 30% response rate and super weak network signal which resulted to WIFI not being in range hence could not be utilized for research output. The findings affirmed those of Emwanta and Nwalo (2013:56) and Andetrimirin (2012:43) in their studies on ICT Usage by postgraduates in Nigerian Universities that revealed challenges to their use as inadequate ICT resources, slow internet connectivity, low bandwidth and weak network signal.

5.3 Conclusion

- Based on the findings of the study, the research has clearly shown that postgraduate students use the ICT facilities; internet services being the most used at the library systems to access their information needed therefore a positive benefit to them. As good as these resources are, the problems identified with their utilization is the slow connectivity of the internet, WIFI not being in range and weak network signals should be addressed at the university by improving the available ICT facilities and increasing the speed of the internet.
- New advancement in ICT has brought great opportunities for academic libraries by enabling them fulfill their vision and mission by providing users with relevant, timely and up to date information. Academic libraries should take advantage of these opportunities by ensuring that relevant and up to date information communication facilities are available and are utilized for research output frequently. The results of the study can help academic libraries understand that postgraduate students prefer utilizing internet facilities for research output due to its efficiency and effectiveness. In addition more resources should be added in the library to ensure that every student can access and utilize ICT facilities.

5.4 Recommendations

5.4.1 Implementation of ICT based technologies

The university management must implement the scarce ICT based technologies for video conferencing technology, E-learning software, smart card technology, more electronic learning resources and also explore cloud computing technology in order to maximize the usage of IC facilities in the library.

5.4.2 Youth empowerment in universities

The government should empower youth through government institutions through information communication technology this will alleviate poverty and enlighten the youth on the emerging trends of information communication technology.

5.4.3 Laptops be replaced with tablets

The university library should buy tablets for the postgraduate students to utilize them for research output. The idea of laptops should be replaced by tablets which should be placed conspicuously where everyone can access them for research output.

5.4.4 Digital divide

The gap between the computer literate and the computer illiterate should be filled by ensuring the computer illiterate people are trained, encouraged to attend ICT seminars, lecturers on the latest information technology. This will shorten the wide gap that is there between computer literate and illiterate.

5.5 Suggestions for further research

5.5.1 Wider study

A comparative research study which is broader and more qualitative covering a broad area to help understand the different available ICT facilities that are being utilized for research output by undergraduates in both public and private universities.

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APPENDIX I
TRANSMITTAL LETTER

Veronica Nabwire,
P.O. Box 28251 -00200,
Nairobi, Kenya.
Email: veronicanabs@yahoo.com

Dear Respondent,

RE: INTRODUCTION LETTER TO ALL RESPONDENTS

I am a student at the University of Nairobi pursuing a Masters in Library and Information Studies. I am currently undertaking a research project on *“Utilization of Information Communication Technology facilities for research output amongst postgraduate students: The Case of University of Nairobi libraries”*. The objectives of the study are to;

1. Assess the frequency of Information Communication Technology usage by postgraduate students in the university of Nairobi library systems.
2. Establish the available Information Communication Technology facilities utilized for research output in the university library systems
3. Establish the competence of information staff in support of Information Communication Technology facilities for research output.
4. Identify the challenges faced by postgraduate students in utilization of Information and Communication Technology for research output and suggest possible solutions.

The purpose of this questionnaire is to collect data that will be used for academic purpose only. I am requesting your assistance in conducting this research by answering all the questions in this questionnaire.

The information you give shall be treated as confidential. Your assistance will be highly appreciated

Yours Sincerely,



Veronica Nabwire Namunya

Registration Number: C54/60423/2013

APPENDIX II

QUESTIONNAIRE FOR POSTGRADUATE STUDENTS

Introduction

Please respond by ticking (√) against your preferred response for questions with options. For Questions that require suggestions or comments, please use the provided space.

Frequency of ICT usage by Postgraduate students at the university libraries

1. Please select the relevant school that you belong to and indicate your department?
 - a) School of Built in Environment
 - b) School of Arts and Design
 - c) School of Engineering
 - d) Institute of Nuclear Science and Technology

Department.....

2. Number of students in your school
 - a) Between 50 and 100
 - b) Between 101 and 150
 - c) Between 151 and 200
 - d) Over 250 and above
3. How often do you use University of Nairobi and ADD libraries?
 - a) Frequently
 - b) Occasionally
 - c) Never
4. What is your information communication technology literacy level?
 - a) Very High
 - b) Average
 - c) Low

Available ICT Facilities Being Utilized for Research Output

- 5. From the listed ICT facilities, select the ones that are available in the university library sytem.
 - a) Internet technology
 - b) WIFI
 - c) Digital library resources
 - d) Laptops and Ipads
 - e) Radio Frequency technology
 - f) Online Public Access Catalogue
 - g) E-mail facilities
 - h) CD-ROM technology

ii) Which amongst the above ICT facilities are frequently used for research output? Please explain

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.....
.....

Competence of Information Staff in the Provision of ICT Facilities to Postgraduate Students for Research Output.

- 6. How often do you do your research at the university libraries?
 - a) Very often
 - b) Occasionally
 - c) Never

7. How often do you use the assistance of the information staff while accessing the available ICT facilities in the library?

- a) Very Often
- b) Occasionally
- c) Never

8. Highlight the extent to which to which the information staff facilitates your usage of ICT facilities.

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Challenges and Possible Solutions in ICT Usage for Research Output

9. Highlight the challenges that hinder effective and efficient utilization of ICT facilities for research output in the university library system.

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10. What are the possible solutions to the identified challenges?

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11. To what extent has your research output improved by utilization of the available ICT facilities in the library system?

- a) Has improved greatly
- b) Has improved slightly
- c) Has remained the same
- d) Has reduced slightly
- e) Has reduced a lot

12. What are your perception levels about the utilization of ICT resources for research output?

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APPENDIX III

INTERVIEW SCHEDULE FOR POSTGRADUATE STUDENTS

1. Do you frequently use the university library systems for your research output?
2. What is your perception on the available ICT facilities that are used for research output?
3. Do the information staff offer support in utilization of the available ICT facilities in the university of Nairobi library?
4. How have the library staffs facilitated your research output by using the available ICT facilities?
5. What challenges do you encounter while using ICT facilities for research output?
6. What are the possible solutions to the problems you have mentioned above?

APPENDIX IV
OBSERVATION CHECKLIST FOR POSTGRADUATE STUDENTS

| | YES | NO |
|---|-----|----|
| 1. Utilization of ICT facilities in research output by postgraduate students. | | |
| 2. Extent to which ICT facilities are being utilized for research output? | | |
| 3. Do the students utilize the library for research output frequently | | |
| 4. Are there ICT facilities that are frequently used by postgraduate students for research output? | | |
| 5. Ascertain if the students are computer literate | | |
| 6. Do the student's frequently use the librarian's assistance while utilizing the ICT facilities for research output? | | |
| 7. Factors inhibiting against utilizing ICT facilities for research output? | | |

Appendix V: Research Authorization letter