USE AND MANAGEMENT OF INFORMATION SYSTEMS IN ACADEMIC

LIBRARIES IN GHANA

By

Patience Emefa Dzandza

A thesis submitted in partial fulfillment of the requirements for the

degree of Philosophiae Doctor in the Department of Library and

Information Science, University of the Western Cape

Supervisor: Dr. Lizette King

April, 2019

DECLARATION

I declare that *Use and management of information systems in academic libraries in Ghana* is my own work, that it has not been submitted before for any degree or examination in any other university, and that all the sources I have used, have been indicated and acknowledged as complete references.

……………………………

Patience Emefa Dzandza   **August, 2019**

I declare that the thesis *Use and management of information systems in academic libraries in Ghana* was submitted to Turnitin resulting in a similarity index of 11%, but with individual sources either 1% or less than 1%.

…………………………..
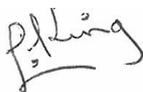
Dr. Lizette King   **August, 2019**

i

DEDICATION

I dedicate this work to the Almighty God for all his gracious mercies and making it possible

for me to complete this course to the Glory of His Holy name.

ACKNOWLEDGEMENT

iii

ABSTRACT

The use of Information Systems (ISs) has been widely accepted and proven to increase the service quality in many organizations. Academic libraries have embraced the use of ISs and have implemented them to perform different activities. The efficient utilization and management of ISs in libraries will help libraries to derive maximum benefit from adopted ISs. The research used the DeLone and McLean (2003) IS success theory to determine the impact of IS management on the quality of the IS, the use of the IS and the benefits gained. The researcher used nine (30%) of the thirty university libraries which are members of the consortium of academic and research libraries in Ghana (CARLIGH) - an association of libraries that help with the IS and electronic resource use of member libraries. A mixed method approach with questionnaires, interviews combined with content analysis of the university websites was used to gather data.

Findings indicated that academic libraries in Ghana are making use of some ISs including; ILS, DAM, social media, websites, among others, amidst a number of challenges. The research also revealed that the management of ISs affects the quality thereof. Quality of ISs affects use, and use affects the benefits gained from use.

The researcher proposed an IS management standard guideline which Ghanaian academic libraries could adopt for using and managing ISs to enhance efficiency and better service delivery.

iv

KEYWORDS

Academic libraries

Consortium of Academic and Research Libraries in Ghana (CARLIGH)

Information system management

Information system use

Information systems

Library management

LIST OF ACRONYMS

BI	Business Intelligence
BITM	Business Information Technology Management
CARLIGH	Consortium of Academic and Research Libraries in Ghana
CCTV	Closed Circuit Television
Cloud ERP	Cloud Enterprise Resource Planning Systems
Cloud OPAC	Cloud Online Public Access Catalogue
CMS	Content Management System
CRM	Customer Relationship Management
DAM	Digital Asset Management
DAMS	Digital Asset Management System
D and McLean IS model	DeLone and McLean Information Systems Success Model
DBMS	Database Management Systems
DLMS	Digital Library Management Systems
DM	Data Mining
DSS	Decision Support Systems
DW	Data Warehousing
EBD	Environmental-Base Design
ECA	Embodied Conversational Agents

vi

EDPS	Electronic Data Processing Systems
EIS	Executive Information Systems
EISs	Enterprise Information Systems
ERP	Enterprise Resource Planning
FTP	File Transfer Protocol
GDSS	Group Decision Support Systems,
GIS	Geographic Information Systems
HTTP	Hypertext Transfer Protocol
IBM	International Business Machines Corporation
ICT	Information Communication Technology
IDSS	Intelligent Decision Support Systems
ILS	Integrated Library Systems
IM	Information Management
IM	Instant Massaging
IoT	Internet of Things
IR	Institutional Repository
IRM	Information Resource Management
IS	Information System
ISs	Information Systems

vii

IST	Information Systems Technology
IT	Information Technology
KBDSS-ERM	Knowledge-Based Decision Support System for Enterprise Risk Management
KMS	Knowledge Management Systems
LAN	Local Area Network
LMS	Learning Management Systems
LMS	Library Management systems
LSPs	Library Services Platforms
MES	Manufacturing Execution Systems
MIS	Management Information Systems
MIS	Management Information Systems
MRP	Manufacturing Resources Planning
MRP	Material Requirement Planning
NLI	Natural Language Interaction
OLMS	Online Learning Management System
OPAC	Online Public Access Catalogue
OS	Open Source
OSS	Open Source Software

viii

PLM   Product Lifecycle Management

RFID   Radio Frequency Identification

RLMS   Resource List Management System

RSS   Rich Site Summary and Really Simple Syndication

SCM   Supply Chain Management

SL   Second Life

SMS   Short Message Service

TPS   Transaction Processing Systems

TABLE OF CONTENTS

x

LIST OF FIGURES

UNIVERSITY *of the*
WESTERN CAPE

LIST OF TABLES

xxvi

CHAPTER ONE: INTRODUCTION TO THE STUDY

1.0: Background to the study

Information Technology (IT) has impacted all aspects of human life. One such impact is the use of IT to manage information. Information is being generated at a rate that is making it difficult for individuals and organizations to keep up with the pace; this has made information management an important obligation for both individuals and organizations. It has therefore become imperative to be able to filter irrelevant from relevant information and also make effective use of the required information in good time. End users of information, who are familiar with Google, are no longer ready to wait for information to be provided but expect information to be delivered even in real time. In the words of Makori and Mauti (2016:1) '…in this competitive world, information organizations and professional leaders need reliable and timely information in order to implement solutions that are cost effective in service delivery'.
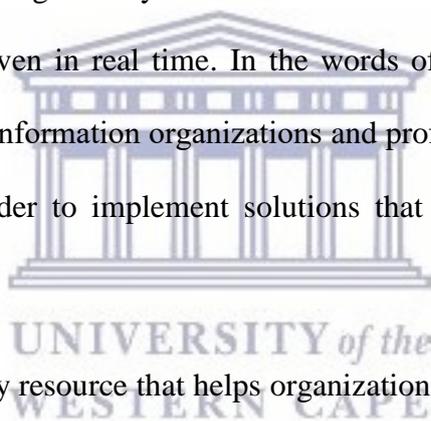
Information is now a necessary resource that helps organizations to deliver on time lines, win over markets and satisfy their clients, and this can also be said of academic libraries as they compete with other information service providers to show their relevance. Rowley and Hartley (2008) indicate that in the 21st century's knowledge-based society, information is integral to everyone's existence, therefore everyone's ability to retrieve, select, evaluate, process and use information is pivotal in becoming successful.

For organizations to be able to make better use of information, they must, with the help of technology, make use of information systems in their daily activities. O'Brien (2005) states that information systems have become vital components of successful businesses and organizations. Laudon and Laudon (2014) also intimate that, information systems have

1

become essential in conducting day to day business in the United States, and most other developed countries, to achieve strategic business objectives, and that there is a growing interdependence between a firm's ability to use information technology and its ability to implement corporate strategies and achieve goals. Stilwell (2012), cited by Makori and Mauti (2016), states that information providing agencies like libraries and professional leaders need business solutions using information and communication technology infrastructure to manage information.

Academic libraries like many other institutions have implemented IS to manage their routine tasks in order to meet current trends and provide better services to their customers. Academic libraries, according to Bailin and Grafstein (2005), in the 21st century are no longer seen as a place but as a set of functions and services backed by information system applications. According to Feather and Sturges (2001), information systems in libraries have enabled academic libraries to provide all their services within their institutions and have helped the library system to be integrated with institutional information systems to provide extended access to library resources within and outside the university community.
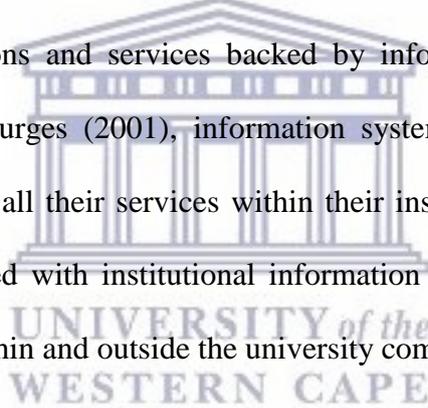
Though Africa lags behind in the application of technology to library services, compared to the more developed countries, the application of technology to libraries is not totally absent. Academic libraries in Ghana in particular have tried to bridge the technology gap by using IS and Internet technology.

For organizations such as libraries to derive maximum benefit from the use of IS, they need to manage and evaluate the performance of these systems in order to determine if the systems are helping them achieve their business objectives. Information systems are now a major component of many organizations including academic libraries. Huge sums of money are invested into the acquisition of these systems. Libraries therefore have the task of using these

2

systems to the optimum in order to harness maximum benefit from the systems and to ensure the systems are functioning well through prudent management practices. Without proper management of information systems, libraries become weak and obsolete and may no longer fulfil the needs for which they were acquired in the first place. This was stated clearly in the 2016 Library Systems Report (Breeding 2016), namely that using weak and obsolete information systems affects a library's success. Moreover, Breeding (2016) stated that in this modern era of web-based and cloud computing, some library technology has held fast to aspects of the previous age of client-server computing and if this continues to be the case then, library systems will continue to see an uneven progress. Breeding (2016) also predicted that library technology infrastructures will affect their ability to manage internal operations efficiently as well as to deliver high-quality personal or online services therefor weak or obsolete technology products will impede success.

Laudon and Laudon (2010), stated that, strategic information systems often change the organization as well as its products, services, and operating procedures, driving organizations into new behavioral patterns. To them successfully using ISs to achieve business objectives is challenging and requires precise coordination of technology, organization and management. They further stated that most businesses do not get the best out of ISs as a system takes on a life of its own and does not serve the interest of the organization often resulting in failed business objectives. Many year ago O'Brien (2005) indicated already that success in the business environment depends on maximizing the use of ISs, but warned that because managing ISs is a major challenge for both business managers and IT professionals, management is often neglected. For effective maximization, O'Brien (2005) proposed that ISs must be managed to support business strategies, processes and structures. Makori and Mauti (2016) alerted to the requirement of effective and efficient management of information resources in organizations stipulated by the International Standards Organization for

knowledge management practices and enhanced and improved provision of quality services to customers. For this reason, this researcher investigated how academic libraries in Ghana use and manage their information systems for maximum benefit.

A few studies, for instance Amekuedee (2005), Boateng, Agyemang, and Dzandu (2014), Thompson and Pwadura (2014), as well as Adanu (2006), have been conducted in Ghana on library automation in academic libraries, but these concentrated on the automation process, the impact thereof on libraries and the challenges experienced. Very little has been done to determine the types of IS that are implemented in academic libraries in Ghana, how the IS that are implemented during automation are managed and used to deliver enhanced library services. This study, therefore, sought to determine which IS systems are used in academic libraries in Ghana and how they are managed. The thesis will therefore fill a vast/considerable gap in the library literature from Ghana.

1.1: Definition of concepts

This section defines information system and academic library which are the major concepts for this study.

1.1.1: Information System (IS)

O'Brien (2005) defines an IS as any organized combination of people, hardware, software, communications networks and data resources that collect, transform, and disseminate information in an organization and are used to support business processes, support decision making and to support strategies for competitive advantage. This concept is discussed further in the next chapter.

4

1.1.2: Academic library

Academic libraries, according to Feather and Sturges (2001), are libraries attached to post-secondary educational institutions, that support the academic activities of students and staff. They provide materials and services to enhance the academic works of students and support teaching staff. Academic libraries also enhance the research status of universities (Brush and Jiras, 2019).

Academic libraries provide well organised information resources and services that support the academic community to acquire knowledge, impart knowledge, investigate problems and provide extension services in universities. They are regarded as warehouse of organised information. The information resources of academic libraries are therefore regarded as strategic resources which serve as foundation for the development of curricula (Makori, 2013).

In an attempt to describe the role of academic libraries, McCarthy and Ortiz (2010) state this succinctly that academic libraries are part of the essential facilities for providing intellectual work. They make a great impact on the scholastic work of the institution they serve taking into consideration the past, current and future missions of the education institution.

As described above, academic libraries have always made significant contributions to research and the transmission of knowledge in every academic discipline. They have acted as transformation agents in the community, the state and the nation by the support they provide to meeting the demands and aspirations of learners and scholars. To perform their role in academia effectively in the digital age, academic libraries need to perform their traditional roles of acquisition and distributing of information for scholarly purposes with electronic tools. Digitization of academic library services will enhance information delivery and make

5

academic information accessible to academics and members of the general public nationally and internationally (Iwhiwhu and Eyekpegha, 2009).

Also, Husain and Nazim (2015) posit that academic libraries promote educational and research activities in the 21st century using ICT and electronic information resources. Academic libraries have been quick to adopt computer solutions including Internet, library 2.0 to support the process of knowledge capturing, storing and sharing in support of research 2.0 (Koizumi and Widdersheim, 2019; Koltay, 2019). Moropa, (2010) is of the view that ICT adoption into libraries has made academic libraries very dynamic. This situation, he postulates, is very challenging, especially for academic libraries in Africa, due to frequent upgrades in technology, changes in legislation, coupled with financial challenges.

Ghana is endowed with a number of academic libraries. Every tertiary institution is, by the national accreditation board, required to establish a functioning library to assist the teaching and research needs of the organisation. The academic library sector is leading the library industry in Ghana. They have qualified library professionals and library resources and attempt to provide library services with modern ICT tools to meet the teaching and research needs of the institutions that they support.

1.2: Statement of the problem

A preliminary review of the literature reveals that a number of studies have been conducted on library automation in Africa by researchers like Amekuedee (2005), Mutula (2012), Adogbeji and Adomi (2005) as well as Garcha and Buttlar (1996), but not much is found on how information technology – specifically an IS - is being used and managed for effective information flow and service delivery in academic libraries in Africa. It has been noted that IFLA has only a standard for OPACs and not yet one for a general information system. The state of Taxes in the United States of America has Library Automation Standards and

6

Guidelines as far back as 1995 (Texas State Library, 1995) but concentrates only on the use of Library Management Systems but no standard was found from the American Library Association. In South Africa, an attempt has been made to develop a standard for purchasing of information systems in libraries (Kirsch, 2014). Ghana has not yet developed a national standard for library information systems. Preliminary field investigations and literature search by the researcher show that, academic libraries in Ghana are also confronted with a number of challenges including, but not limited to, ISs failure, obsolete technology or inappropriate ISs, lack of skills to use the IS, inadequate computer and internet facilities and lack of funds (Amekuedee, 2005; Boateng et al., 2014 and Thompson and Pwadura, 2014).

These problems prompted an interest in the researcher to investigate how information systems are used and managed in academic libraries in Ghana and to develop a standard guideline to manage these systems for better information flow and service delivery.

1.3: Hypotheses

From the problem statement, the researcher formulated the following hypotheses:

H1 Management of ISs affects the quality of ISs in academic libraries in Ghana.

H2 The quality of ISs affects the use of ISs in academic libraries in Ghana.

H3 IS use affects service provision in academic libraries in Ghana.

H4 Challenges affect the use of ISs in academic libraries in Ghana.

1.4: Objectives of the research

The objectives of the study were to examine how academic libraries in Ghana use and manage their ISs and to use the DeLone and McLean (2003) success model to determine the impact of management of IS on quality of information systems, quality information and use.

7

The study also aims to develop a Ghanaian standard guideline for managing ISs, to enhance efficient service delivery in academic libraries.

1.5: Research questions

1. What types of ISs are being used in academic libraries in Ghana?

2. What services and products do academic libraries in Ghana provide using ISs?

3. How does an IS affect services provided by academic libraries in Ghana?

4. Which challenges are encountered in the use of information systems in the academic libraries?

5. a. Do academic libraries have strategic plans in place for managing ISs?

    b. What factors/aspects should be addressed by a strategic guideline for managing ISs?

6. What opportunities exist to formulate a national IS standard guideline for Ghana?
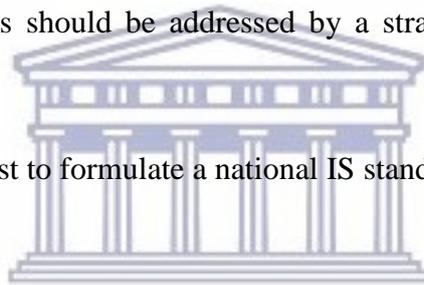
1.6: Theoretical framework

The DeLone and McLean (2003) IS success theory was adapted as a theoretical framework and the study was situated within this theory. Though the Technology Acceptance Model and Model of Internet Adoption could have been used, Bernroider (2008) suggests that these models could be used to assess how organizations use ISs, but they do not provide a holistic picture of what comes out after the adoption. The researcher, therefore, proposed the use of the DeLone and McLean (2003) IS success theory. According to the developers of the theory, the assessment of an IS is essential in determining the impact of managerial efforts and the value of the IS.

8

1.7: Research design and methodology

For the purpose of this research the post-positivist paradigm was chosen. A combination of qualitative and quantitative methods, called mixed methods, was adopted. Mixed methods, according to Creswell (2003), gives the opportunity to collect diverse types of data which best provide an understanding of a research problem. This method generally uses separate quantitative and qualitative methods as a means to offset the weaknesses inherent within one method with the strengths of the other method. The administration of questionnaires was the quantitative method adopted, and interviews and content analyses were used to collect qualitative data for the research. This enabled the researcher (to) collate quantitative responses on uses of the system, and to use the qualitative means to have interaction with heads of the libraries and the IT units on policy issues which may be difficult to acquire quantitatively.

Member libraries of The Consortium of Academic and Research Libraries in Ghana (CARLIGH) that use ISs provided relevant information on how they use and manage the IS they have implemented. CARLIGH was established in 2004 with a vision of being a centre of excellence in providing information resources. CARLIGH aims at using collective efforts of member libraries through available technology to improve teaching, learning and research in Ghana. There are as at the time of this research 30 academic library members of CARLIGH (CARLIGH, 2015).

The researcher used all staff who use ISs in all the libraries purposively selected. This enabled the researcher to solicit responses covering every function that is performed in the libraries. The research design and methodology will be discussed in detail later in the thesis.

9

1.7.1: Data collection instruments

A questionnaire was used as a quantitative data collection instrument. The questionnaire was used to solicit responses from 149 staff members who use ISs in all the libraries selected.

The researcher conducted interviews with all nine head librarians and five heads of IT/IS units. These interviews were recorded with an electronic recorder and later transcribed.

Content analysis of the websites of the selected libraries was done using the Pareek and Gupta, (2013) academic library website check list to determine services provided online, their content as well as navigational strength.

1.7.2: Pilot test

The questionnaire, interview schedule and the check list were tested at the Accra Polytechnic library, located in Ghana, two months ahead of the actual data collection time, to give ample time for possible corrections to be made. This was to enable the researcher to determine if the data collection instruments produced the data needed to answer the research questions. The respondents at the Accra Polytechnic library perform similar functions and use a similar IS as do the respondents in the other libraries used for the study. Accra Polytechnic library is a member of CARLIGH and was among the topmost polytechnics in Ghana based on university web ranking and reviews (4international colleges and universities, 2016)

1.7.3: Data analysis and presentation of results

The Statistical Package for Social Sciences (SPSS) was used to capture and analyse quantitative data. Atlas.ti was used to analyse the qualitative data. Descriptive analysis tools were employed to develop tables and frequencies which were constructively analysed. The results were presented in narrative text, table and graphs. The content analysis of academic

library websites was presented in a narration form according to the adapted check list of Pareek and Gupta (2013).

1.8: Significance of the study

This study provides comprehensive first-hand information on how ISs are used and managed in academic libraries in Ghana. The study hopes to inform the library managers in Ghana of the extent to which libraries are using ISs, the challenges of using IS in libraries and what can be done to improve usage in order to increase service quality. The researcher, based on findings of the study, developed a Ghanaian national IS standard guideline to serve as guideline to be used in information centres. To academia, the study has filled a gap in knowledge by providing literature based on research into the management and use of IS in libraries and has paved the way for further research in the field of IS use and management in libraries.

1.9: Delimitation of the study

The study was carried out in university libraries and not libraries attached to polytechnics, colleges of education or nursing and midwifery training colleges. These libraries could not be chosen because the government of Ghana has upgraded some of them to university status, but they are waiting for the parliament of Ghana to pass a bill to complete the process. It is therefore difficult classifying them as either college or university libraries. Although a national standard guideline was developed, it will only serve as a guideline, as no generalizations can be made.

1.10: Ethical considerations

The researcher abided by the University of the Western Cape policy on research ethics throughout the conduct of the study. By this, the researcher completed, signed and submitted a research ethical statement. Respondents were assured of the anonymity and confidentiality

11

of their responses and were not requested to write their names on the questionnaires. Data were used for academic purpose only. The principles of honesty and integrity were highly adhered to, and falsification of data, plagiarism and fabrication of results were avoided. Consent to conduct the research was obtained from the University of the Western Cape authorities as well as from the Ghanaian universities involved prior to commencement of the research. Laws, legislation and policies pertaining to access and protection of information were adhered to. Privacy and confidentiality of participants were respected. A participant's permission was requested before collection of data was done.

1.11: Chapter outlines

Chapter One discusses the background of the study, Chapter Two, reviews relevant literature in the areas of IS concepts, ISs in libraries, management of ISs, benefits and challenges of ISs. Chapter Three concentrates on the theory that underpinned the study. Chapter Four describes the research design and methodology in detail, while Chapters Five, Six and Seven present the data. Chapter Eight discusses findings, Chapter Nine provides the summary of findings, draws conclusion by answering the research questions and also provides recommendations and the presentation of an envisaged standard guideline for IS use and management in Ghanaian university libraries.

1.12: Concluding summary

This chapter has highlighted the basis of the study, giving particular attention to the background of and motivation for the study. It supplied a brief description of the research problem, objectives, questions, design and methodology. It also introduced the conceptual analysis and theoretical framework that guided the research. The significance, limitations and ethical considerations of the study were discussed. An outline of chapters supplied an

overview of the whole study. The next chapter provides a review of relevant literature on the

IS concept, ISs in libraries, management of ISs as well as benefits and challenges of ISs.

13

CHAPTER TWO: LITERATURE REVIEW

2.0: Introduction

A literature review is a synthesis of research that has been done in a specific area of study with the aim of bringing different aspects of the literature together (Wentz, 2017). This chapter therefore reviews relevant literature deemed pertinent to this research. The chapter is arranged under four sub-topics:

- Information systems concepts,

- Information systems in libraries,

- Use and management of information systems,

- Benefits and challenges with the use and management of information systems in libraries.

2.1: Information systems concept

This section provides definition of information systems, historical development of information systems, uses of information systems and types of information systems.

2.1.1: Definition of an IS

The system theory states that systems are made up of three basic sub-systems: a physical sub-system (this is the operational component made up of human ware, equipment and work procedure), a decision sub-system which provides direction and evaluation of the system and finally an information sub-system where data is manipulated, stored and generated. The three components of a system can each stand as a complete system by themselves (Romero and Vernadat, 2016). Bajgoric (2006) also lists the fundamental concepts that may define a system as proposed by Churchman (n.d) as:

14

System is teleological: this indicates the intended benefit of the system.

The environment of a system: this comprises the external factors that affect the system.

System resources: these are the resources needed to operate a system.

The system has teleological components: these are internal factors that determine the performance of the system.

Management of the system: efforts that are made to ensure the system functions properly.

The researcher agrees with Zubkov and Shcherba (2012) and Romero and Vernadat (2016) on the classification of information systems (ISs) as a component of the general system theory due to the fact that an IS as a system has the three components listed by Romero and Vernadat (2016), namely physical components, a decision sub-system and an information sub-system as explained above, and Bajgoric's (2006) fundamental concepts of a system can be identified in any information system.

O'Brien, (2004) defines an IS as any organized combination of people, hardware, software, communications networks, and data resources that collect, transform, and disseminate information in an organization and are used to support business processes, decision making and strategies for competitive advantage. To Laudon and Laudon (2014) an IS is a set of interconnected elements that collects information about individuals, locations and other phenomena inside or outside an organization, to manipulate, store and disseminate information to aid organizational decision making and control in an organization and help members of the organization to examine complex situations to create new ideas. Zhang (2013) also defines an IS as an interrelated set of components manipulated by humans to provide information to enhance workflow in an organisation. Beeson and Chelin (2006) indicate that the IS field involves four basic elements as follows:

15

- management of data, information, and knowledge, and information systems and services;

- information in organizational decision making and integration of information systems with organizational strategies and development;

- information systems' design, development and maintenance;

- economic, organizational, social and cultural effects of technology-based information systems

Many organizations have invested in numerous ISs, and the advantages that can be derived from them is determined by their usage. This makes the use of ISs an important component of every organization (Shaikh and Karjaluoto, 2015).

Zhang (2013:59) has written on the evolution of ISs, the research aimed at investigating existing literature and on research on ISs to analyse and to model the IS concept using an Environmental-Base Design (EBD). The work reviewed a number of relevant publications to determine how an IS' definition and framework have evolved. Zhang posits that the evolution process of an IS is demonstrated by systems such as: "Electronic Data Processing Systems (EDPS)/Transaction Processing Systems (TPS), Management Information Systems (MIS), Database Management Systems (DBMS), Decision Support Systems (DSS); Group Decision Support Systems, (GDSS), Intelligent Decision Support Systems (IDSS), Executive Information Systems (EIS), Material Requirement Planning (MRP), Manufacturing Resources Planning (MRP II), Enterprise Resource Planning, (ERP), Data Warehousing (DW) and Data Mining (DM), Business Intelligence (BI), and the, application systems in the internet environment".

Bacon and Fitzgerald (2001) agree with Zhang's argument when they stated that different names are used to refer to an IS, for example management information systems (MIS),

information management (IM), information resource management (IRM), Business information technology management (BITM), information system (IS), information technology (IT), information communication technology (ICT) and information systems technology (IST) and points out that in all the names it is only the word "information" that keeps recurring. The use of different acronyms for an IS is also evident in Romero and Vernadat (2016) who use the term Enterprise Information Systems (EISs) as a synonym to an IS. Zhang (2013: 60, 62) specifically indicates that the concepts Management Information System (MIS), Management Information Systems (MISs) and Information Systems (ISs) are synonymous and can be used interchangeably. To help make this distinction, he offered a definition:

"MIS as a specific management information system, and MISs, as a collective term which includes a body of technological systems such as DSS, ERP, BI, etc. (in this sense, MISs is identical with ISs) …In terms of information systems, MISs range from the original, basic data processing system that records transaction data to sophisticated expert system, such as intelligent computer programs that provide advice on decision making. The representative enterprise information systems include: EDPS/TPS, MIS, DBMS, DSS, GDSS, IDSS, EIS, MRP, MRP II, ERP, DW and DM, and BI, etc. Each system represents a certain stage in the process of the MISs evolution. They have distinguished advantages to meet different business management requirements".

However, Zhang (2013) has noticed that the traditional IS has been fragmented due to the reason that specialized ISs have been built to meet the total needs of an organization. While the different specific ISs were being built, the core components of an IS were stable during the evolution process. Zhang further states that ISs have expanded since inception from transaction processing to support administrative and management functions, organizational

17

and inter-organizational functions, but he bemoans the fact that there is no existing framework nor any model that defines an IS systematically and holistically.

Zhang (2013)'s review of relevant literature shows that an IS is multidisciplinary development comprising computer science which provides the logical components of the computer, management science which finds use for the system and organization science which provides resources to use the system.

The history of ISs shows that about 1960, data network technology was enhanced, which brought about the design and use of electronic data processing systems (Shaikh and Karjaluoto, 2015). This brought about the birth of ISs with the availability of computers in organisations in the early 1960s when computers were used to automate manual tasks. The first ISs were used as stand-alone systems for intensive data processing (Romero and Vernadat, 2016) like transaction processing systems (Shaikh and Karjaluoto, 2015). ISs later advanced from data processing functions to support information flow, reporting and data organization. This advancement enabled data to be processed into more meaningful information and were known as management information systems or management support systems (Romero and Vernadat, 2016 and Shaikh and Karjaluoto, 2015). Romero and Vernadat (2016) indicate that the MIS was the first specific named IS to come into being in the early 1970s. Shaikh and Karjaluoto (2015), however, state that MIS was developed at the later part of the 1960s. ISs designed to provide specific assistance for specific decision making tasks were developed in the 1970s and these systems were regarded as decision support systems (DSS). The 1980s brought about the development of the executive support system (ESS) and artificial intelligence (AI). This brought about the introduction of knowledge management systems (KMS) and expert systems (Shaikh and Karjaluoto, 2015). Material requirements planning (MRP) and manufacturing resources planning (MRP) were

18

introduced in the 1980s. Enterprise resource planning (ERP) systems aimed at integrating databases and operational business functions behind the scenes and these included support for staff and management that were developed in the 1990s. After 2000, ERP has been advanced upon to extend beyond organizational boundaries to incorporate inter-organizational collaboration with external stakeholders of an organization (Romero and Vernadat, 2016). Boddy, Boonstra and Kennedy (2005) also posit that from 1965 to 1975, routine tasks with high efficiency gains like payroll, stock control and invoices were automated. The next decade saw the wide spread of automated systems with the design of smaller information systems. From the mid-80s information systems that support managers directly were developed. The introduction of an internet based IS in the 1990s brought about an integrated IS. Boddy, Boonstra and Kennedy (2005) note the rapid evolution of ISs and attribute this to what they term 'three forces of change', namely relentless business pressures, fast changing technology and rapidly evolving organizations that needed the support of modern information systems. Boddy, Boonstra and Kennedy (2005) also note that ISs can vary in their geographical scope of operation by the following characterizations:

Individual: these are systems that allow individual work stations to download data from company-wide systems for specific task like word processing, spreadsheet programmes and database management systems. Individuals use the systems for their control, but the data extracted from the company's database are not current and such systems do not link easily with other systems.

Local or departmental: departments with distinct tasks may have separate ISs and are usually on a departmental local area network.

19

Company-wide: these are systems which integrate departments and people throughout the organization. With such systems, data and information sharing among organizational units is made easy.

Inter-organizational systems: such systems link an organization to its external stake holders using networks.

2.1.2: Use of ISs

Laudon and Laudon (2014) indicate six objectives of every IS: operational excellence where businesses seek to improve the efficiency of their operations in order to achieve higher profitability. Development of new products and services with an IS as the backbone; customer and supplier intimacy, where businesses rely on ISs to really know their customers and suppliers and serve them well, improve decision making, competitive advantages and finally to survive. Businesses therefore invest in ISs to aid them by using technology to win customers, sustain them and to reach efficient outcomes. In the corporate world information has now become a necessary resource as organizations need to meet time lines, outrun their competitors and satisfy customers. Rowley and Hartley (2008) indicate that in the 21st century knowledge-based society, information is integral to everyone's existence; therefore one's ability to retrieve, select, evaluate, process and use information is pivotal in becoming successful.

For businesses to be able to make better use of information with the help of technology, most businesses now use information systems in their daily activities. O'Brien (2004) states that information systems have become a vital component of successful businesses and organizations. Laudon and Laudon (2014), also intimate that information systems have become essential for conducting day to day business in the United States and most other developed countries to achieve strategic business objectives, and that there is a growing

20

interdependence between a firm's ability to use information technology and its ability to implement corporate strategies and achieve goals. An IS has evolved into an organizational engine that is driving current businesses and is used for competitive advantage (Bajgoric 2006; Gökşen, Damar, and Doğan, 2016). Pereira (2016) reporting on a research on the role of social networks in SME performance agrees with Laudon and Laudon (2014), that the economic environment is unstable and characterized by rapid transformation and this has forced firms to adopt the use of ISs such as social networks or the media to stay competitive. This factor is also emphasized by Pilemalm, Lindgren and Ramsell (2016) when they state that emerging solutions to organizational problems in the 2lst century require some kind of IS/ICT support. The wide extent of IS usage has led to the new concept 'pervasive information system' as used by Fatma, Jedidi and Gargouri (2016) to mean excessive use of ISs (Myrtidis and Weerakkody, 2008). An IS helps provide managers with quality information to aid decision making and to help management perform its functions effectively. An IS also provides different options for decision-makers from which relevant choices can be selected to help produce relevant decision (Ada and Ghaffarzadeh, 2015).

Fattahi and Afshar (2006) have produced a conceptual paper on added value of information and an IS and indicate that easy and quick retrieval of needed information are two major factors in using an IS. This helps to save the time of the user and the professional, and this brings about added value. Though Fattahi and Afshar (2006) did not use any model or research setting from which they collected data, they were able to argue through available literature, that ISs are designed to ease routine activities, add value to organizational information through processes and help to make decisions. Fattahi and Afshar (2006) agree with Boddy, Boonstra and Kennedy (2005) who outlined the functions of an IS as operational, monitoring, decision support and knowledge management. Bajgoric, (2006), who used a more scientific method as compared to Fattahi and Afshar (2006) by applying a

21

systems approach to determine the continuance of ISs in businesses, also determined that ISs in businesses process data with high availability ratios are reliable and secure. An IS provides multi-platform data access, including support for all commonly used computing devices, and enhances better decision making through better access to business-critical information wherever and whenever required. The functions and values of ISs have thus been proven by both scientific and less scientific methods, as applied by Bajgoric (2006), Boddy, Boonstra and Kennedy (2005) and Fattahi and Afshar (2006).

Alaraifi, Molla and Deng (2012) explored data centre ISs. They reviewed relevant literature and discovered that in the literature, four dimensions have been identified for the functions of an IS. These dimensions do not operate separately and are named as an IS' role, management level, portfolio, and utility. Regarding ISs' roles Alaraifi, Molla and Deng (2012) indicate that an IS plays three important roles in an organization. These roles have been referred to as automation, informatisation and transformation. Automation is usually the first role and is done by replacing human efforts with computerized system to reduce cost of labour. Informatisation helps improve the link of knowledge sharing within an organization by enhancing information flow among organisational members. Transformation is regarded as the first role of an IS in an organization as it enables modification in the quality of inventions and facilities in an organization. The management level dimension shows that most organisations are using ISs to facilitate communication systems, to aid effective networking at the various levels of management and to help in management decisions making processes. An IS' portfolio is categorised into strategic, informational, transactional and infrastructure. Strategic IS portfolio denotes IS classes that help organizations gain economic advantages and positions in their businesses. Informational portfolio provides the needed information of lower and middle level managers in organizational routines. Transactional portfolio computerises regular activities aimed at cost reduction. Infrastructure portfolio makes

available flexible means of using shared ISs over a period of time. An IS utility is the classification of an IS using the tool view and this will group ISs into four categories: a tool for replacing labour, a tool for increasing output, a tool for handling information and a tool for improving social interaction.

The functions of an IS as applied in various organizations as discussed above have been outlined by Boddy, Boonstra and Kennedy (2005) as:

Operation: performing routine task by rationalizing and standardizing transactions in an efficient, reliable and uniform manner. Such systems also exchange data between organizations. Systems that perform such functions are termed Operational or Transaction processing systems.

Monitoring: this role helps the IS to check the operation of an activity consistently.

Decision support: they help organizations to calculate the consequences of different alternatives before they take a decision. Such systems are called Decision Support systems

Knowledge generation: they are information systems that help make decisions by incorporating human knowledge into the system –these are called knowledge management systems.

2.1.3: Types of ISs

The ISs used by an organization can stand alone, be interfaced with others or tightly integrated with an IS within or outside the organization. ISs can be categorized as transaction-oriented, database centric, form-based, workflow-driven, Web application, enterprise portal or Web site applications (Romero and Vernadat, 2016). Businesses have different business processes, interests, specialties and levels, for this reason. Different ISs are

available to help meet the specific needs of an organization (Laudon and Laudon, 2014). To help classify the numerous ISs available for use in meeting the different organizational needs, Laudon and Laudon (2014) provide three broad levels of categorization. Namely;

- ISs that support decision making needs of an organization

- Enterprise applications

- Collaboration and communication systems

2.1.3.1: ISs that support decision making needs of an organization

These are ISs designed to support the decision making requirements at the different levels of management in an organization. Operational, middle and senior management need particular types of IS to help their decision making needs (Laudon and Laudon, 2014). ISs that have been classified under this category are Transaction Processing Systems (TPS), Management Information Systems (MIS), Decision Support Systems (DSS) and Executive Support Systems (ESS). It has however been noted that functional systems that operate as stand-alone have not been helpful to organizations as they cannot exchange information to enhance intra-organisational processes and are therefore being substituted by integrated ISs (Laudon and Laudon, 2014).

2.1.3.1.1: Transaction Processing Systems (TPS)

These are computer-based systems that are used by operational managers to record daily routine transactions to help them keep track of basic transactions in an organization in the form of sales, receipts, stock etc. Such systems are designed to offer responses to regular kind of questions and to enable seamless routines within an organization. Operational managers utilize TPS to observe organisational activities and to relate the organization's activities with the outside world and they are used to feed information into other types of ISs (Laudon and

24

Laudon, 2014; Takahara, Liu, Chen, and Yano, 2005). TPS are designed for operational managers and staff who are engaged with routine processes to generate activity reports. TPS help organisers and managers make temporary decisions that will not have immense impact on the organisation (Shaikh and Karjaluoto, 2015). TPS are utilised to assist organisational activities in different environment such as airlines, banking, insurance and the telecommunication sectors. They are used to automate business transactions that need to be performed with consistency and reliability. TPS have clearly served as the backbone of many modern businesses and are business critical applications. Because of their critical nature, TPS need to be designed to meet high quality service standards (Hühn, Markl and Bichler, 2009). Hühn, Markl and Bichler (2009) in their research to predict the performance of queuing networks, describe TPS as queuing systems with distinct demarcations for jobs, waiting lines and service stations. The different service stations in a TPS form queues in a network. The output from one work station becomes the input of the next work station. They indicate, however, that it is difficult to predict the response time of the different workstations in the network since it is developed in a nonlinear order.
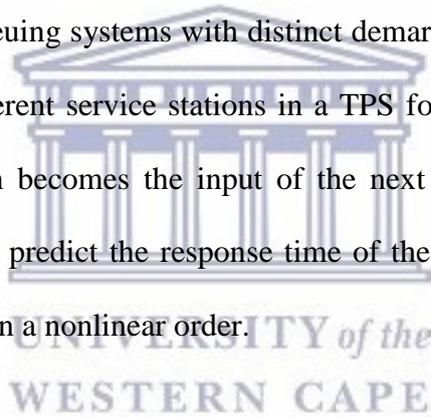
TPS have data transformation systems that transform data into information by abstraction or data mining. The information retrieved is transferred to a problem solving system (Takahara, et al., 2005). Das, Agrawak and El Abbadi (2013) developed ElasTraS, an elastically scalable transaction processing system for multitenant cloud platforms. ElasTraS embodies a combination of three design values that enable sharing of resources within the different facets as well as ensure effective delivery, low latency transaction processing, and low overhead live database migration. According to the developers, ElasTraS efficiently supports transactions by restricting operational accesses to one node and eliminates the requirement for distributed processes.

25

2.1.3.1.2: Management Information System (MIS)

These are a precise class of ISs for use by tactical managers. MIS receives data from TPS to help monitor, control, make decisions and helps in administrative activities. The Information received from MIS is used to predict the future performance of an organization. MIS are designed to use simple routine of summaries and comparisons, they do not use mathematical models or statistical techniques (Laudon and Laudon, 2014). MIS supports tactical managers in the process of decision-making and expands the report generation system and provides tactical managers with organised and regular reports (Shaikh and Karjaluoto, 2015). MIS serves as a communication channel that helps in the information flow between managers of different departments in an organization. MIS helps standardise communication among the organisational managers, emphasises greatly on the information that has been collected and the information that has been received from various sources, both within and outside the organization. MIS helps with organising report of several issues within the organization. This helps managers to make pertinent decisions to enhance organizational processes. Information flow from both top and bottom levels in an MIS produces inflexible reports. MIS uses simple methods to process large volumes of data to generate summarised reports (Ada and Ghaffarzadeh, 2015).

Deng and Hickey (2015) conducted a literature review on anaesthesia information management systems (AIMS) to determine their usefulness. They conducted a search on PubMed to identify English-language articles related to AIMS-based perioperative patient outcome research published between January 1980 and January 2013. They concluded that the potential value brought by AIMS exceeds the simple automation of the paper anaesthesia records. The wealth of data kept in AIMS provides meaning into perioperative care and gives

opportunity for further research as the data are suitable to address diverse clinical questions for patient outcomes.

2.1.3.1.3: Decision Support Systems (DSS)

These are sometimes referred to as business intelligence systems (BIS) used by middle level managers to help with decisions that are non-repetitive. Managers encounter difficulties that are distinct and may not have predefined procedure for arriving at a solution; DSS are thereby designed to be of help in such situations. DSS use information from TPS, MIS, and outside sources (Laudon and Laudon, 2014). Ada and Ghaffarzadeh (2015) describe DSS as a broad term that defines ISs as the ones which provide critical modelling and information to support decision making that are not structured. DSS have features such as: problem structure to be used for decision making processes that are not predetermined, they assist the decision makers but do not substitute them, are used through all the stages of decision-making, use data and standard structure and are developed with features of interactivity.

Khan, Timmings, Moore, Marquez, Pyka, Gheihman and Straus (2014) developed and tested an online decision support system that aims at providing guidance to select a means of measuring the validity and reliability of readiness in the milieu of a particular organization. Pastorella, Borges and De Meo (2016) conducted research on the usefulness of DSS in forestry planning. They indicated that DSSs have been adopted by forestry workers to aid personal decision making to curb immediate and future management challenges in forestry. Their study revealed that DSSs in the forestry comprises methods that replicate different forest concepts to predict the outcome of current decisions in the future. Forestry DSSs also enable information about the preferences of decision makers and participants.

Heikkilä (2015) created a decision support system to enable and escalate the measurement of the influence of investments on organizations using machine-to-machine (M2M) systems.

27

The designed system is made up of cost-benefit analysis, involving different investment decision processes and has been tested on two organizations from the M2M business by the designer to better understand the system. Heikkilä (2015) indicated the identification of the need for industrial companies to assess the influence of investments and projects and the difficulties encountered in doing so in many cases. Zhao, Hwang and Low (2016) developed a knowledge-based decision support system for enterprise risk management (KBDSS-ERM) for Chinese construction organizations to aid their use of ERM. The DSS aimed at helping management to appreciate their ERM installation and also its advantages and disadvantages and to access the action plans proposed by the KBDSS-ERM.

The police services in many parts of the world are challenged handling large amount of information and high volumes of criminal records. It is therefore prudent to employ intelligent support systems that will help in investigating crimes by enabling the storage and use of information. This calls for in-depth analysis of crime data (Gupta, Chandra and Gupta, 2014). Based on their assertion, Gupta, Chandra and Gupta, (2014) developed a DSS for the Indian police service. The IS has a number of intelligent features based on huge volume of crime data from the Indian police force. It is named IPS using current methods of data extraction. Aksoy, Ozturk and Sucky (2012) also developed a decision support system for demand forecasting in the clothing industry. Many other studies have been done on the application of DSS in different fields including Goswami, Singh and Kumar (2016)'s decision support system for engineering aggregate selection; Salam and Khan (2016) use of DSSs to optimize container space utilization; Ohri and Singh (2013)'s GIS based environmental decision support system for municipal solid waste management under Indian socio-economic and regulatory conditions and Karthik, Rakesh, Kamble, Kharat and Kamble (2015)'s proposed DSS for sustainable performance measurement of carry and forward agents.

2.1.3.1.4: Executive Support Systems (ESS)

ESSs are designed for use by senior managers to help tackle long term and strategic issues within and outside an organization. ESSs are used to tackle non-regular decisions that involve reasoning, assessment, and discernment. They help managers collect information in the form of graphs from different sources through a portal (Laudon and Laudon, 2014). Vanharanta and Kantola (2015) bemoan the fact that strategic managers do not have computer systems, that can help them determine the current performance of their organisations as well as forecast their future performance. They recommended that software technology must be provided that are easy to use by executives and consistent with business processes internally and externally. This will enable strategic decision makers to have a comprehensive knowledge on the organization. They therefore developed executive support systems that promote real decision-making through human visual perception, text and object-oriented applications. This system is based on the framework called the 'Continuous Strategy'.

2.1.3.2: Enterprise applications

With the different ISs for decision making, organizations had difficulties managing all the information generated and getting the different ISs to work together. Enterprise applications were developed as a solution to the disintegration of different ISs. Enterprise applications are systems that go beyond the functional areas by coordinating business processes and include every level of management (Laudon and Laudon, 2014).

According to Laudon and Laudon (2014) there are four main enterprise applications, namely: enterprise systems, supply chain management system, customer relationship management systems and knowledge management systems. Romero and Vernadat (2016), however, indicate that from a historical perspective six particular types of enterprise information systems can be concentrated on: Enterprise Resource Planning (ERP), Supply Chain

29

Management (SCM), Manufacturing Execution Systems (MES), Customer Relationship Management (CRM), Product Lifecycle Management (PLM) and Business Intelligence (BI). It is of interest to note that both Romero and Vernadat (2016) and Laudon and Laudon (2014) provided varied ISs as examples of Enterprise applications with ERP, SCM, CRM common to the two, while Laudon and Laudon (2014) added Knowledge management systems whereas Romero and Vernadat (2016) added Product Lifecycle Management (PLM) and Business Intelligence (BI). Laudon and Laudon (2014) indicate that BI is synonymous to DSS.

2.1.3.2.1: Enterprise Resource Planning (ERP)

These systems are also called Enterprise systems. They gather data from several business activities and keep the data in a central database. This helps fragmented information in different system to be shared via the same IS in an organization (Laudon and Laudon, 2014). ERP is an integrated information technology developed to support organisation's management and resource planning. ERP is installed as a strategic key to deal with evolving business environments to find solution to managing dispersed information, to enhance management of resources in organizations and to advance decision-making process through the provision of timely and accurate information (Park and Park, 2015).

ERP has been categorized into three generations by Romero and Vernadat (2016). The first generation, which they termed ERP/I, comprises many integrated modules, made up of; logistics, procurements, sales, marketing, human resources and finance, supporting intra-organizational collaboration. ERP/II is also known as extended ERP and comes with Web-enabled modules such as e-Commerce – including electronic catalogue, on-line purchasing and status checking facilities; e-Procurement – automating the business function from on-line ordering, order status, ship notice and electronic payment and invoicing. Romero and

30

Vernadat (2016) refer to the third generation of ERP as the Next Generation ERP, or ERP/III, which enables the integration of social media with current marketplace intelligence and analytics into the ERP/II. The next generation ERP will help organizations have access to external information from augmented data-warehouse and use social media to create direct channel with customers. The next generation of ERP can be confirmed to be already here with use based on Link and Back, (2015)'s assertion that ERP were previously hosted by companies on local servers but current advancement in technology has caused the product to be based in the cloud.

Park and Park (2015) investigate the economic factor of whether or not implementation of ERP system contributes to Korean P/C insurers' efficiency and performance. They used data envelopment analysis (DEA) to determine efficiencies of the insurers, and the findings revealed a strong positive correlation between ERP use and the benefits gained by the insurers.
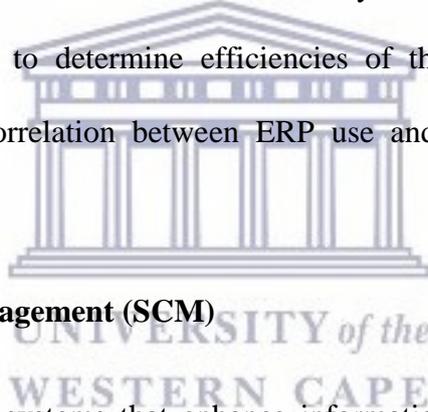
2.1.3.2.2: Supply Chain Management (SCM)

These are interorganizational systems that enhance information flow across organizational boundaries. They help businesses to manage their supplier relationships and aim at getting the precise quantity of produce from the producer to the consumer within the shortest possible time at a minimal cost (Laudon and Laudon, 2014). Ardalan and Ardalan (2009) and Romero and Vernadat (2016) indicate that SCM were developed during the 1970s and 80s and aimed at managing information about products from production to shelf. In the early 90s, SCM expanded to include market information, customer information and currently, SCM are used to manage demand, production and distribution information.

31

2.1.3.2.3: Manufacturing Execution Systems (MES)

MES came into existence in the 80s to help with data gathering, centralization and providing support for manufacturing processes making available real-time data visualization for plant managers. This feature became necessary as previously developed ISs could not support these features (Romero and Vernadat 2016). Nasarwanji, Pearce, Khoudian, and Worcester (2009) indicate that MES is a solution to manufacturing firms as they are being forced to produce good quality products at minimal cost during the economic recession of that period. They therefore attempted to prove the use of MES to reduce labour cost. This was proved by a case study they conducted at an injection moulding Small and Medium Sized Enterprise to assess prospects to reduce labour cost. Nasarwanji et al. (2009) were able to prove that labour overheads required to administer the MES was 50% less than the overheads needed to administer a manufacturing set up without MES. Xu, Yang and Wang (2015) agree with Nasarwanji et al. (2009) that MES are cost reducing systems but broaden the benefits of the use of MES to include product quality improvement and production efficiency. Xu, Yang and Wang (2015) also designed a novel MES architecture for intelligent monitoring based on wireless sensor network (WSN).

2.1.3.2.4: Customer Relationship Management (CRM)

It provides information to organise every customer related activity to enable the firm identify, attract, and retain customers. This is done by integrating multiple channels of communication (Laudon and Laudon, 2014). CRM was introduced in the 80s when database marketing and contact management started. CRM was used to collect and process customer information to improve customer service. It is currently used to support sales initiatives, electronic advertisement, actual sales and customer compliant management (Romero and Vernadat 2016). CRM provides an advantage for competitiveness (Tung, Lee, Chen, and Hsu, 2009).

32

Ward (2007) indicates that firms that have invested in CRM gain financial or market advantage by capturing and leveraging customer information. He argues that CRM supports a culture of client satisfaction, scales service and promotes teamwork.

2.1.3.2.5: Product Lifecycle Management (PLM)

It has its inception from Computer-Aided Design (CAD) and Computer-Aided Engineering (CAE) systems during the 80s. It now supports the entire product life cycle by integrated information systems supporting product data management (Romero and Vernadat 2016). Vezzetti, Alemanni and Macheda (2015) describe PLM as a business strategy to support product development. They provide a guide on how to develop products. PLM helps organizations to make decisions and reduce cost by making use of intelligence generated from the market and partners (Vezzetti, Violante, and Marcolin, 2014).

2.1.3.2.6: Business Intelligence (BI)

BI originated in the 80s to produce, analyse reports and to present graphical visualization (Romero and Vernadat, 2016). Zhang (2013) quoting Turban, Aronson, Liang, and Sharda, (2007)) and Barrs and Kemper (2008) also indicate that BI came into existence in the 70s. Zhang (2013) quoting Gartner (1990) indicates that the term was originally coined by the Gartner Group in the mid-1990s as a collective term for data analysis tools, mainly including data warehouse and data mining. This system has now evolved to support the concept of 'big data' with faster processing capacity (Romero and Vernadat, 2016). 'BI is an integrated set of tools used to support the transformation of data into information to support decision-making' (Aruldoss, Travis and Venkatesan, 2014 : 831). BI helps to convert data to knowledge to help in the decision making process by reducing excess information. BI is data driven DSS (Niu, Lu, Zhang and Wu, 2013).

2.1.3.2.7: Knowledge Management Systems

Prior to the 21st century they were termed as expert systems (Boddy, Boonstra and Kennedy, 2005). These are systems used to capture relevant knowledge and experiences in a firm. They help firms in managing procedures for gathering and implementing knowledge and experience. They use general organisational systems to manage and distribute information to create organizational knowledge bases which are made available to improve business procedures. Knowledge-based systems are used to enhance the way people make decisions (Giboney, Brown, Lowry, and Nunamaker, 2015). Lin and Tseng (2005) who sought to identify gaps in knowledge management systems and proposed a holistic framework for knowledge management gap argued that companies in the information age are no longer measured solely by their accounting value to determine their market value, but also intangible assets such as knowledge, are considered in measuring the market value of a company. For an organization to harness and make use of the relevant knowledge of its employees, Lin and Tseng (2005) proposed the development of knowledge repository through KMS.

2.1.3.3: Collaboration and communication systems

Zhang (2013) posits that in the 21st century, the Internet, the Web, and telecommunication technology will have great impact on ISs and make ISs Internet enabled and inter-organizational. One major effect of the Internet on an IS is the development of collaboration and communication systems.

These systems help provide platforms for interaction among employees, managers, vendors and customers. They help with communication, collaboration and sharing of ideas. The major ones are internet-based collaboration environment, email and instant massaging (IM), Mobile (Cell) Phones and Smartphones, Social Networking, Wikis and virtual world. These systems were not traditionally regarded as information systems but they are now considered as such

34

(Laudon and Laudon, 2014), they are also referred to as Web 2.0 technology (Baro, Idiodi and Godfrey, 2013).

The Internet-Based collaboration environment are tools used by employees of organizations who are dispersed geographically for workgroup collaboration. They provide employees with storage space to enable the creation of group calendars and an audio-visual environment to enable video conferencing. IBM's Lotus' sametime and internet conferencing systems such as WebEx, Microsoft office live meeting, and Adobe Acrobat's connect are some examples (Laudon and Laudon, 2014).

Email and Instant Messaging are used by corporate organizations as a major communication and collaboration tool. It is recorded that by 2010, there were 12 billion instant messages sent daily and eight billion were from corporate organizations (Laudon and Laudon, 2014). Rennecker and Godwin (2003) assert that instant messaging has five features which make its use ideal for corporate organizations. The features outlined are:

Presence awareness: this feature identifies co-workers that are currently online to be engaged with.

A 'pop- up' recipient notification: this allows messages to open for the attention of the recipient in a new window that over shadows the current window displayed

Within-medium polychromic communication: a feature that helps multiple conversations between different colleagues at the same time without disruption.

Silent interactivity: enables conservation among staff without causing disturbance in the office.

Ephemeral transcripts: this allows privacy to some extent in instant messaging as the conversations are not automatically served.

Muller, Raven, Kogan, Millen, and Carey (2003) studied Sametime, the IBM Lotus instant messaging (IM) product in three business organizations to determine how they utilise it and its effects on the use of other communication tools. The findings revealed that members of the three organization use IM instead of other communication channels like the telephone which reduces cost, and the use of IM helps them to socialize. Also Isaacs, Walendowski, Whittaker, Schiano, and Kamm, (2002) studied IM to determine the features, functionalities, and types of IM in the organization by examining conversations logged onto an IM application called 'Hubbub'. The study revealed the main use of IM in the organization was for complicated conversation of work related topics.

Social media or network cannot be left out of the range of collaborative ISs. A social network, as a broad term, comprises of two factors: actors (people, institutions or groups) and all the links connecting the actors (Pereira, 2016). Pereira (2016) aimed at identifying the reasons why organizations use social networks and to determine the impact on performance using a quantitative research approach. The findings revealed that 'Facebook' is the most common social network platform used and is mostly managed internally and not commonly outsourced. The organizations studied utilize social networks as marketing tools at a low-cost which enable them collect information from the market. The reason least mentioned was to seek finance. Pereira's (2016) research revealed five main reasons why organizations use social media (1) identification of opportunities, (2) sharing of information, (3) communication and innovation, (4) cost reduction and (5) marketing. Dreher (2014) also intimates that through social media, employees act as brand promoters.

Figure 2.1 lists the various ISs by the years of development.

36
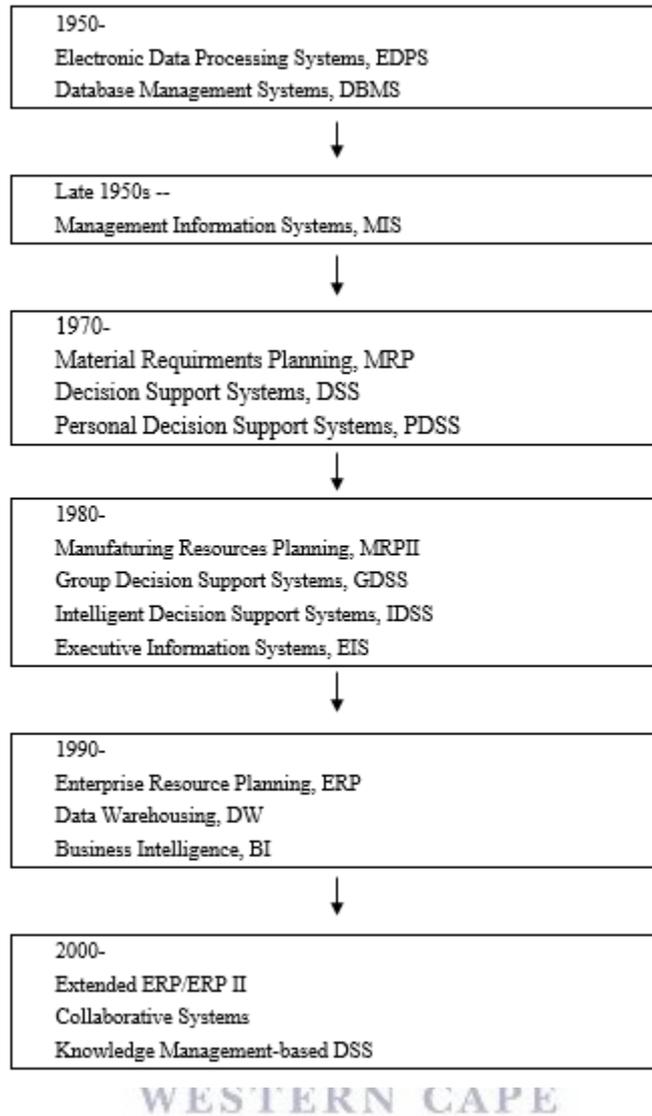
Figure 2.1: The chronicle of the evolutionary development of MISs (Zhang, 2013)

As revealed in the literature, the concept of ISs has been presented by different names including MIS, MISs, IST etc. This can be attributed to the fact that the literature on ISs has not provided any preferred term to represent the concept and also that since the introduction of computers a number of IT solutions have been developed to help in the automation processes of organizations and industries. The researcher is in agreement with Zhang (2013) that when MIS is used, it denotes a specific IS application for a specific group of people but when MISs is used it comprises many forms of computer aided systems and therefore synonymous with ISs.

37

The researcher is therefore adopting IS as a preferred term for any computer aided technology that assists in organizational processes and delivery for the purpose of this research.

The literature on the genealogy of ISs revealed major consistencies, namely: ISs are evolving, are developed based on specific needs of industry or organization to provide specific solution, no one IS provides a holistic solution. It is therefore possible that so long as further research is conducted in the field of IT more ISs will continue to be developed.

2.2.: Information Systems in Libraries

This section provides background to the adoption of IS in libraries. The use of library management systems, digital asset management systems, collaborative systems, RFID and GIS have been discussed.

2.2.1: Background

Stilwell and Hoskins (2012) state that Information management organizations like libraries need business systems to handle, support and provide services. Using information and communication technologies infrastructure as the foundation for appropriately managing information in information centres, libraries for instance have adopted ISs to help make their resources visible to aid development. As stated by Sherriff, Benson and Atwood (2019), libraries in higher learning institutions are depending on the benefits of the web to provide innovative ways of teaching and learning. Davarpanah (2001) attributes the need for the use of ISs in libraries to the fact that the patrons of many libraries have increased, there is an increase in the use of library resources and a rise in the number of published materials coupled with changes in the nature of library materials. There is also the development and availability of cheaper computers and other ICT applications and tools including information systems. Davarpanah (2001) and Pruett and Choi (2013) are of the view that in order for the library user community to make maximum utilization of the vast information available to

38
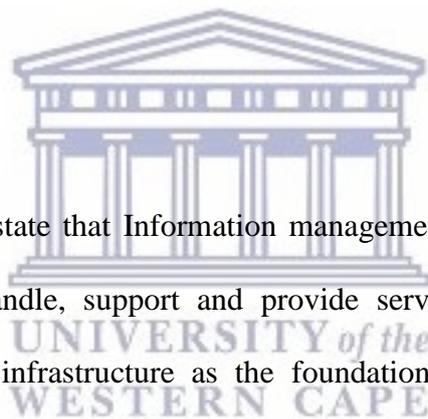
meet their information requirements, libraries, especially academic libraries, at all cost, must apply ICT including information systems to their functions.

2.2.3: Use of Specific ISs in Libraries

Different studies have been conducted in different academic libraries all over the world to assess the application of different ISs to libraries services.

2.2.3.1: Use of Integrated library systems (ILS)/Library management systems (LMS)/library service platforms (LSP)

These are application software used to automate and integrate different library functions related to acquisition, cataloguing, circulation, administration, user management, inter-library interactions, serials management indexing, OPAC (Kouzari and Stamelos, 2018 and Zainab, Kiran, Karim, and Sukmawati, 2018). Academic libraries started using these systems in the 20th century and they have evolved and expanded to integrated, intelligence and cloud based solutions in the 21st century (Makori and Mauti, 2016; Pace, 2009; Tyagi and Senthil, 2015; Pruett and Choi 2013; Wang and Dawes, 2012; Pace 2009; Reitz 2004). The advanced forms of these systems enable libraries to manage their electronic resources, link to other databases and are hosted in the cloud (Mitchell 2007, Cho 2011, Breeding, 2012, Giri 2012, Fu and Fitzgerald 2013, Yang 2013, Madhusudhan and Singh, 2016 and Tyagi and Senthil, 2015).

2.2.3.1.1: The western world

In the developed countries, library automation started in the early 1960s and journals such as Program and Vine were designed to serve as a source of documentation of the automation projects across the libraries. IS application in academic libraries in the developed world is at a very advanced stage. As far back as 1990, library circulation systems were fully automated and allowed self-service to help libraries save cost and users time (Morris, Thornley, and

Snudden, 2001; Tedd, 2006). LMS in developed countries started as trial in-house ISs to the 21st century robust cloud base systems (Groenewegen, 2004). One major trend that is noted in the application of ISs in libraries in developed countries is the emergence of library consortia to help in the development of ISs for member libraries as single projects. This enabled the use of common LMS in member libraries across developed countries (Cannell and Guy, 2001). The LMS' current use in these developed countries have developed single interface for the discovery of diverse resources opening up library data to non-library applications allowing faceted browsing (Warren, 2007). Studies from these developed countries; Australia, America, United Kingdom, Netherland show that libraries from these countries have moved from the use of LMS that manages the resources of only a particular library to library service platform that combines the functions of resource sharing, from discovery through to delivery. A Library service platform offers users the ability to use library resources from any location (Evans and Thomas, 2007 and Froud, 2006).

2.2.3.1.2: Asia

Tyagi and Senthil, (2015) investigated library automation in India by assessing library services platforms through exploratory research. Their findings indicated that library automation in India is at an advanced stage where most libraries have automated various library activities; particularly the web based Online Public Access Catalogues (OPACs) and union catalogues development. Tyagi and Senthil, (2015) did not solicit responses from libraries but rather from IS service providers. They could not, therefore, determine the extent to which the ISs are actually being used. This could serve as a gap in their research methodology. Vendors were, however, able to indicate what types of ISs libraries in India subscribe to and the type of service platforms they use. A study conducted by Kumar and Biradar (2010) shows that only three out of 31 college libraries in India were fully automated,

40

and eight others were at different stages of automation. The acquisition, cataloguing, circulation, serial control modules of LMSs are being used. Also, Husain and Nazim (2015) conducted a survey on the use of ICT in Indian libraries soliciting responses from librarians to indicate the specific uses of ISs in the libraries. Results indicated that 85% of the libraries had automated library catalogues, circulation systems and serial control while, 75% are using ISs for acquisition and budgeting. This confirms Kumar and Biradar's (2010) finding of the services offered with ILMS in India. Easylibsoft, Library Manager, E-Lib, SOUL and Profit+ are among the LMS being used. Cho (2011) studied the use of cloud service as a means of hosting ILS and found that they are widely used in Japan, India and other countries and helps libraries reduce cost on hardware and servicing.

Thailand, like India, has had its fair share of IS use in its libraries since the 1980s, where the first ever library software to be installed being CDS/ISIS. This software was used to create many library databases across the Thai nation. This has led to the development of computerized catalogues, serial control, circulation, acquisition, indexing, lists of new books and union list. Some libraries have added other services which are not general to all LMS, examples are reserve booking, databases of community resources, home bound services, media booking, access to journal citations and indexes. Apart from CDS/ISIS, some university libraries have installed proprietary LMS such as URICA, Dynix, INNOPAC, ALICE, TINlib, VTLS classic. One major trend in the use of these commercial LMSs is to provide links to e-resources (Siriwongworawat, 2003).

In Pakistan, Siddique and Mahmood (2015) intimated that Pakistan libraries were engaged in automation practices as early as 1968 mainly for cataloguing and inventory; a small number of academic libraries computerised their circulation service at that time. Ramzan (2004) notes that, with regards to Library management system in academic and research libraries in

Pakistan, 24% of libraries use in-house developed software, 22% use software that were donated, and 23% use proprietary software, and 70% use Library Automation and Management Program (LAMP), CDS/ISIS, and WINISIS, which are free and sponsored by UNESCO and not ILM. Siddique and Mahmood (2015) expanded the list of the library management systems use in Pakistan to include, dBase, Foxpro, INMAGIC, MINISIS, KITABDAR, Pak Library Software, and Management System, Library World, LIMS, MLIMS, Sci-Mate, and VTLS VIRTUA. Siddique and Mahmood (2015) are however of the view that the different library management systems used by Pakistan libraries do not have local standards and do not provide complete solutions to managing libraries.

With regards to the extent of automation and the use of library management systems in Pakistan, Ramzan and Singh (2009) provided a comprehensive picture by conducting a survey of 288 academic public and private libraries. The study revealed that even though the most respondents had library software, only a handful of the libraries were fully automated. Though, about 50% of the libraries had OPACS, most of them were internal and were not web based.
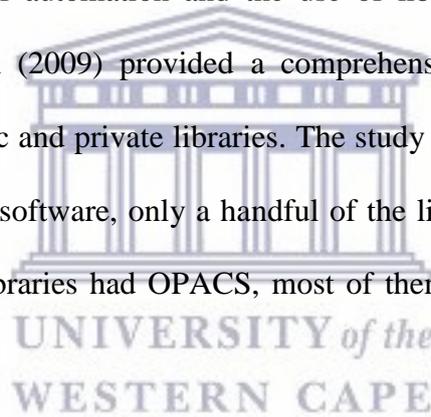
A review of the literature regarding the state of IS use in Asia revealed that though countries adopted ISs in libraries at an early stage, not all academic libraries are catching up with the pace of development. There are still libraries that are not fully utilising ISs. Again, countries like Thailand, Japan and India seem to be ahead of Pakistan. IS use has not advanced as much as in developed countries, and also, unlike the developed countries where IS adoption is seen as a cooperative effort, Asian academic libraries are going solo. This makes the trend in the literature consistent.

2.2.3.1.3: Africa

Bassey, (2016) used a survey design to investigate the adoption of software packages in 58 Nigerian university libraries. Bassey, (2016) had a similar objective to Tyagi and Senthil (2015), and like Siddique and Mahmood (2015) solicited responses from librarians and not vendors. Bassey's study was therefore able to reveal the extent of automation, namely that 75% of university libraries in Nigeria are partially automated, 20% are not automated at all and 5% are fully automated. Tyagi and Senthil (2015) could not provide the exact level of automation but could only generalize based on the types of ISs that are purchased from vendors. Nevertheless, the two studies confirmed Koha as the most widely used library management system in India and in Nigeria. Bassey, (2016) could not however determine whether ISs in libraries are local, cloud or web based.

A descriptive survey was used by Omeluzor and Oyovwe-tinuoye (2016) to assess the adoption and use of integrated library systems (ILS) for library service provision in eight academic libraries in Edo and Delta states, Nigeria. The study revealed that only three of the universities had automated their services by using ILS namely, SLAM- proprietary software and Koha open-source software. The two software were used for retrieving records of library materials but Koha has the feature to link to external databases. Though Omeluzor and Oyovwe-tinuoye (2016) studied university library automation in just one state of Nigeria whereas Bassey, (2016) studied the whole of Nigeria, both studies revealed that there are still some academic libraries in Nigeria that have not adopted ILMs. This finding corresponded with those of Ani, Esin and Edem (2005) who investigated the extent of adoption of ICT in seventeen Nigerian university libraries and revealed that only six of the seventeen libraries were fully using ISs to provide traditional library services, while five provide access to OPACs. TINLIB was the most popular library software used in Ani, Esin and Edem (2005)'s

43

study. Kari and Baro, (2014) also conducted a survey of all Nigerian libraries that have been using LMS. KOHA came top of the LMS use followed by SLAM and VIRTUA in these libraries. The LMS were used for cataloguing, OPAC, serials, acquisitions and circulation, collation of staff research output and managing patron records. A study by Adeleke and Olorunsola, (2010) to determine the use of online tools for cataloguing and classification in Nigerian university libraries found that LC classification webs; LC Online Public Access Catalogue; Cataloguing Calculator; LC Online Classification Scheme; OCLC World Cat; DDC Online Classification scheme and LC List of Subject headings are the online tools used by the libraries studied to perform their cataloguing and classification functions.

A review of the literature on IS use in libraries in Nigeria showed similar trends as in Pakistan: most libraries are not fully using ISs and not much was reported on cloud base services, that were common in Indian libraries.

Stilwell and Hoskins (2012) are of the view that a number of small-scale studies have been conducted on use of particular library management systems in specific libraries in South Africa. They therefore embarked on a comprehensive study of library management in South Africa. The major library management systems used in academic libraries were enumerated as Millennium, ALEPH, SirsiDynix and INNOPAC. University libraries in South Africa adopted the above named systems for varied reasons, including, versatility, effective back up, round the clock help from vendors, visit by vendors to undertake major system upgrades, affordability, ability to be web based and extent of adoption by other South African institutions. Stilwell and Hoskins (2012) did not indicate exactly how these systems are used or what they are used for as was done by other researchers in other countries like India, Pakistan and Nigeria.

44

From the literature, the researcher observed that libraries across the globe have engaged in the use of different ILMS/LMS either based on what is available in their countries or the needs of their libraries. The developed countries have gone beyond using LMS for cataloguing and circulation to using library services platforms. South Africa, Thailand, Japan and India are trying to catch up with the pace of developed countries but in general, most libraries in the developing countries are not fully utilizing all the modules in the ILS they have installed. The basic functions of acquisition; cataloguing, circulation and OPAC are the most used modules in the ILMS installed and not much was reported on library service platforms.

2.2.3.2: Proprietary and open source Library Management Systems

The library management systems discussed in 2.2.3.1 come as free software known as open source library management systems or as proprietary software which libraries have to purchase from vendors. As noted by Upasani (2016:121). 'The present market for ILMS encompasses the spectrum from proprietary systems to open source software (OSS) systems with a variety of hybrid and customized solutions in between'. Library management systems started as custom-developed home grown or proprietary systems and had very few features. They were used to serve specific needs of libraries. Because the customer base of proprietary library management systems is limited, vendors are able to offer full service packages of customization, maintenance, and support. They are expensive, lack flexibility for interoperability with other library management systems, frequent expensive updates force libraries to truncate their subscription and adopt OSS library management systems (Upasani, 2016); the adoption of OSS by libraries for cost reason was also stated by McGarvey, (2018).

Open source software (OSS) has advanced from small based projects to well-funded ones with the involvement of a number individuals/institutions. OSS application in libraries is not

45

a misplaced priority, as both libraries and OSS organizations have the aim of achieving the same end, namely providing information to aid learning. In the current era of budget cuts in libraries coupled with increasing cost of resources, OSS has served as a great means for libraries to embark on automation activities in a cost effective manner to meet economic challenges. OSSs are alternatives to proprietary systems and are characterized by free access and an open source code through the programming code which is made publicly available to allow modification of software by the user (Pruett and Choi, 2013). OSSs have the possibility of being opted for by most libraries (Balnaves, 2008). Koha has been identified as the first OS ILMS and the most used compared to others like Evergreen integrated library system, OpenBiblio, PhpMyLibrary, and Emlida with very few user subscriptions (Giri, 2012; Balnaves, 2008). Others listed by Singh and Sanaman (2013) are Avanti MicroLCS, Gnuteca and PhpMyBiblio. Despite the advantages associated with OS LMS, their adoption by UK libraries, for instance, has been slow (Coyle, 2002; Dalling and Rafferty 2013) but Australia has apparently adopted specific OS LMS (Keast, 2011). Koha and Evergreen were listed by Breeding (2016) as being used in US academic libraries. In developing countries the use of open source is quite rampant notably in Pakistan (Siddique and Mahmood, 2015), Nigeria (Otunla and Akanmu-Adeyemo, 2010), Kenya (Makori and Mauti, 2016), Uganda (Ponelis and Adoma, 2018), Zimbabwe, Malawi and Mali (Mutula, 2012).

A number of researches have been conducted to examine the open source library management system available on the market. Notable among these are the works of Gbadamosi (2012) who enumerated the modules in Koha and their specific functions as:

Circulation Module

- check out or issue out books (charging)

- check in or return of books (discharging)

46

- compilation of overdue books

- calculation of overdue fines

- generation of circulation related reports and statistics

Cataloguing Module

- catalogue searching using Z39.50 for copy cataloguing

- adding of bibliographic records

- verifying existing titles to determine the status of the new material to catalogue

Acquisition

- management of vendors' records

- generating newly selected books including online book selection

- generating receipt reports

Online Public Access Catalogue (OPAC) Module

- checking of available books in the library

- accessing the library's virtual databases
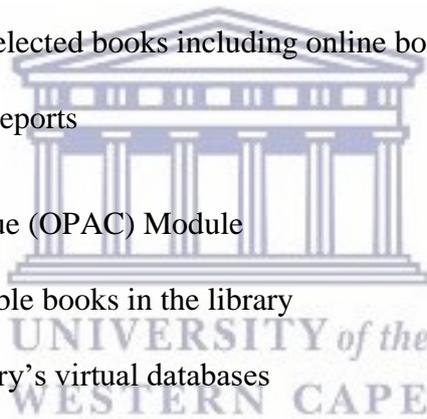
Report Module

- Used to generate various reports such as acquisition statistics, patron statistics, cataloguing statistics, circulation, reference, and serial statistics.

Serial Module

- online cataloguing of serials and other periodicals

- generating indexes for newspapers, journals and magazines

- information and knowledge management in serials and other periodicals

Pruett and Choi (2013) also qualitatively compared two sets of ILS: Evergreen and Koha which are open source with Sirsi-Dynix's Symphony and Ex Libris' Voyager which are proprietary. The comparison was based on functions, adoption and technical support, usability, and economics. Their findings revealed that the two Open source ILS compared favourably with proprietary ILS counterparts, but lacked one key module: the interlibrary loan. With the aspect of usability, customisation is prioritised in the OSS and is better than the proprietary software. No significant user experience was identified as a difference between Evergreen and Koha. With regards to adoption and technical support, comparisons revealed that proprietary ILS vendors have an upper hand in licensing agreements as their systems and conditions are tested and unambiguous. OSS was also found to be of less financial burden to the institutions that use them compared to the proprietary software (Coyle, 2002).

Singh and Sanaman (2013) also provide a detailed comparison between Koha and NewGenLib and conclude that both have a well-designed architecture for work flow and contain almost all modules and necessary features for an ILMS. They note, however, that Koha has more specific characteristics of open source ILMS, and NewGenLib has certain features that need to be upgraded and improved. Singh and Sanaman (2013) are in agreement with Coyle (2002) and did not list an interlibrary loan module as a feature of Koha or NewGenLib. Other software and services to fulfil interlibrary loan requirements are therefore needed.

Likewise, Giri (2012) provides an elaborate description of NewGenlibs3. It is an OSS ILMS software and is used by a number of big libraries in India, namely the Bangalore University Library Learning Resource Centre (LRC), the Indira Gandhi Institute of Technology (IGIT) and the Knowledge Centre of Birla Institute of Management Technology (BIMTECH). It is

an ILMS that is web-based, but can be used on a local area network. It has modules for acquisitions, cataloguing, circulation, administration, serials management, OPAC and ILL. System developers provide support through remote desktop applications. One major shortfall of NewGenlibs3 is that the system was designed based on the workflow process followed in the Indian library market only and therefore does not support western library workflows, thus limiting international usage.

Another open source LMS that has been studied is Automation of liBraries and Centres of Documentation (ABCD), by Smet (2012 : 323) as 'a suite of relatively independent, but co-operating, modules dealing with database administration (catalogues, users, loan objects and so on), acquisition, cataloguing (in any bibliographic format but MARC and CEPAL are pre-defined), loans, serials management, OPAC and a web portal'. Similarly, Upasani (2016) describes ABCD as a web-based platform for managing traditional and digital libraries as well as a tool for managing documentation centres.

The different studies indicate that the open source LMS have well developed models and support cloud services. Though they lack certain features, they compare quite well with proprietary LMS. Libraries everywhere are adopting them, and in the developing countries, the availability of OSS is making it even easier for the adoption of ILMS in libraries due to financial restraints and budget cuts.

2.2.3.3: Use of collaboration and communication systems in libraries

The use of the Internet has brought about collaboration and communication systems. Collaboration and communication systems provide platforms for interaction among employees, managers, vendors and customers assisting in communication, collaboration and sharing of ideas. The major ones are internet-based collaboration environments, email and instant messaging, cell and smart phones, social networking, wikis and virtual worlds

49

(Laudon and Laudon, 2014). Collaboration and communication systems have been considerably enabled by mobile technology equipment and widely used internationally like mobile phones, smart phones and e-readers. Redden (2010) is of the view that several of the web 2.0 tools have the possibility to improve library functions at minimal or no cost. One of such tools is social bookmarking or social tagging which allows users to label web pages to use in the future. Libraries use web 2.0 technologies to connect patrons to resources (Howard, 2018).

Negi (2014) states that they are used as accessories to provide portable acess to information in every discipline in the form of e-books on portable devices, mobile online OPAC, virtual library instruction, short message service (SMS) or Instant Messages (IM) notifications on Facebook, Twitter and other social media platforms and virtual reference services

According to Guo, Liu, and Bielefield, (2018) and Kumar (2014) mobile technologies are utilised libraries across the world to provide quick and better services to library uses. Kumar (2014) conducted research on the use of mobile technology in an Indian library and noted how impressive students found the services to be, as they enhanced library services and communication.

Rubin, Chen and Thorimbert (2010) are of the view that though many may think the extensive use of collaboration systems may be a fad, it is a response to user interest in current technology and are appropriate to complement existing library services.

Web 2.0 has changed the manner with which individuals interact online, it has made it easier to share information. Many libraries across the globe are developing websites using a number of 2.0 features, a process being called Library 2.0 (Balnaves, 2008; Han and Liu 2010). 'Library 2.0 is the application of interactive, collaborative and multimedia web-based technologies to web-based library services and collections. The basic idea of Library 2.0 is to

50

transform library services by making them more personalized, more interactive, collaborative, more web-based, driven by community needs' (Rah, Gul, and Wani, 2010:27). They use the concept 'web based knowledge management' to refer to systems that use the technology in organising and disseminating information. The definition offered by Rah, Gul, and Wani, (2010) summarises the many found in the literature by authors like Huvila Holmberg, Kronqvist-Berg, Nivakoski and Widén (2013); Kwanya, Stilwell and Underwood (2012) and Pirshahid, Naghshineh and Fahimnia (2016).Library 2.0 has also enabled libraries to focus on 'users' knowledge services instead of literature resources (Yang, Wei, and Peng, 2009). Librarians have focused great attention on using social media applications and other Web 2.0 tools to market their resources and services: Kingsley, (2018) and Shapiro, (2012) Kwanya, Stilwell and Underwood (2012), however, note that libraries have advanced upon the existing library 2.0 to library 3.0 which blends traditional library services with web 2.0 elements to provide personalized information services to users using cloud computing and federated search.
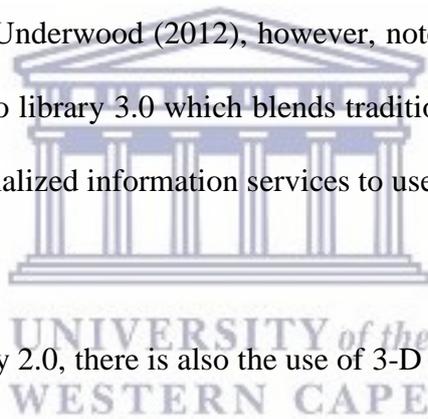
Apart from web 2.0 and library 2.0, there is also the use of 3-D or Second Life (SL). This is a three-dimensional world where users enter to replicate their real life self or enter with completely different self. Residents in the 3-D life can communicate through written chats, instant messaging or voice chats. Contents created by residence are copyrighted. Many libraries in advanced countries are using Second Life environment to provide services which is taking the place of Library 2.0. Alliance Library System (East Peoria, Illinois, USA), Bayerische Staatsbibliothek (Bavarian State Library; Munich, Germany), Cleveland Public Library are some of such libraries offering services in the SL. Libraries can use SL to offer services such as volunteering; exploring Second Life; demonstration purposes; training; exhibits and showcases; presentation; meetings; book discussions; author discussions; support information needs; events; interactive displays; support groups workshops;

references; collaborative projects; links to other resources; classes, tutorials; tours; enhancing services; and supporting research (Shafique and Riedling, 2013).

2.2.3.3.1: Western World

Harinarayana and Raju (2010) studied the extent of application of web 2.0 tools on the websites of the first 100 universities listed by Times Higher Education using 57 of the library sites that are in English. The study revealed that 37 university libraries use RSS feeds for providing library news, events and announcements, fifteen university libraries provide blog space for users, 37 libraries were providing reference service using instance messages (IM). Wiki, podcast and vidcast use were not popular on the sites of these university libraries. Also, 50% of the libraries studied at least one Web 2.0 applications. Social networks came topmost while social bookmarking and tagging were not being used by most libraries.

Xie and Stevenson (2014) selected ten institutions from public libraries, academic libraries, museums, government, and international organizations in the USA to determine the types of social media they use and the functions they performed with them. Facebook and Twitter are used by all ten institutions. Flickr, Blogs, RSS feeds, YouTube, Pinterest and podcasts were also used. The institutions studied used social media sites as means of providing information, marketing/promotion, peer-to-peer connections, and information sharing.

University of Maryland University College (UMUC) also adopted Microsoft SharePoint as a portal to organize and share their collective knowledge. The wiki feature in the software was used as the main tool for creating, organizing, and sharing documentation. This has enabled the library system team to habitually create and maintain documentation to aid work flow (Diffin, Coogan and Fu 2013).

2.2.3.3.2: Asia

In China, WeChat, China's most popular mobile social media site has been heavily documented as being used by libraries. It has features, such as announcements and exchanges, functions for its followers to use services and resources. These functions can be tailored by organizations according to standards provided by the developers to meet an organization's specific needs (Zhu, 2016). Gan (2016) conducted a survey of 46 Chinese public libraries to examine how WeChat is applied in the provision of library services. The results showed that the majority (82.6%) of the 46 libraries had used WeChat accounts and offered services. The results also indicated that 52.65% of the libraries provide introductory information of their library services and 28.9% offer real-time reference services on WeChat. Zhu (2016) also used a case study method to study how WeChat is being used in the Jinan University Library to enhance library use and services to students, faculty and staff. The study revealed that Jinan University Library has set up its WeChat account to automatically send messages of linkup requests to the personal WeChat account of students and staff. The library uses the platform to send news and alerts to its users. WeChat also allows library users to perform self-services such as loan check outs, renewals and OPAC searches. The system also helps library staff to generate usage statistics of each service provided via the WeChat platform. Apart from WeChat, other web 2.0 utilities for improving user-friendly search process with features such as tag, book review, rating and text alert, RSS are also commonly used in Chinese university libraries. Podcast or vodcast use is not so common in Chinese university libraries (Han and Liu 2010). In India, Husain and Nazim (2015) note that the use of blogs, wikis, RSS feeds, social networking and social bookmarking in academic libraries is not common.

Shafique and Riedling (2013) studied the adoption of Library 3-D applications in libraries in Pakistan and noted that the concept is quite new for information professionals and most of them did not seem to have much knowledge of it, however, the authors predict Library 3-D applications will gain popularity among the library community, therefore librarians must start learning about it and position themselves for its adoption.

2.2.3.3.3: Africa

Kebede (2014) conducted a study on the websites of top universities in Africa; the study revealed that most of the websites used one or more web 2.0 applications. In Nigeria, Baro, Idiodi and Godfrey (2013) used a structured questionnaire to collect data on the awareness and use of Web 2.0 tools among librarians in university libraries in Nigeria. The results show that Facebook, Twitter, Instant Messaging, YouTube, Wikis and blogs are the most commonly used social media platforms by libraries. Social bookmarking, Flickr and RSS feeds and Podcasts were not used much. These tools were used for more than half of online reference services, announcements, training resources and image and video sharing, social tagging and bookmarking, collaborating with colleagues in other libraries.

Oladapo (2016) used content analysis to conduct a comparative analysis of available Web 2.0 tools in library websites of ten selected Nigerian and ten South African universities. The findings from the study revealed that university libraries in Nigeria and South Africa use Web 2.0 in their service delivery. However, the South African university library websites have more Web 2.0 tools. South African university libraries also provide more e-resources and e-databases and more efficient information retrieval platforms. Libraries from the two countries provide access to more e-journals than other electronic services and products.

Ahenkorah-Marfo and Akussah (2016b) in their study of social media for reference services concluded that the majority of library staff in top Ghanaian university libraries are aware of

the web 2.0 technology and to some extent are applying it in their library service delivery. Also, in Algeria, Hassoun and Bernaoui (2015) obtained findings from a survey that showed that RSS feeds and wikis are the most dominant collaborative tools used by libraries. There was average indication of the presence of blogs.

2.2.3.3.4: New developments in collaborative systems

Rubin, Chen and Thorimbert (2010) are of the opinion that libraries all over have adopted technology by developing websites and using OPACs but technology has advanced beyond that and libraries need to advance their use of technological systems by adopting Natural Language Interaction (NLI) systems. NLI are systems consisting of human computer interfaces designed to stimulate conversation with human beings. Rubin, Chen and Thorimbert (2010) believe that NLI will be an effective tool that will be appropriate for complementing library services and will help to better interact with information in the future. They identified useful type of NLI namely: 'chatbots' (also called text-based conversational agents, artificial conversation entities, chatterboxes, or simply bots), which use only text as a means of interaction between the user and the computer and embodied conversational agents (ECA) in which the computer is created with a humanlike interface to engage the user in verbal conversation. They propose their use will be beneficial to libraries as automated virtual reference librarians and website tour guides can be created using ECA to give direction to users on a library website; text-based chatbots can thus be used as virtual librarians, Virtual readers' can be created using NLI to serve as social software hosts. Though the study by Rubin, Chen and Thorimbert (2010) showed that NLI applications were non existent in even the top Canadian public and academic libraries, they identified the use of such systems in Germany and one at the Mount Saint Vincent University Library in Halifax, Nova Scotia.

http://etd.uwc.ac.za/

Wojick (2016) propounds that though libraries have embraced ICT, current developments in the field of ICT demands libraries to look at the possibilities of applying very current ICT to library management to make library services relevant to the younger generation. One such ICT current development is the Internet of Things (IoT). Wojick describes IoT as the technology of the future and proposes its possible application in libraries should be critically examined. In order to show the possible use of IoT in libraries, Wojick, (2016) analysed 50 abstracts of papers published in 2010-2015 to identify types of IoT applications made available by IT companies, fifty articles relating to library services were also analysed to develop theoretical model of IoT usage for library services. Wojick, (2016)'s theory of IoT use in libraries states that, IoT has a potential for library services to enhance user experience. Though Wojick's study was not based on actual use of IoT in libraries, he was able to prove that IoT use in libraries can be of great benefit; this is corroborated by Liang and Chen, (2018), Wang, Li, Yang, Chen, and Xu, (2018) and Xie, Liu, Fu, and Liang, (2019).

Although many researchers have proved the benefits of social media in libraries, Shapiro (2012), writing on the use of learning management systems for library marketing, indicated that in Montclair State University Library, the use of web 2.0 technology such as webpages, listservs, news feeds, and social media, for communication was compared to the use of learning management systems: the study found social media use to be of limited value to libraries.

The literature on the use of collaborative systems in libraries indicates a high presence of such tools in library services even in developing countries. The specific type of tool used was noted to depend on the social environment of the library and familiarity of the librarians and users with such tools. It was however noted that libraries in the advanced world have started

looking beyond library 2.0 moving into new collaborative tools like library 3-D, Internet of things and natural language interaction.

2.2.3.4: Use of Digital Asset Management Systems in Libraries

Digital Library Management Systems (DLMS) are used to manage digital libraries (Barbuti, Ferilli, Redavid and Caldarola 2014). Xie and Matusiak (2016) define DLMS as digital asset management systems (DAMS) used to acquire, index, store, manage, preserve and deliver digital objects. DLMS have features in information organization and interoperability by providing functions for creating, maintaining, storing, use and preserving digital objects and collections. DLMS are information gateways or portals used to serve up Internet-based content with advanced search features and browsing, acquisitions and metadata base online (Calhoun, 2002; Nisha and Parichi 2015). Examples of OSS DLMS are DSpace, Eprints, FEDORA and Greenstone. These systems are used to create institutional repositories. Kennan and Wilson (2006) classify institutional repository (IR) as a web-based information system, specifically for managing scholarly material generated by institutions, and used to make the materials open available online.

Xie and Matusiak (2016) provided the core functions of DLMS as; development of digital objects and collections, management of the resource and users, provision of access and preserving the material for future use

Xie and Matusiak (2016) note that, though function of preservation is essential, some systems separate it from access function and some systems also integrate preservation with other functions. Calhoun (2002) strongly believes that the use of DLMS in university libraries should not lead to the neglect of print resources but rather that DLMS should be designed to support the access and use of a library's existing collections.

57

Nisha and Parichi (2015) reviewed the features, usage and utility of Greenstone DLMS. Their finding revealed that Greenstone is appropriate for small- and medium-sized organizations and is easy to use. Though Nisha and Parichi (2015) reviewed only features of Greenstone and not its use and also these not in comparison with other DLMS, they suggest that the use of Greenstone has a minute edge over other DLMS the review of which are not based on research evidence.

IR projects in developed countries stated in large universities with internal technology (Brush and Jiras, 2019). Wu, Thompson, Vacek, Watkins and Weidner (2016) investigated the use of digital asset management at the University of Houston's Digital Library. They indicated that as the University of Houston's Digital Library expanded, the library realized a need for a dynamic digital asset management to manage large collections in different formats. Wu et al. (2016) used the case study method to investigate the process of University of Houston's Digital Library implementation. Though the method chosen could limit their findings from being generalized, other academic libraries could adopt their proposed three phase implementation strategy consisting of system installation, data migration, and interface development to implement successful digital asset management systems. Tyagi and Senthil, (2015) found that in India, there is an intense digital collection development using D-Space or E-Print.

At the Health Sciences Libraries of the University of Southern California, an in-house Electronic Resource Management system was developed to 'provide a means for creating Web pages of electronic resources with the flexibility of generating static pages as well as dynamic pages as a result of a custom search, to manage and control electronic resources in a database, and to create one database for use by both library systems for sharing resources and

for allowing users to search most university resources at once' (Brown, Nelson and Wineburgh-Freed 2005 : 92)

Efforts being made by libraries in Thailand towards the development of digital libraries were elaborated on by Siriwongworawat (2003) citing specific examples from different libraries indicating the content of these libraries, however, the ISs that are being used to create these libraries were not named.

2.3.3.5: Use of Learning Management Systems in Libraries

Learning management systems (LMS) are ISs that provide tools for delivering, tracking and assessing courses to different categories of learners. LMS supports multi-media learning environment, automates the selection and administration of courses, assembles and delivers learning content and provides means of assessment (Laudon and Laudon, 2014). LMS, according to Clossen (2018), possesses tools to accommodate library services and resources.

Purchase College, State University of New York has demonstrated the use of LMS in libraries. The college established collaboration between the Library and the Teaching, Learning, and Technology Centre (TLTC) to use Moodle, the college's LMS. Three customized user roles were created in the LMS for the library to perform specific functions. These are the roles of course librarian, service desk staff, and reserves librarian. The course librarian's role gives access to librarians to add posts and communicate with students. This helps course librarians to build information literacy components into courses that have been assigned on the LMS. The service desk staff's role was created to enable access without interaction to the content of courses on the LMS. This enables library staff to be familiar with course contents and help answer students' queries when they visit the library. In addition, this function helps librarians to know the resource needs of each course through assessment of assignments and syllabi to develop collections to meet such needs. The reserve librarians'

59

role enables librarians to streamline and digitize the physical library's reserve process as all reserve requests can be collected and managed through an interactive dashboard in Moodle (Detterbeck and Sciangula, 2017). Also, at the American University, Washington DC, library services have been incorporated into the LMS- Blackboard. E-reserves, virtual and e-mail reference; online pathfinders and research guides; information literacy support; streaming audio and video services; and copyright resources have been incorporated within Blackboard. The Blackboard library site has also been developed to provide a central information point about virtual services that users can utilize and models the integration of those services into Blackboard (Dygert and Moeller, 2007).

Ohio State University Libraries' use of LMS to deliver library services was presented by Black and Blankenship (2010). Library resources were linked to students with the LMS. The link allows librarians to develop subject guides in the LMS to deliver a page of library resources to students when they click the link labelled library within every course page in the LMS.
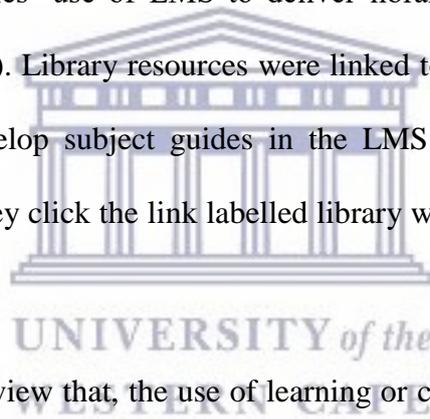
Shapiro (2012) is also of the view that, the use of learning or course management systems is an emerging trend in libraries as academic libraries are using LMS such as Blackboard, Moodle and Sakai as means to disseminate information to students. Shapiro (2012:10) states that, 'library home pages appear in a CMS/LMS, along with LibGuide s, librarian (especially liaison) contact information including e-mail addresses and IM capability, library links, and electronic reserves'. Shapiro (2012) describes how Montclair State University Library used Blackboard to establish a strong presence among the university community. The library initially migrated its e-reserve system to Blackboard. When users send e-reserve request, the requested document is scanned and uploaded into Blackboard and the faculty member will link to it from the course module. The library user community was later created and

60

populated in Blackboard and services provided through the LMS expanded to include announcements, library information, ask a librarian, featured e-resource, librarian spotlight, newsroom, library trivia, suggestion box, and discussion board. Shapiro, (2012) indicates that usage statistics show that the library has received a significant patronage as the Blackboard services were used 3,208 times in the spring 2010 term. He is of the view that, 'with Blackboard, libraries have the potential to reach a larger, and in some ways, captive audience' (Shapiro 2012: 10).

Cross (2015) describes a resource list management system (RLMS) as a system that helps to link references of academics to the library collection and to students. Cross (2015) reviewed the features of a resource list management system (RLMS) at Nottingham Trent University (NTU) using the Aspire application from Talis Education. The outcome of the review showed that Aspire RLMS enables academics to publish their reading lists to students through the use of an online editing screen. The list is automatically matched against the library's catalogue for available and closely related materials to be retrieved. The retrieved list is accessible in the course module. The course instructor uses the RLMS to indicate to library staff whether or not material should be put on reserve. Thus an IS serves as a great tool to bring library resources to the doorstep of users in an academic environment.

Bell (2016) proposes that academic libraries should take advantage of LMS used by their mother institution as tool for training library staff. He bases his argument on the advantages of flexibility, convenience and ease of access, an increased sense of structure and support provided by LMS.

2.2.3.6: Use of other Information Systems in Libraries

There are other minor areas in library operation that have also seen the use of ISs.

61

2.2.3.6.1: Use of general office solutions

Libraries are not limited to the use of only task specific application ISs which have been discussed in the preceding sections. Libraries also use general office management ISs like office suite and the Internet. This section therefore focuses on their application in libraries.

Gatenby (2008) discusses the role of American and Polish academic libraries. He notes that Polish library web sites serve as 'shop windows' that provide basic information about library services. American academic library websites, on the other hand, are fully utilized online and digital information environments where complete services and information are provided to users.

Ramzan (2004) conducted a survey using head librarians working at academic and research libraries in Pakistan to determine the types of available software in their libraries. The study showed that the majority of the libraries utilize office application, Internet and emails for library functions. Windows was found by Ani, Esin and Edem (2005) as the most utilized operating systems in Nigerian university libraries and there is to some extent Internet and LAN service provision. Kumar and Biradar (2010) studied the use of ICT in 31 college libraries in Karnataka; India and determined that 17 of the libraries had computer facilities and 12 had Internet connectivity used for information searching, e-mailing and administration. None of the libraries had websites. In Husain and Nazim (2015)'s study of Indian academic libraries, majority of the libraries used email and telephone calls to communicate, only a few of the libraries used videoconferencing, but there was 80% intranet use. In an analysis of library websites of Ghanaian university libraries, Agyemang, Boateng and Dzandu (2015) observed that though all the libraries studied had active websites, they provided static information and lacked dialogic features.

62

2.2.3.6.2: Content management systems

Connell (2013) defines content management systems as tools for managing websites which enables content and formatting of the website to be separately managed. This enables authors with basic IT skills to add their own content. Connell notes that library websites were formerly designed to provide basic information about the library and library services, but currently libraries are being challenged to provide online services which demand increased complexity of library websites - hence the need to use content management systems (CMS). Connell laments that, though there is a need for libraries to use CMS, some libraries are not allowed to make a choice in the type of system they want to use as this decision is made by institutional web designers.

Connell further investigated how academic libraries apply content management systems in the design of their webpages. From the study, 54% of the institutions used CMSs while 46% used other applications like Adobe Dreamweaver. The study also revealed that 56% of those institutions that did not use CMSs have plans to do so. The most widely used CMSs used were Drupal; WordPress; LibGuide s; Cascade Server; Ektron; ModX and Plone. Though Connell's research was carried out in the western world, it is very relevant and timely regarding the fact that universities all over the world are now ranked, based on the amount of content and links they provide on their websites and university library web content and links could add to the points a university scores. Similarly, Robbins, Engel and Bierman (2006) report that University of Oklahoma Libraries use nineteen systems for managing content on their website and on the staff intranet. The content management systems are used by library staff in managing and generating reports, creating, organizing and displaying library content online.

63

The current development with the use of CMS by academic libraries is to build the CMS into the Learning management system of their institutions: this was noted by Black and Blankenship (2010) and Shapiro (2012) and has been discussed in section 2.3.3.5.

2.2.3.6.2: Geographic Information Systems

These are ISs providing location data to a particular resource to points lines and areas on a map (Laudon and Laudon, 2014). The use of Geographic Information Systems (GIS) has been investigated by Xia (2014) who argues that GIS' application to library management is fairly new but is an effective tool for space management. It can assist in collection management. Pournaghi (2017) used a mixture of descriptive survey and system designing methods at the Tehran University library to gather data for managing the collection. Data gathered revealed that managing the library collection involves several tasks. A GIS was developed to help ease the task of management of collection by systematic weeding, collection development and generating the amount of the sources on loan spatially. The GIS can be integrated into the online catalogue and can be used to locate a missing library item.

2.2.3.6.3: Radio Frequency Identification

University libraries are among many of the institutions which are adopting radio frequency identification (RFID) technology at a very fast pace as a tool for improving the efficiency of information services and increasing quality service (Makori, 2013).

> RFID is a technology that uses radio waves to uniquely identify items in a library. With the components of a tag, a reader and an antenna, the RFID system is able to trace library items without requiring direct contact or visual scanning. In addition to improving books check-out process, inventory can be taken simply by walking through the shelves and passing a wireless reader wand over the books. Some academic libraries have started using RFID in their collection management to streamline check-in, check-out, and inventory tracking, as well as to help minimize theft. The technology can assist in information collection, and upon connecting to the GIS database it can automatically make updates for library collection utilization (Xia, 2014 : 381).

64

RFID is an effective tool for collection management due to the identification feature and this enhances library services (Chelliah, Sood, and Scholfield, 2015). RFID also provides integration and real-time accessibility but its use in Africa and, as used in Kenya libraries, is very low (Makori, 2013). In Husain and Nazim (2015)'s study of Indian libraries, 20% of the libraries indicated that they are in the process of installing RFID systems for theft control.

2.2.3.6.4: Other Minor Systems Identified in the Literature

Krsticev, Tesendic and Verma (2016) developed a mobile application, called MobiLib using an Android application to simplify the procedure of library inventory taking at the Faculty of Science, University of Novi Sad, Serbia. The application interacts with the ILS and can be used to search and update bibliographic records. The system allows the librarian to move round the library using a smart device with a barcode reader to update the catalogue data in real time.

Cabrerizo, Morente-Molinera, Pérez, López-Gijón, and Herrera-Viedma, (2015) are of the view that current technological advancement has enabled the development of digital academic libraries. Most users now expect better services and functionalities, but academic institutions are faced with a major challenge thus; measurement of digital libraries performance to determine how best the digital libraries meet users' needs. They therefore presented a decision support system which uses a number of decision rules in generating proposals using certain criteria for making decision aimed at improving services offered to users.

2.3.: Management issues that affect the quality and use of an IS

This section concentrates on management practices that enhance the quality and use of IS in general and in the library.

2.3.1: Management of an IS from the general IS perspective

'Globalization, distributed manufacturing, data and knowledge management, advanced automation and robotics, virtual engineering, rapid response to market' are the major characteristics of modern organizations (Panetto and Cecil 2013:1). This has made organizations to face diverse forms of competition; enterprises have adopted coping mechanism by using information technology (IT) and other tools as means of collaboration to enable them to be successful in the current global economy. ISs are being developed with features of integration, interoperability and networking in alignment with business objectives to improve collaboration and communication in the most effective way (Panetto and Cecil, 2013).

ISs are developed to provide accurate and timely information to help users make work processes efficient, integrate business process and link an organization to its stakeholders. For this reason, it is of absolute necessity for managers of organizations to ensure the efficient use and quality of ISs (Boddy, Boonstra, and Kennedy, 2005). In the service sector, it is important to improve or maintain quality service. This can be done by ensuring that ISs are always functioning to the optimum. It therefore calls for IS managers in organizations to constantly manage ISs (Bharati and Berg, 2003).

The worth of ISs in organizations can be viewed from two dimensions; as product (the IS) and as a process (the function undertaken to design the IS) though the two are usually summed together in practice. 'The worth of the IS development process is normally evaluated in terms of an assessment of some features of the worth of the product (Beynon-Davies, Owens and Williams 2004:276). Evaluation which is a management function is critical in ensuring the success of an IS. But this has not been integrated into the management process of most ISs (Beynon-Davies, et al., 2004).

66

IS use in an organization is a complex process and the management thereof should be of great importance. This has not been the case as many organizations use unstructured means to manage ISs. The management of an IS should be seen as a well-organized process and as part of the organizational processes which will enhance the quality of service. 'Any project regarding information technology implementation at every enterprise requires competent management' (Anisimov and Reshetnikov, 2011:1319).There is a 'technology management gap' in most organizations (Irani and Love, 2000:163) and libraries cannot be excluded. Maintaining an IS across different organizations has been very difficult especially in terms of determining needs of organization, designing and managing the IS to ensure the needs are fulfilled (Pilemalm, Lindgren and Ramsell, 2016).

It is necessary to note that, though major industries - including libraries - have invested much capital into the development and acquisition of ISs, most of the ISs installed in organizations have been historically shown as heavily underutilized (Maguire, 2002), others have not yielded the maximum output desired (Ravichandran and Lertwongsatien 2014) and a number of them have failed (Marnewick, 2017) causing leading investors in the IS industry like Microsoft, Cisco, Hewlett Packard and IBM to fund academic studies on how to make IS projects sustainable (Boddy et al., 2005). They therefore advise managers not to leave the tasks of use and management of ISs to IS staff as they are mostly concerned with the design of the systems and not whether the systems are functioning appropriately or are being used to the optimum. As noted by Fattahi and Afshar, (2006) the continued use of an information system determines its value. Anisimov and Reshetnikov (2011) also indicate that poor and mismanagement of ISs cause great financial loss to organizations. ISs are adopted as business process solutions to help reduce cost and downtime. This means that the continued functioning and use of the IS are a prerequisite to its success. Bajgoric (2006) thinks that for the above to be achieved, it calls for the IS to be managed in the following areas:

http://etd.uwc.ac.za/

- Operating infrastructure;

- System-application-network uptime;

- Data bases;

- Data access;

- Backup and storage;

- Security and protection;

- IT-operations and

- Human resources

Likewise Wu and Wang (2006) state that the IS quality is determined by level of stability, acceptable response time to user request, how user-friendly interfaces are and the ease of use of the system. Bharati and Berg (2003) conducted a study on the impact of an IS on service quality using the DeLone and McLean model. The study showed that system quality indirectly impacts on service quality. The study noted that ease of use of ISs helps customers to be served better, and leads to quality service. Bharati and Berg (2003) recommend that managers should pay attention to both the quality of an IS and employee IS performance to increase the quality of services provided with the IS.

Beynon-Davies et al. (2004) reviewed relevant literature on IS evaluation and presented a model. The model developed emphasised the importance of an organisational learning feedback loop. The model proposed that after an IS has been implemented, an appropriate time should be assigned to allow the organization to undertake what is termed a summative evaluation of the system. It is also referred to as post-mortem analysis. This analysis is very important since no system is ever complete. The summative evaluation may produce relevant proposals which may be used to modify or extend is applications. This is termed as systems

68

maintenance. They conclude that good evaluation enables management to maintain the IS effectively.

Marnewick (2017) is of the opinion that ISs must be subjected to benefit management. This will enable the organization to determine whether the ISs are beneficial to and can ultimately deliver value to the organization. In order to derive the maximum benefit from any IS, the IS must be subjected to management standards. When managers are not adhering to these best practices and standards, the IS does not become beneficial to the organization. Marnewick (2017), therefore, adopted a qualitative research approach to conduct a study of 28 middle level managers in charge of various IS projects in different organizations in South Africa, to determine the extent to which their organizations adhered to standards and/or management practices and whether the organizations derive value from their IS. The findings revealed that most of the IS managers do not fully comply with management practices or best standards, but report of deriving value from their IS projects. Marnewick (2017) did not indicate whether the reported value was the maximum that could be achieved, but cautioned IS managers not to use partial standard practices as these will have the tendency of creating inconsistency in IS benefits.

Mouakket and Bettayeb (2005) studied the factors influencing continuance usage intention of learning management systems and propounded that, training and technical support (organizational characteristics which are management functions) have a significant influence on the perceived usefulness of an IS leading to user satisfaction and subsequently continuance of usage of the IS. They applied their hypothetical model to the use of LMS in a university in the United Arab Emirates. Findings revealed that an organization's characteristics have a positive influence on satisfaction and continuance intention. Satisfaction also has a significant influence on continuance intention.

69

Cram, Brohman, Chan and Gallupe (2016) adopted a qualitative exploratory approach to study the process of IS development in three organizations to determine the control elements. They posit that organizations using ISs have challenges with ineffective ISs that may stem from underperformance of IS processes and services failures. Managers of IS have tried to mitigate these challenges by putting in place control measures to ensure profitability. Cram et al. (2016) noted, that even with the control measures in place, managers still struggle to monitor the IS to perform to their intended capacity. The authors are of the view that if ISs are not performing to expectation, a possible lack of coordination among the control environment, control mechanisms, socio-emotional behaviour and control execution, which are all management functions, exist. They introduced the concept 'IS control alignment' as a comprehensive approach which helps to integrate an IS control dimension. Cram et al. (2016), themselves, indicated in their work that their work is bound to limitations. Firstly, other control factors like tight versus relaxed control degree could be used. Secondly, they could not determine the applicability of their research to other organizations due to the limitation of a case-study method.
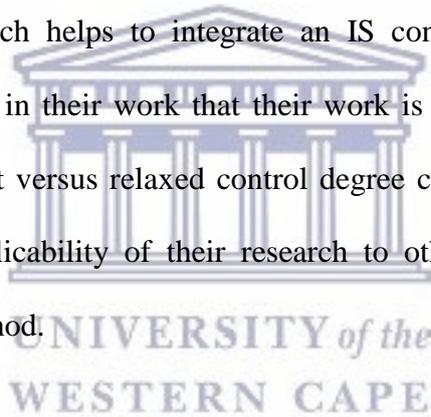
Writing on the measurement of the performance Chang and King (2005), indicated that, organizational leaders always want to see returns or benefits on their investments in ISs. In their attempt to design a tool for evaluating the overall performance of ISs, Chang and King (2005) listed managerial and technical capabilities as significant resources or elements that will make any IS successful.

A case study conducted on a single firm in the UK which had the experience of both a successful and unsuccessful IS, revealed that a number of managerial issues had either a positive or a negative impact on the company's adoption of an IS. These factors include company culture, education/tranining, justification of the IS to workers and commitment

70

from stake holders (Irani and Love, 2000). Though Irani and Love (2000) indicate that their work is a case study and findings could therefore not be generalized, it could serve as a good case for other organizations to learn from, as the study indicated how the factors affected both the failed and successful IS adopted by the organization.

Ravichandran and Lertwongsatien (2014) used a resourced based theory to study the effect of IS resources and capabilities on the output of an organization. They gave the premise that an organization can only perform well when it uses the IS effectively and rejected the claim that it is the availablity of the IS that effects an organization's performance. From a survey of 129 firms in the United States, they could prove that the use of ISs helps an organization to perform. The results from the study also reveal that the effective use of an IS in an organization is greatly dependant on how functional the IS is and that the latter is dependent on the management practices of the IS unit. Ravichandran and Lertwongsatien (2014), therefore, developed a model that links IS resources, IS capabilities, IT support for core competencies and firm performance.

In a quantitative online survey of 104 respondents of a global developing agency in different countries, Alleyne and Lavine (2013) aimed to explore factors influencing the usage of an enterprise resource planning system (ERP) by accountants . The study revealed, among other things that, the functioning of the IS which Alleyne and Lavine (2013) termed 'facilitating conditions' influenced the actual usage of the ERP by the accountants, thus it was recommended that the organization should continue to maintain the IS to encourage usage.

Campos (2016) sought to understand ISs with regards to condition monitoring and maintenance by reviewing relevant literature from the IS field. Findings revealed that most organizations have put systems in place to aid the maintenance of ISs. The use of social media and web 2.0 tools were also found to be used in the management process of ISs due to

71

its advantage of enabling learning and collaboration among IS staff. Campos (2016) described an IS as an investment that needs to be evaluated and managed in organizations to facilitate the gain of maximum benefit.

Lin (2007) examined the determinants for successful use of online learning systems (OLS) based on empirical findings and concluded that users who find the system to retrieve quality information are satisfied with the system and will like to use it again. Lin (2007) therefore called on instructors and system designers to ensure accuracy, relevance, timeliness, usefulness, and completeness of information in the system so as to continue to increase user satisfaction and behavioural attitude towards use of OLS. Another dimension of managing the system for optimum usage, as proposed, was that the IS should be continually improved to ensure service quality through reliability, access, convenience, acceptable response time, and ease of use. To help encourage user participation, web sites should be designed and organized well to facilitate interaction between users and the IS. Immediate feedback mechanisms that correct misunderstood processes of the system should be put in place to enhance ease of use.
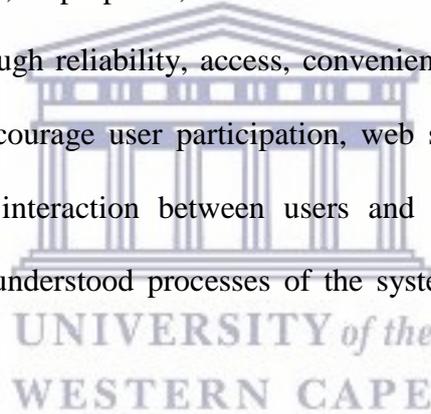
Conrado, Neville, Woodworth and O'Riordan (2016) applauded the use of social media in decision making but noticed that content and unauthorised sources can put users at risk, since the accuracy of such information is difficult to determine. They attempted to explore different mechanisms which have been used in verifying information utilizing social media inbuilt resources and other resources such as experts' advice, crowdsourcing and linked data. Their investigation showed that technical resources like analytical packages are the approaches used for social media information verification. They are developing a verification framework to support decision-making process by managing social media uncertainty.

One dimension of IS management identified in the literature is IS security management. This has been identified as the activities aimed at reducing the risk an IS may encounter in an organization (Belsis, Kokoklakis and Kiountouzis 2005). To ensure the success of an IS, Belsis, et al. (2005) propose a knowledge management dimension to IS security management in that management must put plans in place to help involve all who engage with the IS. This will consist of soliciting and processing feedback for monitoring, reviewing, and improving the IS security management.

2.3.2: Management of ISs in libraries

Fattahi and Afshar (2006) are of the opinion that in the library field, management or housekeeping of ISs is the responsibility of both IS professionals and librarians. Without proper management, the IS cannot achieve its capabilities. The experience of both librarians and IT professionals need to be put together to optimise the functionality of the IS enhancing it to add value to information. Baker (2008)'s opining on strategic information management in the information age, argues that, for libraries to be able to manage the vast information resources they are exposed to in the digital age, they need to manage technology; thus the technological systems enable libraries to provide information. The proposition was made by Baker (2008:9) that, in the modern sense, libraries need to manage technology trends, trajectories and capabilities to track the development of ISs to ensure 'seamlessness, transparency and unity in provision, presentation and utilization of systems, content, and services; increased full-text availability'. The capabilities of an IS are when the most is made out of the system by its users. For this to be achieved, system users should be made to see the system as their own and be able to use it for personalised task via less complex user interfaces.

73

Skretas (2005) is of the view that not much research has been done to examine the actual use of ISs, specifically ILM, by the libraries that adopt them. He thinks that the use or not of all the features of an IS in a library and the extent of use will be associated with a number of factors – general factors, factors relating to the IS, and internal library factors.

Under general factors are categorized issues such as funding, computer literacy level, the level of professionalism of library staff and the amount of training received. IS factors related to the quality of the IS and the functions that it can perform, adaptability to library services and functions, popularity and sustainability of the IS by the vendor. Internal library factors considered issues such as strong leadership support by management, stipulated library goals for using the IS, strong indication of how each individual work role is affected by the use of the IS, staff motivation in use the IS, provision of adequate and functioning equipment, adequate and regular technical support and a convenient office environment (Skretas 2005).

Asemi, Akbari, Kheradmandnia and Farazi (2012) examined the information obtained from library managers in Tehran University Central library about their IS. This was to help determine how relevant, accurate, timely, exhaustive, valid, reliable and cost effective the received information is to the managers of the library. The study showed that, library managers are not highly satisfied with the information they receive from the IS used in their library and this affects the overall benefit of information received. Though Asemi et al. (2012) did not indicate the factors that could affect the output of the IS, it can be directly or indirectly linked to the IS management issues.

A survey was conducted at the University of Albany to determine the level of satisfaction of library staff of the library systems department which is responsible for maintaining the ILS and other ISs of the library, web support and desktop support among others. The results of the study revealed that library staff members were mostly satisfied with the service provided by

the library systems department. Though library staff were satisfied with the general service provision, they complained about change of processes without notification and documentation, so they are not sure of whom to contact when in need of help and a lack of awareness of training opportunities offered by the library systems department (Mugridge and Poehlmann, 2015). Mugridge and Poehlmann (2015), however, did not study the impact of the level of satisfaction on the level of use of the IS of the library.

Swanepoel, Du Toit and Van Brakel (2001) assert that libraries need a management protocol to manage IT, which can be narrowed down to ISs. This assertion Swanepoel et al. (2001) believe is legitimate as IT is a changing resource. They, therefore, examined the management of IT as a changing resource in South Africa's academic information services. From the literature, eleven variables were identified to develop an IT management model for academic information services (libraries). These variables include:

1. Environment scanning: this will help identify the changes that are taking place in the IT industry and will enable libraries to identify new IT tools that can be applied to their services.

2. Availability of resources in the organization: this requires library management to analyse the library's internal capabilities interms of financial support, infrastructure support and technical expertise.

3. Centralized management responsibility: this calls for an assigned personnel at the level of management to take charge of coordinating the activities of the IS unit.

4. Technological forcasting: this is linked to environmental scanning and enables the library to have a proactive vision of what IT/ISs in libraries can achieve in the future.

5. Information Technology standards and architecture: managers of the IS are to ensure that stated standards are adhered to.

75

6. Evaluation of IT/IS: it is advised for the IS to be evaluated at regular intervals. This can be done by comparing the outcome of the IS to the stated standards to determine the level of deviation or otherwise.

7. Risk assessment: the different risks that IT/IS can be exposed to should be critically analysed interms of integrity, availability, security and infrastructure.

8. Market analysis: End users of the IS should be made to determine the success or failure of the IS to enable management identify changing needs of users in time.

9. Vision of the role of IT in the organization: management should compare the current IS situtation to what the IS situation will be like in the future.

10. Integration of IS/IT and strategic plans of the organization: management must make a conscious effort to utilize IS regularly and align it to the organizational strategies.

11. Human aspect with reference to mankind's influence on and use of IT/IS: managers should come to an understanding that the human factors such as acceptance will affect the use of any IS project. Users should always be educated on the human aspects of an IS.

Swanepoel et al., (2001) listed variables identified in the literature to managers of all academic information services of tetiary institutions in South Africa to be assessed and ranked in order of priority. The results of the ranking was as follows:

1. Vision of the role of information technology in the enterprise;

2. Integrated strategic information technology and business plan of the enterprise;

3. Environmental scanning;

4. Available resources in the enterprise;

5. Centralized management responsibility;

6. Information technology standards and architecture;

76

7. Technological forecasting;

8. Market analysis;

9. Human aspect with reference to mankind's influence on and use of information technology;

10. Evaluation of the information technology;

11. Risk assessment

Swanepoel et al. (2001) note that the first six variables were ranked very high and therefore used those in developing the proposed model. They were, however, of concern that the human factors of IS management were not ranked high by library managers in South Africa, conversely, existing literature showed the contrary. The model proposed was able to identify and illustrate the different relationships that exist between the six set of variables selected.

Dorman (2001) reports that an increasing number of libraries are replacing their public access computers with a thin client service due to security and file corruption, cost and maintenance time. The case of the Taulatin public library was cited where the library replaced all its public access computers used to access the internet and the library catalogue with Veicon Technology V-link thin client service. The technology allows terminals or thin clients to connect to a base unit which is then connected to the library's local area network. Ths system is configured to allow the terminals to connect to the service provider's server which imitates web browser functionality and therefore reduces the risk of exposing the libraries' local area network to the world wide web, and this reduces the risk of the library system getting corrupted.

Ani et al. (2005) encouraged libraries in Nigeria using different IS platforms to form regional and national academic libraries computer networks with the aim of ensuring standardization of policies, procedures and library practices in the consortium to ease the sharing of

77

resources. Also, in a study in Australian public libraries, Fitzgerald and Savage (2004) proposed that, for libraries to make the use of ICT a success story, they need to form or join a consortia which will create partnerships to increase their purchasing power, cooperative negotiation with IT service and product providers for reduced cost of services and products. They also proposed libraries should ensure they have well-functioning IT infrastructure which should be regularly updated or replaced due to technological advancement. Library staff need to monitor bandwidth usage; the people using it and what it is being used for. This will ensure efficient data flow across the network and will enhance the usage of the library IS.

A study conducted in Kuwait by Awadh (2016) on user perception of ICT in a library found that students were very comfortable using the library computer system due to the fact that the computers were of high specification, ensured fast reaction time and were well maintained. A high quality of Internet connection was also reported. Though Awadh (2016)'s study was on students' perceptions, the findings can be applied to library staff, as both students and staff use the same library system to retrieve information.

With regards to the human aspect of ISs in libraries, Spacey, Goulding and Murray (2003) intimated that managers of libraries need to appreciate the potential effect of technology on library staff. This knowledge will aid them to find the most appropriate solution to manage the effect of IS adoption on staff. If training is deemed necessary, the approach should also be appropriate, as some of the training if wrongly done will aggravate the rate of fear among staff.

In a study in Ghana, a very dust prone country, especially during the harmattan season, Thompson and Pwadura (2014) proposed the cleaning and dusting of servers and the client computers at least once a week to ensure they function efficiently. They also recommended

78

covering of such equipment after use, over weekends and holidays and the installation of air conditioners to reduce dust as routine management practice to ensure the effectiveness of ISs in libraries in Ghana.

2.4.: Benefits and challenges of IS use in libraries

This section views literature on the benefits and challenges libraries gain in the use of various ISs in service delivery.

2.4.1: Benefits of ISs in libraries

Access to ISs has enhanced service delivery in most libraries, including academic libraries. This has enabled libraries to install networks and create links to the Internet through which databases can be searched and other relevant sources from across the world. The creation of digital libraries has also been enabled by IS' use in libraries. Libraries have created local online catalogues and other gateways to the digital libraries which can be accessed worldwide with the advantage of simultaneous usage of a single resource at any point in time (Siriwongworawat, 2003). Most African university libraries have implemented ICT facilities to aid more efficient information storage, processing and retrieval. This has enhanced the way information is handled in academic libraries even in developed countries (Adeyoyin, 2006).

The use of ISs in libraries offers the opportunity for libraries to become part of the globalized world. IS use provides libraries with countless opportunities to gain access to information resources outside their local collection and also enables libraries to create digital contents which can be accessed anywhere in the world (Omekwu and Echezona, 2009). This is in sync with the findings of Rafiq and Ameen, (2013) that libraries embark on digitizing their collections with a specific IS in order to provide access via the web to increase access and to preserve the materials. The internet and the web have helped librarians to use their traditional knowledge to create interfaces of virtual collection management, web directories and web

79

portals, helping user groups to navigate in the new information environment. Libraries have also utilised the web to create an online interface for library resources with the basic aim of improving information retrieval and service delivery (Nielsen, 2005).

The use of ISs in libraries has introduced new and innovative ways into the operations of libraries, eliminated routine and repetitive tasks and has offered multiple modes of interaction, (a)synchronous, differentiated content, flexibility (time, place, pace), new dimension to information dissemination, simpler means of information retrieval in a single channel through the next generation of web technology (Ram, Anbu and Kataria, 2011).

The use of next generation library systems has brought enormous benefits to the library's clients in the sense that the use of discovery layers has shortened the process of finding and acquiring information. The next generation library systems have also broadened the scope of library collection to now include all the materials the client can find anywhere online. This has been made easy with just in time acquisition and patron driven acquisition, where a library can loan or purchase an e-book or any electronic resource within minutes after a client requests it. The client may not even be aware he or she is participating in the acquisition process of the library but may only assume the discovery of the item in the library catalogue (Green, 2014). Also, information from additional sources is now being included in online public access catalogues (OPACs) to improve their usefulness and quality. These catalogues may include web services that provide additional bibliographic information, keyword searching, relevance and ranking, enriched content like book covers, delivery of content, alternative resource recommendations, web 2.0 features like social bookmarking, tagging and user contributions, book reviews, alternative sources for bibliographic items, contents delivery like table-of-contents, previews and excerpts, bibliographic management tools and creation and management of user accounts. This initiative in many ways is making OPAC

records available online. Course instructors in universities are also able to transfer bibliographic details from OPAC into citation management software. These initiatives have really helped in increasing the use of library resources (Back and Bailey, 2010).

A study by Adeleke and Olorunsola, (2010) on the use of electronic cataloguing and classification tools in a Nigerian library revealed that cataloguers and classifiers are able to process more books with the online tools compared to the manual system, thus the online tools have improved productivity in the library. Likewise, Boateng, et al. (2014) after studying the impact of the adoption of an IS for library transaction at the KNUST library in Ghana, posit that staff of the library were able to perform major library activities like circulation and cataloguing faster than they could with the manual system. The system made access to information easier as they were now able to use the OPAC without much assistance from staff. Magara (2002) also recorded academic libraries in Uganda using ISs to create online publications, share resources with other libraries, provide public access and to create union catalogues.
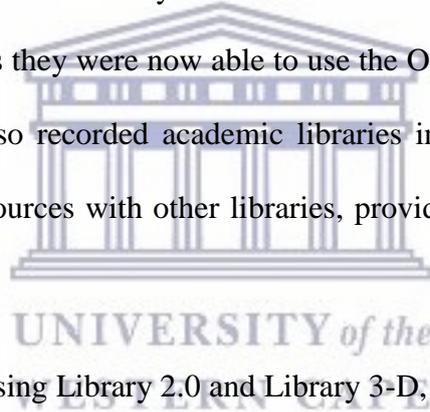
In discussing the benefits of using Library 2.0 and Library 3-D, Shafique and Riedling (2013) note that libraries' use of ISs to collect information from external sources such as blogs, wikis and information islands in Second Life. The tools are also used for cataloguing and tagging library resources such as Library Thing and del.icio.us. These provide a means of standardization in the processing of information sources leading to better time management. Social media also provide the benefit of quick distribution of digital content or alerts about printed/traditional content with the help of RSS feeds and micro blogging tools. An additional advantage thereof is reaching potential users who do not want to visit libraries. With regards to social media tools like wikis, Hassoun and Bernaoui (2015) posit that the tools are designed for professionals to collaborate in a network by sharing information. They serve as a

81

quick way to create content for free. Redden (2010) describes the benefits of social media especially social bookmarking and social tagging in academic libraries as a simple means of collaboration that allows users to access organised materials and also add to the collection. Tagging of resources also serves as marketing tool.

Kumar (2014) conducted research on the mobile technology use in an Indian library and noted it enhanced library services and communication. Similarly, Malik and Mahmood (2013) are of the view that cell phone technology serves as a source of immediate interaction between the library and users as well as among users greatly enhancing library functions and services. Instant message with broadcast feature is used to send message to every user with a click to create awareness on current collections and services. IM is also used by most academic libraries to provide reference services thereby helping users to avoid unnecessary travels to the library. A study by Anbu and Mavuso (2012) at the University of Swaziland libraries, revealed that the use of short message services increased user awareness levels and the use of library services up to about 150%.

Makori (2013) discussed the benefits of using radio frequency identification technology (RFID) ISs in academic libraries and noted that the ISs enable automatic identification and tracking of information resources allowing quick self-charge and dis-charge of materials by users. Librarians used the extra time they now have to provide other services such as organising information literacy programmes for users. RFID also provides quick means to keep stock of the library resources using a hand reader, allowing information professionals carry out stock taking regularly. RFID also enables accurate shelving of physical materials leading to their quick retrieval.

A number of benefits have been identified in the literature accruing to the use of ISs in libraries. Libraries that adopted and used ISs efficiently were reported to find the

82

management of both their physical and electronic collection easy. The use of the Internet, collaborative platforms and cloud-based services has also enabled libraries to expand their collection base beyond their local and subscribed collections. These e-platforms have also enabled libraries to make their collections widely available for the whole world to see or use.

2.4.2: Challenges with use and management of ISs in libraries

The creation of digital libraries and the provision of electronic services which are made available via an IS poses a number of challenges to libraries, especially in Africa. Key among these challenges are lack of specialized staff using the IS for the selection, organization and retrieval of information. Many countries lack or have inadequate ICT infrastructure and do not possess 'robust and elaborate infrastructure involving PCs, servers, Web authoring languages, browsers, application programs, Internet connectivity, content, information architecture and standards' which serve as the backbone of any functioning IS (Mutula, 2008:61-62). In other parts of the world, like Yemen, such systems are mostly not available (Muthanna and Sang, 2019). Digital libraries only provide information resources but do not make provision for the interest of users and the type of data the users will require (Li, Jiao, Zhang, and Xu, 2019). The management of digital libraries is also a challenge to African libraries which have to put in place new strategies to ensure ISs for digital libraries are functioning. One other problem identified with the use of ISs in libraries in Africa which has not been trumpeted by most scholars, is the language barrier. Most ISs and digital library resources are in English and this affects their effective use in African libraries (Mutula, 2008). There is also the absence of human resources to create and manage digital libraries (Joo, Hofman, and Kim, 2018) and Kakai, Musoke, and Okello-Obura, (2018). Han and Liu (2010) reported that, there were many libraries that did not use any form of IS or Web 2.0 technology due to lack of human resources and inadequate budgets for IS use.

83

Gillingham (2014) observes from field work in human services organizations that introducing, updating and/or expanding an IS are very expensive. Organizations usually have to justify why the use of an IS is necessary. It was also noted that ICT staff had challenges understanding how end users would like the system to function to meet organizational processes resulting in systems not meeting the needs of organizations. Challenges of wrong or inaccurate data input leading to the generation of misleading reports have caused disappointment at managerial levels. Front line personnel have also been accused of spending too much time entering data instead of attending to customers, causing delays in service delivery. Kennan and Wilson (2006), writing on how institutional repositories can be regarded as ISs in libraries, expressed the view that most IS projects are faced with the challenge of no thought through agreement on system requirement due to IS and library professionals finding it difficult to come to a consensus on the expectations about the system. Similarly, Gbadamosi (2012) stated that librarians, system analysts and programmers are not brought together to coordinate the IS design to ensure successful library information systems.

An IS also needs to meet the needs of varied users in the library and this usually is not achieved in full. The system must meet future unknown requirements of the organization which is difficult to determine by system designers as needs may change (Kennan and Wilson, 2006). Gbadamosi (2012) alerted the lack of routine maintenance of systems by system administrators.

With regards to LMS/ILS, Tyagi and Senthil (2015) they are mostly closed proprietary systems and there are usually technical challenges advancing these systems to embrace cloud technology. Academic libraries do not have the luxury of a wide range of library service platforms from which they can choose, and are limited to a few well known ones. Some libraries have installed some modules of LMS resulting in inefficient use thereof.

Siriwongworawat (2003) cited the installation of Dynix LMS; a proprietary LMS in a Thailand library where the cataloguing module was installed first before the acquisition, OPAC, community resources and serial control modules were added. Boateng et al. (2014) studied the impact of the adoption of an IS for library transaction at the KNUST library in Ghana and found that because not all the IS modules were installed and the RFID function was not enabled, there were lots of errors and omissions regarding book records and resources which affected the retrieval function. Mitchell (2003) reporting on the implementing and impact of the LMS at Merthyr Tydfil Public Libraries, noted that challenges were encountered as certain parts or modules of the system, and this did not run smoothly and certain required packages or modules in the LMS were absent. Because staff members were inexperienced and lacked the necessary skills to handle the system, difficulty in determining the origin of system failures resulting in delayed processes. Wasike and Njoroge (2015) noted that because most library ISs are not developed on web technology, it is difficult to integrate them in the cloud environment.
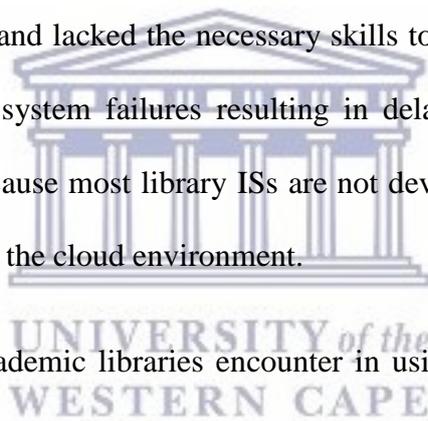
Apart from the challenges academic libraries encounter in using the library IS, it was also identified that in most universities, the library IS was not integrated with the course management or learning management systems, resulting in difficulties to link library collection as citations to the different courses (Dygert and Moeller, 2007; Shapiro, 2012).

A study in India indicated that lack of budget, manpower, skilled staff and training was the cause of lack of automation in libraries. The majority of staff members in the libraries studied, learned computer by themselves or through friends (Kumar and Biradar, 2010). Shivaputrappa and Ramesh (2013) in evaluating the ICT skills of some Indian librarians found a lack of commitment on the part of institutional heads to encourage library staff or to send them for ICT training. Due to work overload, staff members could not be released from

85

duty to pursue further skills in ICT. Contrary to the real situation on the ground in India, Shivaputrappa and Ramesh (2013) are of the view that, it is very important for every library and information professional to have computer skills in order to work in the changing technological environment in libraries, as Baccarne, (2019) noted, most library professionals had to learn IT skills on the job to establish IR, for instance.

Fitzgerald and Savage (2004) studied the challenges facing Australian public libraries with regards to ICT developments. They noted that the funding base of most libraries across the world is very low and ICT/IS developments demand huge financial investment. Consortia formations grant libraries partnerships to increase their purchasing power, cooperative and negotiate with IT services and product providers. Some libraries have not been able to join a consortia to enjoy these benefits. Those who have joined also face other challenges such as lack of commitment by university authorities, as reported in a study in Ghana by Dzandza and Alemna (2011). Inadequate funds to subscribe to and sustain internet connectivity were also noted as a challenge. This is because libraries do not link their objectives to that of governments (in the case of academic libraries their institutions) to be deemed relevant.

Technological and infrastructural issues were also noted as challenges by Fitzgerald and Savage (2004)**.** IS need well-functioning IT infrastructure. This is not a one-off project but involves recurrent cost as these resources need to be regularly updated or replaced due to technological obsolescence. Access to bandwidth, its cost, monitoring of the people using it and what it is being used for is a major challenge for most libraries. Issues of bandwidth greatly affect the performance, use and functionality of an IS. Library staff must now be abreast with new skills, such as managing telecommunication by monitoring data traffic across the library network to ensure efficient use of available bandwidth. Interoperability of library ISs are also a major challenge, as libraries must ensure their ISs are compatible with

those of other libraries and with web resources to enhance cross searching. Though the research of Fitzgerald and Savage (2004) was on public libraries and conducted in a developed country, the findings are very relevant to academic libraries in developing countries like Ghana that are faced with similar challenges currently. A study in the Bangladeshi academic libraries by Shuva (2014) also enumerated inadequate finance, lack of infrastructure and lack of qualified library professionals as major challenges to the adoption of ISs to develop digital libraries and services. Connell (2013) identified the following reasons for libraries not using content management systems:

- It is expensive and the library budgets cannot support it annually

- Libraries do not have authority to manage the website. Institutional web services manage the website

- Some libraries have small staff strength and it is difficult for staff to have extra time to learn and implement CMS.

Ani et al. (2005) explored the sources of funds available for ICT and factors that impede effective adoption of ICT in academic libraries in Nigeria. The study showed that the main causes inhibiting the use of ICT in Nigerian university libraries are lack of funds, frequent power outage, lack of trained personnel and the negative attitude of university management towards the adoption of IT/IS in libraries, lack of the impact of the IS by users and the staff behaviour towards change.

Adeleke and Olorunsola (2010) conducted a study on the use of online tools for cataloguing and classification in Nigerian university libraries and found that lack of skills on the part of library staff in using the tools is a major challenge. Adeleke and Olorunsola (2010)'s findings on ICT skills were also echoed by Adeyoyin (2005) and Ibegbulam and Eze (2016) by stating that the rate of ICT literacy among Nigerian library staff is very low. Libraries also encounter

87

subscription challenges dealing with licensing agreement coupled with lack of experience of completing online forms, difficulty with the use of credit cards coupled with the risk of internet fraud. Asogwa (2014) measured the information technology infrastructural availability in academic libraries and skills and competencies of academic librarians in Nigeria. The study revealed that most of the libraries had unstable power supply, inadequate computers, poor Internet, poor ICT policy and regulatory framework and low bandwidth. Library staff had inadequate knowledge of web development and therefor under-utilized digitized institutional repositories. Similar problems were stated by Anie and Achugbue (2009) as well as Baro and Asaba (2010). At the broader institutional level, a study by Eze, Awa, Okoye, Emecheta and Anazodo, (2013) to determine the inhibiting factors to ICT adoption by Nigerian universities also buttressed the finding of similar studies in Nigerian academic libraries by stating that electricity, internet connectivity, technology support, obsolete technology pose challenges to adoption of ICT in Nigerian Universities. Lack of institutional support and embezzlement of funds were also cited as challenges by Eze et al. (2013). In Kenya, Makori (2013) identified the lack of an ICT policy as a major drawback to the adoption of an IS in libraries. Husain and Nazim, (2015) and Ayoku and Okafor, (2015) indicate the specific areas of ICT training need in academic libraries as computer programming, website, portal or subject gateways development, hardware maintenance, metadata or e-resource management and content management. The issue of lack of ICT skills among library staff is not limited to specific countries in Africa, as a study by Adeyoyin (2006) of 370 professional librarians in West African countries revealed that only 179 of them had adequate ICT skills.

Mapulanga (2013) studied the digital library initiative of the University of Malawi Libraries. Findings showed that three out of the five college libraries adopted Greenstone and the other two adopted DSpace and the central repository for Procite and Endnote. Thus, in the same

88

University library system, three different software programs were being used for the digital library project. The University of Malawi did not have a policy to regulate the activities of the digital library. Other challenges identified by the study included low level of ICT among library staff, viral attacks, funding and inadequate bandwidth. In a study by Kari and Baro (2014) on the use of LMS in Nigerian university libraries, it was reported that there was a high software turnover rate in most Nigerian university libraries for reasons such as lack of proper feasibility studies, huge maintenance cost and lack of technical support. Thompson and Pwadura (2014) also identified frequent power outages/surges, poor maintenance culture, lack of appropriate system security and inadequate finance as major problems affecting the use of LMS at the University of Development Studies in Ghana. In another study in Ghana by Ahenkorah-Marfo and Akussah (2016a) it was revealed that the adoption of social media in top universities in Ghana was not streamlined, as the libraries did not have policies to guide them in the use of social media and they lacked the required skills to make the use of such tools effective.
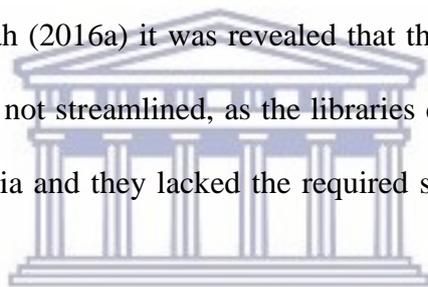
Ramzan (2004)'s study in Pakistan provided a list of common challenges encountered by libraries in their quest to use ISs as, budgetary constraints, lack of standard library software, inadequate hardware, unavailability of skilled human resources, cost of software, and negative attitude of management confronting them. In a study conducted by Siddique and Mahmood (2016) using focus group discussion with experts, it was revealed that most academic libraries in Pakistan were using tailor made software which did not conform to LMS standards and some of the institutions were using only the Microsoft Excel spreadsheet. The discussion also revealed that most of the efforts made to procure ISs in libraries were efforts from individual libraries who developed library software to meet their requirements which do not follow required standards. Such systems were not compatible with that of any other library and therefore limited the chances of developing union catalogues and Inter

89

Library Loan (ILL) activities. Though some of the libraries used Koha, they had challenges customizing the software to meet their internal library needs; this made other libraries reluctant to install the Koha software for use.

Mutula (2004) writing on IT diffusion in Sub-Saharan Africa noted that there is a limited utilization of the ISs that are available in libraries across Africa, as for instance Internet use is restricted to accessing specific sites and services. A number of university libraries change their ISs over short periods with reasons of poor performance, lack of technical support from suppliers, inadequate information on the functions of the IS prior to is purchase. There is also lack of ICT policy in most of the universities and their libraries. High cost of ISs coupled with maintenance cost make the systems unsustainable. In addition to this, IS project managers in libraries in Africa also provide wrong cost to IS projects which affects the budget for projects. These challenges make the adoption of ISs a huge burden for small academic libraries especially in Africa (Cho, 2011).

2.5: Summary of literature

Libraries have been portrayed in the literature as one of the earliest institutions to adopt the application of technology specifically ISs to the organization of information and service delivery. Technology experts have tried to provide tailor made solutions through the development of software to help manage library resources and services. Initial efforts in this direction were meant to manage only print collections; these systems were called integrated library systems (ILS) or Library management systems (LMS). Advancement in technology and the changing nature in library collection format and service delivery made these earlier systems incapable of meeting current needs of libraries. System experts brought in solutions by developing other systems like Electronic Resource Management (ERM) and Digital Asset Management (DAM) to aid in new library workflows to be used in collaboration with ILS or

LMS to help libraries function. There came the time when these other systems were merged with ILS and this brought about second-generation library automation systems, next-generation library systems or the new library system. In this 21st century these systems have again been upgraded to what is being termed Library Service platform where cloud computing devices and services are in information systems application in libraries. Social media and other collaborative tools have also been at the heart of library services. Social media is used for communication, marketing, collaboration and sharing of ideas in libraries. Other advanced collaborative tools like library 3-D, Internet of things and natural language interaction are also being used by libraries. The list of IS use in the library also include geographic information systems and content management systems.

The researcher is of the view that, the list of ISs that are used in libraries can never be exhaustive; as early adopters of ICT/IS libraries and for the matter academic libraries will continue to embrace new ISs as long as they are being developed. This gives the chance to libraries never to be regarded as outmoded so long as they can provide the traditional services using the most current IS available, they will be regarded as relevant from the user's perspective.

Section two of this chapter portrayed the importance of management of ISs both from the bigger industry perspective and specifically in the library industry. It was revealed that despite the importance of managing and maintaining ISs, most organizations struggle to keep up to the task leading to loss of huge capital investments in the IS. Different studies were cited to prove the benefits of managing ISs; well-functioning ISs that will lead to use of the IS. A number of studies also gave recommendations as to how ISs should be managed to ensure its effectiveness. Notable among these recommendations are: management of ISs should not be seen as the responsibility of only IT staff but also the responsibility of

91

managers, regular evaluation of ISs should be carried out and quality infrastructure should be put in place and maintain regularly.

From the literature, the researcher discovered a number of challenges encountered by academic libraries in their quest to use ISs in the delivery of services. The researcher noticed four major broad areas of challenges based on the trends of reported challenges in the literature reviewed for this study. These trends are;

- Financial challenges

- Technological and infrastructural challenges

- Human Resource challenges

- Organizational challenges

It should however be noted that these challenges are not mutually exclusive of one another but move hand in hand. For instance, financial challenges will lead to technological and infrastructural challenges and will also not enable a library to maintain highly qualified IT/ library staff. Organizational challenges will lead to financial challenges due to lack of commitment from leadership and will also cause staff not to be committed to IS projects.

The review identified that there were not many studies done in Ghana on the use and management of ISs in libraries. A number of studies were found on the automation process, ICT adoption and social media use in libraries. This research is therefore very relevant as it will provide literature on what academic libraries use IS to do and how they manage the IS they use beyond the automation process.

2.6: Concluding summary

This chapter reviewed relevant literature in the areas of the concept, use, management, benefits and challenges of ISs. This was done to position the research in the context of the

92

available literature and to identify the gaps in the literature that this research seeks to fill. The next chapter focuses on explaining the theory adopted to explain the concept of use and management of ISs.

93

<center>**CHAPTER THREE: THEORETICAL FRAMEWORK**</center>

3.0: Introduction

This chapter focuses on the theoretical framework and how the study is situated within the chosen theory. The chapter introduces the concept of theoretical framework and its role in research, explains the theoretical framework that is adopted for this study, indicates how it has been applied in other fields of study and in the field of library and information science and finally explains how it is going to be used in this research.

3.1: Background to theoretical framework

The term theoretical framework has not been consistently defined in the literature. It can generally be defined as a theory that is applied by a researcher to understand phenomena. It is also sometimes referred to as a conceptual framework. The adopted framework guides the researcher. It is regarded as the structure, the scaffolding or the frame of the study. It also delineates the main concepts to be studied and the relationship that is expected to exist between them (Anfara, 2012). It is a guiding principle for research that provides structure or an explanation of a phenomenon and describes the best possible explanation for the nature and causes of a phenomenon. Thus, it helps to describe the characteristics of a phenomenon and the factors that will cause change in the phenomenon. In scientific research theories can be used in two ways: through either deductive or inductive reasoning. When a theory is used as the starting point and conclusions about a selected material are identified it is deduction, but when observations about phenomena are made at the starting point and the theory is formulated as the conclusion, it is induction (Wentz, 2017).

Unlike Anfara (2012) who posits that the theoretical framework is the same as the conceptual framework, Wentz (2017: 85) indicates the two are totally different though sometimes used

<center>94</center>

interchangeably and further explains that 'unlike theoretical framework, a conceptual framework may or may not have theory associated with it. Instead it is an approach to solving a problem in a particular way. It is typically less strict than a theoretical framework because it may include empirical observations, untested or untestable hypotheses, and intuition'. Based on Wentz (2017), the researcher preferred to use the concept theoretical framework in the context of the explanation given above.

3.2: The DeLone and McLean Information Systems Success Model

The theory chosen as the structure of this research is the 2003 updated DeLone and McLean Information Systems Success Model (theory). A number of abbreviations have been used to refer to the model in the existing literature. Major ones include the DMSM (Moturi and Mbiwa, 2015) DeLone and McLean information systems success model (Bernroider, 2008), ISSM (Chen, Chang, Kao, and Huang, 2016), DeLone and McLean IS success model (Hossain 2016, Fleischman, Walker, and Johnson, 2010). To enhance consistency, the researcher is using 'DeLone and McLean IS success model' as the preferred term. Although the Technology Acceptance Model and the Model of Internet Adoption could have been used, Bernroider, (2008) suggests that these models could be used to assess how organizations use ISs, but they do not provide a holistic picture of what comes out after the adoption.

In 1992, DeLone and McLean developed a framework for conceptualizing and operationalizing IS success. In the framework, DeLone and McLean attempted to bring structure and awareness to the 'dependent variable' IS success, as it was defined in IS research. The development of their theory was based on the premise that, it was necessary to understand IS management actions and IS investment, and this understanding can only be gained through the measurement of IS success or effectiveness. The model was based on theoretical and empirical IS research done and published by different researchers between

95

1970s and 1980s, the communication research of Shannon and Weaver and the information 'influence' theory of Mason. The primary purpose was to synthesize previous researches on IS success into an organized knowledge base to guide future researchers (Delone and McLean, 2003). DeLone and McLean (2003) explain the model is based on Shannon and Weaver's communication research that, system quality measures the technical success of the IS, information quality is used to determine semantic elements and use and effects determines the effectiveness of the IS. This they illustrated as shown in Fig 3.1.
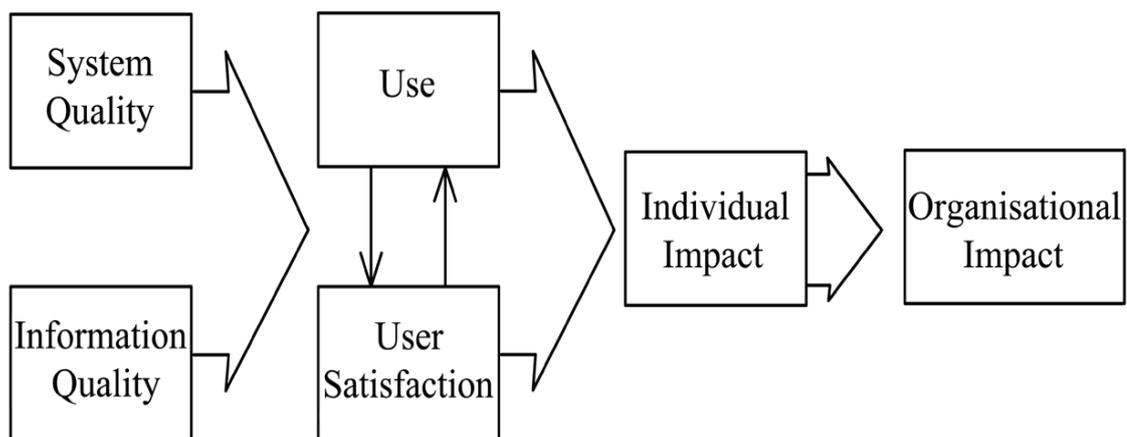
Source: DeLone and McLean (1992)

Figure 3.1: DeLone and McLean IS Success Model

In 2003, DeLone and McLean updated the original success model based on research contributions since the publication of the original model, and this is based on changes in the role and management of information systems. In the updated model, DeLone and McLean replaced 'use' with 'intention to use'. This they defined as an attitude as against the previous 'use' which is a behaviour (Delone and McLean, 2003). In the updated model DeLone and McLean (2003) explain "use" and "user satisfaction" are interconnected but "use" is experienced first before "user satisfaction". They note that when users have great experience with "use" it increases their intention to re-use the system and the reverse in also true.

96
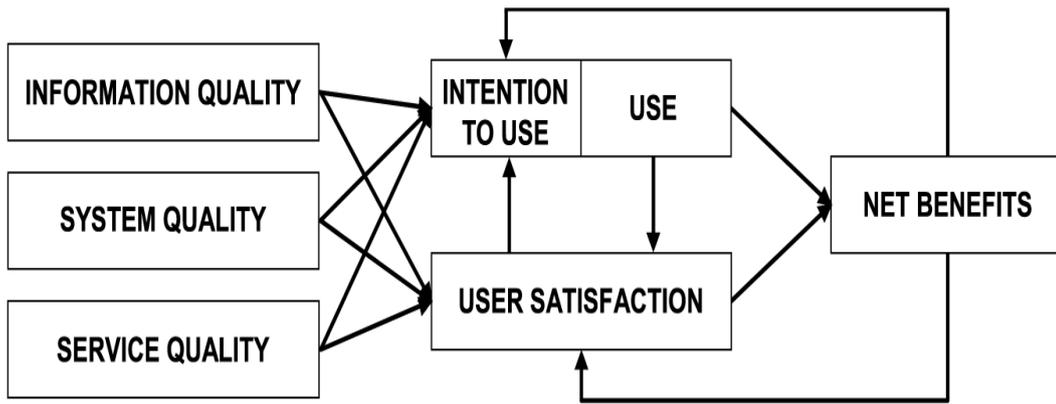
Source: DeLone and McLean (2003)

Fig. 3.2: The updated DeLone and McLean IS Success Model

The updated DeLone and McLean IS success model, as shown in Figure 3.2, consists, according to Delone and Mclean (2004), of six interrelated dimensions of information systems success:

- System quality

- Information quality

- Service quality

- Use

- User satisfaction

- Net benefit
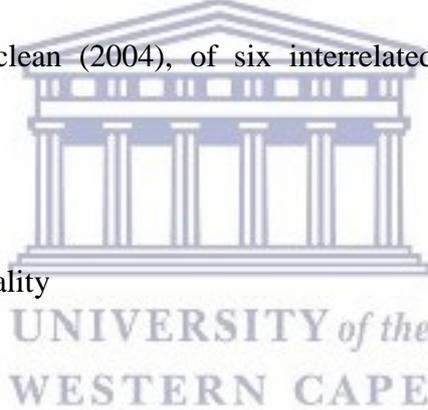
Delone and Mclean (2004) explain that improvement on the old model brought about two major changes. Firstly, service quality was added to reflect how important service and support are in ISs. This was also noted by Wang, Tseng, Wang, Shih and Chan (2018). Service quality is essential as a variable to measure IS success due to increase in electronic activities. It includes all technical support from web providers. Secondly, individual impacts

97

and organizational impacts from the old model were merged to form net benefits. The six variables in the updated model were explained by Delone and McLean (2003);

'System quality', refers to the required features of an IS; usability, availability, reliability, adaptability and response time are what users will expect from an IS

'Information quality': the content of an IS; IS content should be made personal, complete, relevant, easy to understand, and secured.

'Service quality', encompasses the all the services provided by the vendor and the IS department.

'Usage' measures the extent to which users interact with the IS including visit to a Web site, navigation within the IS, through information retrieval to execution of a transaction.

'User satisfaction': this relates to the entire experience of users from logging onto an IS till the end of their transaction.

'Net benefits': the concept of benefit comprises three major issues. Thus, what is benefit, whose benefit and at what level is benefit determined. In their definition of benefit Delone and McLean (2003), posit that they used 'net benefit' to capture the balance of positive and negative impacts of an IS. The benefit for whom deals with the different actors in the IS chain; suppliers, employees, organizations, markets, industries, economies, and societies. The third issue of benefit determines the perspective from which the benefit must be analysed; individual user, employer/organization, industry or the nation.

To help with better understanding of the key concepts in the DeLone and McLean IS Success Model, the researcher reviewed the work of Nelson, Todd, and Wixom, (2005) who explain the concept of system quality and information quality in detail based on the review of the

literature on ISs. Nelson et al. (2005:202) note that, across the literature, a variety of definitions for information quality has been identified. These definitions fall in three categories: an intrinsic, a contextual and representational dimension views of information quality. 'The intrinsic view considers the properties of information largely in isolation from a specific user, task, or application'. The context-based definitions look at information quality by the degree to which it is helpful in completing a particular task; thus it includes dimensions such as relevance, completeness, and currency. Representational dimension deals with the format of information. The representational dimension deals with how effectively the information is presented to aid interpretation and understanding. The different attributes found in the literature to describe the quality of information as stated by Nelson et al. (2005:203) are as follows:

Accuracy: 'is most commonly defined as the correctness in the mapping of stored information to the appropriate state in the real world that the information represents'. It is an intrinsic quality.

Completeness: 'refers to the degree to which all possible states relevant to the user population are represented in the stored information'. It is a contextual quality.

Currency: 'refers to the degree to which information is up to date or the degree to which the information precisely reflects the current state of the world that it represents'. It is a contextual quality.

Format: is a representational quality. 'Format refers to the degree to which information is presented in a manner that is understandable and interpretable to the user, and thus aids in the completion of a task'.

Nelson et al. (2005:205) define system quality as the features of the information processing system required to produce output. This is dependent on user perceptions of interaction with the system over time. System quality can be assessed based on system dimensions and task dimensions 'System dimensions are those characteristics of a system that are largely invariant across different uses and can be assessed independent of task, context, or application. Task dimensions are those for which an assessment will depend on the task and setting'. Nelson et al. (2005:205) identify five key dimensions to system quality in IS literature: accessibility, reliability, flexibility, response time, and integration. 'Accessibility and reliability are, to a large extent, system dimensions. They represent defined properties that are largely independent of usage. Response time, flexibility, and integration are characteristics that are perhaps best evaluated in the context of specific tasks and should be considered task-related.'

Accessibility: 'represents the degree to which a system and the information it contains can be accessed with relatively low effort'.

Reliability: 'refers to the dependability of a system over time … It can be defined objectively as the technical availability of the system and can be concretely measured by metrics such as uptime, downtime, or mean time between failures'.

Response time: 'refers to the degree to which a system offers quick (or timely) responses to requests for information or action'.

 Flexibility: 'relates to the degree to which a system can adapt to a variety of user needs and to changing conditions'.

Integration: 'refers to the degree to which a system facilitates the combination of information from various sources to support business decisions'.

100

A critical look at the concepts of information quality and system quality as they have been used in the IS field identified by Nelson et al. (2005) and the explanation and understanding offered for their use in the DeLone and McLean IS success model by Delone and McLean (2003), shows clearly that the concepts have been appropriately defined by Delone and McLean (2003) and applicability of their use in the model is valid.

In explaining the updated DeLone and McLean IS success model Fang, Chiu, and Wang (2011:481) indicate that the model is a major breakthrough in IS research. They further explain that: 'the model posits that system quality and information quality, individually and jointly, affect user satisfaction and system use. Additionally, system use affects user satisfaction with the reverse being true'. Ahmad and Mehmood (2015) also posit that, it is a model that assesses IS success from the perspective of end users. Hossain (2016) indicates that the DeLone and McLean IS success model is one of the few original theories that can be used to measure the success of an IS. According to Chiu, Chao, Kao, Pu, & Huang (2016), the DeLone and McLean IS success model is an indicator model proposed for the evaluation of IS performance. Researchers can use it to determine effect of systems on staff performance and organizational output. Häkkinen and Hilmola (2008) claim both the original and updated model were built on the systhesis of different academic researches and has elements that help to determine the impact of the features of a system on utilisation of the system.

3.3: Criticism of the DeLone and McLean IS success model

Bacon and Fitzgerald, (2001) indicate that, though a number of models have been developed including the DeLone and McLean IS success model, there is no underlying framework to provide a holistic picture for the field of ISs. They make reference to a number of models including a five-component model of hardware, software, data, procedures, and people that relates to information system, models that delineate strategic systems of IS development and

101

many others. They are of the view that, the models describe a particular part of the IS field by looking at an IS from the lens of an information system, strategic systems planning approaches, types of development, types of system/application, and research themes. Though Bacon and Fitzgerald, (2001) appreciate the significant contributions of other models to the field they are of the view that the models were developed with orientation geared toward a particular source and do not provide an integrated, overall, systemic view to the IS area of study and the consequential difficulties in teaching and learning and which in turn, leads to a lack of alignment between information systems and technology (IST) and the strategic aims of an organization which they indicated could lead to failure of ISs in most organizations. Hossain (2016) cited Seddon (1997) criticizing the DeLone and McLean IS success model on the basis that the model has the tendency of creating unnecessary confusion because it included both variance and process interpretation. Fang et al. (2011) also intimate that the model is limited in e-commerce context.

Leem and Kim (2004) are of the view that IS success models such as the DeLone and McLean IS success model concentrate on the evaluation of just a particular stage of the IS development instead of evaluating the IS project from the planning through maintenance. These models do not include detailed procedures and in addition, the models do not establish any relationship between evaluation and business implication. Though Leem and Kim (2004)'s claims about DeLone and McLean IS success model is true, the claims will not affect this study in any way, as the objectives of this study do not include any of the factors listed by Leem and Kim (2004). In that issue, one is based on the entire automation process, issue two is based on evaluating an IS, and issue three is a control measurement, and all three are beyond the scope of this study.

3.4: Review of application of the D and M IS success model in research

Petter and McLean (2009) empirically evaluated the relationships within the DeLone and McLean IS success model using the quantitative method of meta-analysis. The results support the major relationships postulated in the updated DeLone and McLean IS success model. Unlike Petter and McLean (2009) who in their study found that most of the relationships were supported by their findings, Chiu et al. (2016) who applied the DeLone and McLean IS success model to evaluate user recognition and use of cloud e-bookcases indicated from their findings that, system quality was noted not to have any significant positive influence on the intention to use the system, but rather had a significant positive influence on user satisfaction. Information quality also had no significant positive influence on system use but service quality had a significant positive influence on intention to use the system. Intention to use had a significant positive influence on net benefit.

Xinli (2015) assessed the effectiveness of EMS in curbing corruption using the DeLone and McLean IS success model by exploring the relationship among information quality, system quality of EMS, use of EMS, user satisfaction and organizational stated net benefit. Findings brought to the fore that the higher the quality of the system the greater the use of the EMS. Xinli (2015) concluded that, if the executive leadership give maximum support to the use of the system, the continuous use of the system will help reduce corruption.

Häkkinen and Hilmola (2008) used the DeLone and McLean IS success model to identify the dimensions that contribute to the success of an ERP system. Fleischman et al. (2010) investigated user and provider perceptions of management accounting system (MAS) services an organization using the DeLone and McLean IS success model. They concentrated their study on how information quality affects provider and user perception of MAS. The study revealed that the MAS did not meet users' expectation of information quality and timeliness

103

of service and that the system provided irrelevant information that does not help in decision making.

Lin (2007) applied DeLone and McLean IS success model to measure the success of an online learning management system. Findings revealed that quality of information influenced user satisfaction and intention to use OLMS. Lin (2007) recommends that system developers should increase the quality of information. This will aid in increasing user satisfaction and the subsequent use of the system. From Lin (2007)'s conclusions, the role of ensuring system and information quality as management practices to ensure the IS functions to the expectations of users to increase their usage of the IS were identified. Likewise, Akram, Malik, Shareef, and Goraya (2019) confirm from an examination of online tax filing system, that the quality of the IS determines the future intention to use the IS.

Trkman and Trkman (2009) analysed the benefits and challenges of using a wiki as an intranet/content management system in a company using the DeLone and McLean IS success model. With regards to information quality, it was noted that it was satisfactory through the provision organised content. With the aspect of system quality, convenience of access was noted; training was also noted to have effect on service quality. Trkman and Trkman (2009) proposed an extension of the DeLone and McLean IS success model to include separate construct for intension to use and use and also passive use and active use.

Fang et al. (2011) used the DeLone and McLean IS success model to study the factors that will satisfy customers and cause them to re-use online shopping IS. From the study, the model was proven to be true as information quality, system quality, and net benefits were significant determinants of customer satisfaction. Fang et al. (2011), however, expanded the DeLone and McLean IS success model to meet the full requirement of online shopping by adding justice and trust as components of online systems' quality, as these two factors were

104

also determined from their study as contributing significantly to the satisfaction of customers and their intention to re-use the system.

Using the DeLone and McLean model, Tsao, Hsieh, and Lin (2016) proved that IS quality has a significant positive effect on customers decision to use or not to use shopping websites for purchase, leading to their conclusion that, when the online system is managed properly, the system quality is enhanced with features of reliability, and easy-to-use operating interface; this will increase consumers' trust to use the IS. This was confirmed by Baabdullah, Alalwan, Rana, Kizgin and Patil (2019) who also found that usage of IS affects the satisfaction level of IS users. Also, Hsu, Chang, Chu, and Lee (2014) used the DeLone and McLean model to determine the repurchase intentions of online group buyers and observed that, satisfaction with website and satisfaction with sellers influences intention repurchase.

Wang and Liao (2008) also used the model to determine the success of e-Governance system. They hypothesized the relationship between IS quality, use and benefit which they used the model to prove. Landrum and Prybutok (2004) used the model to formulate the hypothesis that increase in IS and service quality increase user satisfaction in knowledge management systems, and Bernroider (2008) used the model to justify why organizations should use quality enterprise resource planning system. Also, Martins et al. (2018) developed a model for determining the success of information systems in higher education using the DeLone and McLean IS success model.

DeLone and McLean IS success model has not only been applied in other areas of IS application, in the field of library and information science, this famous model has been applied to a number of studies: Matayong and Mahmood (2013) observed from the review of

105

literature that, the model has been applied extensively in the field of knowledge management. Notable among these studies are:

Cheng (2014) who purposed to propose a hybrid model based on expectation-confirmation model (ECM), technology acceptance model (TAM), and updated the DeLone and McLean IS success model to examine whether IS quality affects user intention to use a digital library, found from the study that relevance of information, ability to access IS, and support from technical team are major system quality factors that determine a user's intention to use and actual use of the digital library as proposed by the DeLone and McLean IS success model. In the study, Cheng (2014) identified that interface features and navigation also contribute significantly to use of the digital library. Also, Chen et al. (2016) integrated the technology acceptance model with the DeLone and McLean IS success model to develop the research framework of investigating the behavioural model of accessing the National Central Library of Taiwan's Digital Meta-Library. The study revealed that among all the findings, the effects of user satisfaction and personal net benefits are the strongest. The study of Chen et al. (2016) on the library IS also proves the validity of the DeLone and McLean IS success model. Lwoga (2013) also examined how the DeLone and McLean IS success model can be applied in the adoption of library 2.0 technologies. The study proved that the model is appropriate for testing the factors the influence user intention of Library 2.0 tools.

Writing on how the model has been used across literature Petter and McLean (2009:161) noted that a number of studies have made attempts to study the DeLone and McLean IS success model as completely in a one study. Some researchers also compared the original DeLone and McLean IS success model with other models. In other spheres also parts of the model were examined. Literature reviews have also been conducted 'to examine if the results of empirical studies supported the relationships posited by the original success model. These

106

reviews revealed that some relationships in the model had consistently received support (i.e., significant in all) while others have received only mixed support (some found significant results while others did not)'. It is worth noting that a number of studies including very recent ones: Aldholay, Isaac, Abdullah, and Ramayah (2018), Baabdullah et al. (2019) and Sharma and Sharma (2019) have tested and proven the assertions of the MandD IS success model.

3.5: Application of the DeLone and McLean IS success model in this research

For the purpose of this study the variables in the model will be adopted to mean;

'System quality', the desired characteristics of the specific IS that are used in the libraries selected for this study. Specific qualities to look out for will include usability, availability, reliability, adaptability and response time.

'Information quality': the content of data in the different IS used in the libraries selected for this study. Specific qualities to look out for will include IS content customization, completeness of data and information, relevance of content and whether or not content is easy to understand and is secure.

'Service quality', will be determined by the support services provided by vendors of IS, Internet and other IS/IT service providers and technical support from the IS department.

'Usage' by staff accessing any of the IS of the libraries to perform any official transaction. For example: cataloguing, retrieval of information, posting announcement etc.

'User satisfaction': this relates to the entire experience of staff from logging onto an IS till the end of their transaction.

'Net benefits': the benefit will be determined using staff and the outcome of the use of the different IS to the individual staff and the net benefit to the libraries.

107

The researcher added the variable management: all the internal organizational strategies put in place to ensure IS functions appropriately.

This theory, though criticized by researchers such as Wu and Wang (2006) on the premise that the concept 'system use' is not an appropriate IS success measure and Leem and Kim (2004) that the model concentrates on the evaluation of just a particular stage of the IS development, will be very relevant to this study as it is situated within the objectives of the study. The model can be used to determine how management of IS in academic libraries can lead to quality information systems, quality information and quality services. When this is achieved, it can be further used to determine how quality information, system and service will lead to further usage or non-usage of the system that will also lead to user satisfaction. The model further determines the net benefit the organizations will derive from managing and using the system. The adopted and modified model is illustrated in Figure 3.3
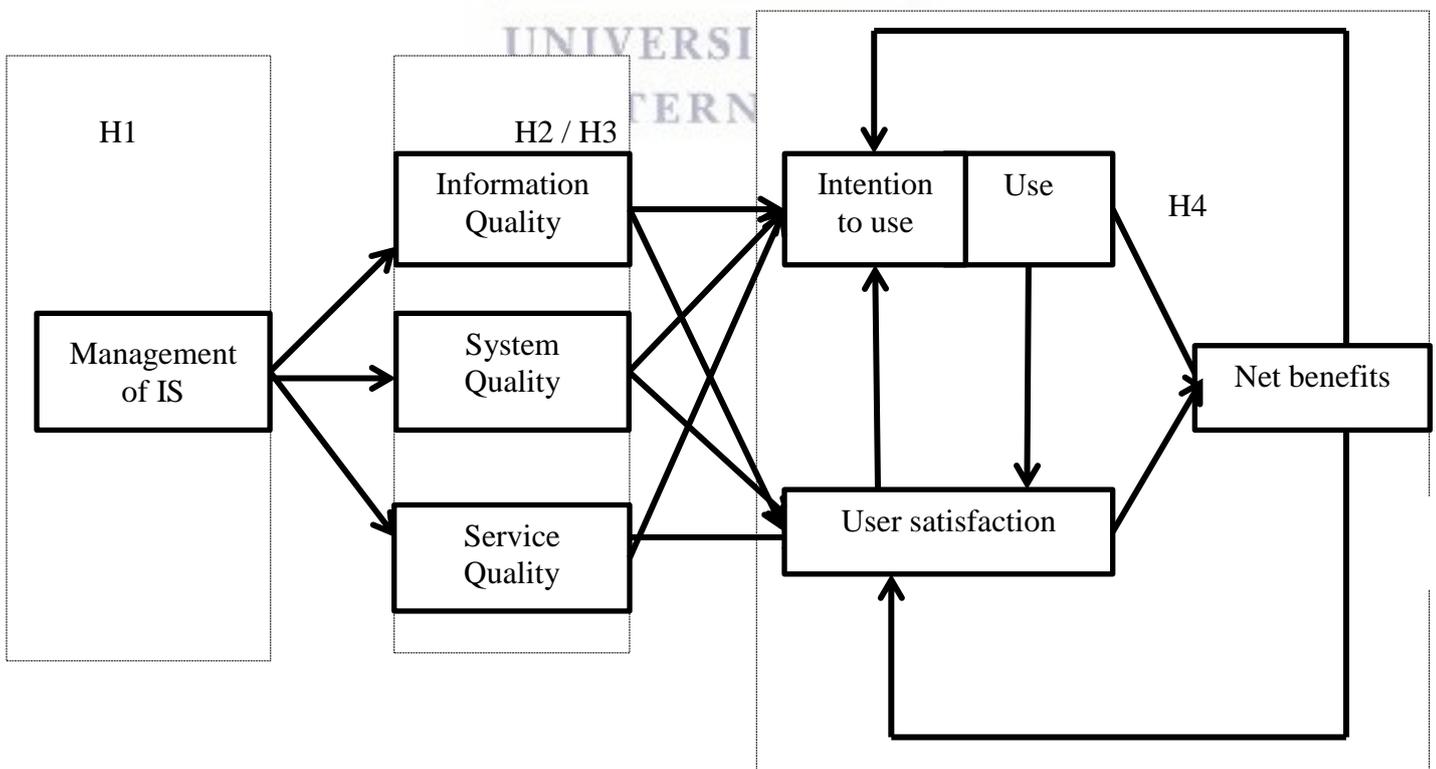
Fig. 3.3: Adopted and modified updated DeLone and McLean IS Success model

108

The researcher is using the model to predict the hypotheses for this study:

H1 Management of an IS affects the quality of an IS in academic libraries in Ghana

H2 The quality of an IS affects the use of the IS in academic libraries in Ghana

H3 IS use affects service provision in academic libraries in Ghana

H4 Challenges affect the use of an IS in academic libraries in Ghana

As was indicated by Wentz (2017) and Anfara (2012) the DeLone and McLean IS success model is used in this research to explain the structure of the phenomena of this study, their characteristics and the relationships that exist between or among them. The theory is used from the deductive reasoning point.

3.6: Concluding summary

This chapter looked at the concept of theoretical framework and its role in research, explained the theoretical framework that was adopted for this study, indicated how it has been applied in other fields of study and in the field of library and information science, and it finally explained how it is used in this research. The next chapter discusses the research methods; research design, paradigm, data collection method, instruments for data collection and method of analysis.

CHAPTER FOUR: RESEARCH METHODOLOGY

4.0: Introduction

This chapter explains the research design adopted, the paradigm aligned to, population, sampling, the research instruments and techniques for data analysis.

4.1: Paradigm

A paradigm is a theoretical structure or a framework of thought, beliefs, values, techniques shared by a given scientific community that acts as a template for a researcher to follow (Baille and Miller, 2011). Teddlie and Tashakkori (2017) citing Morgan, (2007) explain a paradigm as beliefs that are shared by research groups in a particular field.

In mixed methods research, Teddlie and Tashakkori (2017) state that with the use of a paradigm, researchers can adopt the substantive theory stance. In this situation the theory underpinning the research is of more value than the paradigm chosen. They cite Greene (2007) who also supports this assumption. This helps the researcher to overcome the challenge of assumptions raised by some scholars (Biesta, 2017; Johnson and Gray, 2017) on mixed method that there is only one paradigm to be used in mixed method: pragmatism, to choose the paradigm that will help conduct the study in the way that answers will be provided for the research questions.

This research has adopted the DeLone and McLean Information Systems Success Model (theory) to help study how academic libraries use and manage information systems in Ghana. The researcher adopted the substantive theory stance in order to situate the research in this theory aligning to post-positivist paradigm to help explain the variables in the theory and how they interrelate. Though some scholars argue that post-positivism is associated with purely quantitative research, Christie and Fleischer (2017) posit that although post-positivists have

110

strong preference for quantitative methods and deductive reasoning, they do not agree that quantitative research is the sole means of understanding a research problem and therefore support the use of some amount of qualitative data in understanding a research problem.

A post-positivist paradigm, as explained by Creswell and Clark, (2011), is directed at determinism or the cause and effect thinking, reductionism by narrowing and focusing on the select variables to interrelate, detailed observations and measures of variables and the testing of theories that are continually refined. This paradigm was deemed appropriate for this study as it seeks to determine how the management of ISs in academic libraries can lead to quality information systems that will generate quality information leading to quality services using DeLone and McLean (2003) IS success theory and Pareek and Gupta's (2013) academic library website check list to conduct content analysis of library web sites.

4.2: Research design

A research design is regarded as the overall plan or strategy for conducting a research. It is the structure, or the blueprint that guides the research process from the formulation of the research questions and hypotheses to reporting the research findings. The design chosen by the researcher is determined by the 'nature of the research questions and hypotheses, the variables involved, the sample of participants, the research settings, the data collection methods, and the data analysis methods' (Kalaian, 2011:727). It is the model and the logical organization that allows the researcher to reach valid conclusions (Miller, 2011). It is the way research ideas are transformed into a plan to be carried out in practice. It combines three interconnected and inter-dependent components: the theoretical, methodological and ethical components of the research (Cheek, 2012). According to Maggetti, Gilardi and Radaelli, (2017) it is a set of decisions we take in order to reduce or control bias. Andranovich and Riposa (2011) argue that there is no one best research design.

111

For the purpose of this research, a combination of qualitative and quantitative methods, called mixed methods, was adopted. The researcher opted for the use of the mixed method due to the nature of the research problem. In order to determine the nature of use of ISs in academic libraries and the challenges encountered, the researcher needed to collect quantitative data from the staff who actually use the IS and to observe from the websites of these libraries the online ISs that are being used. To determine the management functions and overall organizational policy and benefit of using the IS, the researcher needed to interact with the head of the IS and head librarians in order to solicit relevant information for answering the research questions.

The mixed method research design is one of the fastest growing areas in research methodology, it takes the best of qualitative and quantitative methods and combines them (Bergman, 2008). It involves combining or integration of qualitative and quantitative research and data in a study (Creswell, 2014; Molina-Azorin, 2019). Mixed methods, according to Creswell (2003), give the opportunity to collect diverse types of data which best provide an understanding of a research problem. This method generally uses separate quantitative and qualitative methods as a means to offset the weaknesses inherent within one method with the strengths of the other method. Kalaian (2011) in the *encyclopaedia of survey research* method outlines three types of mixed methods research: exploratory, explanatory, and triangulation. Likewise, Creswell (2014) also identified the three major types of mixed methods research; though Creswell provided the same explanations to the types, he used different terminologies to refer to them.

In exploratory mixed method research design, the researcher starts with conceptualization of a qualitative research study, collects and analyses the qualitative data. From the qualitative findings, the researcher then formulates a quantitative research study, collects and analyses

112

the quantitative data to validate the qualitative findings. This type, Creswell (2014) refers to as the exploratory sequential mixed method.

The explanatory mixed method research design helps the researcher to first conceptualize a quantitative research study then collects and analyses the quantitative data. From the quantitative findings, the researcher conceptualizes a qualitative research study, collects qualitative data to clarify and enhance the quantitative research findings. Creswell (2014) termed this type the explanatory sequential mixed method.

The triangulation mixed method research design allows the researcher to simultaneously conceptualize quantitative and qualitative research studies in order to collect and analyse both quantitative and qualitative data and to use the results from the quantitative and qualitative studies to validate findings from both studies. Creswell (2014) called this the convergent parallel mixed method.

This research adopted the convergent parallel mixed method research design. According to Teddlie and Tashakkori (2017), this design has been variously referred to as concurrent, simultaneous, and triangulation design in mixed methods literature. This design is chosen to enable the researcher to collect both qualitative and quantitative data at the same time to help answer the research questions. Creswell and Clark (2011) note that this design is used when the researcher has limited time for data collection; and that triangulation is a very efficient method of research, as it allows both types of data to be collected at the same time; each type of data is collected and analysed separately using the techniques traditionally associated with each data type. The use of the convergent design allows the results of both qualitative and quantitative data to be merged to provide the opportunity of studying a problem from multiple angels (Creswell, 2015). In this research, the qualitative and quantitative data were collected at the same time upon visit to the selected research sites, the two data sets were

113

analysed separately; and the two results were discussed side by side based on themes determined from the research questions.

Bergman (2008) outlined four major types of triangulation which have been noted in literature namely: indefinite triangulation, triangulation as validity checking, triangulation as seeking complementary information, triangulation as epistemological dialogue or juxtaposition.

Triangulation that seeks complementary information was chosen for this study as the purpose for the triangulation in this research is to seek complementary information as against all the others. This is to enable the researcher solicit information on managerial issues that may not be easy to access through questionnaire. Bergman (2008) notes that this type of triangulation is the most common meaning assigned to the term. It is associated with combining the strengths and weaknesses of two research methods, deriving complementary data from diverse respondents.

In this research, both qualitative and quantitative data were collected. More quantitative data were however gathered. At the interactive strand the two methods were mixed before final interpretation during data analysis thus merging occurred after qualitative and quantitative data had been analysed separately.

Kalaian (2011) notes that, a significant advantage of the mixed-methods research design is, it provides a more comprehensive and enhanced image of the research problem that is under investigation than would either quantitative or qualitative design provide. Harwell (2014) asserts that research problems will be well investigated by the use of multiple means of enquiry. Creswell and Clark (2011) also indicate that mixed methods research has a number of advantages, by providing more evidence, helping to answer research questions with both

114

qualitative and quantitative data and by encouraging the use of multiple worldviews or paradigms.

Harwell (2014) is of the view that despite popularity of the mixed method research design, researchers have not come to a consensus on what exactly constitutes a mixed methods study. While some authors posit that any study with both qualitative and quantitative data is mixed methods, others are of the view that mixed methods research has a mixed methods question, both qualitative and quantitative analyses and integrated interpretations. The views of authors also vary with regards to the stage of the research where the mixing should occur: during the designing of a study, data collection stage, data analyses stage, or the discussion stage. According to Creswell and Clark (2011) there are also challenges commonly associated with triangulation. Common among them are: expertise in both the qualitative and quantitative methods required, different sample and sample sizes needed to collect both data types, the task of combining the two methods is very time involving and it is usually difficult to merge the different data types in a meaningful way. Despites these challenges, the researcher supports the use of mixed method as it helps provide both qualitative and quantitative views for understanding the research problem and for the reason that the advantages far outweigh the disadvantages.

A questionnaire was the quantitative tool adopted and interviews and content analysis were used to collect qualitative data for the research. This enabled the researcher to collate quantitative responses on uses of the system and used the qualitative means to have interaction with heads of the libraries and IT units on policy issues which may be difficult to acquire quantitatively.

4.3: Population

A population is the unit from which information is sought from for a research (Lepkowski, 2011). It is the relatively large pool from which a sample size is drawn on which research findings are generalized (Durrheim and Painter, 2006). The population of this research is the members of the Consortium of Academic and Research libraries in Ghana (CARLIGH), the only library consortium in Ghana. The researcher decided to use members of this consortium because the research demands that responses are solicited from libraries that use ISs. CARLIGH assists member libraries with ISs and electronic resource subscription and training (CARLIGH, 2015). Member libraries of CARLIGH that use ISs will be able to provide relevant information on how they use and manage the IS they have implemented.

CARLIGH has as its members thirty (30) university libraries of which eight (8) are public universities and twenty-two (22) private universities (CARLIGH, 2015). The 30 university library members of CARLIGH served as the sampling frame from which the libraries were selected and used as research centres from which respondents were then selected for the purpose of this research.
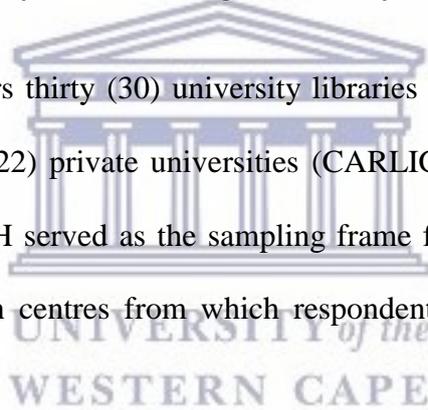
4.4: Sampling of institutions

This section explains the method used to sample libraries that were used as study centres for this research.

4.4.1: Sample size

Sampling is defined as the selection of a subset of a population for inclusion in a study (Daniel, 2012).The researcher used 30% of the population of 30 universities as sample size based on Durrheim and Painter's assertion (2006) that for a small population size, a sample size of 30% should be used. Thus nine (9) university libraries were selected as the sample size.

116

4.4.2: Sampling technique

The proportionate stratified sampling technique was used. This is a sampling technique used when the total population has uneven sub-groups. Sub- groups are divided into homogenous groups and proportions taken to represent the whole population (Durrheim and Painter 2006).

The population was divided in to two strata: public universities and private universities. To determine the sample size from the two strata, 30% of the population was calculated resulting in nine (9) universities. The number of libraries in a stratum (8 and 22 respectively) was divided by the total population of 30 and multiplied by nine (9). This is based on Durrheim and Painter's (2006) suggestion that the same proportion of units should be selected from as many strata as there are in the population. This led to the selection of two (2) public and seven (7) private universities as research sites for the study.

The researcher purposively selected these nine university libraries, for they are among the topmost universities in Ghana based on university web ranking and reviews (4international colleges and universities, 2016). The web ranking is based on web metrics and the use of ISs in university libraries would have had effect on this. This was to enable the researcher to select university libraries that provide online services. Purposive sample is a form of non-probability sample where the informants are selected based on the needs of the research and that the selected sample has a typical issue of interest to the research (Durrheim and Painter, 2006).

4.4.3: Selection of individual respondents

The researcher solicited responses from all the staff members who use any electronic system in all the nine libraries that were purposively selected through consultation with head librarians. The use of all members of a population for a study, according to Shapiro, (2011), is called a census. This was done to enable the researcher to solicit responses covering every

117

function that is performed in the libraries and the total number of 202 staff, as shown in table

4.1 below, is manageable for a PhD study.

Table 4.1: Libraries and staff numbers excluding heads of library and IS/IT

University Libraries Selected	Status	Senior Members	Senior Staff	Junior Staff	Total
University of Ghana	Public	9	25	8	**42**
Kwame Nkrumah University of Science and Technology	Public	20	53	15	**88**
Central University	Private	20	3		**23**
Wisconsin University College	Private	2	9		**11**
Methodist University College	Private	3	7		**10**
Presbyterian University College	Private	8	3		**11**
Ashesi University	Private	2	1		**3**
Valley view university	Private	4	7		**11**
Regent University college	Private	1	2		**3**
Total		**69**	**110**	**23**	**202**

Source: Field Data, 2018

Table 4.1 above depicts the number of staff in each library selected, giving a total of 202 as

the number of expected respondents to the questionnaire.

4.5: Data collection instruments

This section provides description of the three data collection instruments that were used for

this study.

4.5.1: Questionnaire

The questionnaire was used as a quantitative data collection instrument. It is a set of

standardized questions, used to collect data about specific topics (Trobia, 2011). It is a

document that contains a series of both open and closed questions and given to respondents

118

participating in a research process to solicit information. It is one of the most widely used means of collecting data in social sciences research (Rowley, 2014).

A questionnaire is used to gather facts, opinions, attitudes, beliefs judgments and behaviours from or of respondents on a particular issue of interest to the researcher. It has the advantage of being used to solicit responses from relatively large number of users who may or may not be scattered geographically and the data gathered generate findings that are more generalizable. The major disadvantage of a questionnaire is that the researcher is not always present to explain questions to the respondents, this leads the respondents to read and understand questions from their own world view (Rowley, 2014).

The questionnaire was used to solicit responses from 149 library staff who use ISs in their line of duty. See attached draft questionnaire as appendix B.

4.5.1.1: Questionnaire design

The questionnaire for the study contained questions meant to determine the types of ISs used by staff of academic libraries in Ghana, how they are used, managed and the benefits and challenges associated with their use. The questions were structured and divided into nine main sections bearing in mind the objectives of the study.

Section one deals with background information of respondents. This section asked questions, including, institutional affiliation, qualification, job position, and level of ICT skills.

Section two asks questions to determine the specific types of ISs used by the staff and what the ISs are used for.

Sections three to nine provide statements which respondents had to rank using a Likert scale. Section three seeks to determine the impact the IS has had on the staff. Section four is to

determine the quality of the information provided by the IS, section five aims to determine the quality of the system, section six determines the support provided by management, section seven concentrates on maintenance issues, section eight seeks to determine the willingness of staff to use the IS, and section nine determines the challenges encountered by staff in the use of the IS.

4.5.2: Interview

The research conducted interviews with all nine head librarians and five heads of IT/IS units. The interviews were recorded with an electronic recorder and later transcribed. (See interview schedules in appendices C and D respectively).

A research interview is a conversation that has a structure and a purpose determined by the interviewer. It is a professional interaction which has, as its elements, a careful questioning and listening approach with the purpose of obtaining thoroughly tested knowledge. An interview grants opportunity to the researcher to get to know other people, get to learn about their experiences, feelings and hopes and the world they live in (Kvale, 2011). An interview is one of the most widely used data collection methods for producing knowledge in the social science (Brinkmann, 2012).

The researcher adopted a structured interview procedure. A structured interview is sometimes called a standardized interview. The same questions are asked of all respondents, the answers provided are usually in forms that are amenable to quantitative procedures (Brinkmann, 2012).

The interview schedule used was meant to collect data in relation to the management functions and overall organizational policy, benefits of using the IS, reasons for adopting particular ISs, understanding of IS management concept and the challenges that have been encountered in using the IS.

120

Major challenges of interviews are: the knowledge produced is mostly dependent on the social relationship of interviewer and interviewee and the interview process is often frustrating (Kvale, 2011).

4.5.3: Content analysis

Content analysis of the websites of the selected libraries was done using Pareek and Gupta's (2013) academic library website check list as data collection tool of fourteen standards which relate to information quality, system quality and service quality in DeLone and McLean's (2003) framework to determine the quality of information and electronic services which are provided by the selected libraries via their websites. This check list has not been used widely in other research, but its use in the original work of the authors provided very relevant information and was therefore adapted for use in this research. Table 4.2 below lists the fourteen aspects of a library website to be considered. See chapter seven for the detail component of each category.
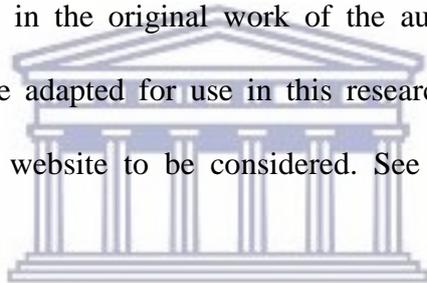
Table 4.2: Pareek and Gupta's (2013) academic library website check list

	System Quality
1	Accessibility and Speed
2	Navigation
3	Website aid and tools
4	Link to e-resources including a research portal
	Information Quality
5	Authority and Accuracy
6	Currency
7	Language
	Service Quality
8	Library resources
9	Library collection
10	Information on e-resources
11	Library services and technical services
12	Library general Information
13	Information on different library sections
14	Value added services

121

4.6: Pilot test

The questionnaire, the interview schedule and the check list were tested at the Accra polytechnic library located in Ghana two months ahead of the actual data collection time to give ample time for possible corrections to be made. This was to enable the researcher to determine if the data collection instruments produced the data needed to answer the research questions. The researcher did not perform any statistical measures on the data other than to determine if respondents were able to understand the questions and answer them appropriately. The respondents at the Accra polytechnic library perform similar functions and use similar IS as do the respondents in the libraries to be used for the study. Accra polytechnic is a member of CARLIGH and is among topmost polytechnics in Ghana based on university web ranking and reviews according to 4international colleges and universities (2016).

4.7: Reliability and Validity

The researcher used Cronbach's alpha coefficient to determine the reliability and validity of quantitative data collection instrument. The test in SPSS automatically selected only the Likert scale questions which produced the alpha coefficient for the 60 items as .939 suggesting that the item has very high internal consistency. See result in Table 4.3.

Table 4.3: Reliability Statistics

Cronbach's Alpha	Number of Items
.939	60

122

4.7: Data collection procedure

The researcher visited the selected libraries and presented the questionnaire to the Heads of Libraries for them to distribute to their staff. Permission had been sought by presenting the information sheet from UWC to the head librarians. The first visit was also used to schedule interview dates with heads of libraries and IT units.

On the scheduled dates for interviews in a specific library, the researcher conducted separate interviews with heads of library and IT section. The interviews were recorded with an audio recorder. These visits were also used to collect the answered questionnaires which had been distributed on the first visit.

With regard to the content analysis of web sites of the selected libraries, the researcher logged onto the library websites one on each day during off peak time GMT from four to six am to ensure that the internet connection was not choked/over-loaded with traffic during the study. The check list was used as a guide to determine the electronic services provided and the quality of the websites.
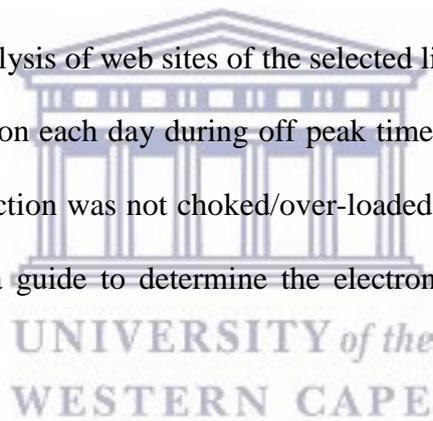
4.8: Data analysis and presentation of results

The Statistical Package for Social Sciences (SPSS) was used to capture and analyse quantitative data. The questionnaire generated categorical data types, both nominal and ordinal. The statistical analysis was done at two (2) levels: univariate and bivariate.

At the univariate level, descriptive statistics was used to profile the responses from respondents, one variable at a time using frequency table or chart.

At the bivariate level, the researcher determined the relationship between variables using the Spearman rank order correlation coefficient (Kalaian, 2011; Rowley, 2014). This was used to

123

test the null hypotheses and cross tabulations that were used to analyse the data when necessary.

Atlas.ti was used to analyse the qualitative data. The recorded interviews were transcribed using Microsoft word. The audio tape was played three times to ensure the transcription was accurately done. The transcribed documents were uploaded into Atlas.ti. The uploaded documents were assigned identification codes. The documents were read for interpretation by identifying key themes that recur across different respondents. Theme codes were generated to help bring together the various comments from different respondents on the same theme. This was used to determine the frequency of occurrence of themes and to identify interesting quotes which were used to compliment data from the questionnaire.

The content analysis of academic library website was presented in a narration form using the broad fourteen check list of Pareek and Gupta (2013) as themes.

4.9: Concluding summary

This chapter focused on research design, paradigm, population, sampling, instruments and the techniques adopted to analyse the data. Chapter five presents the quantitative data.

CHAPTER FIVE: QUANTITATIVE DATA ANALYSIS

5.0: Introduction

This chapter revisits briefly the quantitative data gathering done, how the quantitative data were analysed and presents the quantitative data using tables and charts.

5.1: Data analysis and presentation of results

The researcher collected three different kinds of primary data: quantitative data using a questionnaire, qualitative data using interviews and content analysis of academic library websites. This chapter provides detailed analysis of the quantitative datasets collected. The Statistical Package for Social Sciences (SPSS) was used to capture and analyse the nominal and ordinal quantitative data at two levels; univariate and bivariate.

5.2: Response rate

Of the 202 questionnaires distributed, 149 were returned resulting in a response rate of 73.7%. Of the nine libraries studied, eight library heads were interviewed. As the ninth library had a staff member in the position titled 'Systems Librarian', he was interviewed in place of the head librarian. The researcher also interviewed five IT unit heads of the nine libraries studied. Again the 'Systems Librarian' of the ninth library was interviewed in place of the IT head. Two libraries do not receive support from their IT unit, while the staff of the IT unit assigned to the remaining library was not available during the time of data collection.

5.3: Background information on respondents

The research aimed at determining how academic libraries in Ghana use and manage ISs. To gain insight, the researcher explored basic background information on the respondents which is pertinent to this research. These include institution of work, staff rank, level of education,

125

section of work, knowledge level of ICT use in general and knowledge level of ICT applications in libraries.

5.3.1: Institution of work

The breakdown of the 149 respondents according to libraries studied is as follows: University of Ghana 40 (26.8%), Kwame Nkrumah University of Science and Technology 55 (36.9%), Central University sixteen (10.7%), Valley View University nine (6%), Wisconsin University College ten (6.7%), Presbyterian University College seven (4.7%), Ashesi University College three (2%), Methodist University College seven (4.7%) and Regent University College two (1.3%). This result is depicted in Table 5.1.

Table 5.1: Institution of work (n=149)

Name of institution	Frequency	Percent
UG	40	26.8
KNUST	55	36.9
CUC	16	10.7
VVU	9	6.0
WUC	10	6.7
PUC	7	4.7
AUC	3	2.0
MUC	7	4.7
RUC	2	1.3
Total	**149**	**100.0**

5.3.2: Rank of respondents at their work place

Respondents were asked to indicate their staff ranks. This was to enable the researcher to determine the categories of staff who use electronic information systems at the libraries studied to perform library functions or services. Responses depicted in Figure 5.1 indicate that the majority of library staff in the libraries studied who use ISs are senior staff 105

126

(70.5%), followed by senior members 28 (18.8%) and junior staff 14 (9.4%). Two of the respondents, however, did not indicate their ranks.

(Senior staff in Ghana are people who hold a Diploma certificate from a tertiary institution or Bachelor's Degree, senior members hold a minimum of a Master's degree and Junior staff do not hold any tertiary qualifications)
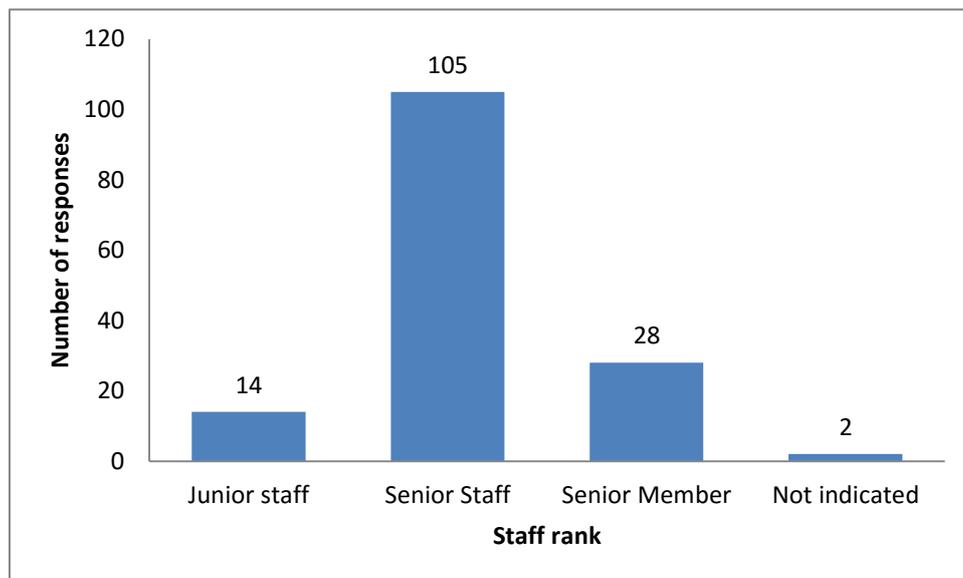
Figure 5.1: Staff rank (n=149)

In order for the researcher to determine the categories of staff who use the IS in each library studied, a cross tabulation of staff rank and library of work was done as shown in Table 5.2. The cross tabulation shows that senior staff and senior members use ISs in all the libraries studied and it is only in the two public universities that junior staff are allowed to use the library IS. The junior staff from the two public university libraries therefore participated in the study.

127

Table 5.2: Library of work and Staff Rank (n=149)

		Staff Rank				
		No responses	Junior staff	Senior Staff	Senior Member	Total
Library of work	UG	1	4	30	5	40
	KNUST	1	10	34	10	55
	CUC	0	0	12	4	16
	VVU	0	0	9	0	9
	WUC	0	0	9	1	10
	PUC	0	0	3	4	7
	AUC	0	0	1	2	3
	MUC	0	0	5	2	7
	RUC	0	0	2	0	2
Total		2	14	105	28	149

5.3.3 Highest level of education of respondents

In order to ascertain the educational background of respondents, they were asked to indicate their highest level of education. The responses show that 31 (20.8%) are diploma holders, 72 (48.3%) hold a bachelor's degree, 26 (17.5%) have acquired a Master of Arts (MA) or Master of Science (MSc) degree, nine (6%) hold Master of Philosophy (MPhil) and eleven of the respondents, representing 7.4%, did not indicate their level of education. This is represented in Figure 5.2.

128
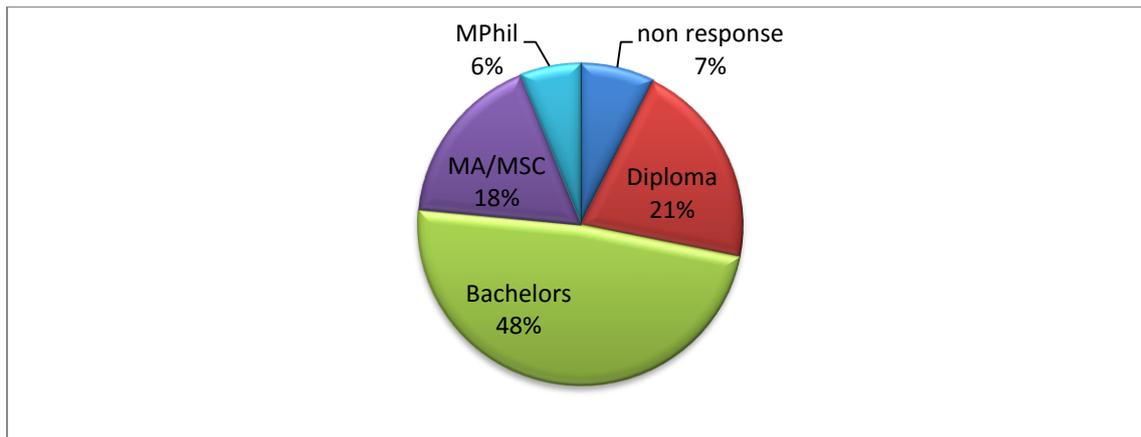
Figure 5.2: Highest Level of education (n=149)

5.3.4: Section of work

In order for the researcher to determine the functions ISs are used to perform in each section of the library, respondents had to indicate their section of work in their various work places. The frequency distribution of the responses shows that the majority: 37 (24.8%) of the respondents work in the reference section, 31 (20.8%) of the respondents perform all functions in their libraries, this was followed by circulation 24 (16.1%), cataloguing 23 (15.4%), electronic support 22 (14.8%), and digitization 6 (4.0%). Two (1.3%) respondents indicated they work in other sections without specifying the section, while one (0.7%) respondent did not indicate his/her section of work. This result is shown in Table 5.3.

129

Table 5.3: Section of work (n=149)

Section of work	Frequency	Percentage
Reference	37	24.8
Performs all library duties	31	20.8
Circulation	24	16.1
Cataloguing	23	15.4
Electronic support	22	14.8
Digitization	6	4.0
Acquisition	3	2.0
Other	2	1.3
No response	1	0.7
Total	**149**	**100.0**

A cross tabulation of library and library of work and section of work depicted in Table 5.4 shows that in libraries of University of Ghana, Central University, Valley View University, and Methodist University College, all respondents were assigned to specific library functions, while in KNUST, Wisconsin University College, Presbyterian University College, Ashesi University and Regent University College some of the staff members indicated they perform all functions. The findings also revealed that it was only UG which recorded respondents from acquisition and digitization: three and six respondents respectively. Despite this, the responses reflected in Table 5.4 show that the respondents were widely dispersed across all units of the libraries.

130

Table 5.4: Library of work and section of work (n=149)

		Reference	Circulation	Cataloguing	Acquisition	Electronic support	Digitization	All library duties	Other	Total
Library of work	UG	13	3	9	3	6	6	0	0	40
	KNUST	10	6	6	0	12	0	19	1	55
	CUC	7	6	1	0	1	0	0	1	16
	VVU	2	3	3	0	1	0	0	0	9
	WUC	3	1	3	0	0	0	3	0	10
	PUC	0	2	0	0	0	0	5	0	7
	AUC	0	1	0	0	0	0	2	0	3
	MUC	2	2	1	0	2	0	0	0	7
	RUC	0	0	0	0	0	0	2	0	2
Total		37	24	23	3	22	6	31	2	149

5.3.5: General knowledge of ICT and ICT application in libraries

Respondents were asked to indicate their knowledge level of ICT application in general using a Likert scale of excellent, good, average, poor and very poor. This is to help determine how their knowledge of ICT affects the use of the IS. The majority of the respondents (57.05%) indicated that they have good knowledge of ICT, 30.2% of them indicated they have average level of knowledge of ICT use, and 12.75% indicated they have excellent level of knowledge of ICT use in general. With regard to ICT application in libraries, again the majority of the respondents (59.73%) specified they have good level of knowledge of ICT applications in libraries, 27.52% intimated they have an average level of knowledge of ICT applications in libraries, 12.08% of the respondents have excellent level of ICT application in libraries,

131

however only one person (0.6%) indicated having very poor knowledge of ICT application in libraries. These results are represented in figures 5.3 and 5.4 respectively.
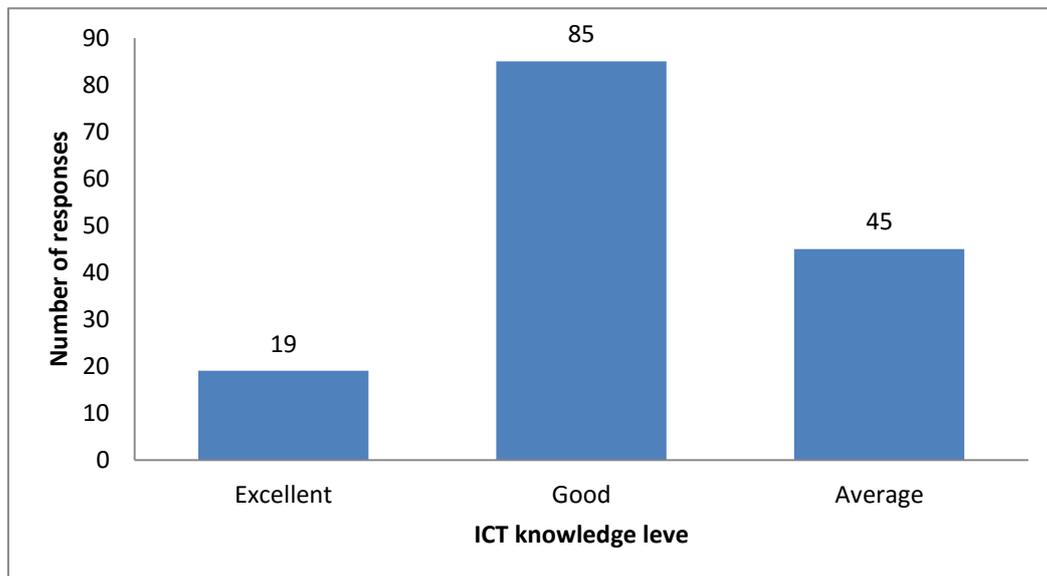
Figure 5.3: Knowledge level of general ICT application (n=149)
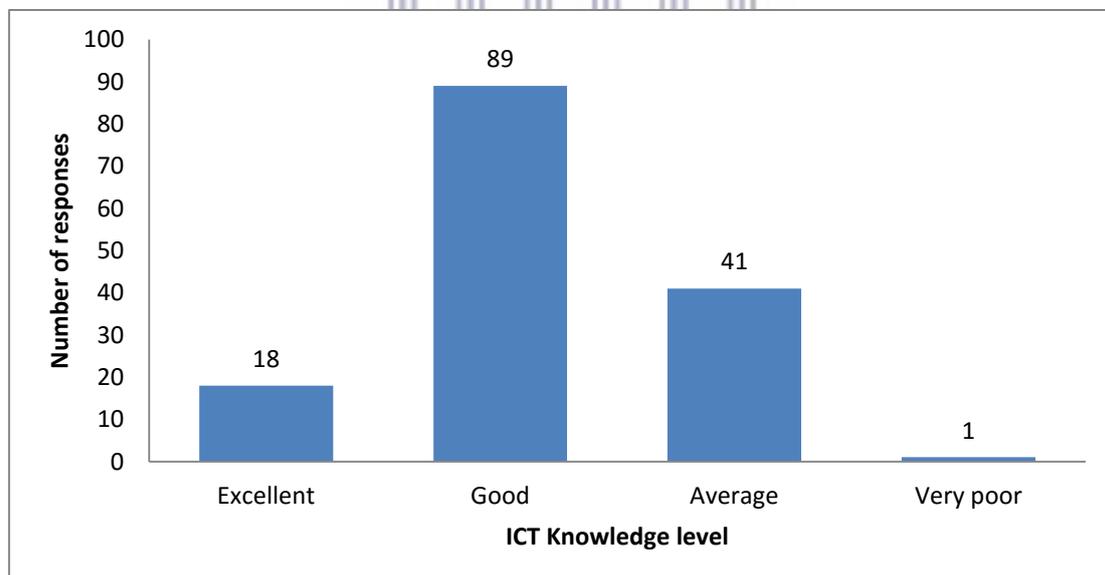
Figure 5.4: Knowledge level of ICT application in libraries (n=149)

132

5.4: Use of Information system

This section of the questionnaire solicited responses on the types of ISs used by the respondents in their line of duty and what the ISs are used for.

5.4.1: Use of library management system

Respondents were asked to indicate whether or not they use a library management system in their line of duty. To this question, the majority of the respondents 141 (94.6%) responded in the affirmative and eight (5.4%) indicated they do not use LMS in their line of duty.
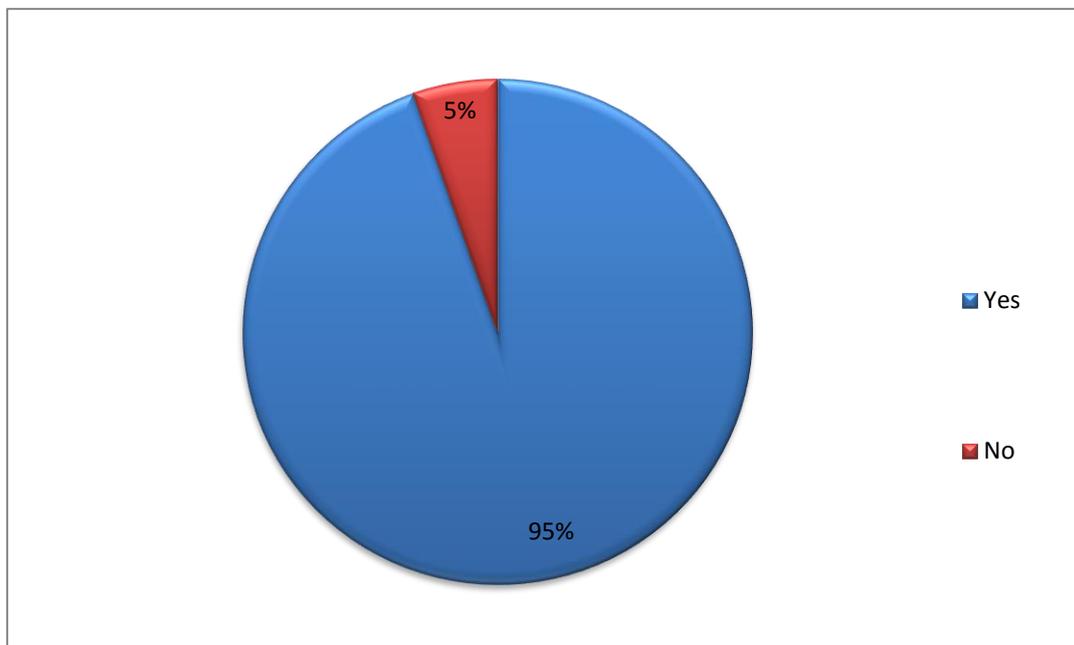
Figure 5.5: Use of library management system (n=149)

5.4.1.1: Functions library management system is used to perform

Respondents were asked to indicate the functions they use the LMS to perform. Of the 141 respondents who indicated they used LMS in the previous question, one (1) of them did not indicate the specific function the LMS is used for. The majority of the respondents, 46 (30.9%), use their LMS for circulation, while 30 (20.1%) use it for multiple functions of

133

circulation, cataloguing and the OPAC, 29 (19.1%) use it just for cataloguing, another 29 (19.5%) use it only for the OPAC, four (2.7%) use it for acquisition and two (1.3%) respondents use the LMS for course reserves. This is shown in Tables 5.5 and 5.6 respectively.

Table 5.5: Functions of LMS (n=149)

Library function	Frequency	Percent
Circulation	46	30.9
Circulation, cataloguing and OPAC	30	20.1
Cataloguing	29	19.5
OPAC	29	19.5
Acquisition	4	2.7
Course reserve	2	1.3
Non response	9	6.0
Total	149	100.0

Table 5.6: LMS use and function of LMS (n=149)

		Function library management system is used for							
		No response	Acquisition	Cataloguing	Circulation	Course reserve	OPAC	All	Total
LMS use	Yes	1	4	29	46	2	29	30	141
	No	8	0	0	0	0	0	0	8
Total		9	4	29	46	2	29	30	149

To ascertain how the LMS is used, respondents were asked to briefly explain how they use the LMS to perform the functions. The responses received are:

134

- *to catalogue new materials,*

- *identifying and modifying MARC records,*

- *charge and discharge materials to users,*

- *to cross check materials from the library catalogue before they are digitized,*

- *training of users,*

- *searching for the availability of materials in the library collection (OPAC),*

- *reserve materials, students' registration,*

- *generating circulation statistics,*

- *create accounts for staff and preparing purchasing and receiving books.*

5.4.1.2: Availability of line supervisor and information generation

The respondents were asked if they were responsible to a line supervisor in their line of duty. This was to enable the researcher to determine if they use the LMS to generate information on their work schedules for their supervisors. To this question, the majority, 128 (85.9%), of the respondents indicated they have line supervisors, 20 (13.4%) do not have a line supervisor and one (0.7%) did not respond to this question. The responses are reflected in Table 5.7.

Table 5.7: Availability of line supervisor (n=149)

Line supervisor	Frequency	Percentage
Yes	128	85.9
No	20	13.4
No response	1	0.7
Total	149	100.0

135

A cross tabulation of the availability of line supervisors and the generation of information from the LMS is illustrated in Table 5.8. The cross tabulation shows that of the 128 respondents who indicated having a line supervisor, 52 of them generate information from the LMS for their supervisors. Of the 20 respondents who do not have line supervisors, only two generate information using the LMS.

Table 5.8: Availability of line supervisor and generation of information for the line supervisor (n=149)

		Generate information for line supervisor			
		No response	Yes	No	Total
Availability of line supervisor	Yes	2	52	74	128
	No	2	2	16	20
	No response	0	1	0	1
Total		4	55	90	149

Respondents who indicated generating information from the LMS were asked to indicate the type of information they generate. Of the 55 respondents who indicated generating information from the LMS, 19 (34.5%) used the LMS to generate information on membership and circulation, 18 (32.7%) for overdue lists, nine (16.4%) for collection reports, three (5.5%) to report on resources worked on and one (1.8%) for acquisition reports. Five of the respondents in this category did not provide any response as shown in Table 5.9.

Table 5.9: Type of information generated from the system (n=55)

Information generated	Frequency	Percentage
Membership and circulation statistics	19	34.5
Overdue list	18	32.7
Report on collection	9	16.4
List of resources worked on	3	5.5
Acquisition report	1	1.8
No response	5	9.1
Total	55	100.0

5.4.2: Use of general information application systems

To ascertain the types of general application systems that are used to perform library functions in academic libraries in Ghana, respondents were asked to indicate the use of office suites products in their line of duty.

5.4.2.1: Use of word processor

Findings revealed that the majority of respondents, 110 (74%), use word processors in their line of duty, while 39 (26%) do not use word processors. Fifty-one of the 110 respondents who use word processors indicated what they use it for. Of the 51 respondents, 41 (80.4%), use it for correspondence activities, including letters, memos and writing of minutes, six (11.8%), use it to type out class numbers of library resources, two (3.8%) use it to type lists of library resources and one (2%) respondent each use it for circulation reports and formatting of documents for uploading onto DSpace. These results are depicted in Figure 5. 6 and Table 5.10 respectively.

137
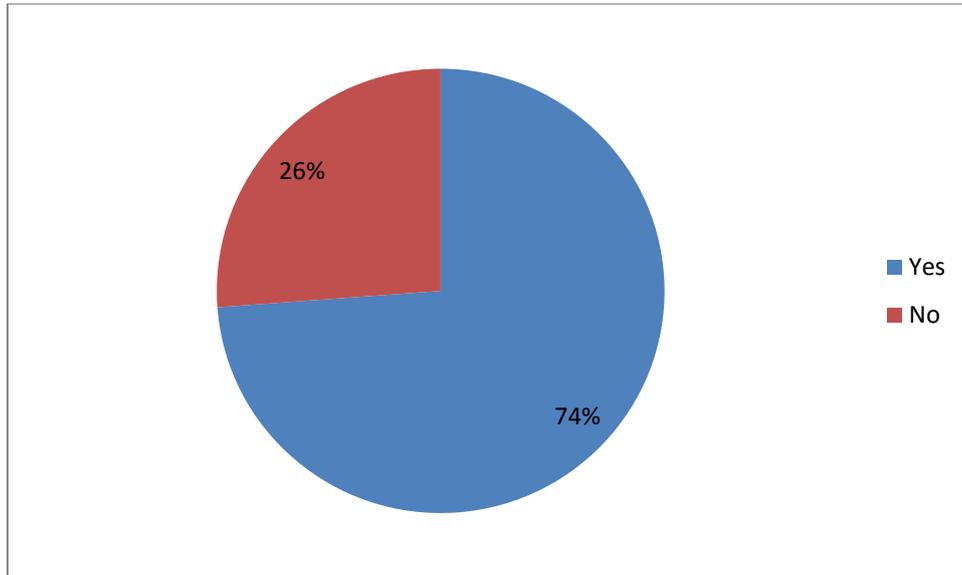
Figure 5.6: Use of word processor (n=149)

Table 5.10: Purpose of word processor use (n=51)

Use of word processor	Frequency	Percentage
Typing letters, memos, minutes, correspondence	41	80.4
Labelling of class numbers	6	11.8
List of library resources	2	3.8
Circulation report	1	2
Formatting document before upload on DSpace	1	2
Total	**51**	**100**

5.4.2.2: Use of database tools

To the question of whether respondents use database management tools from *office suite*, only 32 (21.5%) of the entire respondent population use database tools. In response to the subsequent question on uses of database management systems, responses were:

- *manage dissertation collection,*

- *print serial management,*

138

- *patron list,*

- *research output of students and faculty,*

- *list of electronic resources, usage statistics,*

- *list works uploaded unto DSpace and*

- *cataloguing*

5.4.2.3: Use of spreadsheet

Responses gathered indicated that only 53 (35.6%) of the respondents use spreadsheets. In response to the subsequent question on what they use spreadsheets for, 52 responses were received. Creating lists of library stock came up as the major function that the spreadsheet is used for (thirteen respondents, 25%), followed by usage statistics (ten respondents, 19%) and circulation reports (seven respondents, 13%). Other functions were designing graphs for reports, assertion registers and list of documents catalogued or digitized. See results in Tables 5.11 and 5.12 respectively.
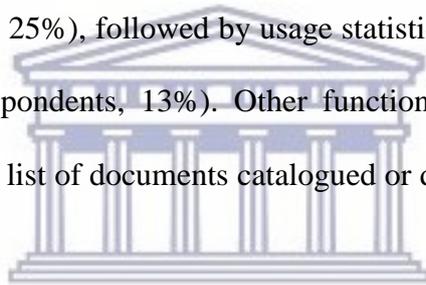
Table 5.11: Use of spreadsheet (n=149)

Use of spreadsheet	Frequency	Percent
Yes	53	35.6
No	95	63.8
No response	1	0.7
Total	149	100.0

139

Table 5.12: Purpose of spreadsheet use (n=52)

Use of spreadsheet	Frequency	Percent
List of library stock	13	25
Usage statistics	10	19
Circulation report	7	13
Budget preparation	5	10
Accession register/list	4	8
Graphs for reports	3	6
List of documents catalogued or digitized	3	6
Typing class numbers	2	4
Work schedule	2	4
Indexing of materials	2	4
List of equipment	1	2
Total	52	100

5.4.2.4: Use of presentation tools

Forty-three (28.9%) of the respondents indicated use of presentation tools such as PowerPoint. The majority (71.1%), however, do not use any form of presentation tools. All the 43 respondents who stated they use presentation tools use it for training library users or staff.

5.4.2.5: Other general IS use

One respondent indicated the use of the Adobe Reader to access pdf documents and three respondents indicated the use of Publisher for designing documents and flyers.

5.4.3: Use of collaboration system

Respondents were asked to indicate the collaborative (social media) systems they use to perform library functions.

5.4.3.1: Twitter

With regards to the use of Twitter, only seven (4.7%) use it to perform official library functions. They all stated they use it to send announcement to patrons on library services and resources.

5.4.3.2: Facebook

Respondents who use Facebook for library activities are 28 (19%), indicating that the majority (81%) are not using Facebook for work related activities. Facebook is used to send announcements regarding library resources and services to users (26 respondents, 17%) and to chat with users (2 respondents, 1%). Details are depicted in Table 5.13.

Table 5.13: Use of Facebook and what Facebook is used for (n=149)

		What Facebook is used for			
		No Response	Library announcements	Chat	Total
Use Facebook	Yes	0	26	2	28
	No	121	0	0	121
Total		121	26	2	149

5.4.3.3: Use of LinkedIn

LinkedIn use for library functions was accounted for by seven (4.7%) respondents. Of the seven respondents, five use LinkedIn to connect with other professionals, while the remaining two use it to promote and make their libraries visible. See Table 5.14.

141

Table 5.14: Use of LinkedIn and what LinkedIn is use for (n=149)

		What LinkedIn is used for			
		No Responses	Connect with other professionals	Visibility and promotion of my library	Total
Use of LinkedIn	Yes	0	5	2	7
	No	142	0	0	142
Total		142	5	2	149

5.4.3.4: Xing

Only one respondent indicated the use of Xing for library function but did not state the exact library function it is used for.

5.4.3.5: Google+

From Table 5.15 it can be seen that eight (5.4%) respondents use Google+. All eight users of Google+ use it to disseminate information to user groups.

Table 5.15: Use of Google+ and what it is used for (n=149)

		What Google+ is used for		
		No Responses	organize user groups to disseminate information	Total
Use of Google+	Yes	0	8	8
	No	141	0	141
Total		141	8	149

5.4.3.6: Snapchat

Snapchat use was recorded only by two (1%) respondents. Both respondents however did not state what they use it for.

142

5.4.3.7: Tumblr

The data in Table 5.16 reflects Tumblr use and recorded only three (2%) respondents. One respondent uses it to read United Nations information, another to find ideas on library space designs, while the third respondent did not state the use of Tumblr.

Table 5.16: Use of Tumblr and what Tumblr is used for (n=149)

		What Tumblr is used for			
		No Response	read information from UN sites	to find ideas about library spaces and designs	Total
Use of Tumblr	Yes	1	1	1	3
	No	146	0	0	146
Total		147	1	1	149
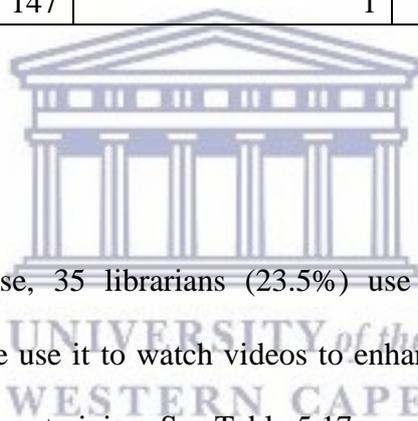
5.4.3.8: YouTube

With regards to YouTube use, 35 librarians (23.5%) use it for library work. All 35 respondents who use YouTube use it to watch videos to enhance their knowledge in library work or for demonstration in user training. See Table 5.17.

Table 5.17: Use of YouTube and what YouTube is used for (n=149)

		What YouTube is used for		
		No Response	Watch videos to learn for my job and user training	Total
Use of YouTube	Yes	0	35	35
	No	114	0	114
Total		114	35	149

5.4.3.9: WhatsApp

In response to the question whether or not they use WhatsApp, 61 respondents (40.9%) answered affirmative, while 88 (59.1%) indicated they do not use WhatsApp in their line of

143

duty. WhatsApp was used for two major functions, namely to interact with library patrons and with colleagues. This is shown in Table 5.18:

Table 5.18: Use of WhatsApp and what WhatsApp is used for (n=149)

| | | What WhatsApp is used for | | | |
		No Responses	interact with users	platform for staff interaction	Total
Use of WhatsApp	Yes	0	30	31	61
	No	88	0	0	88
Total		88	30	31	149

5.4.3.10: Other collaborative platforms

Two respondents stated they use Blogger. Other collaborative platforms indicated by one respondent each are, Instagram, Rich Site Summary or Really Simple Syndication (RSS), text messages, Quick Response (QR) codes, Google hangouts, Skype and slack.

5.5: IS Evaluation

This section of the questionnaire solicited responses from respondents on the main IS they use to perform their official duties. Respondents were asked to evaluate the IS on seven major issues, namely personal impact of IS use, information quality, system quality, management support, maintenance, use and future use and challenges using a five-point Likert scale of strongly agree, agree, average, disagree, and strongly disagree on the comments that were provided under each section.

5.5.1: Main IS use in line of duty

The respondents were asked to indicate the main IS they use to perform their official duties. As illustrated in Table 5.19, 124 (83.3%) indicated they use Library Management Systems

144

(LMS), thirteen (8.7%) use Digital Asset Management Systems (DAM), four (2.7%) use Automated finger print indexing system and Springshare reservation system, three (2%) use office suite, another three (2%) use Institutional email, and the last two (1.3%) use a content management system.

Table 5.19: Main IS use in line of duty (n=149)

IS use	Frequency	Percent
Library management system	124	83.3
Digital Asset management system	13	8.7
Automated finger print indexing system and Springshare reservation system	4	2.7
Office suite	3	2.0
Institutional email	3	2.0
Content management system	2	1.3
Total	149	100.0

5.5.2: Impact of IS use in library

To determine the impact, the major IS indicated in the section above has had on their job performance, respondents were asked to rate four statements using a Likert scale of strongly agree, agree, average, disagree, and strongly disagree.

5.5.2.1: Impact of IS on staff level of knowledge

Respondents were asked to rank the statement 'I have learnt much through the presence of the IS'. To this statement, 35 (23.5%) of the respondents strongly agreed, 77 (51.7%) agreed, 33 (22.1%) indicated average, two (1.3%) each of the respondents disagreed and strongly disagreed. See Figure 5.7:

145
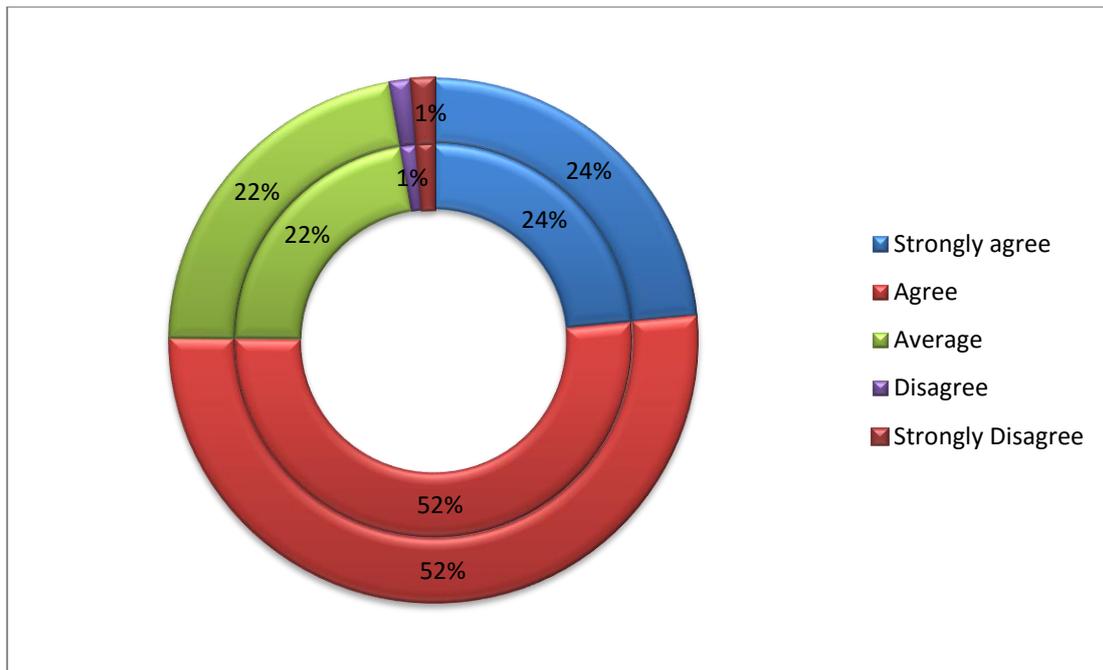
Figure 5.7: Impact of IS on knowledge (n=149)

5.5.2.2: Impact of IS on information recall

In order to determine how IS helps library staff to keep up to date in using and recalling job related information, the respondents were asked to rate the statement 'The IS enhances my awareness and recall of job related information'. To this statement, 30 (20.1%) strongly agreed, 74 (49.7%) agreed, 41 (27.5%) indicated average, three (2.0%) disagreed and one (0.7%) strongly disagreed. This result is illustrated in Figure 5.8:

146
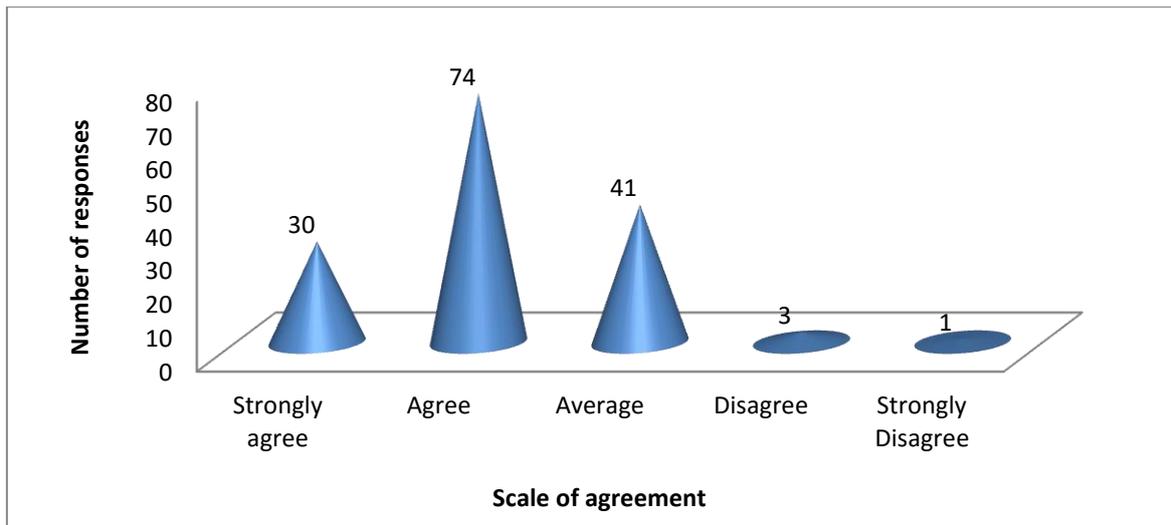
Figure 5.8: Impact of IS on information use (n=149)

5.5.2.3: Impact of IS on job effectiveness

In ranking the statement 'The IS enhances my effectiveness on the job' as shown in Figure 5.9, 40 (26.8%) of the respondents indicated they strongly agreed, 61 (40.9%) agreed, 45 (30.2%) indicated average, two (1.3%) disagreed and one (0.7%) strongly disagreed.
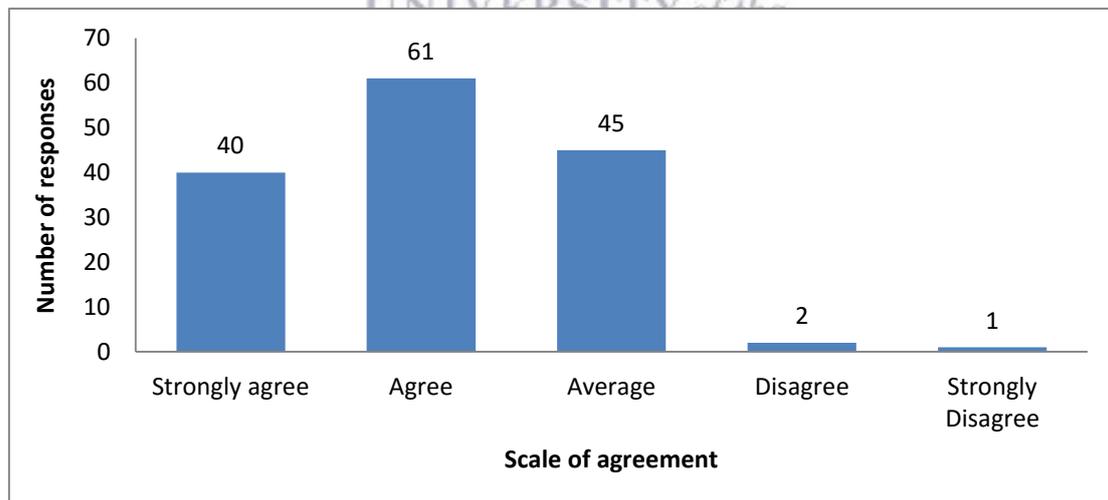
Figure 5.9: Impact of IS on job effectiveness (n=149)

147

5.5.2.4: Impact of IS on productivity

Respondents were asked to indicate if IS increases their productivity. Thirty-eight (25.5%) strongly agreed, 77 (51.7%) agreed, 28 (18.8%) indicated average, six (4.0%) disagreed, while nobody strongly disagreed. This is illustrated with Figure 5.10.
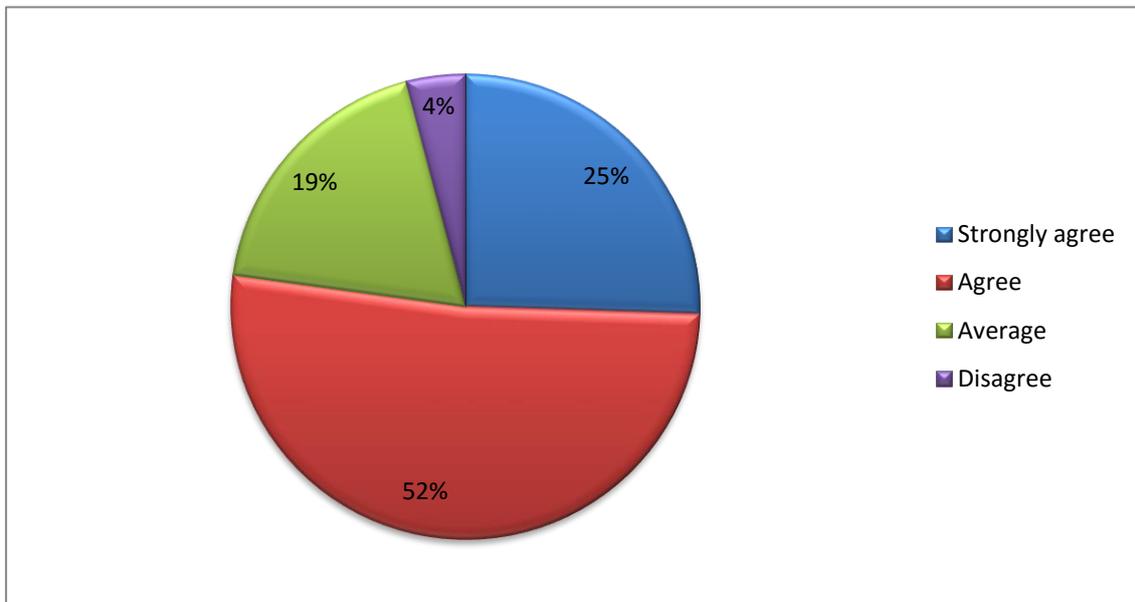
Figure 5.10: Impact of IS on productivity (n=149)

Respondents were asked to provide reasons why they think IS has impact on their work. Some of the comments provided are;

- *Complete task effectively and rapid information retrieval,*

- *For effectiveness and efficiency,*

- *Has help to improve in the efficiency of the library activities,*

- *I am able to provide timely response to users,*

- *I have learnt new and innovative ways,*

- *IS has brought a positive impact on the library,*

- *It allows me to work more smoothly,*

- *It has enabled me deliver on my job,*

148

- *It has personally helped increased my knowledge,*

- *It has transformed the manual library system and has modernize our work,*

- *It is effective and enhances service performance.*

5.5.3: Information quality in IS

Respondents were asked to indicate their level of agreement to statements that can help determine the level of information quality in the IS they use.

5.5.3.1: Importance of information from the IS for decision making

In indicating their level of agreement to information from the IS being important for decision making, as shown in Table 5.20, 48 (32.2%) of the respondents strongly agreed, 73 (49%) agreed, 24 (16.1%) indicated average, two (1.3%) disagreed, one (0.7%) strongly disagreed and one (0.7%) did not respond.
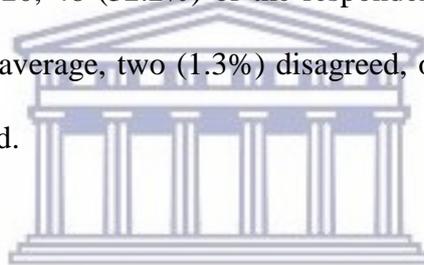
Table 5.20: Importance of information from the IS for decision making (n=149)

Level of agreement	Frequency	Percent
Strongly agree	48	32.2
Agree	73	49.0
Average	24	16.1
Disagree	2	1.3
Strongly Disagree	1	0.7
No response	1	0.7
Total	149	100.0

149

5.5.3.2: Desired output

Respondents were asked to indicate whether they agree to the statement 'The IS provides output that seems to be exactly what is needed'. To this statement, seventeen (11.4%) strongly agreed, 68 (45.6%) agreed, 30 (20.1%) indicated average, 23 (15.4%) disagreed, ten (6.7%) strongly disagreed and one (0.7%) respondent did not answer this question. See Figure 5.11.
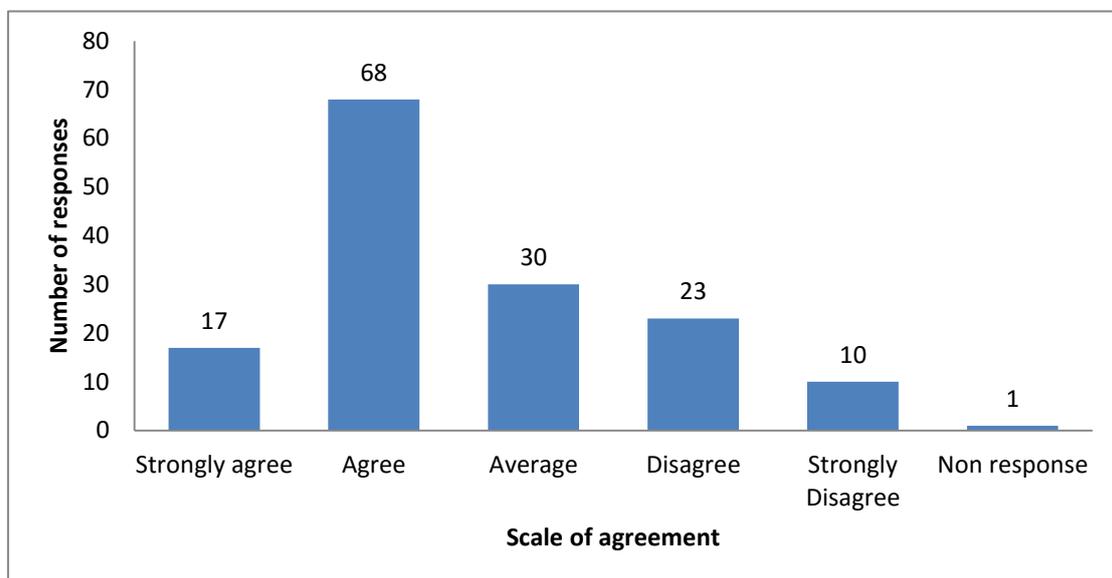
Figure 5.11: IS provides desired output (n=149)

5.5.3.3: Availability of information from IS

Reactions to the statement, 'Information needed from the IS is always available' revealed that, fourteen (9.4%) of the respondents strongly agreed, 72 (48.3%) agreed, thirteen (8.7%) disagreed, one (0.7%) each strongly disagreed and did not indicate the level of agreement. This is shown in Table 5.21.

Table 5.21: Information from IS always available (n=149)

Level of agreement	Frequency	Percent
Strongly agree	14	9.4
Agree	72	48.3
Average	48	32.2
Disagree	13	8.7
Strongly disagree	1	0.7
No response	1	0.7
Total	149	100.0

5.5.3.4: Form of information from IS usable

Respondents were asked if information from the IS is readily usable. As can be depicted from Figure 5.12, 23 (15.4%) indicated they strongly agree, 79 (53%) agree, 39 (26.2%) indicated average, five (3.4%) disagreed, two (1.3%) strongly disagreed and one (0.7%) did not indicate the level of agreement.
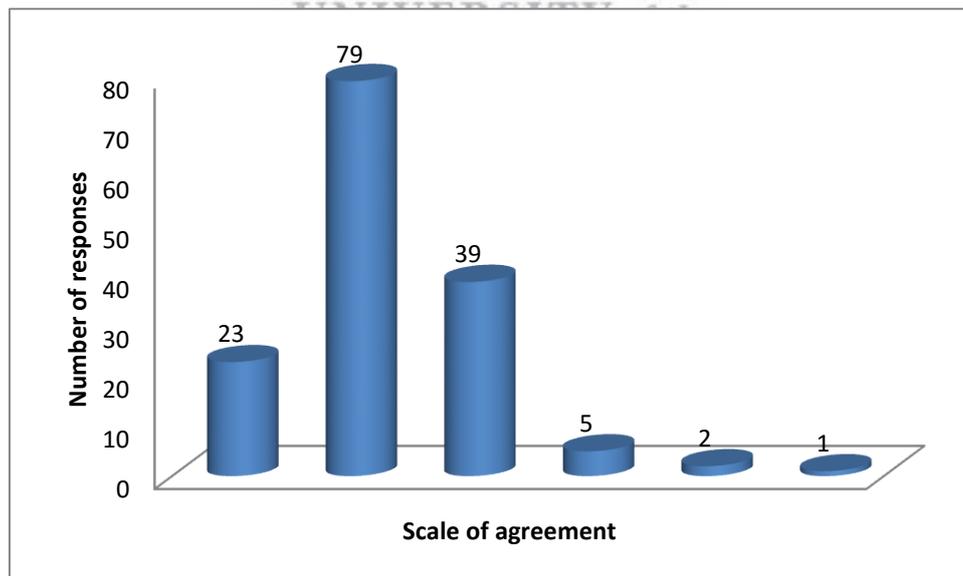
Figure 5.12: Information from IS readily usable (n=149)

151

5.5.3.5: Understanding information from IS

Respondents were asked to indicate their level of agreement to the statement 'Information from the IS is easy to understand'. To this statement, seventeen (11.4%) strongly agreed, 82 (55%) agreed, 43 (28.9%) indicated average, one (0.7%) strongly disagreed and three (2%) did not respond to this statement. This is shown in Table 5.22.

Table 5.22: Understanding of information from IS (n=149)

Level of agreement	Frequency	Percent
Strongly agree	17	11.4
Agree	82	55.0
Average	43	28.9
Disagree	3	2.0
Strongly disagree	1	0.7
No response	3	2.0
Total	149	100.0
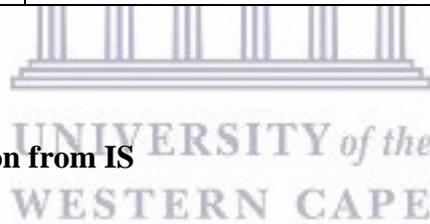
5.5.3.6: Clarity of information from IS

To ascertain whether information from IS used by academic libraries are clear, respondents were asked to indicate the level of their agreement to the statement 'Information from the IS appears readable, clear and well formatted'. To this statement as depicted in Table 5.23, 24 (16.1%) of the respondents strongly agreed, 93 (62.4%) agreed, 26 (17.4%) indicated average, three (2%) disagreed, one (0.7%) strongly disagreed and two (1.3%) of the respondents did not indicate their level of agreement.

152

Table 5.23: Clarity of information from IS (n=149)

Level of agreement	Frequency	Percent
Strongly agree	24	16.1
Agree	93	62.4
Average	26	17.4
Disagree	3	2.0
Strongly disagree	1	0.7
Not indicated	2	1.3
Total	149	100.0

5.5.3.7: Accuracy of output data

With the statement, 'Output data base on input data is always accurate', of the 149 respondents, eleven (7.4%) strongly agreed, 63 (42.3%) agreed, 45 (30.2%) of the respondents indicated average, 27 (18.1%) disagreed, two (1.3%) strongly disagreed and one (0.7%) did not indicate the level of agreement. This is depicted in Figure 5.13.
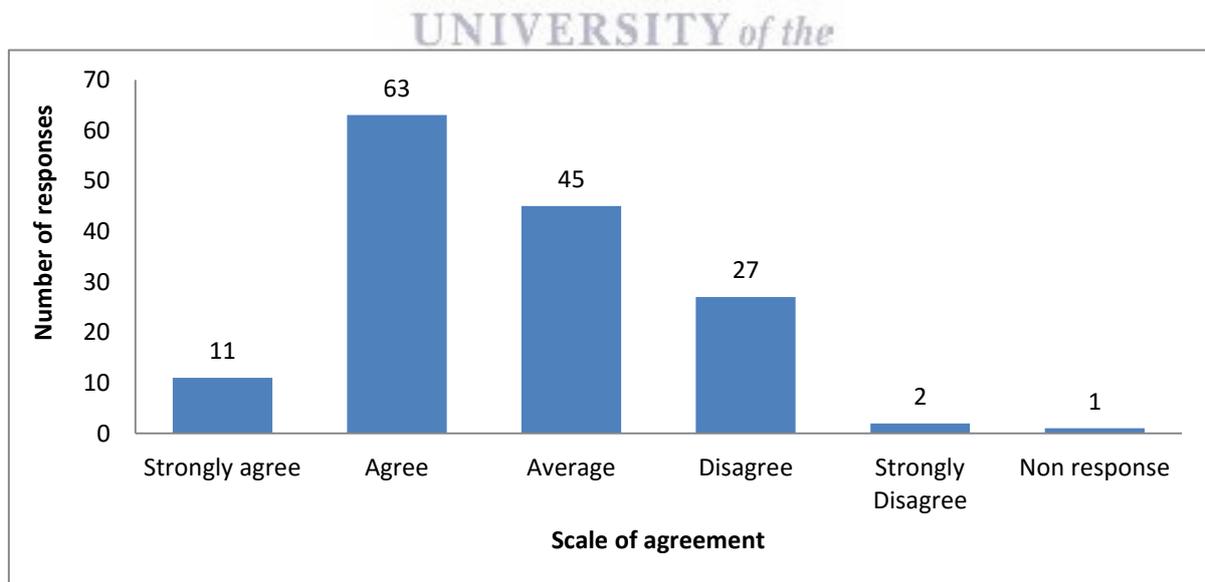
Figure 5.13: Accuracy of output data (n=149)

153

5.5.3.8: Conciseness of information from IS

In rating the statement that information from the IS is concise, ten (6.7%) strongly agreed, 85 (57%) agreed, 46 (30.9%) indicated average, five (3.4%) disagreed, two (1.3%) strongly disagreed and one (0.7%) did not respond. See results in Table 5.24.

Table 5.24: Conciseness of information from IS (n=149)

Level of agreement	Frequency	Percent
Strongly agree	10	6.7
Agree	85	57.0
Average	46	30.9
Disagree	5	3.4
Strongly disagree	2	1.3
No response	1	0.7
Total	149	100.0

5.5.3.9: Timeliness of information from IS

In ranking the timeliness of information from the IS, 22 (14.8%) strongly agreed, 66 (44.3%) agreed, 40 (26.8%) indicated average, eighteen (12.1%) disagreed, two (1.3%) strongly disagreed to the statement that information from the IS is timely. One (0.7%) respondent did not respond to this question. See Figure 5.14.
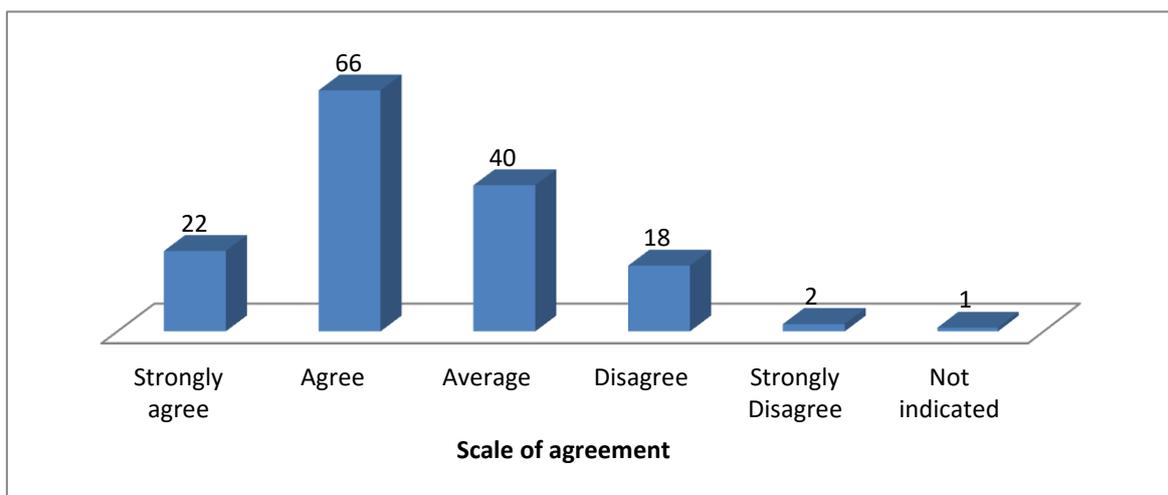
Figure 5.14: Timeliness of information from IS (n=149)

154

In concluding this section, some relevant comments given by respondents to support their opinion on the quality of information from the IS are:

- *It helps managers to have the information they need to perform their task,*

- *It helps to generate information on the library collection,*

- *It is easy to retrieve materials from the system.*

5.5.4: System quality

Respondents were requested to rank statements determining the quality of the information systems used in academic libraries in Ghana.

5.5.4.1: Ease of use

In response to the statement 'The IS is easy to use', eleven (7.4%) strongly agreed, 52 (34.9%) agreed, 26 (17.4%) mentioned it was average, 43 (28.9%) disagreed, sixteen (10.7%) strongly disagreed and one respondent, representing 0.7% did not provide any response. This is represented in Table 5.25.

Table 5.25: Ease of use of IS (n=149)

Level of agreement	Frequency	Percent
Strongly agree	11	7.4
Agree	52	34.9
Average	26	17.4
Disagree	43	28.9
Strongly disagree	16	10.7
Non response	1	0.7
Total	149	100.0

155

5.5.4.2: Ease of learning to the use of IS

Indicating how easy it is to learn using the IS, seven (4.7%) intimated they strongly agree that the system is easy to learn, 56 (37.6%) agreed it is easy to learn how to use the system, 34 (22.4%) indicated it is averagely easy to learn how to use the system, however, 37 (24.8%) and fourteen (9.4%) disagreed and strongly disagreed respectively to the statement that is easy to learn how to use the IS. One (0.7%) respondent did not respond to this statement. See Figure 5.15.
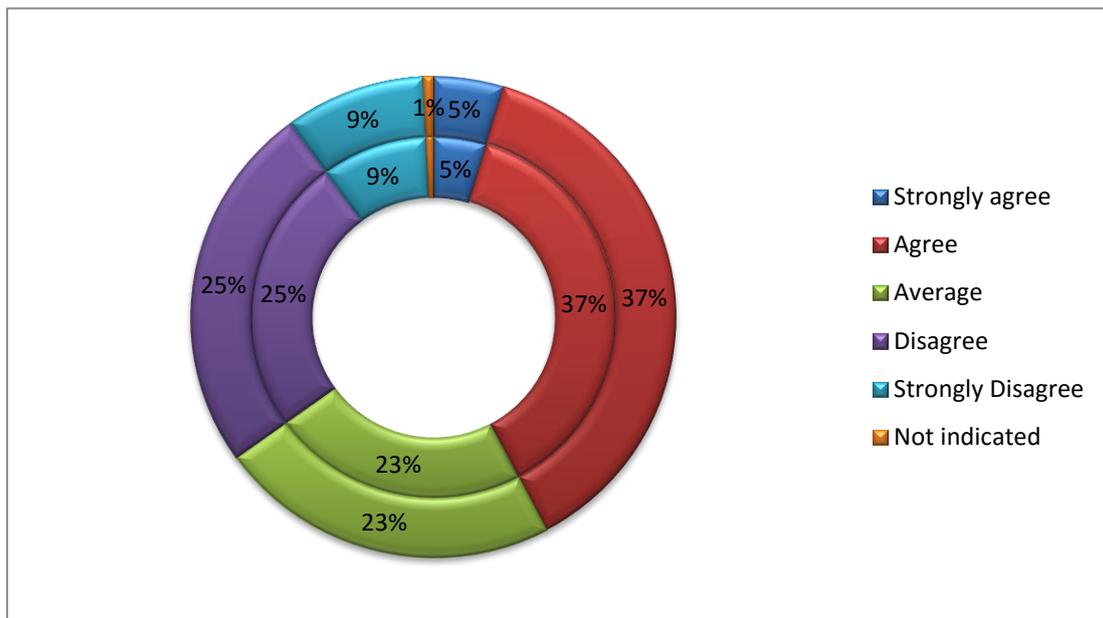
Figure 5.15: Ease of learning the use of IS

5.5.4.3: Ease of accessing information from IS

Respondents had to indicate whether they find it easy to get access to information from the IS. Nine (6%) strongly agreed, seventeen (11.4%) agreed, 32 (21.5%) indicated average, 72 (48.3%) disagreed, eighteen (12.1%) strongly disagreed and one (0.7%) did not respond to the statement. This is illustrated in Figure 5.16.

156
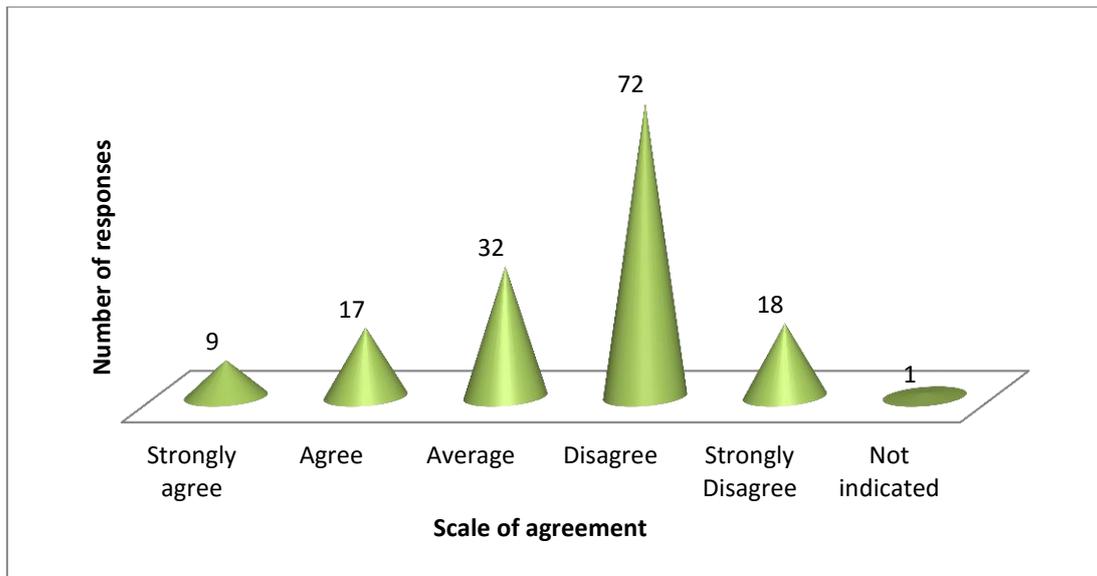
Figure 5.16: Ease of accessing information from the IS (n=149)

5.5.4.4: IS meeting unit's requirement

Respondents were asked their level of agreement to the statement 'The IS meets my unit's requirements'. Seventeen (11.4%) of the respondents strongly agreed, 50 (33.6%) agreed, 31 (20.8%) were of average opinion, 32 (21.5%) disagreed, eighteen (12.1%) strongly disagreed and one (0.7) did not indicate the level of agreement.
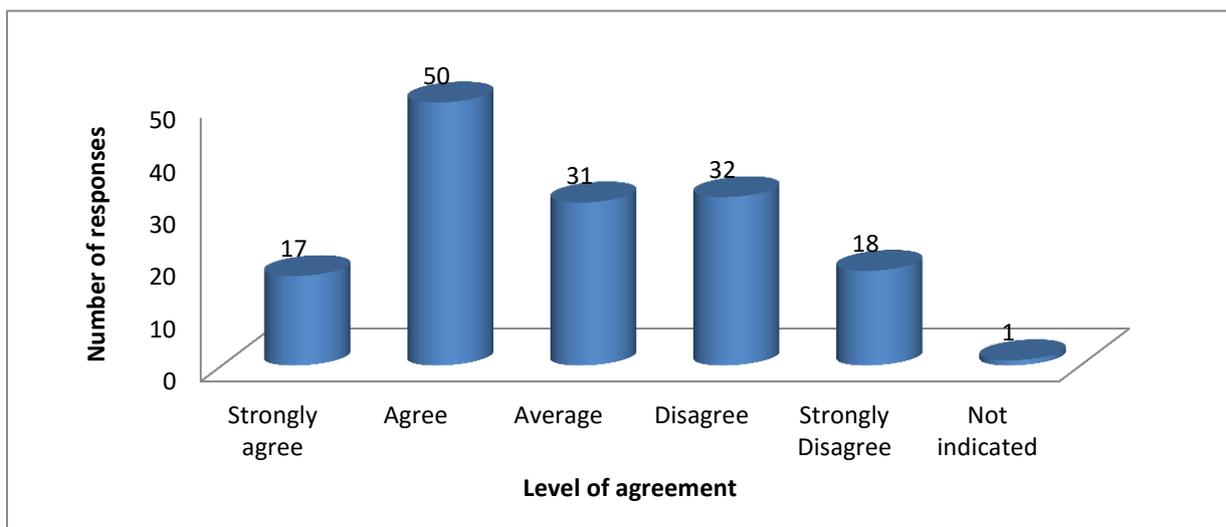
Figure 5.17: IS meets unit's requirement (n=149)

5.5.4.5: IS includes necessary features and functions

As shown in Table 5.26, the majority of the respondents 56 (37.6%) agreed that the IS they use includes necessary features that meet their work schedules and job requirements, while 24 (16.1%) each disagreed and strongly disagreed. Two respondents did not respond to the question.

Table 5.26: IS contains necessary features (n=149)

Level of agreement	Frequency	Percent
Strongly agree	13	8.7
Agree	56	37.6
Average	30	20.1
Disagree	24	16.1
Strongly disagree	24	16.1
No-response	2	1.3
Total	149	100.0

5.5.4.6: Adaptability of IS user interface

In indicating if the user interface of the IS use can be easily adapted, the responses were dispersed with 45 (30.2%) indicating average, 39(26.2%) disagreed while 38 (25.5%) and seven (4.7%) respectively strongly agreed and agreed. Two respondents did not respond to the question. This result is portrayed in Figure 5.18.
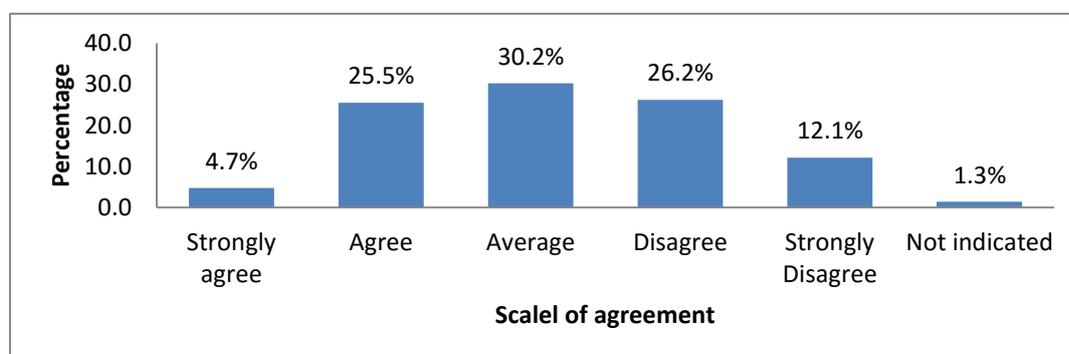
Figure 5.18: Ease of adapting IS user interface (n=149)

158

5.5.4.7: IS response time

Respondents indicated their level of agreement on how quickly the IS responds. Seven (4.7%) strongly agreed, the majority 42 (28.2%) agreed, 38 (25%) indicated average, 39 (26.2%) disagreed while another 20 (13.4%) strongly disagreed and another three gave no response. Table 5.27 shows the results.

Table 5.27: Quick response of IS (n=149)

Level of response	Frequency	Percent
Strongly agree	7	4.7
Agree	42	28.2
Average	38	25.5
Disagree	39	26.2
Strongly Disagree	20	13.4
No-response	3	2.0
Total	149	100.0

5.5.5: Management support for IS

This section of the questionnaire solicited responses from respondents regarding the institutional support the library receives for the IS use. Ten comments were provided for staff to indicate their level of agreement. For the purpose of analysis, the ten comments have been categorized into three main groups as follows: availability of strategic plan and policy, information from management to staff regarding IS and provision of resources.

5.5.5.1: Availability of strategic plan and policy

As shown in Table 5.28, three comments were given for respondents to indicate their level of agreement to help determine whether or not their libraries have a strategic plan, policy and/or standards in place regarding IS use. With regards to the availability of IS policy, only 47 (31.5%) agreed and fifteen (10.1%) strongly agreed. Responses to the availability of IS policy

159

also revealed that only 46 (30.9%) agreed and sixteen (10.7%) strongly agreed. Again, the responses to availability of IS standard was not much different, as 50 (33.6%) agreed and twelve (8.1%) strongly agreed.

Table 5.28: IS plan, policy and standard availability (n=149)

Strategic plan for IS use is available			Policy for IS use is available			Standard for IS use is available		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	15	10.1	Strongly agree	16	10.7	Strongly agree	12	8.1
Agree	47	31.5	Agree	46	30.9	Agree	50	33.6
Average	37	24.8	Average	36	24.2	Average	39	26.2
Disagree	38	25.5	Disagree	35	23.5	Disagree	37	24.8
Strongly Disagree	8	5.4	Strongly Disagree	13	8.7	Strongly Disagree	9	6.0
No-response	4	2.7	No-response	3	2.0	No-response	2	1.3
Total	149	100.0	Total	149	100.0	Total	149	100.0

5.5.5.2: Information from management to staff regarding IS

To determine information flow between management and staff concerning IS, five statements were provided for staff to indicate their level of agreement. Two of the statements were on information provided by management before installation of the IS, and the other three were on information exchange between management and staff after the IS has been installed.

160

5.5.5.2.1: Information provision before IS installation

As indicated in Table 5.29, responses to the two statements on information provision before IS installation show that only 33 (22.1%) and seven (4.7%) of the respondents agreed and strongly agreed respectively to the statement that they were consulted before the IS was installed. As to whether respondents were educated on the impact the IS will have on their job performance before installation, 42 (28.2%) agreed and another sixteen (10.7%) strongly agreed.

Table 5.29: Information on IS before installation (n=149)

Staff consultation done before IS installation			Staff educated on the impact of IS on their jobs		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	7	4.7	Strongly agree	16	10.7
Agree	33	22.1	Agree	42	28.2
Average	31	20.8	Average	36	24.2
Disagree	62	41.6	Disagree	37	24.8
Strongly disagree	14	9.4	Strongly Disagree	16	10.7
No response	2	1.3	No response	2	1.3
Total	149	100.0	Total	149	100.0

5.5.5.2.2: Information provision after IS installation

Table 5.30 shows responses on three categories of information exchange on the IS between management and library staff after the IS has been installed. On the issue of management encouraging staff to use the IS, 20 (13.4%) strongly agreed and 50 (33.6%) agreed. With management discussing problems of the IS with staff, only fourteen (9.4%) strongly agreed and 33 (22.1%) agreed. The data reveal that staff are not really consulted to provide

161

information on how to improve the system, as only 32 (21.5%) and eight (5.4%) agreed and strongly agreed respectively to this statement.

Table 5.30: Information on IS after installation (n=149)

Management encourages and appreciates the use of IS			Management discusses problems with IS with staff			Staff views are solicited to improve IS		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	20	13.4	Strongly agree	14	9.4	Strongly agree	8	5.4
Agree	50	33.6	Agree	33	22.1	Agree	32	21.5
Average	41	27.5	Average	48	32.2	Average	38	25.5
Disagree	25	16.8	Disagree	32	21.5	Disagree	51	34.2
Strongly Disagree	11	7.4	Strongly Disagree	20	13.4	Strongly Disagree	17	11.4
No response	2	1.3	No response	2	1.3	No response	3	2.0
Total	149	100.0	Total	149	100.0	Total	149	100.0

5.5.5.3: Provision of resources

Respondents were provided with two statements to determine their level of agreement on whether their libraries have the required resources to run the IS. The first statement was on availability of qualified IT staff and the second was on availability of computing devices. The data presented in Table 5.31 shows that 52 (34.9%) agreed and 22 (14.8%) strongly agreed to having qualified IT staff. With regards to availability of computing devices, 48 (32.2%) agreed they have adequate computing devices, while ten (6.7%) strongly agreed.

162

Table 5.31: Availability of resources (n=149)

Qualified IT staff have been employed			Computer devices are available		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	22	14.8	Strongly agree	10	6.7
Agree	52	34.9	Agree	48	32.2
Average	32	21.5	Average	38	25.5
Disagree	24	16.1	Disagree	31	20.8
Strongly Disagree	17	11.4	Strongly Disagree	20	13.4
No response	2	1.3	No response	2	1.3
Total	149	100.0	Total	149	100.0

5.5.5: Maintenance of IS

To determine the level of maintenance of ISs in academic libraries in Ghana, three categories of statements were provided for respondents to indicate their levels of agreement. These categories are updating of the IS, training and response to system failure.

5.5.5.1: Updating of IS

Table 5.32 reflects the level of agreement to three statements to indicate how updated the ISs they use are. Responses reveal that only 11(7.4%) of respondents strongly agree that current version of IS has been installed for them, 48 (32.2%) agree, 47(31.5%) indicated average and 28 (18.8%) and 12 (8.1) disagreed and strongly disagreed respectively, three respondents did not provide any response.

On the issue of IS being maintained regularly, eight (5.4%) strongly agreed, 45(30.2%) agreed, 46(30.2%) indicated average, 32(21.5%) disagreed and 15(10.1%) strongly disagreed. Three respondents did not indicate their level of agreement.

163

In ranking the comments that computers are maintained regularly, seven (4.7%) respondents strongly agreed, 48 (32.2%) agreed, 41(25.5%) indicated average, 32(21.5%) disagree and 17 (11.4%) strongly disagreed. There was no response from four respondents to this question

Table 5.32: Updated IS (n=149)

Current version of IS has been installed			IS is maintained regularly			Computers and related devices are maintained regularly		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	11	7.4	Strongly agree	8	5.4	Strongly agree	7	4.7
Agree	48	32.2	Agree	45	30.2	Agree	48	32.2
Average	47	31.5	Average	46	30.9	Average	41	27.5
Disagree	28	18.8	Disagree	32	21.5	Disagree	32	21.5
Strongly disagree	12	8.1	Strongly disagree	15	10.1	Strongly disagree	17	11.4
No response	3	2.0	No response	3	2.0	No response	4	2.7
Total	149	100.0	Total	149	100.0	Total	149	100.0

WESTERN CAPE

5.5.5.2: Training of staff

In determining the level of training respondents received on IS use, respondents were asked to indicate their level of agreement to training before installation, refresher training and training on changes to IS. Responses, as shown in Table 5.33, reveal that with regards to adequate training before installation, only a total of 46 (30.9%) strongly agreed and agreed to being adequately trained before installation. Almost an equal number 47 (31.6%) disagreed and strongly disagreed on being adequately trained before installation of IS.

164

On receiving ongoing training, a total of 50 (33.3%) strongly agreed and agreed while a total of 56 (37.6%) disagreed and strongly disagreed. The figures for training after upgrades was not much different as a total of 52 (34.9%) agreed and strongly agreed while 52 (34.9%) disagreed and strongly disagreed.

Table 5.33: Training on IS use (n=149)

Adequate training before the installation			Receive refresher training on IS use			Trained any time IS is upgraded		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	8	5.4	Strongly agree	13	8.7	Strongly agree	7	4.7
Agree	38	25.5	Agree	37	24.8	Agree	45	30.2
Average	54	36.2	Average	40	26.8	Average	41	27.5
Disagree	32	21.5	Disagree	37	24.8	Disagree	35	23.5
Strongly Disagree	15	10.1	Strongly Disagree	19	12.8	Strongly Disagree	17	11.4
No response	2	1.3	No response	3	2.0	No response	4	2.7
Total	149	100.0	Total	149	100.0	Total	149	100.0

5.5.5.3: Response time to system failure

Respondents were to rate how promptly system challenges and breakdowns are attended to. Responses to the two statements show that, 55 (36.9%) of the respondents agreed and strongly agreed that challenges are attended to promptly, while a total of 47 (31.5%) disagreed and strongly disagreed. Responses to IS breakdowns being attended to promptly revealed that 48 (32.2%) agreed and strongly agreed and a higher number of respondents 54 (36.3%) disagreed and strongly disagreed. Details are reflected in Table 5.34.

165

Table 5.34: Prompt response to system challenges and breakdowns (n=149)

Challenges with use are attended to promptly			IS breakdowns are attended to promptly		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	7	4.7	Strongly agree	10	6.7
Agree	48	32.2	Agree	38	25.5
Average	45	30.2	Average	45	30.2
Disagree	31	20.8	Disagree	35	23.5
Strongly Disagree	16	10.7	Strongly Disagree	19	12.8
No response	2	1.3	No response	2	1.3
Total	149	100.0	Total	149	100.0

5.5.6: Use and future use of IS

In order to determine whether or not respondents will want to use the IS with their current state of skills and if they will need more training in order to maximize the use of the IS, four statements were given for them to state their level of agreement. For the purpose of this analysis, the statements have been grouped into two.

5.5.6.1: Use of IS with current skills

In response to the statements indicating always using the IS to perform jobs, the number of respondents who strongly agreed and agreed totalled 67 (45%) - less than half of the respondents. The same pattern occurred when 68 (45.6%) agreed and strongly agreed that they find the IS always available and flexible to use. This is illustrated in Table 5.35.

166

Table 5.35: Use of IS (n=149)

Always performs job with IS		
Level of agreement	Frequency	Percent
Strongly agree	17	11.4
Agree	50	33.6
Average	37	24.8
Disagree	33	22.1
Strongly disagree	10	6.7
No response	2	1.3
Total	149	100.0

IS is always available and flexible to use		
Level of agreement	Frequency	Percent
Strongly agree	16	10.7
Agree	52	34.9
Average	43	28.9
Disagree	23	15.4
Strongly disagree	13	8.7
No response	2	1.3
Total	149	100.0

5.5.6.2: Training to use IS

Responses to statements on respondents having adequate training to continue using the IS as shown in Table 5.36 reveal that 52 (34.9%) acknowledge to having adequate training. This is supported by responses to the statement that more training is required to use the system optimally, which shows that 112 (75.2%) indicated they need further training.

Table 5.36: Training to use IS (n=149)

Enough training to continue using IS		
Level of agreement	Frequency	Percent
Strongly agree	8	5.4
Agree	44	29.5
Average	50	33.6
Disagree	33	22.1
Strongly disagree	12	8.1
No response	2	1.3
Total	149	100.0

More training required to use the system to the optimum		
Level of agreement	Frequency	Percent
Strongly agree	50	33.6
Agree	62	41.6
Average	25	16.8
Disagree	9	6.0
Strongly disagree	1	0.7
No response	2	1.3
Total	149	100.0

167

5.5.7: Challenges with IS use

Ten comments regarding system challenges were provided to respondents to indicate their level of agreement or disagreement. The ten comments have been categorized into four groups, namely system failure, internet and power challenges, challenges with skills to use the IS and lack of resources.

5.5.7.1: System failure

The majority of the respondents strongly agreed 49 (32.9%) and agreed 48 (32.2%) that they encounter regular system downtimes. Slow response time of the IS was agreed and strongly agreed to by a total of 106 (71.1%) respondents. This result is depicted in Table 5.37.

Table 5.37: System failure and slowness (n=149)

Regular system downtimes are encountered				IS is slow		
Level of agreement	Frequency	Percent		Level of agreement	Frequency	Percent
Strongly agree	49	32.9		Strongly agree	33	22.1
Agree	48	32.2		Agree	73	49.0
Average	49	32.9		Average	38	25.5
Strongly disagree	1	0.7		disagree	3	2.0
No response	2	1.3		No response	2	1.3
Total	149	100.0		Total	149	100.0

5.5.7.2: Internet and power challenges

Forty- four (29.5%) of the respondents strongly agreed and 54 (36.2%) agreed to experiencing regular internet downtime. In line with this, 47 (31.5%) strongly agreed and 60 (40.3%) agreed to having insufficient bandwidth. Challenges with power supply was strongly

168

agreed to by 42 (28.2%) and agreed to by 57 (38.3%) of the respondents. Table 5.38 reflects details.

Table 5.38: Internet and power challenges (n=149)

Regular internet downtime			Insufficient bandwidth			Regular power outages/surges		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	44	29.5	Strongly agree	47	31.5	Strongly agree	42	28.2
Agree	54	36.2	Agree	60	40.3	Agree	57	38.3
Average	46	30.9	Average	35	23.5	Average	40	26.8
Disagree	3	2.0	Disagree	4	2.7	Disagree	6	4.0
Strongly disagreed	0	0.0	Strongly disagreed	0	0.0	Strongly Disagree	1	0.7
No response	2	1.3	No response	3	2.0	No response	3	2.0
Total	149	100.0	Total	149	100.0	Total	149	100.0

5.5.7.3: Challenges with skill to use IS

Forty-three (28.9%) and 55 (36.9%) of the respondents strongly agreed and agreed totalling 98 (65.8%) who agreed to the statement that they lack adequate training affecting their use of the IS. In responding to the statement that lack of skills also affects respondents' use of IS, 45 (30.2%) strongly agreed and 59 (39.6%) agreed. Forty-five (30.2%) strongly agreed and 57(38.3%) agreed that the lack of IT skills by their colleagues affect the cooperate use of the IS. See Table 5.39 for details.

169

Table 5.39: Effect of skills on IS use (n=149)

Insufficient training affects IS use			Lack of adequate skills affect IS use			Lack of IT skills by colleagues affect cooperate IS use		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	43	28.9	Strongly agree	45	30.2	Strongly agree	45	30.2
Agree	55	36.9	Agree	59	39.6	Agree	57	38.3
Average	44	29.5	Average	36	24.2	Average	41	27.5
Disagree	4	2.7	Disagree	4	2.7	Disagree	2	1.3
Strongly disagree	1	0.7	Strongly disagree	3	2.0	Strongly disagree	2	1.3
No response	2	1.3	No response	2	1.3	No response	2	1.3
Total	149	100.0	Total	149	100.0	Total	149	100.0

5.5.7.4: Lack of resources
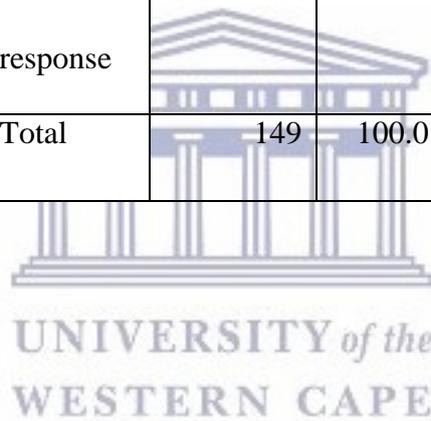
With regards to lack of resources, 44 (29.5%) of the respondents strongly agreed and 60 (40.3%) of the respondents agreed that they lack modern IT equipment - only four (2.7%) of the respondents disagreed. Responses to lack of qualified IT staff show that 42 (28.2%) respondents strongly agreed and 55 (36.9%) agreed that they do not have enough qualified IT staff. Details are depicted in Table 5.40.

170

Table 5.40: Lack of resources (n=149)

Lack of modern IT equipment			Lack of qualified IT staff		
Level of agreement	Frequency	Percent	Level of agreement	Frequency	Percent
Strongly agree	44	29.5	Strongly agree	42	28.2
Agree	60	40.3	Agree	55	36.9
Average	39	26.2	Average	40	26.8
Disagree	4	2.7	Disagree	7	4.7
Strongly disagreed	0	0.0	Strongly disagree	3	2.0
No -response	2	1.3	No response	2	1.3
Total	149	100.0	Total	149	100.0

5.6: Testing of hypotheses

The study stated four hypotheses which have been tested and presented below.

5.6.1: H1: Management of ISs affects the quality of ISs in academic libraries in Ghana

To test H1, a Spearman's correlation was run to determine if managerial support and maintenance affect the quality of ISs. Table 5.41 shows that there was a strong positive correlation between management and IS quality (rs = .553, n = 147, p < .001).

171

Table 5.41: Correlation between management and IS quality

Correlations			Median of management support and maintenance	Median of system quality
Spearman's rho	Median of managerial support and maintenance	Correlation Coefficient	1.000	.553[**]
		Sig. (2-tailed)	.	.000
		N	147	147
	Median of system quality	Correlation Coefficient	.553[**]	1.000
		Sig. (2-tailed)	.000	.
		N	147	148
**. Correlation is significant at the 0.01 level (2-tailed).				

5.6.2: H2: The quality of an IS affects the use of the IS in academic libraries in Ghana

Spearman's correlation was used to statistically determine if the quality of an IS affects the use of the IS. Table 5.42 indicates a strong positive correlation between the quality of an IS and the IS use (rs = .656, n = 147, p < .001).

Table 5.42: Correlation between IS quality and use

Correlations			Median of Use	Median of system quality
Spearman's rho	Median of Use	Correlation Coefficient	1.000	.656[**]
		Sig. (2-tailed)	.	.000
		N	147	147
	Median of system quality	Correlation Coefficient	.656[**]	1.000
		Sig. (2-tailed)	.000	.
		N	147	148
**. Correlation is significant at the 0.01 level (2-tailed).				

172

5.6.3: H3: IS use affects service provision in academic libraries in Ghana

To test H3, Spearman's correlation was used to determine the relationship between IS use and service provision. Table 5.43 reflects a strong positive correlation between IS use and service provision (rs = .528, n = 147, p < .001). H3 as stated is accepted.

Table 5.43: Correlation between IS use and service provision

Correlations			Median of Use	Median of impact of IS
Spearman's rho	Median of Use	Correlation Coefficient	1.000	.528[**]
		Sig. (2-tailed)	.	.000
		N	147	147
	Median of impact of IS	Correlation Coefficient	.528[**]	1.000
		Sig. (2-tailed)	.000	.
		N	147	149
**. Correlation is significant at the 0.01 level (2-tailed).				
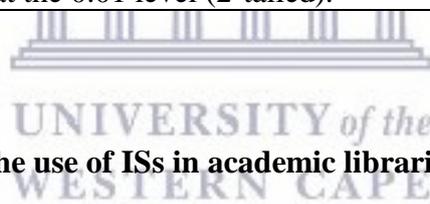
5.6.4: H4 Challenges affect the use of ISs in academic libraries in Ghana

H4 was stated to determine whether challenges encountered affect the use of ISs. Spearman's correlation was used and the result shown in Table 5.44 depicts a moderate negative correlation between challenges encountered and IS use (rs = -.344, n = 147, p < .001).

Table 5.44: Correlation between challenges and IS use

Correlations			Median of Use	Median of Challenge
Spearman's rho	Median of Use	Correlation Coefficient	1.000	-.344[**]
		Sig. (2-tailed)	.	.000
		N	147	147
	Median of Challenge	Correlation Coefficient	-.344[**]	1.000
		Sig. (2-tailed)	.000	.
		N	147	147
**. Correlation is significant at the 0.01 level (2-tailed).				

5.7: Concluding summary

In this chapter, the quantitative data collected and analysed with SPSS were presented under four main sections; background information on respondents, use of the IS, IS evaluation and testing of hypotheses. The next chapter presents the qualitative data collected.

UNIVERSITY *of the*
WESTERN CAPE

174
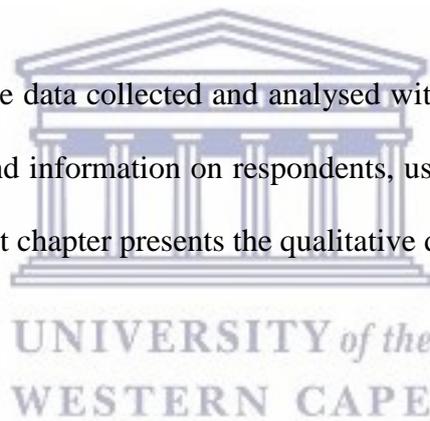
CHAPTER SIX: ANALYSIS OF QUALITATIVE DATA

6.0: Introduction

This chapter presents data gathered from interviews with the head librarians and IT unit heads. Atlas.ti was used to analyse the data. Theme codes were generated to help bring together the various comments from different respondents on the same theme. This was used to determine the frequency of occurrence of themes and to identify interesting quotes which were used to compliment data from the questionnaire.

6.1: Response rate

Out of the nine (9) libraries studied, eight (8) library heads were interviewed. As one library has a staff member in the position of 'Systems Librarian' s/he was interviewed in the place of the head librarian and IT unit head. Of the nine (9) libraries studied, the researcher was able to interview IT unit heads of five (5) libraries. As mentioned, the 'Systems Librarian' of one was interviewed in the place of the IT head. Two libraries do not receive support from the IT unit, while the IT staff member assigned to ninth library was not available during the time of data collection.

6.2: ISs use

In the section on ISs use, the interviews aimed at determining the major ISs used to enhance library services, whether they are proprietary or open source, the main aim of adopting the ISs, the reason for choosing the specific IS and the date of implementation.

6.2.1: Use of LMS/ILLS

Librarians were asked whether they use LMS/ILMS and which one they use. Interview responses revealed that all nine (9) libraries that participated in this study use a library

175

management system. Four (4) main LMS and were identified from the responses: Sierra,

Destiny, Librarysoft, Koha and Alexandria. Responses are reflected in Table 6.1

Table 6.1: LMS use (n=9)

Themes	Responses
Sierra	**Librarian 1 -** *We use the LMS Sierra*
Destiny	**Librarian 2 -** *Destiny library manager is used*
	Librarian 4 - *Koha is used currently, formally Destiny*
	Librarian 5 - *The library is using Destiny software which is currently migrating to Koha.*
Librarysoft	**Librarian 3 -** *We have Librarysoft, It is extremely frustrating so we just implemented Koha about a month ago*
	Librarian 6 - *We are using Librarysoft*
	Librarian 7 - *Before Koha we were using Librarysoft*
	Librarian 8 – *We initially subscribed to Librarysoft*
Koha	**Librarian 3 -** *We have Librarysoft, It is extremely frustrating so we just implemented Koha about a month ago*
	Librarian 4 - *Koha is used currently, formally it was Destiny*
	Librarian 5 *- The library is using Destiny software which is currently migrating to Koha.*
	Librarian 6 - *Due to the challenges with Librarysoft we have done consultations and have decided to use Koha.*
	Librarian 7 - *Before Koha we were using Librarysoft*
	Librarian 8 – *We use Koha*
	Librarian 9 - *we are currently in the process of rolling over our newly adopted software; Koha*
Alexandria	**Librarian 9 -** *We are using an ILM; Alexandria*

A word cloud image (Figure 6.1) of the LMSs in use by the libraries shows that Koha is the

most popular LMS, with eight (8) users followed by Librarysoft with four (4), Destiny with

three (3) and Sierra as well as Alexandria each with one (1) user.

176
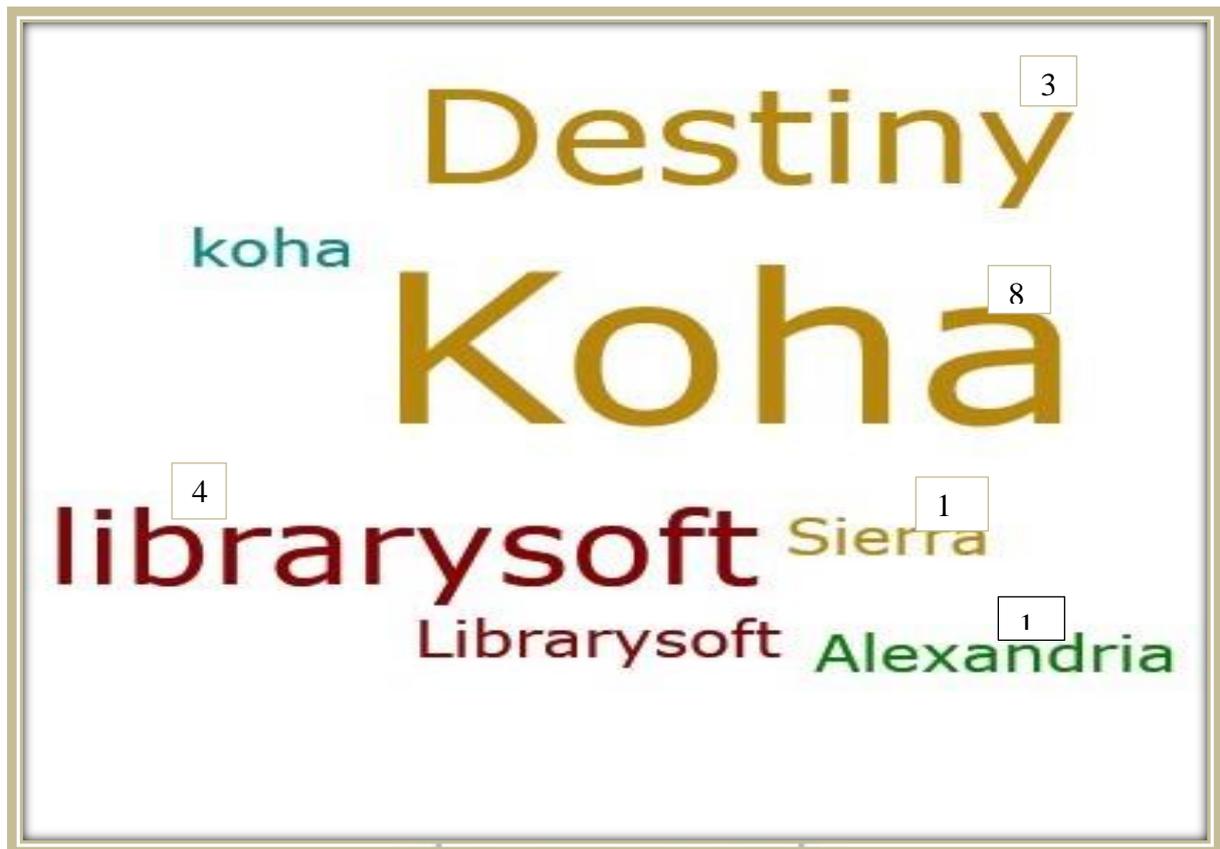
Figure 6.1: Brands of LMS use

6.2.2: Use of DAM

Seven of the librarians interviewed indicated the use of a Digital asset management system (DAM). All seven institutions using DAM as shown in a network diagram from Atlas.ti (Figure 6.2) specifically use DSpace.
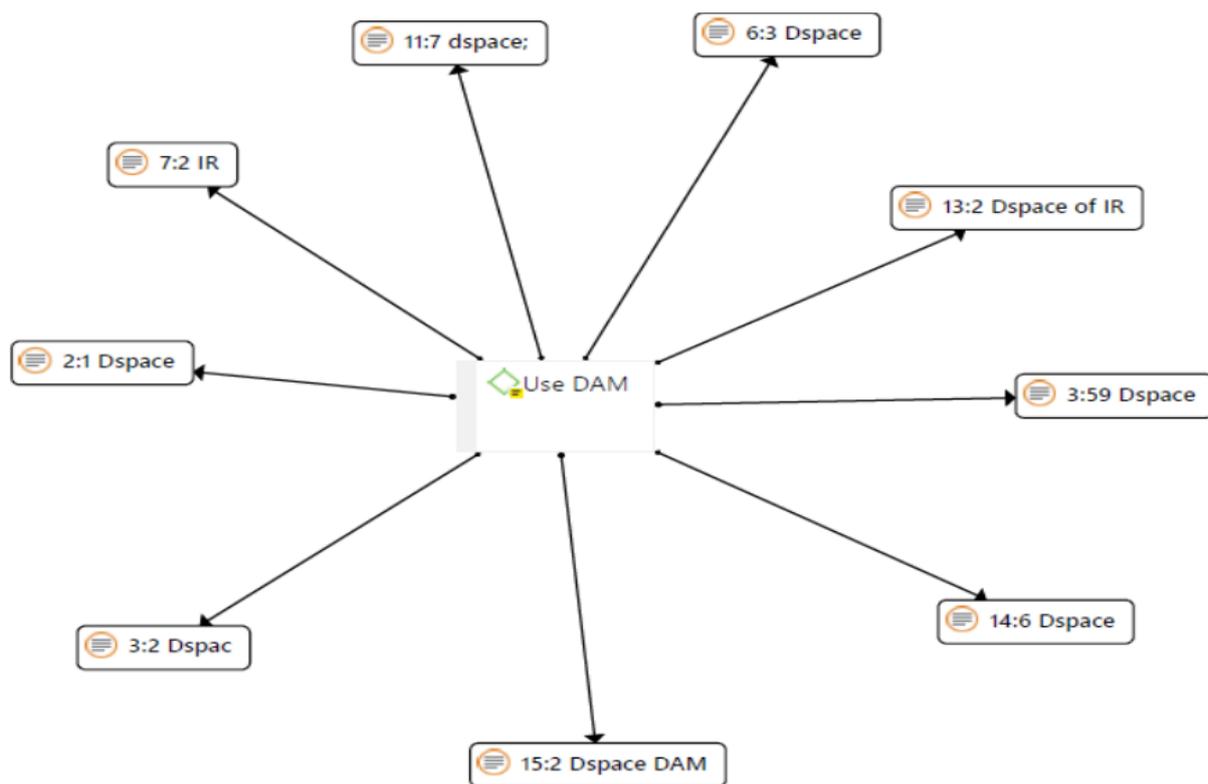
Figure 6.2 Use of DSpace (The numbers sequence of the codes)

6.2.3: Year of installing IS

Responses to the date(s) of installing the two major ISs used in libraries in Ghana are depicted in Table 6.1. The earliest year of installation is 2006 and the latest is 2016.

Table 6.2 Year of installing IS (n=9)

Librarian	Date of LMS	Date of DAM
Librarian 1	2009	2010
Librarian 2	2011	2012
Librarian 3	2006	2016
Librarian 4	2016	
Librarian 5	2006	2010
Librarian 6	2010	
Librarian 7	2016	2015
Librarian 8	2013	2016
Librarian 9	2009	2009

6.2.4: Change of LMS/ILS

In response to the question whether LMS have been changed, eight (8) of the nine (9) libraries studied, acknowledged change. Of the eight (8) that changed, six (6) changed to Koha which is an open source LMS. It is noteworthy that at the time of the study, two more libraries were in the consideration stage of changing their LMS. One of them is considering Koha. Changes are shown in Table 6.3.

Table 6.3 Change of LMS/ILS (n=9)

Themes	Responses
Changed LMS	**Librarian 1** - *We changed our LMS from Millenium to Sierra* **Librarian 2 –** *we changed from an in-house system to Destiny*
Changed LMS to Koha	**Librarian 3 -** *We have Librarysoft, It is extremely frustrating so we just implemented Koha about a month ago* **Librarian 4 -** *Koha is used currently, formally Destiny* **Librarian 6 -** *Due to the challenges with library soft we have done consultations and have decided to use Koha. We have installed Koha already and have started doing manual entry of all our resources.* **Librarian 7 -** *Before Koha we were using Librarysoft* **Librarian 8 –** *We were never able to install Librarsoft so we moved to Koha* **Librarian 9 -** *we are currently in the process of rolling over our newly adopted software; Koha*
In the processes of changing LMS	**Librarian 2 -** *I am considering moving to an open source system. I am learning more on them and will present a proposal to management* **Librarian 5** - *The library is using Destiny software which is currently considering migrating to Koha.*

179

6.2.5: Reasons for change of LMS/ILL

As indicated in the comments from respondents recorded in Table 6.4, four major reasons were given for changing LMS. Reasons were need for upgrade (1 respondent), cost associated with proprietary LMS (3 respondents), technical challenges (6 respondents) and LMS being used by other universities (1 respondent).

Table 6.4 Reasons for change of LMS/ILL (n=9)

Themes	Responses
Need for upgrade	**Librarian 1**- *We did not have any major challenges with millennium. It was just a need for change to enhance our services*
Cost of old LMS	**Librarian 2** - *I am considering moving to an open source system. I am learning more on them and will present a proposal to management*
	Librarian 4 -*Formerly Destiny was used but the cost associated with its use made us abandoned it.*
	Librarian 7- *We stopped using the old system because it is a paid service. We have chosen Koha because it is an open source and it is more user friendly compered to Librarysoft*
Technical challenges with old LMS	**Librarian 3** -*It is extremely frustrating; we had issues with Librarysoft and we noticed there is an increased migration to Koha among academic libraries in Ghana*
	Librarian 5 -*We had problems using Destiny, cataloguers were not able to log unto the system, it was a technical problem. We tried to solve the problem by liaising with developers and the IT unit.*
	Librarian 6 - *Due to the technical challenges with library soft we have done consultations and have decided to use Koha*
	Librarian 7- *We stopped using the old system because it is a paid service. We have chosen Koha because it is an open source and it is more user friendly compered to Librarysoft*
	Librarian 8 - *We initially subscribed to Librarysoft. Even the initial installation was a problem, we were depending on the IT staff of another university who has Librarysoft installed to help install it for us. They had a problem with coding issues*
	Librarian 9 - *We are migrating to Koha because it comes with all the flexibilities you can think about.*
Used by other universities	**Librarian 3 -***It is extremely frustrating; we had issues with Librarysoft and we noticed there is an increased migration to Koha among academic libraries in Ghana*

180

6.2.6: Reason for choosing a particle brand of IS

With regards to the reasons for deciding on a specific brand of IS, six (6) librarians indicated they considered the cost, four (4) considered the functions the IS can perform, one (1) considered the reputation of the IS, five (5) considered the fact that the IS is being used by other universities, while two (2) librarians considered 'ease of use' of the IS. Details can be seen in Table 6.5.

Table 6.5 Reasons for choosing an IS (n=9)

Themes	Responses
Cost	**Librarian 1**- *We considered the cost and the fact that it can help us serve our users better*
	Librarian 2 -*Destiny has proven as a robust system. Other universities have used it. There is a track record and we bought a standard one 2011 and no extra cost was involved as part of the cost of the software.*
	Librarian 4 -*The challenges of cost of our former LMS coupled with technical challenges with use made me recommended Koha*
	Librarian 7 - *I was not here at that time so I am not sure why Librarysoft was chosen. We have chosen the Koha because it is an open source and it is more user friendly compered to Librarysoft*
	Librarian 8 - *When the idea of open source came then we saw it as a good idea. At that time there was only one library in Ghana using it.*
	Librarian 9 - *We noticed the Alexandria was very expensive $3000 annually, anytime you want to integrate Alexandria with another university system, you have to consult the vendor for assistance. The library was never free to fully explore other uses of Alexandria. Koha comes with all the flexibilities you can think about*
Functions	**Librarian 1**- *We considered the cost and the fact that it can help us serve our users better*
	Librarian 4 -*The challenges of cost of our former LMS coupled with technical challenges with use made me recommended Koha*
	Librarian 6 - *When I was joining this library they were doing data entry into the system Librarysoft. Before that they were using a manual system. We decided on Koha because it can support our work, we took cognizance of the fact that most universities even including some big universities are using it.*
	Librarian 9 - *For us to consider adopting any software, we research into the use of the software to see if it will meet our current and future needs*

181

Reputation	**Librarian 2** -*Destiny has proven as a robust system. Other universities have used it. There is a track record and we bought a standard one 2011 and no extra cost was involved a part of the cost of the software.*
Used by other university	**Librarian 2** -*Destiny has proven as a robust system. Other universities have used it. There is a track record and we bought a standard one 2011 and no extra cost was involved a part of the cost of the software.*
	Librarian 3 - *We noticed there is an increase migration to Koha among academic libraries in Ghana*
	Librarian 5 - *I cannot give reasons as to why destiny was adopted among other choices. This is due to the fact that I have not found any document giving reasons for the choice of Destiny. But we are recommending Koha because a number of universities in Ghana are also using it*
	Librarian 6 - *When I was joining this library, they were doing data entry into the system Librarysoft. Before that they were using a manual system. We decided on Koha because it can support our work, we took cognizance of the fact that most universities even including some big universities are using it.*
	Librarian 8 - *When the idea of open source came, then we saw it as a good idea. At that time there was only one library in Ghana using it.*
Easy to use	**Librarian 7** - *I was not here at that time so I am not sure why Librarysoft was chosen. We have chosen the Koha because it is an open source and it is more user friendly compered to Librarysoft*
	Librarian 9 - *We noticed the Alexandria was very expensive $3000 annually, anytime you want to integrate Alexandria with another university system, you have to consult the vendor for assistance. The library was never free to fully explore other uses of Alexandria. Koha comes with all the flexibilities you can think about*

6.2.7: Open source IS

The networked diagram Figure 6.3 shows that Koha and DSpace are the two open source IS

use in the libraries studied.

182
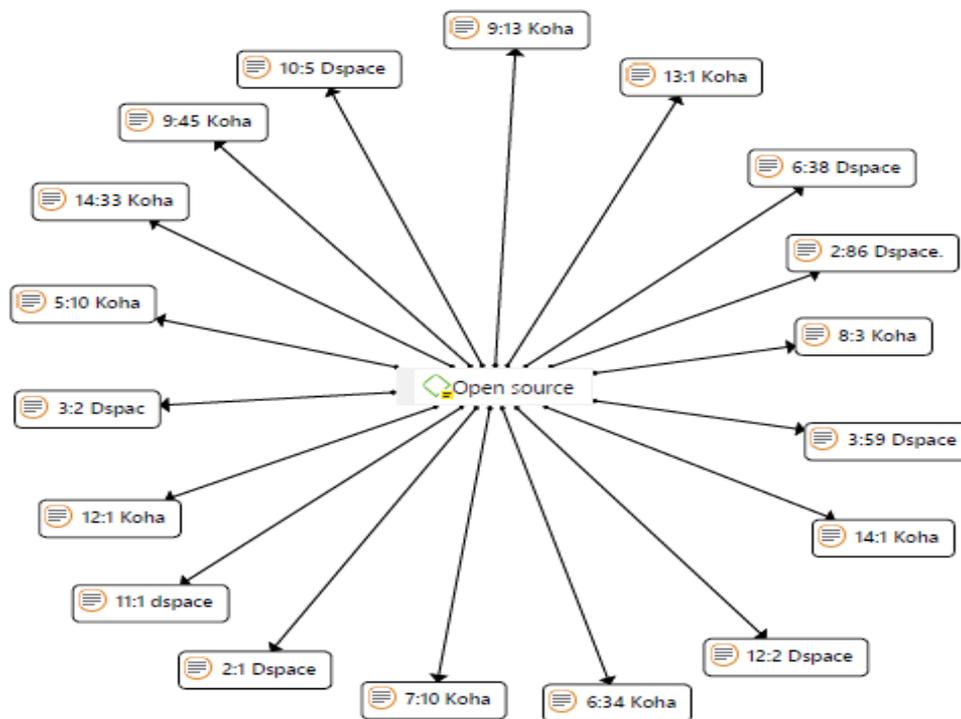
Figure 6.3: Open source IS use (The numbers sequence of the codes)
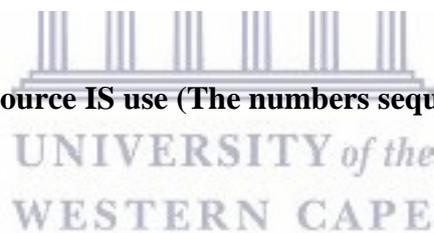
6.2.7.1: Reasons for Open source IS

The reasons given for choosing open source IS are listed in Table 6.6. Four major themes were identified as reasons for adopting open source IS, namely no IS cost (3 respondents), usage by other universities (3 respondents), functionality of the IS (5 respondents) and response to the open access drive (2 respondents).

Table 6.6 Reasons for open source IS (n=9)

Themes	Responses
No subscription cost	**Librarian 4** - *We are using Koha to avoid the challenge of paying subscription fee*
	Librarian 8 - *Flexibility and cost are the main reasons for our adoption of open source software*
	Librarian 9 - *We adopted the open source because they are free and secure*
Used by other universities	**Librarian 2 -** *The DSpace was chosen because of wide usage and support*
	Librarian 5 – *Koha, because a number of universities in Ghana are also using it*
	Librarian 6 - *We took cognizance of the fact that most universities even including some big universities are using it*
Reputation/ functionality	**Librarian 1 -** *We are using DSpace because can take audio, video, text files*
	Librarian 2 - *The DSpace was chosen because of wide usage and support*
	Librarian 3 - *We decided to go with Koha, it has good reputation*
	Librarian 8 - *Flexibility and cost are the main reasons for our adoption of open source software*
	Librarian 9 - *We adopted the open source because they are free and secure*
Open source drive	**Librarian 1 -** *Response to the open access drive*
	Librarian 9 -*The University, as a whole, supports open source initiatives. It is part of the culture and explicitly stated in the university's IT policy that if there is an open source option that should be highly considered.*

6.2.8: Use of other ISs

Head librarians revealed the use of other ISs. CCTV is used by two (2) libraries, 3M security system by one (1) library, EZproxy for off campus access by six (6) libraries and LibGuide and discovery by one (1) library for creating subject content and searching resources respectively. This is shown in Table 6.7.

184

Table 6.7: Other ISs use in libraries (n=9)

Theme	Responses
EZproxy	**Librarian 1 -** *In addition to the major IS, we use LibGuide , EZproxy, 3M electronic security and CCTV cameras* **Librarian 2 -** *We use EZproxy* **Librarian 3 -** *EZproxy* **Librarian 6 -** *we use EZproxy for off campus access* *Librarian 7 - We also use EZproxy* *Librarian 9 - We have use EZproxy and electronic security, We have a trial version of an electronic security system, it is not really working. The stands are just there to scare our users*
CCTV	**Librarian 1 -** *In addition to the major IS, we use LibGuide , EZproxy, 3M electronic security and CCTV cameras* *Librarian 8 - We have CCTV cameras*
Electronic security	**Librarian 1 -** *In addition to the major IS, we use LibGuide , EZproxy, 3M electronic security and CCTV cameras*
LibGuide	**Librarian 1 -** *In addition to the major IS, we use LibGuide , EZproxy, 3M electronic security and CCTV cameras*
Discovery	**Librarian 1 -** *In addition to the major IS, we use LibGuide , EZproxy, 3M electronic security and CCTV cameras*

6.2.9: Use of collaborative systems

Responses from head librarians as shown in Table 6.8 reveal that eight (8) of the nine (9) libraries studied officially use Facebook, two (2) use WhatsApp, three (3) use Twitter and two (2) use SMS for reaching out to library users and for interacting with staff.

185

Table 6.8: Use of collaborative platforms (n=9)

Theme	Responses
Facebook	**Librarian 1 -** *We use Facebook and Twitter*
	Librarian 2 - *Facebook, WhatsApp and SMS*
	Librarian 3 - *Facebook and Twitter*
	Librarian 4 - *There is a minimal use of Facebook; occasionally we place news or information on Facebook*
	Librarian 6 - *We use Facebook and Twitter and managed by the circulation desk to send announcement to patrons*
	Librarian 7 - *We are using Facebook*
	Librarian 8 - *Facebook account is available but we are not very active there...we are not using it the way we would have loved to. We have not given it the necessary publicity. We also tried using the Whatsapp account to reach to our students*
	Librarian 9 - *we use to have Facebook but no longer active. Social media will help an online face of the library so we need to have a strategy in place*
SMS	**Librarian 5 -** *The library uses text messages and Whatsapp to send alerts to students*
	Librarian 2 - *Facebook, WhatsApp and SMS*
Twitter	**Librarian 1 -** *We use Facebook and Twitter*
	Librarian 3 - *Facebook and Twitter*
	Librarian 6 - *We use Facebook and Twitter and managed by the circulation desk to send announcement to patrons*
WhatsApp	**Librarian 2 -** *Facebook, WhatsApp and SMS*
	Librarian 5 - *The library uses text messages and Whatsapp to send alerts to students*

6.2.10: Reasons for adopting IS for library services

Head librarians were asked to indicate the major reason(s) for adopting IS to perform library functions. Table 6.9 lists responses given reflecting three main issues, namely enhanced service (four responses), fast and easy work procedures (four responses) and automation (two responses).

186

Table 6.9: Reasons for IS use (n=9)

Themes	Responses
Enhanced service	**Librarian 3** - *LMS and other systems will enhance the services we provide in this library*
	Librarian 4 -*The use of Koha is for enhanced services*
	Librarian 8 - *Enhance our services*
	Librarian 9 - *To automate the library procedures to help serve our users better.*
Fast and easy work procedures	**Librarian 1 -** *The use of the systems comes with a number of advantages such as easy work procedure and speed; that is why we are using them*
	Librarian 5 -*To help the university library to automate its functions*
	Librarian 6 - *To support our work for efficiency*
	Librarian 7 – *The library decided to use the systems for fast and easy retrieval of information*
Automation	**Librarian 2** - *It will help automate all our library functions*
	Librarian 9 - *To automate the library procedures to help serve our users better.*

6.3: Funding and institutional support

This session sought responses from head librarians on issues of availability of funds, sources of funding and institutional support for IS projects.

All nine (9) libraries depend on internal institutional funds. Only five (5) have funding and institutional support available for IS projects, while two (2) libraries receive funding from outside their institutions. Detailed responses are shown in Table 6.10.

187

Table 6.10: Source of fund (n=9)

Themes		Responses
Funding and institutional support available	Internal / External	**Librarian 1 -** *The initial IS project was sponsored by a donor. I think we have enough money; I think the library is blessed, I have a lot of money I have not even spent; it is the bureaucratic process of accessing the money that makes my work difficult. You have to plan and start the requisition process early in the year or semester. Sometimes, by the time you get approval to take the money, the financial year is close to the end and the money goes back to chest.*
	Internal	**Librarian 5 -** *With regards to finance, we do not have any challenges…if you are able to convince them, they will provide you with what you have requested for.*
	Internal	**Librarian 6:** *Management supports us financially when we are acquiring software from internally generated funds*
	Internal	**Librarian 7**- *We had the support of our institution; upon informing them of the challenges with Librarysoft, they gave us the go ahead to implement Koha. The training and installation costs were all paid for promptly.*
	Internal / External	**Librarian 9 -***Yes we receive all the funds from the university from the library user fee charged to students; the Alexandria was partly funded through a project*
Funding and institutional support not available	Internal	**Librarian 2 -***We are supposed to be paying for Destiny annually, for the past 6 or 5 years we have not paid so we do not get technical support from the developers again, and other services like data from them. I do not think the university is ready to pay such an amount. In case the system breaks down I can only depend on my backup*
	Internal	**Librarian 3 -** *We never paid for Librarysoft after the initial payment… I think that is how come it never worked…The institution later hosted the IR in cloud but due to the fact that we could not meet our financial obligations, we lost all data about 3years a go.*
	Internal	**Librarian 4 -** *The university advertised for bidding and the least amount quoted was 45000 Ghana cedis. Knowing my university could not raise such an amount what we did was to fall on students from our computer science department who formed a team to help us install Koha. We promised the students some money…some of the students have been paid and others have not. They keep calling me even though they have completed school. But the library issues are not of priority now.*
	Internal	**Librarian 8 -** *I have indicated that dedicated IT staff should be employed in the library a thousand and one times; we have interviewed someone but there was no money to pay.*

188

6.4: Hosting of ISs

Interviews with Heads of IT units and the librarians who did not have IT unit heads, revealed

that only one (1) library has its ISs hosted in the cloud. All the others are using local servers

as indicated in Table 6.11:

Table 6.11: Source of hosting IS (n=9)

Themes	Responses
Local server	**IT 1** - *It is hosted on the main university server at a central network centre. It was formerly hosted in the library, management decided to move it to the central network centre due to certain challenges like power. We did this in collaboration with the software developers since they have to provide the server requirements*
	IT 2 - *The systems are hosted on the main University server which is a virtual server. We were initially hosting all library savers in the library, due to technical challenges we moved all to IT unit*
	IT 3 - *The systems are hosted in-house on local servers*
	IT 4 - *The systems are hosted locally and I do not allow my assistants to work on servers due to their attitude to work*
	IT 5 - *The systems are hosted on local servers we have back up power system 24/7*
	Librarian 2 - *The library systems are hosted on local servers. There is a backup server which is also at the same campus as the main server. I also do backups on external drive which is kept in my office though.*
	Librarian 4 - *Koha is hosted in-house in the IT department, the director of IT is in charge of managing it*
	Librarian 5 - *The server is here in the library*
Cloud base	**Librarian 3** - *We had discussions with IT team so that they could host it locally but there was not much cooperation from the IT department. Since the institution has a number of cloud base software the library decided to look for an external organization to help install Koha and DSpace and we have hosted it on the cloud*

189

6.5: Function of IS

This section sought responses on the specific functions LMS and DAM are used to perform in the libraries studied.

6.5.1: Function LMS

The librarians were asked to list the specific functions they use the LMS to perform. As shown in Table 6.12, collation of responses revealed that all nine (9) libraries use the cataloguing module, eight (8) use the OPAC, seven (7) use the circulation module, seven (7) use the query and report generation module, two (2) libraries use the acquisition module while only one library each use their LMS to send automatic emails, use Myaccount and serial management modules. One library has its OPAC only on their intranet.

Table 6.12: Modules of LMS use (n=9)

Acquisition	**Librarian 1**- *We are using 4 modules; cataloguing, acquisition; OPAC and circulation With the OPAC end users are not using the Myaccount section. I also do queries at the back* **Librarian 4** - *We are using almost all the modules; cataloguing, circulation, accessing the database of other libraries, acquisition.*
Cataloguing	**Librarian 1**- *We are using four modules: cataloguing, acquisition; OPAC and circulation With the OPAC end users are not using the Myaccount section. I also do queries at the back end* **Librarian 2** - *Cataloguing, circulation, report generation and OPAC interfaces are being used* **Librarian 3** -*We are using cataloguing, circulation, OPAC and report features. We are not using the serial and acquisition modules because of the nature of their acquisition* **Librarian 4** - *We are using almost all the modules; cataloguing, circulation, accessing the database of other libraries, acquisition.* **Librarian 5** - *The Destiny is used only for cataloguing though the idea was to use it for total automation of the library* **Librarian 6** -*We are using, cataloguing, circulation, OPAC and record generation.* **Librarian 7**- *We are using the cataloguing, circulation, online OPAC and report sections of Koha* **Librarian 8** - *Cataloguing, tools, Partial report generation and administration function are the ones being used, OPAC is in house and Circulation is done manually*

190

	Librarian 9 - *With regards to Koha, we are using cataloguing, serials and periodicals management, OPAC, Circulation, Reports and Patrons management.*
Circulation	**Librarian 1** -*we are using four modules; cataloguing, acquisition; OPAC and circulation With the OPAC end users are not using the Myaccount section. I also do queries at the back end* **Librarian 2** - *Cataloguing, circulation, report generation and OPAC interfaces are being used* **Librarian 3** -*We are using cataloguing, circulation, OPAC and report features. We are not using the serial and acquisition modules because of the nature of their acquisition* **Librarian 4** - *We are using almost all the modules; cataloguing, circulation, accessing the database of other libraries, OPAC, acquisition.* **Librarian 6** -*We are using, cataloguing, circulation, OPAC and record generation.* **Librarian 7**- *We are using the cataloguing, circulation, online OPAC and report sections of Koha* **Librarian 9** - *With regards to Koha, we are using cataloguing, serials and periodicals management, OPAC, Circulation, Reports and Patrons management.*
Report generation	**Librarian 1 -** *we are using four modules; cataloguing, acquisition; OPAC and circulation With the OPAC end users are not using the Myaccount section. I also do queries at the back end* **Librarian 2** - *Cataloguing, circulation, report generation and OPAC interfaces are being used* **Librarian 3** -*We are using cataloguing, circulation, OPAC and report features. We are not using the serial and acquisition modules because of the nature of their acquisition* **Librarian 6** -*We are using, cataloguing, circulation, OPAC and record generation.* **Librarian 7**- *We are using the cataloguing, circulation, online OPAC and report sections of Koha* **Librarian 8** - *Cataloguing, tools, Partial report generation and administration function are the ones being used, OPAC is in house and Circulation is done manually* **Librarian 9** - *With regards to Koha, we are using cataloguing, serials and periodicals management, OPAC, Circulation, Reports and Patrons management.*
Automatic email	**Librarian 1 -***Sierra has also been programmed to send automatic emails to patrons*
Online OPAC	**Librarian 1 -***we are using four modules; cataloguing, acquisition; OPAC and circulation With the OPAC end users are not using the Myaccount section. I also do queries at the back end* **Librarian 2** - *Cataloguing, circulation, report generation and OPAC interfaces are being used* **Librarian 3** -*We are using cataloguing, circulation, OPAC and report features. We are not using the serial and acquisition modules because of the nature of their acquisition* **Librarian 4** - *We are using almost all the modules; cataloguing, circulation, accessing the database of other libraries, OPAC acquisition.*

191

	Librarian 6 -*We are using, cataloguing, circulation, OPAC and record generation.*
	Librarian 7- *We are using the cataloguing, circulation, online OPAC and report sections of Koha*
	Librarian 9 - *With regards to Koha, we are using cataloguing, serials and periodicals management, OPAC, Circulation, Reports and Patrons management.*
Intranet OPAC	**Librarian 8** - *Cataloguing, tools, Partial report generation and administration function are the ones being used, OPAC is in house and Circulation is done manually*
Myaccount	**Librarian 1** -*we are using four modules; cataloguing, acquisition; OPAC and circulation With the OPAC end users are not using the Myaccount section. I also do queries at the back end*
Serials management	**Librarian 9** - *With regards to Koha, we are using cataloguing, serials and periodicals management, OPAC, Circulation, Reports and Patrons management.*

6.5.2: Function of DAM (DSpace)

As shown in Table 6.13, all seven libraries using DAM, use DSpace to digitize materials for access of resources from outside the library.
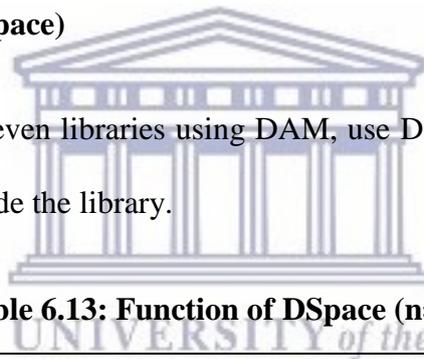
Table 6.13: Function of DSpace (n=7)

Theme	Responses
Digital content creation	**Librarian 1** – *To digitize the intellectual output of the university in that, irrespective of one's location in the world the intellectual output of the university is accessible.*
	Librarian 2 – *For digitizing our records, to collect and store intellectual output of the university.*
	Librarian 3 – *For digital content creation*
	Librarian 6 – *We use DSpace for digitization*
	Librarian 7 – *For digitizing the publications of a faculty member*
	Librarian 8 – *DSpace has been installed to help us create a digital library of our own*
	Librarian 9 – *To aid our users to access the content of the library from outside campus.*

192

6.6: System integration

With regards to the integration of the LMS with the IR and the wider university system, only one (1) respondent indicated there is some level of integration between the LMS and the university system. There was no integration of any sort between the LMS and IR of any of the libraries studied. Comments are indicated in Table 6.14.

Table 6.14: System integration

Themes	Responses
LMS and University system integrated	**IT 3 -***The ILS is integrated to the university's central authentication system and email system. Students and faculty accounts are same on all system. The Learning management Moodle is being used and integrated with a reading list management system locally name Nyansapo which is modelled after Loughborough Online Reading List System (LORLS). We are now experimenting to see if we can link this to the Library Management System.*
LMS, IR and university system not integrated	**IT 1 -** *We load patron records from the ITS web. To enable this to be done the data must be restructured in a certain way that can be accepted by sierra. The discovery service does not currently fetch data from the IR. Currently the discovery service only fetches data from the catalogue and the databases that are subscribed to. The IR must be searched separately. We are currently in discussions with the providers to help link resources from the IR in the discovery.*
	IT 2 - *Library system is not integrated into the student administration system we did not upload students' information from the OSIS to Librarysoft. We will explore this possibility with Koha*
	IT 3 - *The IR and LMS are not integrated*
	IT 4 -*The students administration system in not integrated into the Koha; we are about moving to using a new students management system which I hope to integrate into Koha. I have also not linked Koha and DSpace.*
	IT 5 *-The LMS and DAM are not integrated also not with the university main system*
	Librarian 2 - *Destiny and DSpace are not integrated. We do not have a discovery service too. A link has been provided from either platform to the other. The library system has also not been integrated into the campus wide system*
	Librarian 3 - *We do not have integrated search nor a discovery service and I don't know if the university system will be integrated into the Koha*
	Librarian 4 - *LMS is not integrated in the students' management system and we don't have an IR in the library*
	Librarian 5 - *The destiny is used only for cataloguing so it is not integrated*

193

6.7: Expectations of IS

Librarians were asked if the expectations of the library regarding the use of ISs are being met.

Table 6.15 reflects that five (5) respondents indicated their expectations are being met.

Table 6.15: Expectation of IS (n=9)

Themes	Responses
Expectation met	**Librarian 1 -** *The systems have been very beneficial to us; the systems help us to reach out to our customers wherever they are especially those who cannot come the library for one reason or the other.*
	Librarian 4 - *Unless our challenges become more sophisticated, I will not recommend my library going in for any sophisticated software and be burdened with the challenge of facing accountants for money to pay subscription. Koha is meeting our basic need; unless our needs become more complex*
	Librarian 7 - *The IS has brought a lot of benefits; it is now easy for us to do our work*
	Librarian 8 - *To a very large extent, 80% the expectations of the library in the use of Koha are being met*
	Librarian 9 -*It has enabled us to automate the library procedures, to manage content on the website, to protect the books from being stolen and for other purposes*
Expectations not met	**Librarian 2 -** *The training on the use of Destiny has not sunk well with staff so they are not able to use the system well.*
	Librarian 3 - *It is extremely frustrating; we had issues with library soft*
	Librarian 5 -*The expectation of the library with regard to destiny has not been met. We plan to achieve higher than we got. If it had been good, we will not have gone in to look for another software*
	Librarian 6- *Librarysoft; it has its own challenges. Sometimes you enter data and you will not find the data, during searches it does not retrieve all relevant documents. The system is also very slow to boot. I think the system has its own challenges*

194

6.8: Benefits from IS use

Table 6.16 indicates that all nine (9) librarians mentioned the benefit of time saving and easy work processes, eight (8) mentioned speed of work, seven (7) have experienced the benefit of digital storage of data, six (6) indicated enhance collaboration, and three (3) acknowledge to the visibility of library, collaboration and global access being enhanced.

Table 6.16: Benefits of ISs

Themes	Responses
Visibility	**Librarian 1 -** *It also enhances collaboration, it does not matter ones location in the world the intellectual output of the university is accessible, we save data of the researches that have been conducted and this is accessible to the general public, It is also one of the criteria for ranking universities currently, visible to the outside intellectual world and it makes work easier*
	Librarian 7 *-The DSpace helps to showcase the scholarly work of the university, helps in gaining points on the rankings; it has also helped to improve the image of the academic staff as it helps for others to know the publications of a faculty member*
	Librarian 9 - *The IR for instance helps scholars to access the publications of our faculty members. This helps them to collaborate*
Increase speed of work	**Librarian 1 -** *It also enhances collaboration, it does not matter ones location in the world the intellectual output of the university is accessible, we save data of the researches that have been conducted and this is accessible to the general public, It is also one of the criteria for ranking universities currently, visible to the outside intellectual world and it makes work easier*
	Librarian 2 - *The Destiny system has been very beneficial to the library in terms of easy work schedule, and the DSpace helps us to save our institutional output.*
	Librarian 4 - *The use of Koha has enhanced the performance of staff in a broad sense. There was a gap between the use of the destiny and the Koha, and we had to use manual method to keep records of borrowed materials. The recording of the details of users and books were not done properly but with the Koha all the details of patrons and materials are already in the system and this has saved us a lot of time. I think my expectations of the use of Koha are being met. I will rate it 7 out of 10. Because it has helped us mitigate all the challenges we were having with Destiny*
	Librarian 5 - *Partially as it has helped eliminated the manual cataloguing of materials, the electronic means of sending information to users is also fast and retrieval of materials within a short time*
	Librarian 6 - *Easier to use, faster as compared to the manual system*
	Librarian 7 - *The benefits are: it is easy for the students to know the library collection before they even come to the library. It has also made library work routine very easy*

195

	Librarian 8 - *The use of the different IS has enhanced our services, make our routine processes easy and for easy retrieving and dissemination of information. The Koha has helped integrate all the materials from the different libraries we have as a University; City campus, Nursing, Law and main library.*
	Librarian 9 - *The IS has benefited the library a lot as it has aided the speed of service delivery and ease of work, it is easier to use, faster as compared to the manual system. The system aids us to serve our users better and preserve the records on our collection*
Makes their work easier	**Librarian 1 -** *It also enhances collaboration, it does not matter ones location in the world the intellectual output of the university is accessible, we save data of the researches that have been conducted and this is accessible to the general public, It is also one of the criteria for ranking universities currently, visible to the outside intellectual world and it makes work easier*
	Librarian 2 - *The Destiny system has been very beneficial to the library in terms of easy work schedule, and the DSpace helps us to save our institutional output.*
	Librarian 3 - *The generation of basic statistic has been made easy*
	Librarian 4 - *The use of Koha has enhanced the performance of staff in a broad sense. There was a gap between the use of the destiny and the Koha and we had to use manual method to keep records of borrowed materials. The recording of the details of users and books were not done properly but with the Koha all the details of patrons and materials are already in the system and this has saved us a lot of time. I think my expectations of the use of Koha are being met. I will rate it seven out of 10. Because it has helped us mitigate all the challenges we were having with Destiny*
	Librarian 5 - *Partially as it has helped eliminated the manual cataloguing of materials, the electronic means of sending information to users is also fast and retrieval of materials within a short time*
	Librarian 6 - *Easier to use, faster as compared to the manual system*
	Librarian 7 - *The benefits are: it is easy for the students to know the library collection before they even come to the library. It has also made library work routine very easy*
	Librarian 8 - *The use of the different IS has enhanced our services, make our routine processes easy and for easy retrieving and dissemination of information. The Koha has helped integrate all the materials from the different libraries we have as a University; City campus, Nursing , Law and main library.*
	Librarian 9 - *The IS has benefited the library a lot as it has aided the speed of service delivery and ease of work, it is easier to use, faster as compared to the manual system. The system aids us to serve our users better and preserve the records on our collection*
Enhance collaboration and Global access	**Librarian 1 -** *It also enhances collaboration, it does not matter ones location in the world the intellectual output of the university is accessible, we save data of the researches that have been conducted and this is accessible to the general public, It is also one of the criteria for ranking universities currently, visible to the outside intellectual world and it makes work easier*

196

	Librarian 7 -*The DSpace helps to showcase the scholarly work of the university, helps in gaining points on the rankings; it has also helped to improve the image of the academic staff as it helps for others to know the publications of a faculty member*
	Librarian 9 - *The IR for instance helps scholars to access the publications of our faculty members. This helps them to collaborate*
Saving of data	**Librarian 1 -** *It also enhances collaboration, it does not matter ones location in the world the intellectual output of the university is accessible, we save data of the researches that have been conducted and this is accessible to the general public, It is also one of the criteria for ranking universities currently, visible to the outside intellectual world and it makes work easier*
	Librarian 2 - *The Destiny system has been very beneficial to the library in terms of easy work schedule, and the DSpace helps us to save our institutional output.*
	Librarian 3 - *The generation of basic statistic has been made easy*
	Librarian 4 - *The use of Koha has enhanced the performance of staff in a broad sense. There was a gap between the use of the destiny and the Koha and we had to use manual method to keep records of borrowed materials. The recording of the details of users and books were not done properly but with the Koha all the details of patrons and materials are already in the system and this has saved us a lot of time. I think my expectations of the use of Koha are being met. I will rate it seven out of 10. Because it has helped us mitigate all the challenges we were having with destiny*
	Librarian 7 -*The DSpace helps to showcase the scholarly work of the university, helps in gaining points on the rankings; it has also helped to improve the image of the academic staff as it helps for others to know the publications of a faculty member*
	Librarian 8 - *The use of the different IS has enhanced our services, make our routine processes easy and for easy retrieving and dissemination of information. The Koha has helped integrate all the materials from the different libraries we have as a University; City campus, Nursing , Law and main library.*
	Librarian 9 - *The IS has benefited the library a lot as it has aided the speed of service delivery and ease of work, it is easier to use, faster as compared to the manual system. The system aid us serve our uses better and preserve the records on our collection*
Time saving	**Librarian 1 -** *It also enhances collaboration, it does not matter ones location in the world the intellectual output of the university is accessible, we save data of the researches that have been conducted and this is accessible to the general public, It is also one of the criteria for ranking universities currently, visible to the outside intellectual world and it makes work easier*
	Librarian 2 - *The Destiny system has been very beneficial to the library in terms of easy work schedule, and the DSpace helps us to save our institutional output.*
	Librarian 3 - *The generation of basic statistic has been made easy*
	Librarian 4 - *The use of Koha has enhanced the performance of staff in a broad sense. There was a gap between the use of the destiny and the Koha and we had to use manual method to keep records of borrowed materials. The recording of the details of users and books were not done properly but with the Koha all the details of patrons and materials are already in the system and this has saved us a lot of time. I think my expectations of the use of Koha are being met. I will rate it 7 out of*

197

10. Because it has helped us mitigate all the challenges we were having with destiny

Librarian 5 - *Partially as it has helped eliminated the manual cataloguing of materials, the electronic means of sending information to users is also fast and retrieval of materials within a short time*

Librarian 6 - *Easier to use, faster as compared to the manual system*

Librarian 7 - *The benefits are; it is easy for the students to know the library collection before they even come to the library. It has also made library work routine very easy*

Librarian 8 - *The use of the different IS has enhanced our services, make our routine processes easy and for easy retrieving and dissemination of information. The Koha has helped integrate all the materials from the different libraries we have as a University; City campus, Nursing , Law and main library.*

Librarian 9 - *The IS has benefited the library a lot as it has aided the speed of service delivery and ease of work, it is easier to use, faster as compared to the manual system. The system aids us to serve our uses better and preserve the records on our collection*

6.9: Evaluation of IS

When asked if the ISs have ever been evaluated, only two (2) librarians acknowledged to evaluating the system. As method of evaluation, one (1) library generated data from the IS while the other used students' surveys. The outcomes of both evaluation lead to the purchase of more equipment and one library had to work on internet stability. See Table 6.17 for detailed responses.

198

Table 6.17: Evaluation of IS (n=9)

Themes	Method of Evaluation	Outcome	Responses
IS not evaluated			**Librarian 1 -** *The library ISs have never been evaluated. Since I assumed this role, the library ISs have never been evaluated. But I think it will be good to do that so that we will know if the systems are performing well or not and if it is detected that training is required that will be done. It is important to do that.* **Librarian 2 -** *I have never evaluated the IS but Destiny has been proven as a robust system. Other universities have used it. There is a track record and we bought a standard one 2011 and no extra cost was involved a part of the cost of the software.* **Librarian 3 -** *We are still setting it up. We have not taken much statistics yet. But I know Koha can generate reports which can be used to evaluate the system so long as we have internet* **Librarian 4 -** *I have not done any formal evaluation. But I can say that Koha has served as well. Destiny was a bit complex to use though destiny could do more than Koha* **Librarian 5 -** *The performance of Destiny was never evaluated* **Librarian 6 -** *We never did any formalized evaluation* **Librarian 8 -** *We have never evaluated the IS, but I expect Koha to perform certain functions for us so if I log on to the system and it is not functioning well it means the system is not meeting my needs*
IS evaluated	Through data generation	Purchase of equipment	**Librarian 9 -** *Yes we have ever evaluated. We have evaluated our system on the BSU project. We generated data for the management on usage, infrastructure and identified areas of need. The challenge was that the project had its own focus. Out of the project instead of concentrating on the needs of the current IS, survey management software was purchased and a knowledge commons was created. Through the project, we purchased touch monitors and projectors for information display in the library, and a number of computers for the library*
	Survey of students	Purchase of equipment stable internet	**Librarian 7 -** *We started some sort of evaluation, we tried finding out if Koha will be convenient for use for the students, from the evaluation we noticed we needed a dedicated PC for people to use and then we also looked at internet service to determine how well the Internet can support our system.*

199

6.10: Utilization of IS

In this section responses were solicited on the extent of IS usage and attitude towards use by library staff.

6.10.1: Maximum utilization of the IS

To determine extent of IS usage, librarians were asked if they think the library is making maximum use of the ISs and the reasons for not maximizing usage. Table 6.18 clearly shows that only on (1) librarian thinks they are using the IS to the maximum.

Table 6.18: Utilization of IS (n=9)

Themes	Responses
Using IS to the maximum	**Librarian 4 -** *The use of Koha has enhanced the performance of staff in a broad sense. There was a gap between the use of the destiny and the Koha and we had to use manual method to keep records of borrowed materials. Koha is meeting our basic need; unless our needs become more complex*
Not using IS to the maximum	**Librarian 1 -** *Frankly I don't think the library is making maximum use of the ISs that are available in the library; they are being underutilized. With the LMS only the cataloguing, acquisition and circulation are being used. But it could be used for reference services, IR, ERM. Initially the idea was to roll out the modules one after the other. The issue is to get the library staff to use the system. They have found other ways of doing things; for instance, the use of DSpace to manage the IR. This would have enabled the library to use only one system and will help connect all staff and resources at the same time. It will take a while to go back to use the system, but we are paying for the package. Even in the circulation module not all the features have been activated. For instance, it is only this year I asked them to activate the automatic renewal of books by the patrons. And this will greatly help the library users.*
	Librarian 2 - *The library is not making maximum use of the systems. I think we are making only 50% use of the system. The circulation module is not being utilized to the maximum; staff have been trained but they keep reporting of forgetting their passwords and use manual means rather than the electronic system to circulate information. It is a very big challenge to me. It means at every point in time the report generated using Destiny is not the full record on the number of materials in possession of patrons. This is something management must take seriously. I can only train staff, when management of the library puts up a policy on use of the system before I can ensure that this is done. The voice of the librarian should be well felt to ensure adequate usage. I do not have enough management support. Some of them do not even understand the systems and what they do.*
	Librarian 3 - *We do not use the system for managing electronic resources though we have a number of e-resources even outside the subscription of CARLIGH*

200

Librarian 5 *Though no official evaluation was ever done, it is very clear staff were not able to use the system fully due to the technical challenges we had*

Librarian 6 *We have not used Librarysoft to the maximum. Some of the modules were never used because we did not have much knowledge on them; maybe we also did not want to learn. The acquisition and serial management modules, for instance, were never used. We are using, cataloguing, circulation, OPAC and record generation. We did not even explore whether it could send automatic overdue message*

Librarian 7 - *The Koha is still at the introductory stage it has not been rolled out fully. We still use manual means when the internet is off. To match up our data we compile both the manual and electronic record.*

Librarian 8 - *We are under-utilizing Koha because we are not using all the modules in it. I think we have not challenged Koha enough.*

Librarian 9- *Some staff are not willing to acquire skills to use the system fully.*

Comments from Table 6.18 were used to generate codes on the reasons librarians gave for not fully utilizing their ISs. Table 6.19 indicates that six (6) of the librarian just did not explore all the functions of the IS, three (3) did not have enough skill to use the systems fully and two (2) experienced technical challenges.

Table 6.19: Reasons for not utilizing IS (n=9)

Respondents	Just not explored	Technical Challenges	Lack of skills
Librarian 1	1		
Librarian 2	1		1
Librarian 3	1		
Librarian 5		1	
Librarian 6	1	1	1
Librarian 7	1		
Librarian 8	1		
Librarian 9			1
Total	**6**	**2**	**3**

201

Heads of IT were also asked if the library is making maximum use of the IS and whose responsibility is it to ensure the IS are used fully. Responses as shown in Table 6.20 reveal that, all five (5) IT heads indicated the ISs are not being fully utilized. With regards to the person who is to ensure the full usage, two (2) of the IT heads indicated it is the librarians' responsibility and the rest (3) think it is the responsibility of both the IT unit and the librarian.

Table 6.20: Responsibility to utilize IS (n=5)

Themes	Themes	Responses
Not fully utilized	Library's responsibility	**IT 1 -** *We are not using the system to the maximum; the librarians must step up their game as we have provided the systems for them they must make sure they are being used*
		IT 2 - *The library is not using all the modules in the Librarysoft; it was the libraries responsibility to decide on which modules they want to use*
Not fully utilized	Library and IT responsibility	**IT 3 -** *I cannot objectively say we are making maximum use of all IS as we still have a lot of the functionalities to explore*
		IT 4 - *I have not been able to customize it fully, it is quite difficult. I need knowledge in library management to do this*
		IT 5 - *Not at all, I don't think so, we both have to ensure it is used*

6.10.2: Staff attitude towards use

Librarians were asked if staff are happy using the system, and if they are not happy, what reason(s) account for this. Responses listed in Table 6.21 reveal that it is only in three libraries (1, 4 and 7) where staff are happy using the IS because it makes their work easier and serves them well. In the rest (6) of the libraries, staff are not happy using the IS because of lack of skills (2 responses), technical challenges (4 responses) and being forced to use it (1 response).

Table 6.21: Happy to use IS (n=9)

Themes	Responses
Easy work schedule	**Librarian 1 -** *I don't know but I am happy using the system because it makes my life and work easier. I think they should be happy. If you talk to people who used the old manual system, they really appreciate the IS because it makes their work easier* **Librarian 4 -** *I can say that Koha has served us well, we are happy using it* **Librarian 7 -** *We have started the cataloguing on all campuses and everybody is participating.*
Lack of skills	**Librarian 2 -** *The staff are not happy using the system but use it because that is what is available the reason being that the staff do not have enough training and some staff think it is not user friendly enough* **Librarian 9 -** *I cannot objectively tell if staff are happy using the system or not but I know library staff easily throw in the towel in, and give up on even the minor task they need to perform using IT*
Technical challenges	**Librarian 3 -** *Using Librarysoft is extremely frustrating; we had issues with Librarysoft but once we get Koha running fully we will be fine using the IS* **Librarian 2 -** *The staff are not happy using the system but use it because that is what is available the reason being that the staff do not have enough training and some staff think it is not user friendly enough* **Librarian 5 -** *I don't think staff are happy using the system. Staff will usually complain 'the system is down'* **Librarian 6 -** *Sometimes you enter data and you will not find the data, during searches it does not retrieve all relevant documents; we are not happy with it.*
Use it because they have to	**Librarian 8 -** *The staff do not have a choice but to use them, I can use Koha to determine what staff have done in a particular time. This is a means of checking on the staff to use the system*

203

6.11: Maintenance of IS

This section focuses on the type of maintenance carried out on IS use the libraries studied and the frequency of carrying out maintenance activities.

6.11.1: IS maintenance

IT staff and the system librarian interviewed were first asked what IS maintenance means to them as IT professionals. From the responses listed in Table 6.22, it can be seen that all six (6) respondents see IS maintenance as a routine activity on both physical equipment and software to ensure usage.

Table 6.22: IS maintenance (n=6)

Themes	Responses
Routine activity on hardware and software	**Librarian 2 -** *System maintenance is to ensure the peripherals of the system are working very well, the hardware and software should be upgraded regularly*
	IT 1 – *It is looking for additional innovations to enhance the use of the IS, keeping both physical equipment and data safe and clean to use.*
	IT 2 - *System maintenance is carrying out activities that will enhance the smooth running of any IS. This includes common dusting of severs, running upgrades and running queries on the server to ensure the system is running well.*
	IT 3 - *The routine activities performed to ensure that services are available, reliable and conform to establish standards to help achieve expected outcomes*
	IT 4 - *It is to ensure effective and efficient internet connection, regular backups, ensure servers are working well and upgrade the system regularly*
	IT 5 - *It is all the activities including upgrade and cleaning to ensure the system is working well*
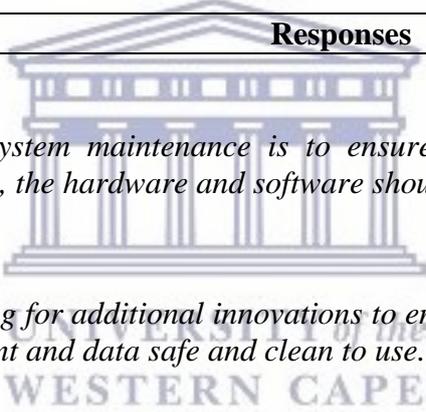
204

6.11.2: System maintenance activities

The IT heads and the system librarian were asked to supply details of the kind of maintenance work they under take to improve the system and ensure usage. The responses given shown in Table 6.23 indicate that all IT heads perform some level of maintenance work on the systems. Four (4) of the respondents undertake upgrades, three (3) use query generation to embark on maintenance work and two (2) does maintenance on hardware.

Table 6.23: System maintenance activities

Themes	Responses
Upgrade	**IT 1 -** *What I do is to go the developer's site and learn about the software. When I find any interesting feature I cross check from the library to determine if we have that feature or not then I implement it. The developers are at version 4 and we are still using version 1.* **IT 2 -** *I carry out maintenance work every morning by running queries on the server. I blow dust off the servers quarterly and carry out upgrades whenever they are available. I can even work virtually on the servers wherever I am. I ensure I do this because when the system breaks down, I am the one who all the staff will be worrying so I do this to stay out of that kind of trouble.* **IT 3 -** *To improve the system we do monitoring, update and upgrade the software* **IT 4 -** *The library systems are of major concern to me because I know how important library systems are in an academic environment so once an upgrade is released, I give the upgrade a maximum of five months for major bugs to be corrected. Back up for Koha and DSpace are done monthly*
Query generation	**IT 1** *I also do queries at the back end of the system using the feature called (create list) to generate list from the system to see if the metadata is accurate* **Librarian 2 -***I use the internal checks of Destiny to ensure it is working well. It tells the uptime and downtime and the usage* **IT 2 -** *I carry out maintenance work every morning by running queries on the server. I blow dust off the servers quarterly and carry out upgrades whenever they are available. I can even work virtually on the servers wherever I am. I ensure I do this because when the system breaks down, I am the one who all the staff will be worrying so I do this to stay out of that kind of trouble.*
Maintenance of physical equipment	**IT 2 -** *I carry out maintenance work every morning by running queries on the server. I blow dust off the servers quarterly and carry out upgrades whenever they are available. I can even work virtually on the servers wherever I am. I ensure I do this because when the system breaks down, I am the one who all the staff will be worrying so I do this to stay out of that kind of trouble.* **IT 5 -** *By ensuring the servers are function well and backing up the data*

205

6.11.3: Frequency of maintenance

The IT heads and the systems librarian were asked to indicate how often they embark on maintenance activities. As shown in Table 6.24, two (2) respondents undertake maintenance every morning, one (1) monthly, while the rest (3) did not have a fixed schedule on maintenance activities.

Table 6.24: Frequency of maintenance

Themes	Responses
Every morning	**Librarian 2 -** *Every morning I enter the servers virtually from my desktop to do updates and also check if all library computers are working well.* **IT 2 -** *I carry out maintenance work every morning by running queries on the server.*
Monthly	**IT 3:** *We do this monthly*
As and when needed	**IT 1 -** *I do maintenance work on the system as and when there is a problem or when out of curiosity I want to try new features.* **IT 4 -** *I do maintenance work quite regularly though I don't have a schedule but* **IT 5 -** *we do this as and when needed*

6.12: Training issues

This section solicited responses on the kind of training available for both library staff and IT staff.

6.12.1: Training for library staff

With regards to training, all the librarians acknowledged to their staff being given training on IS before and after the installation. The most used methods of training as shown in Table 6.

206

25 are in-house training (eight responses), workshops and seminars (seven responses) and
virtual training (one response).

Table 6.25: Training for library staff (n=9)

Theme	Responses
Internal Training	**Librarian 1 -** *We also do a lot of in-house training for all the IS we have even on the use of the web site for staff.*
	Librarian 2- *I organize training for all library staff every semester on all four campuses*
	Librarian 4 - *I personally trained them after the installation of Koha. Occasionally I train them and my doors are always open to them for walk in consultations. Just this morning, one staff came in with a problem which I helped him resolve*
	Librarian 5 – *We mostly do internal training*
	Librarian 6 - *We have regular training internally and also take advantage of GLA and CARLIGH trainings, we have also benefited from some collaborative training programmes with other university libraries*
	Librarian 7 -*We do internal training for our staff from time to time in addition to association workshops*
	Librarian 8 - *The people who installed Koha helped with initial hands on training*
	Librarian 9 - *We give hands on in-house training and also staff benefit from periodical workshops*
Workshops	**Librarian 1 -** *We take advantage of all the association we belong to and attend their training programmes*
	Librarian 2 - *We also attend other workshops*
	Librarian 3 - *Once a month we participate in virtual training by vendors and we take part in local training programmes*
	Librarian 6 - *We have regular training internally and also take advantage of GLA and CARLIGH trainings, we have also benefited from some collaborative training programmes with other university libraries*
	Librarian 7 -*We do internal training for our staff from time to time in addition to association workshops*
	Librarian 8 - *We send our staff for training organized by library association and other institutions*
	Librarian 9 - *We give hands on in-house training and also staff benefit from periodical workshops*
Virtual Training	**Librarian 3 -** *Once a month we participate in virtual training by vendors and we take part in local training programmes*

6.12.2: Training for IT staff

Responses with regards to training for IT officials and the system librarian, indicate as can be seen in Table 6.26 that all of them depend on self-training and local workshops. Only two benefit from vendor support.

Table 6.26: Training for IT staff

Themes	Responses
Self-training/ workshops	**Librarian 2 -** *I do attend training to enhance my skill and also read on the IS to see how best I can develop them*
	IT 1 - *What I do is to go the vendor's site and learn about the software There has been a number of international opportunities to help train us on the IS*
	IT 2 - *What I do is to read around the library systems regularly and also watch YouTube videos to keep myself on top of my task. I have also participated in some training programmes*
	IT 3 - *With regards to training, I attended a few workshops; I do a lot of self-training with online resources and forums*
	IT 4 - *I am still reading and learning from communities that are using it to help advance on what is done in the library currently, I have also attended a few local workshops*
	IT 5 - *I have benefited from some local workshops and we read around to help enhance the system*
Vendor support	**IT 1 -** *I also use the virtual classroom of the developers to train for the job. . So far I have participated in about 3 administrative training sessions*
	IT 5 - *And also because we are on a proprietary software, we receive vendor support for the LMS*

6.13: Availability of IS policy

Responses from librarians on whether the library has an IS policy indicate that only four (4) of the nine (9) libraries studied have an IS policy. Of the four (4), one librarian has never seen the IS policy, but was sure the university will have one, two (2) of them are depending on the IS policy of the entire university and only one (1) has an IS policy for the library. Table 6.27 contains detailed responses.

Table 6.27: Availability of IS policy

Themes	Responses
IS policy available	**Librarian 1 -** *I am sure the university will have an IT policy but I have not seen it. I believe the IS one will be part of it.*
	Librarian 4 - *We do have an IS policy subsumed in the library management policy*
	Librarian 5 - *The entire university has an IS policy*
	Librarian 7 - *We have an IS policy for the whole university. It contains information on the different documents that are generated electronically, security, migration, infrastructure and human resource*
IS policy not available	*Librarian 2 -* *I have done a draft*
	Librarian 3 - *We do not have an IS policy*
	Librarian 9 - *We do not have IS policy*
	Librarian 6 - *We have not actually drawn one*
	Librarian 8 - *The library does not have an IS policy*

6.14: Challenges with IS use

In this section, respondents were asked question on the specific challenges they encounter in the use of IS. The challenges have been grouped under; common challenges, system downtime challenges and challenges with system change over.

6.14.1: Common challenges

Both librarian and IT officer interviewees enumerated a number of challenges associated with IS use. As can be depicted from Table 6.28, lack of equipment (14 responses), power surges (5 responses), lack of ICT skills (4 responses), poor staff attitude (2 responses), lack of IT staff (6 responses), lack of training (4 responses), internet down time (6 responses), bureaucratic challenges (2 responses) and unprocessed materials (1 response) are regarded as challenges.

Table 6.28: Common challenges with IS use

Theme	Responses
Equipment	**Librarian 1 -** *Though we have some equipment, I think comparing our situation to the developed world; we will need more modern equipment. I have seen people with tablets and cameras well equipped for them to work on their digital projects wherever they are. I think we do not even have up to 30% of the equipment other institutions outside are using*
	Librarian 2 – *We have challenges with staff ICT skills, equipment, internet, power and training as some staff are still not conversant with the use of the system*
	Librarian 3 – *our major challenge has to do with support from IT unit and equipment. Internet is not very stable*
	Librarian 4 - *We have challenges with computers; most of the computers are broken down. I have to use my personal tablet to do library work. All the workstation for students' use are broken down coupled with internet and power issues*
	Librarian 5 - *We have less than the required number of functional computers. And also have a challenge of having a dedicated ICT staff to be assigned to help the library. It is 'a bigger issue'. This is due to the fact that the ICT unit thinks they should not be performing library functions.*
	Librarian 6 - *We will need industrial scanners for the IR*
	Librarian 7 - *We have a challenge with staffing. At least on every campus we need to have one person in charge of DSpace and Koha management in order to save time. We also need more equipment like computers and stable internet and adequate training for staff*
	Librarian 8 - *We have challenges with our bandwidth, machines for students to use to access the library resource*
	Librarian 9 - *We need more equipment*

210

	IT 1 - *One major challenge is that the security cameras do not cover the entire library; they should be extended to cover everywhere in the library and the old ones should also be replaced and also staff's IT skills need upgrading.*
	IT 2 - *We do not have enough equipment to fully use all our IS. Currently we are using only one desktop hp scanner for our IR which is a major challenge and the reason we have not been able to open the IR for public use. And also the computers available for students' use is not enough*
	IT 3 - *We do not have enough equipment*
	IT 4 - *The library does not have enough equipment to run the IS effectively they need Barcode readers, industrial scanners and training for staff*
	IT 5 - *Lack of equipment; computers, lack of training, lack of IT skills; they have about 50% skills*
Power	**Librarian 1 -** *And also the systems depend on internet and power, for about six month our two generators were not working. So you have to ensure that there is always a backup* **Librarian 2 –** *We have challenges with staff's ICT skills, equipment, internet, power and training as some staff are still not conversant with the use of the system* **Librarian 4 -** *We have challenges with computers; most of the computers are broken down. I have to use my personal tablet to do library work. All the workstation for students' use are broken down coupled with internet and power issues* **Librarian 9 -** *Challenges comprise power and user behaviour. With the user behaviour, sometimes people want things immediately; they don't want to take their time. They try doing things they are not authorized to do with the system and the technical staff have to go back to correct them. This I will attribute to lack of adequate training to use the systems. With power outages, this does not affect the server, but it affects the end user* **IT 4 -** *The major challenge has to do with power; during power cuts our ups's and other equipment get destroyed due to power surges. The internet is also usually slow*
ICT skills	**Librarian 1 -** *Some have acquired the IT skills for the work they are doing. Once they know the skills for their job they do not want to go beyond that.*
	Librarian 2 – *We have challenges with staff ICT skills, equipment, internet, power and training as some staff are still not conversant with the use of the system*
	IT 1 - *One major challenge is that the security cameras do not cover the entire library; they should be extended to cover everywhere in the library and the old ones should also be replaced and also staff IT skills*
	IT 5 - *Lack of equipment; computers, lack of training, lack of IT skills; they are have about 50% skills*

211

Staff attitude	**Librarian 1 -** *There is also a challenge with staff; The people also needs more motivation; may be financial but for me the ability to be able to use IS should be enough motivation since this gives staff skills that they will use to work with other organizations or render services elsewhere. Maybe they do not see it in that light. They are privileged to have been working with this systems because other libraries do not have such systems.* **Librarian 9 -** *Challenges comprise power and user behaviour. With the user behaviour, sometimes people want things immediately; they don't want to take their time. They try doing things they are not authorized to do with the system and the technical staff have to go back to correct them. This I will attribute to lack of adequate training to use the systems. With power outages, this does not affect the server but it affects the end user*
IT staff	**IT 3 -** *The major challenge I encounter with the system is human behaviour, when people behave in undesirable ways* **Librarian 3 –** *Our major challenge has to do with support from IT unit and equipment. Internet is not very stable* **Librarian 5 -** *We have less than the required number of functional computers. And also have a challenge of having a dedicated ICT staff to be assigned to help the library. It is "a bigger issue". This is due to the fact that the ICT unit thinks they should not be performing library functions.* **Librarian 7 -** *We have a challenge with staffing. At least on every campus we need to have one person in charge of DSpace and Koha management in order to serve time. We also need more equipment like computers and stable internet and adequate training for staff*
Training	**IT 3 -** *We are currently under staffed in the library IT support unit, we are only five IT personnel to five college libraries including the main library. The five of us attend to library and students' IT support services* **IT 4 -** *There is also a major challenge with staffing; to be honest with you I happen to be the one doing everything.* **Librarian 2 –** *We have challenges with staff's ICT skills, equipment, internet, power and training as some staff are still not conversant with the use of the system* **Librarian 7 -** *We have a challenge with staffing. At least on every campus we need to have one person in charge of DSpace and Koha management in order to serve time. We also need more equipment like computers and stable internet and adequate training for staff* **Librarian 9 -** *Challenges comprise of power and user behaviour. With the user behaviour, sometimes people want things immediately; they don't want to take their time. They try doing things they are not authorized to do with the system and the technical staff have to go back to correct them. This I will attribute to lack of adequate training to use the systems. With power outages, this does not affect the server, but it affects the end user*

	IT 5 - *Lack of equipment; computers, lack of training, lack of IT skills; they have about 50% skills*
Internet down times	**Librarian 1 -** *And also the systems depend on internet and power, for about six months our two generators were not working. So you have to ensure that there is always a backup*
	Librarian 2 – *We have challenges with staff ICT skills, equipment, internet, power and training as some staff are still not conversant with the use of the system*
	Librarian 3 –*Our major challenge has to do with support from the IT unit and equipment. Internet is not very stable*
	Librarian 4 - *We have challenges with computers; most of the computers are broken down. I have to use my personal tablet to do library work. All the workstation for students' use are broken down coupled with internet and power issues*
	Librarian 7 - *We have a challenge with staffing. At least on every campus we need to have one person in charge of DSpace and Koha management in order to serve time. We also need more equipment like computers and stable internet and adequate training for staff*
	IT 4 - *The major challenge has to do with power; during power cuts our ups's and other equipment get destroyed due to power surges. The internet is also usually slow*
Bureaucratic process	**Librarian 1 -** *Certain amounts take about two months before it is released; accessibility of funds is a major challenge*
	Librarian 3 - If you want to get money you should start work on it early and put it in your budget
	Librarian 1 - *Another challenge is that during the retrospective cataloguing, not all the materials were catalogued into the system. There are still books on the shelves that have not been entered into the sierra.*
Data entry	

6.14.2: System shutdown challenges

Apart from the challenges reported in section 6.14.1, three (3) of the IT officials; as shown in

Table 6.29 reported having experienced major system down time caused by the malfunction

of the air conditioner (2 responses), malfunctioned equipment, fibre cuts, and data loss (1

response each).

213

Table 6.29: System shutdown

Theme	Responses
Malfunction air conditioner	**IT 2 -** *I have experienced downtime once. This was due to the fact that the library server was housed in the librarian's office which did not have constant AC; when the librarian closes, the AC is put off and there is no backup generator there to keep the system always running* **IT 3 -** *We have also experience air-conditioner breakdown in the server room for 3 days*
Malfunctioned equipment	**IT 3 -** *We do experience system breakdowns once a while due to issues such as hardware failure and power cuts. The major system down times I have experienced so far has to do with a power supply unit blowing in the server room and this destroyed the switch supplying power to the library.*
Fiber cut	**IT 3 -** *We have experienced fibre cuts on three occasions due to other construction work*
Data loss	**IT 5 -** *We lost all our data from Librarysoft, so we are cataloguing every material again*

6.14.3: Challenge with system change over

Interviews with head librarians revealed that, five (5) of the nine (9) libraries studied have

had difficulties with system change over. Two (2) libraries experienced data loss, three (3)

could not migrate data from one LMS to a new one and two (2) libraries are challenged to use

two LMS concurrently. See Table 6.30 for detailed responses.

214

Table 6.30: System change over challenges

Theme	Responses
Loss of data	**Librarian 1 -** *We once migrated from a lower version to version 6.2. It looks like the migration was not planned well, some the collection on the DSpace were no longer accessible on the system. We also have some files relocated from one collection to another; for instance, theses files moving to article collection. We have to sit and manually move files from one collection to the other. About 500 files were affected* **Librarian 7 -** *We lost all our data from Librarysoft, so we are cataloguing every material again*
Inability to migrate data	**Librarian 4 -** *We were not able to migrate the library data from destiny to Koha because I did not have the expertise to do that. We tried looking for help from elsewhere, but it could not be done* **Librarian 6 -** *We have installed Koha already and have started doing manual entry of all our resources. We decided not to migrate because we have noticed a number of the entries in the Librarysoft are full of errors due to mistakes made by library staff during entries.* **Librarian 9 -***The only challenge we had migrating the data was that we could not migrate our circulation records. As a solution what we will do is we will recall our documents in possession of users during the long vacation in order to close the circulation records in Alexandria; this is already an annual process the library goes through, so we will just intensify it to help us do this exercise. We will possibly be running the two LMS concurrently for the next one year till we fully train our users*
using two IS concurrently	**Librarian 6** *We are using the two systems concurrently, but Koha is just for data entry and using Librarysoft for all library functions including entry of new books. So, for newly acquired materials we are doing double entries into Koha and Librarysoft for us to still be able to serve our patrons* **Librarian 9 -***The only challenge we had migrating the data was that we could not migrate our circulation records. As a solution what we will do is we will recall our documents in possession of users during the long vacation in order to close the circulation records in Alexandria; this is already an annual process the library goes through, so we will just intensify it to help us do this exercise. We will possibly be running the two LMS concurrently for the next one year till we have fully trained our users*

6.15: National IS standard guideline

Librarians were asked to list issues they think will be necessary to be addressed by a national IS standard guideline. The responses as indicated in Table 6.31 reveal the issues to be addressed as maximum use (five responses), funding (four responses), qualified IT and library staff (three responses), training (three responses), infrastructure (two responses),

215

maintenance (two responses), legal and ethical issues (two responses), security (two responses), compulsory automation (one response) and stable power and internet (one response). One librarian, though, saw the issue of a national IS policy as intimating that the private universities, as small libraries, will not be able to cope with its demands due to inadequate staff capacity.

Table 6.31: Issues to be addressed by national IS standard guideline

Theme	Responses
Infrastructure	**Librarian 1 -** *Basic infrastructure, Qualification of staff, Source of funds, Training for staff, And other logistics; stable electrical environment*
	Librarian 7 - *For IS policy in Ghana, we need to consider personnel, availability of funds and infrastructure.*
Qualified library and IT staff	**Librarian 1 -** *Basic infrastructure, Qualification of staff, Source of fund, Training for staff, And other logistics; stable electrical environment*
	Librarian 7 - *For IS policy in Ghana, we need to consider personnel, availability of funds and infrastructure.*
	Librarian 2 – *An IS policy should state an electronic support unit for the library and define its role, regular maintenance, training should be regular, the work of the systems librarian should be address, every library should have a systems librarian. Automation should be must for every library;*
Funding	**Librarian 1 -** *Basic infrastructure, Qualification of staff, Source of fund, Training for staff, And other logistics; stable electrical environment*
	Librarian 4 - *The IS policy should indicate what the library should use IS for to meet the expectation of users, the regular things we should be doing to update the system, training to enhance the skills of students and staff of the library in the use of the IS, how the IS can be sustained*
	Librarian 5 - *A policy should address issues on usage, security and institutional support. When there is a policy, it will ensure management will give its support.*
	Librarian 7 - *For an IS policy in Ghana, we need to consider personnel, availability of funds and infrastructure.*
Training	**Librarian 1 -** *Basic infrastructure, Qualification of staff, Source of fund, Training for staff, And other logistics; stable electrical environment*
	Librarian 2 – *An IS policy should state an electronic support unit for the library and define its role, regular maintenance, training should be regular, the work of the systems librarian should be address, every library should have a systems librarian. Automation should be must for every library;*

216

	Librarian 4 - *The IS policy should indicate what the library should use IS for to meet the expectation of users, the regular things we should be doing to update the system, training to enhance the skills of students and staff of the library in the use of the IS, how the IS can be sustained*
Maintenance	**Librarian 2** - *IS policy should state electronic support unit for the library and define its role, regular maintenance, training should be regular, the work of the systems librarian should be address, every library should have a systems librarian. Automation should be must for every library;* **Librarian 4 -** *The IS policy should indicate what the library should use IS for to meet the expectation of users, the regular things we should be doing to update the system, training to enhance the skills of students and staff of the library in the use of the IS, how the IS can be sustained*
Maximum use	**Librarian 4 -** *The IS policy should indicate what the library should use IS for to meet the expectation of users, the regular things we should be doing to update the system, training to enhance the skills of students and staff of the library in the use of the IS, how the IS can be sustained* **Librarian 5 -** *A policy should address issues on usage, security and institutional support. When there is a policy, it will ensure management will give its support.* **Librarian 6** *The Policy should address issues on use of the system, how it should be used, include legal and ethical issues,* **Librarian 8** - *IS policy should address issues with usage, security, authorization,* **Librarian 9 -** *I will like the policy to address usage, access, rights and legal issues*
Legal and Ethical issues	**Librarian 6** *The Policy should address issues on use of the system, how it should be used, legal and ethical issues,* **Librarian 9 -** *I will like the policy to address usage, access rights and legal issues*
Security	**Librarian 8** - *IS policy should address issues with usage, security, authorization,* **Librarian 9 -** *I will like the policy to address usage, access right and legal issues*
Compulsory automation	**Librarian 2** – *An IS policy should state an electronic support unit for the library and define its role, regular maintenance, training should be regular, the work of the systems librarian should be address, every library should have a systems librarian. Automation should be must for every library;*
Stable power and Internet	**Librarian 1 -** *Basic infrastructure, Qualification of staff, Source of funds, Training for staff, And other logistics; stable electrical environment*
Not in support of IS policy	**Librarian 3** *I think the policy will be good for big institutions. Small libraries do not have the staff strength to support such things*

217

6.16: Concluding summary

This chapter presented analysis of the qualitative data collected. The data was presented in 14 sections namely: IS use, funding and institutional support, hosting of IS, function of IS, system integration, expectation of IS, benefit of IS, evaluation of IS, utilization of IS, maintenance of IS, training of staff, availability of IS policy, challenges and national IS policy.

The next chapter presents an analysis of website information of the nine libraries studied using the adapted Pareek and Gupta (2013) checklist.

UNIVERSITY *of the*
WESTERN CAPE

7.0: Introduction

This chapter presents an analysis of the websites of the nine libraries studied. The content analysis of academic library websites was done using the broad fourteen check list of Pareek and Gupta (2013) as themes. Findings were presented using simple frequency narration.

Pareek and Gupta's (2013) checklist was adapted. Current features such as Myaccount, Discovery (one search point), interactive or library 2.0 were added and re-categorized into three main themes: System Quality, Information Quality and Service Quality. The elements of the three broad categorizations are presented in Table 7.1.

Table 7.1: Check list

	System Quality
1	Accessibility and Speed
2	Navigation
3	Website aid and tools
4	Link to e-resources including a research portal
	Information Quality
5	Authority and Accuracy
6	Currency
7	Language
	Service Quality
8	Library resources
9	Library collection
10	Information on e-resources
11	Library services and technical services
12	Library general Information
13	Information on different library sections
14	Value added services

219

7.2: Systems quality

Under this section, the researcher sought to determine the ease of accessing the websites and features that have been provided by the developers to make the website use easy.

7.2.1: Accessibility and speed of library website

Assessment of the speed of library websites as presented in Table 7.2, revealed that all the nine libraries (100%) have their website popping up within eight seconds of a click, have links on their parent organization's home page, are accessible publicly, have library link not more than three links from the institution's webpage. Four libraries (44%) have some dead links on their website and one library (11%) still has its website under construction.

Table 7.2: Accessibility and speed (n=9)

Check list	Frequency	Percentage
User can see something within eight seconds	9	100
The web site can be accessed publicly (no fees, registration or application required to enter the site)	9	100
Link on parent organization website homepage	9	100
Information about library can be found from link with 'Library'. Title Information about library can be found from link with facilities/ resources/ infrastructure/Academic	9	100
Library link not more than three clicks from homepage	9	100
Are there dead links?	4	44
Site is under construction	1	11

220

7.2.2: Website navigation

With regards to website navigation, six (67%) of the websites have the home link on every page, seven (78%) have page titles describing content, eight (89%) have page titles appearing in the top window bar, six (67%) provide information using graphics, charts and pictures with three (33%) using only text format. Findings are presented in Table 7.3.

Table 7.3: Navigation (n=9)

Check list	Frequency	Percentage
Home link on every page of website	6	67
Page title describes content or location in site structure	7	78
Page title appears in the top window bar	8	89
Use of Graphics/ pictures / charts	6	67
Text-only version	3	33

7.2.3: Website aid and tools

The assessment of website aids and tools in Table 7.4 reveals that only one (11%) library provides a website index, site map, mobile version or webmaster link, seven (78%) libraries provide a website search feature and none of the websites has a web feedback link or frequently ask questions.

Table 7.4: Website aid and tools (n=9)

Check list	Frequency	Percentage
Web site index	1	11
Site map	1	11
Library web site feedback form or e-mail link	0	0
Web site search	7	78
Frequently Asked Questions (FAQs)	0	0
Mobile version (mobile catalogue)	1	11
Webmaster link	1	11

221

7.2.4: Link to e-resources including a research portal

The evaluation of the websites reveals that seven (78%) of the libraries provide links to their Institutional Repository and to e-journals, six (67%) libraries provide research tools, five (56%) provide links to e-books, four (44%) has links to other relevant databases, three (33%) provide a manual for e-resources use and one (11%) each provides links to reference tools lists, search engines, and a discovery service. See Table 7.5.

Table 7.5: Link to e-resources including a research portal (n=9)

Check list	Frequency	Percentage
Link to Institutional Repository	7	78
Link to Professional organizations or associations	1	11
Links to e-journals	7	78
Links to e-books	5	56
Link to Reference tools list/LibGuide s	1	11
Links to manuals for e-resources	3	33
Link to other databases	4	44
Links to search engines	1	11
Link to Discovery services	1	11
Link to Research tools	6	67

7.3: Information quality

The check list for assessing information quality on the library websites was used to help the researcher determine the authority, accuracy, currency and the language of the websites.

7.3.1: Authority and accuracy

With regards to authority and accuracy of website information as depicted in Table 7.6, seven libraries (78%) provide copyright information, four (44%) provide contact information, eight

222

(89%) have the information well written and three (33%) provide links to other credible websites.

Table 7.6: Authority and accuracy (n=9)

Check list	Frequency	Percentage
Copyright information	7	78
There is a phone number and postal address to contact for further information. (Just an e-mail address is not sufficient)	4	44
Text well written and understandable (no grammatical, typing, or spelling mistakes)	8	89
There are links to other credible websites	3	33

7.3.2: Currency

Assessment of currency factors indicates that none of the websites is updated regularly or has been updated in the last three months, five (56%) has current information and have indicated when last the website was updated and one (11%) indicated the source of graphs and tables used. This is depicted in Table 7.7.

Table 7.7: Currency (n=9)

Check list	Frequency	Percentage
The web site is updated frequently.	0	0
The information is current and timely enough to meet the need.	5	56
The pages have been updated in the past three months.	0	0
There is an indication of when the page was last updated/revised. (Or is there a date on the page to indicate when it was uploaded to the web?)	5	56
If material is presented in graphs and/or charts and/or tables, is it clearly stated when the data was gathered?	1	11

223

7.3.3: Language

Language assessment revealed that all nine (100%) website are in English with only one (11%) providing the welcome message of the librarian in French.

7.4: Service quality

This section sought to determine the kind of library services that are provided via the website of the libraries studied and also to check whether information has been provided on both manual and electronic library services and collections.

7.4.1: Library resources/collection

With regards to information provision on library resources as depicted in Table 7.8, six (67%) of the websites provide information on OPAC and books, three (33%) provide information on serials, two (22%) websites each provide information on CDs, dissertations and link to other online catalogues and one (11%) provides information on the library's audio-visual collection. None of the websites provide information on project reports, legal deposits, manuscripts, maps, microfilms or music collections.

Table 7.8: Library resources/collection (n=9)

Check list	Frequency	Percentage
OPAC	6	67
Books (printed/electronic)	6	67
Journals, newspapers and magazines	3	33
CDs/DVDs ROMs	2	22
Audio-video materials	1	11
Dissertations	2	22
Project reports	0	0
Legal deposits	0	0
Manuscripts	0	0
Maps	0	0
Microfilms	0	0
Music	0	0
Links to other libraries online catalogues	2	22

224

7.4.2: Information on e-resources

Checking the availability of information on e-resources from the library websites revealed that six (67%) provide information on online databases, seven (78%) provide information on e-journals, five (56%) provide information on e-books, four each provide information on e-theses and off-campus access to e-resources. None of the websites, however, provides information on e-standards, e-patents, online exhibitions and online seminars available in their libraries. This is illustrated in Table 7.9.

Table 7.9: Information on e-resources (n=9)

Check list	Frequency	Percentage
Online databases	6	67
E-journals/E-magazines	7	78
E-books	5	56
E-Theses	4	44
Off campus access	4	44
CD-ROM databases	1	11
E-standards	0	0
E-patents	0	0
Online exhibitions	0	0
Online seminars	0	0

7.4.3: Library services and technical services

Evaluation of library service provision via the websites reflected in Table7.10 shows that three (33%) each provide information on photocopying and reference services, two (22%) each provide information on search requests, ask a librarian, purchase suggestions and reading room request, one (11%) each provides information on internet access, issue/return of materials, renewal and material reservation. None of the websites provides bibliographic services, inter-library loan, or information on cataloguing and classification, indexing and translation services.

225

Table 7.10: Library services and technical services (n=9)

Check list	Frequency	Percentage
Photocopying service	3	33
Reference services	3	33
Information search request	2	22
Reference queries 'Ask a librarian'	2	22
Purchase suggestions	2	22
Reading room	2	22
Internet access services	1	11
Issue-return (Browsing, self-check in/ out)	1	11
Renew material	1	11
Material reservation	1	11
Bibliography services	0	0
Inter library loan	0	0
Information about classification and cataloguing	0	0
Indexing services	0	0
Translation service	0	0

7.4.4: Library general information

In assessing the extent of information provided on the library websites on general library information, the research revealed that eight (89%) each provide an introduction to their libraries, library services, and working hours. Seven (78%) provide library rules, six (67%) each give information about library resources and staff, five (56%) describe the library collection and library mission or objectives, four (44%) provide contact information, news and events, and how to contact library staff or the library. Information on membership and library departments are provided by three (33%) libraries. Two (22%) libraries each indicate where their libraries are located, their policies and procedures and information on branch libraries. One (11%) provides information about the library building, instructions on how to use the library and on-going projects. None of the websites provides annual reports, administrative activities or library committee members. See Table 7.11.

226

Table 7.11: Library general information (n=9)

Library General Information	Frequency	Percentage
Library introduction	8	89
Information about library services	8	89
Working hours	8	89
Library rules	7	78
Information about library resources	6	67
Staff directory	6	67
Library collections	5	56
Library mission statement or objectives of library	5	56
Contact information	4	44
News and events	4	44
Mail to facility to librarian/staff	4	44
Information about membership	3	33
Library department's information	3	33
Library location	2	22
Library policies and procedures	2	22
Information about the branches of library (if any)	2	22
Information about the building	1	11
Instructions or tutorials about library use	1	11
On-going projects	1	11
Annual reports/statistics	0	0
Administrative activities	0	0
Information about library committees	0	0
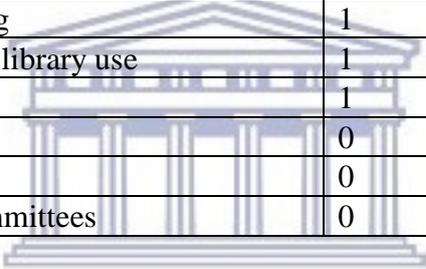
7.4.5: Information on different library sections

With regards to the extent of information provision on different sections of the library, as shown in Table 7.12, three (33%) of the websites provide information of the stack sections, two (22%) each provide information on the circulation and acquisition sections, while information on the periodical, photocopying and technical procession sections are provided by one library (11%) each. None of the websites provides information on their computer sections.

227

Table 7.12: Information on different library sections (n=9)

Check list	Frequency	Percentage
Stack section	3	33
Circulation section	2	22
Acquisition section	2	22
Periodical/ Back volume section	1	11
Micrographic/Photocopy section	1	11
Technical processing section	1	11
Computer section	0	0

7.4.6: Value added services

The evaluation of the websites sought to find out whether other services are provided via the library portals under study. This revealed that four (44%) of the websites provide news alerts and RSS feeds, three (33%) added web 2.0 features, two (22%) provide user guidelines, virtual help desk, and information on new arrivals, one (11%) provides a library events calendar. None of the websites provides links to union catalogues, image gallery of library, list of librarians, online tutorials, projects, consultancy, the library archive, book vendors, the library blog or job vacancies. This is depicted in Table 7.13.

228

Table 7.13: Value added services (n=9)

Check list	Frequency	Percentage
Library 'news alerts'	4	44
RSS feed	4	44
Web 2.0	3	33
User guidelines	2	22
Virtual help desk	2	22
New-arrival section	2	22
Myaccount	1	11
Library events calendar	1	11
Job vacancies	0	0
Image gallery of library	0	0
List of librarians	0	0
Online tutorials	0	0
Projects and consultancy	0	0
Library archive	0	0
Book vendors links	0	0
Library blog	0	0
Union catalogue	0	0

7.5: Concluding summary

In this chapter, the analysis of the website information of the nine libraries were presented under three sections; System Quality, Information Quality and Service Quality. The next chapter presents discussion of findings.

CHAPTER EIGHT: DISCUSSION OF FINDINGS

8.0: Introduction

This study sought to examine how academic libraries in Ghana use and manage their ISs and to develop a Ghanaian standard guideline for managing ISs to enhance efficient service delivery. The study adapted the DeLone and McLean, (2003) IS success model as a framework within which the research was situated.

This chapter therefore focuses on the discussion of the quantitative and qualitative data collected and presented in chapters five, six and seven. To collect the quantitative data, a questionnaire was used and a total of 149 respondents from the nine libraries responded. The qualitative data was collected through interviews with nine heads of libraries and six heads of IT units. The web sites of all the nine libraries were analyzed using a check list. This current chapter also puts the data as analyzed in the last three chapters already presented in the context of the literature review as well as the theoretical framework as provided in chapters two and three respectively.
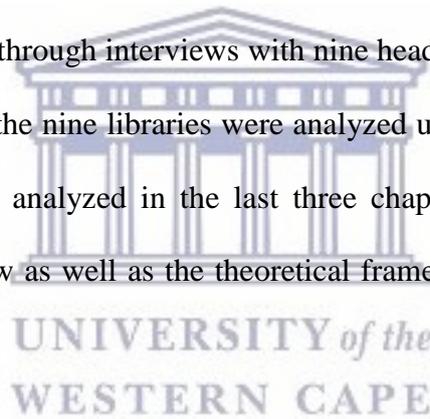
8.1.: Background information of respondents to questionnaire

A total of 149 respondents completed the questionnaires distributed. Of the 149, 95 (64%) of the respondents are from the two public university libraries and the rest 54 (32%) are from the seven private universities selected. This is an indication that the public university libraries have large staff numbers compared with the private universities.

8.1.1: Educational level, staff rank, section of work and IS use

With regard to the educational background of staff who answered the questionnaire, the majority of 72 (48.3%) hold bachelor's degrees followed by 31 (20.8%) holding diploma

certificates and 26 (17.5%) have acquired a Master of Arts or Master of Science degrees. This is an indication that academic libraries in Ghana have employed qualified library staff both as para-professionals (staff with either a university diploma or degree) and professionals (staff with a minimum of a master's degree) to handle library functions.

It was identified that, majority of the staff in the libraries excluding the heads of the libraries were senior staff 105 (70.5%), followed by senior members 28 (18.8%) and junior staff 14 (9.4%). In relation to which category of staff use the IS, all senior staff and senior members (Senior staff in Ghana are people who hold a Diploma certificate from a tertiary institution or Bachelor's Degree, senior members hold a minimum of a Master's degree) use ISs in all the libraries studied. It was only in the two public university libraries where junior staff (staff without tertiary education) use the IS in the library.

In four of the nine libraries, all staff were assigned to specific units or sections of the library to perform specific functions leading to, the researcher believes, better opportunity for the library staff to use the IS to perform specific function. This is unlike the other five libraries where a total of 31 (20.8%) staff use the IS to perform all functions like circulation, reference services, cataloguing and digitization. This creates a major challenge to the efficiency of library services as the same staff will have to juggle between one service and IS to the other. This problem is brought about by lack of staff to handle IS functions as noted by Kumar and Biradar (2010), Mutula (2008) and Gillingham (2014) leading to delay in service delivery to end users as staff work on cataloguing and other functions at the front desk.

8.1.2: Knowledge level of respondents to questionnaire of ICT use

Using a Likert scale of excellent, good, average and very poor to indicate the level of knowledge of ICT use and ICT application in libraries, responses revealed that, more than 50% of respondents had good level of knowledge of both general ICT use and ICT

231

application in libraries. About 12% of respondents indicated having excellent skills in general ICT and its application in libraries. Lack of advanced ICT skills among African library staff was widely reported in the literature by Adeleke and Olorunsola (2010), Adeyoyin (2005), Adeyoyin (2006), Asogwa (2014) and Ibegbulam and Eze (2016). This situation pushed Ayoku and Okafor (2015) and Husain and Nazim (2015) to propose advanced areas of ICT training for library staff in Africa including computer programming, website, portal or subject gateways development, hardware maintenance, metadata or e-resource management and content management.

8.2: Types of ISs used

This section provides discussion of data on the different ISs that are used in the libraries studied. The three different sets of data collected in this study established that the major ISs that have been adopted by academic libraries in Ghana are LMS/ILS, DAM (DSpace), collaborative platforms (social media, IM), general office management systems, Website and EZproxy.

Two libraries have installed CCTV and there was only one library using Discovery, LibGuide s, and a 3M security system. The use of RFID and GIS was totally absent, thus affirms the assertion of Makori (2013) and Xia (2014) that these two technologies have not been adopted by many libraries in Africa and this study has shown that the situation in Ghana is still the same.

8.2.1: Use of LMS/ILMS

The interviews with head librarians revealed that all nine (9) libraries use a LMS. The LMS were installed between the periods of 2009 and 2016. It was also noted that although all the libraries studied belong to the same consortium, all the LMS were installed as individual

http://etd.uwc.ac.za/

projects in the various libraries. This finding is similar to the practice of libraries acquiring ISs individually, rather than as a consortium as revealed by Siddique and Mahmood (2016). This is contrary to the western trend where a major role of a library consortium is to help acquire LMS for all member libraries (Cannell and Guy, 2001). The current practice in Ghana comes with a lot of risk as each library needs to raise a lot of funds to acquire LMS and needs technical expertise to run the project successfully.

The brands used include Sierra, Destiny, Librarysoft, Koha and Alexandria. Koha however was the most used LMS by eight libraries. This is an indication that all the libraries studied in Ghana are using standard LMS as is done in developed countries like the USA and South Africa to enhance standardization (Breeding 2016; and Stilwell and Hoskins 2012) and not in-house ones that do not enhance standardization like some libraries in Pakistan (Siddique and Mahmood, 2016).

The use of LMS by all the libraries was also confirmed in the quantitative data that showed that 94.6% of the respondents make use of LMS to perform library functions such as circulation, cataloguing, OPAC, course reserve and acquisition. The adoption of LMS in academic libraries in Ghana affirms the claims in the literature by researchers like Balnaves (2008), Makori and Mauti (2016) and Pruett and Choi (2013) that libraries apply LMS to automate their routine activities.

8.2.1.1: Functions LMS is used to perform

This section discusses the specific functions respondents use the LMS to perform in their line of duty.

233

8.2.1.2:. Main library functions performed with LMS

Although the LMS use in all the libraries studied were meant to automate all library functions, none of the libraries was making full use of all the modules. Acquisition and course reserve modules were for instance used by 2.7% and 1.3% of respondents respectively. It was note that none of the libraries is using the Electronic resource management (ERM) module of the LMS though their LMS could perform such a function. This was confirmed by the qualitative data collected which indicated that only the cataloguing module of LMS was used by all the nine libraries, while the other modules including OPAC, circulation, report and acquisition were not used by all. This situation is common in Africa and supports the claims of Bassey (2016) and Omeluzor and Oyovwe-tinuoye (2016) that in some libraries in Nigeria, not all library functions are automated and that of Boateng, Agyemang and Dzandu (2014) that not all modules of the LMS used at the KNUST library in Ghana have been installed. Similar situations were recorded in parts of India and Pakistan by Husain and Nazim (2015), Kumar and Biradar (2010) and Ramzan and Singh (2009). This situation is contrary to libraries in developed countries where application of LMS has advanced to enable self-service (Morris, Thornley, and Snudden, 2001 and Tedd, 2006) and even in parts of Asia (Tyagi and Senthil, 2015).

The library fraternity in other parts of the world have developed union catalogues to help users request library items from within a consortium or from nationally or internationally locations (Evans and Thomas, 2007 and Froud, 2006, Tyagi and Senthil 2015). It was noted in this study that libraries in Ghana do not have a national union catalogue. This situation does not market the library facilities within the Ghanaian community well enough and also means that the libraries are not taking full advantage of their LMS.

8.2.1.3: Information generation from LMS

Information generation is one of the key features of any information system. Information generated from ISs helps managers and general staff make informed key decision leading to the progress of the organization. Specifically, in the library environment, information from a major system such as LMS helps library staff and management to know at any point in time among others which resources are available in the library, the number and specific titles of resources circulating, the regularly used materials of the library and the number of titles worked on by a cataloguers. This function the researcher believes is the most essential part of every system since information generation is the key reason for the use of an IS apart from easy work processes. Information provision by ISs in libraries is highly regarded by Asemi, Akbari, Kheradmandnia and Farazi (2012) in that it helps to bring all activity reports together.

In response to the request to indicate whether or not respondents to the questionnaire generate information from the LMS, as many as 90 (60.4%) of the respondents do not generate any information from the IS. This figure includes 80% of unit heads. This finding is an indication of the effect of the quality of the IS on use of the IS as shown in the correlation between the quality of an IS and the IS use which indicates a strong positive correlation. This confirms the Delone and Mclean (2004) theory that system quality which consists of usability, availability, reliability, adaptability and response time affects the use of an IS.

It can therefore be concluded that library staff in Ghana are not making use of the report generation feature of LMS, thus not generating information which can be used to assess the effective use of the LMS and its effect on the services provided to end users. The non-utilization of the report generation feature is possibly due to lack of adequate knowledge of use of the LMS linked to no advanced IT skills acknowledged by respondents. The trend

235

corresponds with Kumar and Biradar, (2010) as well as Shivaputrappa and Ramesh (2013) claiming that library staff lack skills in IT applications due to learning IT by trial and error method and also due to heavy work schedules which prevents them from attending training initiatives.

8.2.2: Use of DAM

Aside from the use of LMS, seven of the nine libraries use DAM specifically DSpace to create their institutional repositories (IRs) to help digitize the intellectual output of their institutions. Interviews with heads of libraries showed that the earliest installed DAM was in 2009 and the latest in 2016 meaning the IR adoption is just about a decade old in Ghana. This supports the findings of Brush and Jiras (2019) and Siriwongworawat (2003) that university libraries are now engaged in digitizing institutional records. The finding again supports Tyagi and Senthil (2015) research findings from India where most of the libraries used DSpace to establish their institutional repositories.

8.2.3: Use of office application

Findings revealed an extensive use (74%) of word processing software for correspondence, typing of class numbers of library resources, typing of lists of library resources, circulation reports and for formatting documents for upload onto DSpace. The use of database management tools such as access for managing dissertation collection, print serial management, patron list, research output of students and faculty, list of electronic resources, usage statistics, list works uploaded unto DSpace and cataloguing was recorded by 31.5% of respondents. Spread sheet was used by 35.6% of the respondents for creating lists of library resources, usage statistics and circulation reports. Presentation tool such as power point was used by 28.9% for library instructions and other training initiatives. The use of office application to support library functions is similar to findings by Ramzan (2004) in Pakistan

236

where libraries utilized office applications to support library functions as has been found in this study.

The extensive use of office application for functions such as typing circulation report, list of electronic resources, usage statistics, patron list and managing dissertation collections is another clear indication of non-utilization of the available LMS in all the libraries. This supports the discussion in section 8.2.2.1 above and corroborates the findings of Siddique and Mahmood (2016) that some libraries use office applications to perform core library functions like cataloguing.

8.2.4: Use of collaborative systems

Collaborative systems such as social media have become a part of library functions in most advanced libraries and are regarded as IS. Opportunity was given to respondents in the questionnaire to indicate the specific social media platforms used and how they are applied. Responses show that WhatsApp is the most used (40.9%) collaborative platform among university library staff in Ghana. It is used for information sharing among colleagues and patrons. YouTube was used by 23.5% of respondents for personal study and Facebook by 19% of respondents for sharing information on library activities. However, the data from the interviews with head librarians show that the official social media platforms used for library functions are Facebook, Twitter and WhatsApp, and indicated that Facebook is the most used social media platform.

The two data sets give indication that most of the staff use WhatsApp (40.9%) and YouTube (23.5%) for their "personal" work roles and to share information among themselves but not as a requirement by the library. The social media platforms Facebook and Twitter which have been officially signed up by the library for official use, recorded very low patronage; 19% and 4.7% respectively by the library staff. The use of social media platforms to disseminate

237

information to library patrons on resources and services of the library was noted by Guo, Liu, and Bielefield, (2018) and Howard, (2018). The rate of usage is comparatively low in comparison to libraries in advanced countries as was reported by Harinarayana and Raju (2010) and Xie and Stevenson (2014). The official use of Facebook and YouTube however low corroborates with findings by Baro, Idiodi and Zaccjeaus (2013) as well as Xie and Stevenson (2014) of Facebook and YouTube as the most used official social media platforms in libraries in parts of Africa and the western world.

Though Ahenkorah-Marfo and Akussah (2016b) indicated that the majority of library staff in Ghana are aware of the possibilities of using social media for library services, this study revealed that the actual usage is very low and limited to WhatsApp (40.9%), YouTube (23.5%) and Facebook (19%). Other platforms such as LinkedIn (4.7%), Google+ (5.4%), Snapchat (1%), Twitter (4.7%), Xing (0.7%) Tumblr (2%) recorded very poor usage. The lack of extensive social media presence in academic libraries in Ghana is not a positive marketing strategy since most of the students who are library patrons and potential patrons are more comfortable using such platforms.

8.2.5: Use of websites

Library websites are also regarded as ISs. They are used to store and retrieve information on library functions and resources (Fattahi and Afshar 2006). The study revealed that all the nine libraries studied had websites but the website of one of the libraries contains information on another foreign university library that they are in collaboration with. There is therefore no information on the site that pertained to the local library studied.

238

8.2.5.1: Service provided on library website

The analysis of data on this sub theme is on the services and the type of information that are provided on the websites of the libraries studied. The section is sub divided into five sections. library resources and collection, information on e-resources, library services and technical services, library general information and library sections and value added services

8.2.5.1.1: Library resources and collection

The analyzed data revealed that six (67%) of the libraries provided information on their websites on OPAC and books. Information on audio-video materials, journals, newspapers and magazines were provided by just one (33%) of the libraries. Information on other types of library collection including Project reports, Legal deposits, Manuscripts, Maps, Microfilms and Music were totally absent from the websites of the libraries despite the fact these materials form part of the collection of most of the libraries studied and two of the libraries are beneficiaries of legal deposit in Ghana. This defeats the purpose of the library website as an online interface for both print and electronic collection and services of the library as found in the text of Nielsen, (2005).

This affirms the underutilization of ISs in Ghanaian academic libraries as was already revealed by both the quantitative and interview data collected. It also means that managers of ISs do not dedicate enough time to upload relevant information that will benefit users as well as market library resources. The lack of information on library resources on the websites is also an indication of not making use of the websites as a marketing tool to reach users outside the immediate environment of the libraries and connect the library and its resources to the global world.

239

8.2.5.1.2: Information on e-resources

Information provision on electronic resources on the websites was limited to E-journals/E-magazines and online databases. It was noted that though all the libraries studied are members of CARLIGH and therefore have access to "Off campus access" as a service that can be provided to their users, only four (44%) of the libraries have provided information on this service on their websites. The question then remains why the other libraries find it difficult to put such relevant information that will advertise library service and give direction to users on the website; lack of IT staff and technical expertise is the possible answer as was revealed by the quantitative and interview data and has proved to hinder effective utilization of the ISs that have been acquired by the libraries. None of the libraries provided any service and information on online seminars, E-patents, online exhibitions and E-standards.

8.2.5.1.3: Library services and technical services

In this 21st century where libraries in advanced countries are using ISs including websites to provide virtual services to their patrons including e-reference services (Green, 2014), the data from the website analysis revealed that Ghanaian academic libraries are lagging behind in this aspect. Only 33% of the libraries provide information on photocopying and reference services. Information search request, Reference queries "Ask a librarian", Purchase suggestions and Reading room are the only actual virtual services provided by just two (22%) of the libraries. It is also noted that none of the libraries provided information on or actually provides interlibrary loan services on their website.

8.2.5.1.4: Library general information and library sections

This section used 22 items as check list to determine the amount of general information provided by the libraries on their websites. It was once again revealed that the libraries are

240

underutilizing their websites, only, three set of information namely: library introduction, information about library services and working hours were provided by 89%. All other set of information recorded very low percentages to the extent that even the location of the libraries and their policies and procedures were provided by only two (22%) of the libraries. Likewise not much information was provided on the different departments of the libraries. None of the libraries provided information on all of its sections. This again defeats the purpose of a website; in that the website is supposed to provide detailed information on the library and its services so that a user does not need to visit the library unless there is the need to use physical material.

8.2.5.1.5: Value added services

The use of websites has advanced from provision of information to the addition of other features that enhance the user experience of library patrons. This may range from simple news alert to more complex functions such as RSS feeds and creation of "myaccount" to make the use of the website more personal. The research data revealed that some of the libraries have made effort to build some of these functions on their websites. Library "news alerts" and RSS feed were present on four (44%) of the website. Though eight out of the nine librarians admitted using social media platforms like Facebook, only three (33%) of them have their social media handles as links on their websites. User guidelines, New-arrival section, Virtual help desk were also provided by just two (22%) of the websites and "Myaccount by just one library. Other current functions provided by libraries in other parts of the world such as Library blog, Union catalogue, Online tutorials were totally absent from the websites studied.

This study affirms the findings of Oladapo (2016) from Nigeria that library websites from West African countries use fewer web 2.0 features as compared to libraries in South Africa

241

and that the library sites were mainly used to provide access to electronic journals. Most of the library websites thus lack extensive use of library 2.0 elements and therefore does not meet the current standard of using web 2.0 to make library services web-based, personal and interactive for users as was recommended by Rah, Gul, and Wani, (2010). From the library website analysis, it can be concluded that unlike developed countries that have used their library websites as online spaces that provide complete library services and information (Gatenby 2008), Ghanaian academic libraries lack even certain basic information like contact numbers, location among others which affirms the findings of Agyemang, Boateng and Dzandu (2015) that though university libraries in Ghana have websites they do not provide much information to users.

8.2.6: Other software use

The services provided in an academic library are quite complex resulting in, apart from major software such as LMS, DAM, social media the use of other add-on software to enabled libraries to provide additional services, enhance service delivery, increase security and make the work of the library staff easier. Despite the wide availability of such add-on tools, as was noted by Back and Bailey (2010), among the nine libraries studied in Ghana, only six (66.6%) of them use EZproxy to enable users access content of subscribed databases from off campus, two (22.2%) use CCTV as a security measure, while one use LibGuide s to create subject specific content on their website, "discovery tool" to serve as a one stop search tool to help access content of OPAC and e-resources and 3M security to help prevent theft of physical library resources.

This is an indication that the libraries studied are yet to witness total automation. Although the use of LMS and DAM enables the library automation process, it does not enable full

242

automation of services such as off campus access, subject guides and control over security of physical library materials which the CCTV and the 3M for instance provide.

The availability of a number of ISs; LMS, DAM, Social media, Website and office applications in the libraries and their use to perform different functions as has been discussed above provides an opportunity for the use of Delone and McLean, (2003) Information Systems Success Model to determine how management of ISs in academic libraries can lead to quality information systems, quality information and quality services.

8.3: Reason for choosing a particular IS

Through interviews with head librarians, the researcher tried to establish the reasons for adopting a specific brand of IS from those available on the market. Responses revealed that the majority (66.6%) of libraries considered the cost of ISs as the most important factor before acquiring it. The next most important factor considered was the use of the IS by other libraries (55.55%), followed by whether that IS can perform the functions of the library (44.4%) and lastly ease of use (22.22%). Though the reasons given correspond with those given by South African libraries (Stilwell and Hoskins, 2012), the South African librarians provided a more extensive list to include versatility, back up, vendor help and web based characteristics.

Cost and use by other libraries overshadowed the other critical factors of feasibility studies, ability to meet the library's requirement and ease of use before IS installation. The opinion of the researcher is that, though sustainability determined by cost is very important, acquiring an affordable IS not meeting the needs of the library is useless. Likewise, as much as it is important to use ISs that are being used by others in order to share expertise and information, this factor should not take prominence over ease of use as there will be no value derived from an IS not easily used to perform basic functions.

243

From some of the comments presented, librarians think IS performance is based on trusting others' opinions and usage. An IS should be tailored to meet the unique needs of each institution.

8.4: Change of LMS/ILS

In response to questions on whether LMSs were changed and the factors that led to the change, eight head librarians indicated they have ever changed their LMS. This finding reveals that there is a high LMS turnover rate among academic libraries in Ghana and is similar to the very high turnover rate of LMS in Nigerian libraries as indicated by Kari and Baro (2014).

It was interesting to note that of the eight libraries which changed, six of them changed from proprietary software to Koha, an open source software. This finding supports evidence in the literature that, Koha is the most preferred open source LMS as has been noted by Giri (2012) and Balnaves (2008). It can be deduced that most libraries especially in Africa are opting for open source LMS and their most preferred brand is Koha as has been revealed by this study.

The chief reason for changing LMS was indicated as technical challenges with a previous LMS leading to non-use of IS or non-use of some modules. This is referred to as IS failure and has occurred in other organizations as well (Marnewick, 2017). Cost associated with LMS was the second most cited reason for change followed by need to upgrade service provision and the desire to use an LMS that is used by other universities. Upasani (2016) recorded the same reasons for libraries relinquishing proprietary LMS for open source ones. This also confirms the assertion of both Balnaves (2008) and Pruett and Choi (2013) that Open source software (OSS) are cost saving options for library automation resulting in many libraries now opting for OSS.

244

8.5: Open source software (OSS)

Eight of the nine head librarians revealed making use of open source software for core library functions. Eight libraries are using Koha open source LMS while seven are using DSpace open source software for managing institutional repositories. Five head librarians indicated that they changed to open source software as it performs similar functions as the proprietary software. Three head librarians each also indicated that open source software do not require purchasing cost and open source software are being used by other university libraries. Two heads librarians changed in response to the open access drive. This affirms existing literature (Makori and Mauti, 2016; Mutula, 2012; Otunla and Akanmu-Adeyemo, 2010 as well as Siddique and Mahmood, 2015) that OSS is widely adopted in developing countries as a cost saving means of automation (Upasani, 2016).

8.6: Maximum utilization of ISs

The researcher enquired from head librarians their opinion on the extent to which they think their libraries are utilizing the ISs that they have acquired. Responses revealed that only one librarian indicated the library is making maximum use of their acquired ISs. Some of the comments from the head librarians are as follows (see Table 6.18 for the detailed responses):

> **Librarian 1 -** *Frankly I don't think the library is making maximum use of the ISs that are available in the library; they are being underutilized...*

> **Librarian 2 -** *The library is not making maximum use of the systems. I think we are making only 50% use of the system. ...*

Reasons given by head librarians for not being able to make maximum use of the ISs include lack of initiative to explore all the functions of the IS, lack of skills to use the systems fully

245

and technical challenges. This is explicitly confirmed by all five of the heads of IT units stating that the libraries are not making maximum use of the acquired ISs.

Libraries not using all the modules of the LMS to perform library functions means that libraries are not making maximum use of the LMS, are therefore not getting value for money and affect the quality of service delivery as some are still using manual circulation records. Similar situations were reflected by Maguire (2002) and also Ravichandran and Lertwongsatien, (2014) state that most ISs are underutilized resulting in limited output. Wasike and Njoroge (2015) confirm that most libraries utilize just about ten percent (10%) of the IS capacities.

In response to whose responsibility it is to ensure optimum use, two of the IT heads place responsibility with the librarians, while the other three think it is the responsibility of both the IT unit and the librarians. Thus the IT heads believe "use" responsibility rather lies in the hands of the librarians as the IT units only install and maintain the system.

8.7: Management issues regarding IS

This section discusses findings from the interviews conducted on the aims libraries have for the use of IS, funding of IS project, institutional support, hosting of IS, system integration and post implementation evaluation of IS.

8.7.1: Aim of IS use

In determining the aim of adopting an IS, the most cited reason was to enhance service delivery followed by quick and easy work procedures and lastly to computerize library work procedures. These reasons reflect the general consensus in the literature (Alaraifi, Molla and Deng, 2012; Boddy, Boonstra and Kennedy, 2005 as well as Fattahi and Afshar, 2006) regarding the aim of adopting ISs in service delivery this shows that the library fraternity in

246

Ghana is thinking alike with their counterparts in the developed world to provide enhanced service. It also reveals that the libraries have objectives which they expect to achieve from the use of ISs. This represents the teleological element of the system as stated by Bajgoric (2006).

8.7.2: Funding and Institutional support

IS projects are expensive and therefore adequate budgetary provision must be made even if the IS is an open source to cater for the purchase of equipment. The optimum utilization of any IS is based on the reality that the IS and equipment to aid its use are made available and this cannot be done without financial resources. In ascertaining the source of finance and how willingly university management supports an IS project, it came to fore that, all nine libraries depend on internal funding from their institution for their IS projects. Seven of the libraries which are all private universities, solely depend on internal funding. The two public university libraries receive external support through grants for their IS projects in addition to the internal funds received from their institutions.

Four of the librarians however indicated that though IS projects are to be funded internally, they lack institutional support from the university management directly leading to delays in providing funding.

The 44.4% of librarians lacking institutional support and finance regarding installed ISs confirm the assertion of Ani, Esin and Edem (2005), Han and Liu, (2010) and Shuva (2014) that many libraries lack finance to run IS projects effectively. Lack of adequate institutional support and finance is likely to affect the acquisition of required equipment and maintenance of the IS which will then affect the quality of the information system.

8.7.3: Hosting of ISs

Interviews with heads of IT units reflected only one library hosting both its IR and LMS (DSpace and Koha) in the cloud. All the other libraries use local servers to host. This is an indication that though one library is making use of cloud service, none of the libraries studied is making use of the current type of LMS; library service platforms which are required to be hosted in the cloud as specified by Breeding (2012) as well as Makori and Mauti (2016). This is an indication that academic libraries in Ghana are lagging behind in terms of current trends as most libraries in the developing countries are engaging cloud services (Cho (2011) and Groenewegen, (2004) to reduce cost of investment in hardware and technical services required to host locally.

Local hosting of ISs also demands technical expertise and robust equipment. Considering that the current study revealed that only 49.7% of the libraries have qualified IT staff and 39.8% have the required equipment as evident in section 8.12.5.3, hosting ISs locally will pose challenges.
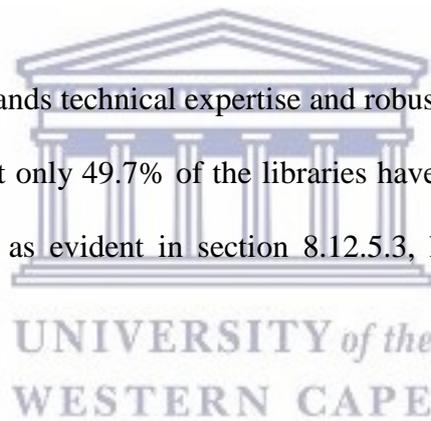
8.7.4: System integration

The extent of integration between/among the major IS use in the library; LMS, DSpace and the main university system was determined. This level of integration enhances the use of library systems and enables the flow of data between the university system and the library system for a seamless service to the university community. However, it was noted that only one of the nine libraries has some level of integration between the LMS and the main university system to enable the same user account. Below is the statement from the IT head indicating the level of integration.

248

IT 3 -*The ILS is integrated to the university's central authentication system and email system. Students and faculty accounts are same on all systems. The Learning management Moodle is being used and integrated with a reading list management system locally name Nyansapo which is modeled after Loughborough Online Reading List System (LORLS). We are now experimenting to see if we can link this to the Library Management System.*

It is unfortunate to note that even with the library that uses the discovery service to search content of e-resources and OPAC, this system has not been linked to the IR and users therefore must search the IR separately. Thus not opening up the library collection to a single interface to help discover and retrieve library resources (Calhoun (2002) and Warren, (2007). Not linking library and university systems also makes it difficult to add citations of library resources to e-learning management systems (Dygert and Moeller, 2007 and Shapiro, 2012).

The lack of integration between LMS and university systems in Ghana is also contrary to existing literature from developed countries where a number of researchers have shown how academic libraries have been able to integrate their services into existing e-learning management systems of institutions to increase patronage of library services and resources for learning and being able to generate analytical data from LMS (Bell, 2016; Cross, 2015; Detterbeck and Sciangula, 2017; Dygert and Moeller, 2007 and Shapiro, 2012).

8.7.5: Expectation and benefits of ISs from the perspective of head librarians

In determining whether their expectations of using ISs are being met, five (55.5%) head librarians indicated in the affirmative and the remaining four (44.5%) think their expectations are not being met. These figures are not significantly different from the quantitative data retrieved from questionnaires assessing the quality of the IS which indicated that 45% of respondents regard the IS as meeting their needs.

249

Though the researcher did not find out the specific expectations of the librarians of the ISs, all the head librarians indicated that their libraries derive one benefit or the other from the use of the IS as stipulated by Siriwongworawat (2003) on ISs enhancing library services. The lead benefit is noted to be saving time and making work processes easy, followed by speedy work processes, digital storage of data, enhanced collaboration, visibility of the library and global access to the contents of the library. Similar benefits have been widely noted in the literature by among others Back and Bailey (2010), Omekwu and Echezona (2009), Rafiq and Ameen (2013), Ram, Anbu and Kataria (2011).

8.7.6: Post implementation system evaluation and maintenance

In order to ascertain whether an IS is performing as expected, it needs to be evaluated. Continues evaluation should be part of the organizational processes and good management practices (Anisimov and Reshetnikov, 2011) to produce relevant results to help modify the system (Beynon-Davies, Owens and Williams, 2004). The evaluation additionally helps to determine if the IS is performing as expected and being beneficial to the organization (Marnewick, 2017). If the results of the evaluation indicate poor performance, it will assist IS managers to improve the quality and use of the system. Data from this study reflects that IS evaluation is not a culture in the libraries studied. The results of the interviews show that only two libraries have ever evaluated their ISs - specifically LMS. One library used a survey of students while the other used system generated data to determine the usefulness of the IS. This lack of proper evaluation of an IS is what Irani and Love (2000) referred to as a technology management gap. The researcher believes that non-evaluation of ISs has led to average performance resulting in only 42.3% of the library staff finding the system easy to use to perform their duties. Below are some comments from Head librarians;

250

Librarian 8 - *We have never evaluated the IS but I expect Koha to perform certain functions for us so if I log on to the system and it is not functioning well it means the system is not meeting my needs*

Librarian 5 - *The performance of destiny was never evaluated*

Librarian 4 - *I have not done any formal evaluation. But I can say that Koha has served as well. Destiny was a bit complex to use though destiny could do more than Koha*

Although the majority of the libraries have never carried out IS evaluation, interviews with heads of IT units indicated that they all value system maintenance and see it as a routine activity on both hardware and software to ensure the IS functions properly. The major evaluations carried out on the systems are upgrades and maintenance on hardware. Despite the fact that all the IT heads see IS maintenance as an important management factor, only half of them perform maintenance activities regularly. The rest perform maintenance as and when the system breaks down – a practice against the standard practice proposed by Bajgoric (2006) that ISs should be constantly managed by looking at operating infrastructure, system-application-network uptime, databases, backup and storage among others.

Comparison of data discussed in sections 8.11.5 and 8.11.6 reveals that though libraries do not conform to best practices on IS management, all the libraries turn to derive one benefit or the other. This is similar to the finding of Marnewick (2017) on IS use in organizations in South Africa.

251

8.8: Evaluation of the ISs used in the libraries

This section provides discussion of the results from the questionnaire of the evaluation of the IS respondents use in their line of duty and the websites analysis. Where necessary, evidence from the interview is used to support the discussion.

8.8.1: Main IS used by staff

In order for the respondents to the questionnaire to evaluate the major IS they use to perform their main library duties, they were asked to indicate the one major IS used. The analyzed results show that the majority (83.3%) use LMS as the major IS in their line of duty. DAM drew 8.7% of use. The usage of DAM by 8.7% of respondents to the questionnaire is supported by evidence from the qualitative data collected. It is used in seven of the libraries studied and in most of the libraries, only a few staff members have been selected to work on digitization projects.

It can be concluded that the adoption of an IS especially LMS in performing the traditional library function is very high among Ghanaian academic libraries. Thus the libraries are adhering to the proposal made by Davarpanah (2001), Pruett and Choi (2013) and Stilwell and Hoskins (2012) that academic libraries must of necessity implement an IS in order to provide smooth services enabling users to maximize the use of available library resources.

8.8.2: Impact of IS use

The impact of IS use by staff was measured by four factors. Namely staff level of knowledge, information recall, effectiveness of job performance and productivity.

With regards to the IS providing respondents with the opportunity to learn new things in their work environment, 51.7% agreed, while 23.5% strongly agreed. This is an indication that the

252

majority of respondents (75.2%) have experienced an increase in knowledge to perform their duties as a result of the use of ISs. However, although Back and Bailey (2010), Green, (2014) and Ram, Anbu and Kataria (2011) mentioned benefits for staff, such as, easy work processes, global access to library resources and information, they did not mention the benefit of increase in knowledge levels of staff.

On the impact of ISs on information recall 49.7% of respondents agreed and 20.1% strongly agreed that the use of an IS enables them to remember and recall information needed to perform their tasks. This supports Asemi, Akbari, Kheradmandnia and Farazi (2012) position that IS use in libraries provides activity reports and information regarding work which help staff to recall relevant information to be used in decision making.

An analysis of data on IS impact on efficiency and productivity reflected 40.9% library staff members agreeing and 26.8% strongly agreeing to a high impact on efficiency. The majority of respondents (77.2%) either agreed (51.7%) or strongly agreed (25.5%) that IS use has a high impact on productivity. This gives evidence that the libraries studied are reaping positive benefits from IS use in transforming the manual processes and serving users in a timely manner. This is also supported by the qualitative data where all library heads agree to benefiting from IS use. The benefit of efficiency and productivity are not uncommon to find in library science literature. Adeleke and Olorunsola,(2010), Boateng, Agyemand and Dzandu (2014), Hassoun and Bernaoui (2015) and Shafique and Riedling (2013) are just a few of the authors stating that IS use in libraries enhance efficiency and productivity. The correlation test performed in this study also showed a strong positive correlation between IS use and service provision. This study therefore supports the DeLone and McLean IS success theory adapted that the use of ISs impacts the work of the individual staff member which

leads to the collective impact on the organization, this is referred to as net benefit (Delone and McLean, 2003).

8.8.3: Quality of the information from the IS

The researcher assessed the quality of information from the IS. Information quality is one of the key components of the DeLone and McLean IS success theory (Delone and Mclean 2004). In assessing the quality of the information generated by the IS used by the respondents, a total of 57% of them strongly agreed or agreed that the IS they use provide the desired output. Thus indicating that the IS provide output that is exactly what is needed. However, 22.1% of the respondents strongly disagreed or disagreed that the IS provides them with the desired output. Though the majority of librarians agreed the IS provides desired output, the 22.1% of respondents not receiving desired output or not generating meaningful information, is not the best as using IS to generate information to support decision making is one of the major roles of ISs use in organizations (Ada and Ghaffarzadeh, 2015).

On the other hand, 57.7% of respondents strongly agreed or agreed that information needed from the IS is always available. Only 9.4% strongly disagreed or disagreed. Comparing this data to the data generated on desired output, it can be inferred that, though the IS used by the libraries generates information to some extent, it is not the desired information to some of the staff, this defeats the added value concept of Fattahi and Afshar (2006) which states that an IS must produce the desired information.

In evaluating the information format provided, the majority (68.4%) of the responses indicated that information is presented in usable form and does not necessary need to be formatted for use in decision making.

254

In judging the quality of information from the ISs based on how easy it is for users to understand and how clear and readable the information is, 66.4% and 78.5% of the respondents rated the information as understandable as well as clear and readable respectively.

In response to rating the accuracy of data received from the IS after accurate input of data, 49.7% of the respondents indicated accurate data, while 19.4% indicated inaccurate recall. This should be a cause of concern to the managers of the ISs as trust is not reflected and misleading information might lead to wrong decision making.

Analysis of data on the quality of information from the ISs used shows that, although seven of the eight criteria used to measure the quality of information from the IS scored over 50%, none of the criterion used was ranked to score up to 80% by the respondents. This therefore means that though the quality of information from the IS can be regarded as above average, it is not very high and confirms the finding by Asemi et al. (2012) that, library staff are not highly satisfied with information received from ISs used. Thus all the dimensions of information quality (intrinsic, contextual and representational) identified by Nelson, Todd, and Wixom, (2005) as elements in the DeLone and McLean IS success theory were assessed in this study but were not ranked very high by the respondents.

Despite the fact that responses did not show a highly satisfied level of information accuracy, the majority (81.2%) strongly agreed or agreed that the information from the ISs is important for decision making echoing the claim by Ada and Ghaffarzadeh (2015) that IS helps provide quality information for decision making to help management perform tasks effectively.

8.8.4: Information quality on website

In determining the quality of the information on the websites of the libraries studied, three major factors were used; authority and accuracy, currency and language. These are also elements in the DeLone and McLean IS success theory as identified by Nelson, Todd, and Wixom, (2005).

8.8.4.1: Authority and accuracy of information on website

With regards to authority and accuracy, majority of the websites (78%) provided copyright information, this initiative is great as it will help users to determine the owner of the website, the organization involved in its development, and an indication of the authority of the information providing agency. Again 89% of the websites provided well written text that can easily be understood by end users. The provision of contact information was rather lacking on most of the websites as only 44% of the sites provided such information. This situation of not providing enough contact information is not the best; websites are supposed to be the online face of the libraries. It is basically the virtual home so users should be given all contact details so that they can chose which platform to reach the library on.

8.8.4.2: Currency

The websites ranked very low on currency. None of the sites is updated frequently; none has also been updated in the last three months before the data was collected. Only 56% of the sites provided current information to some extent to meet users need and also indicated when last the sites were updated.

This is a clear indication of not managing the website well. For a website to provide current information, it must be regularly updated which is one the functions of website management.

256

8.8.4.3: Language

One advantage of electronic platforms is the provision of global access to information and users all over the world will not need to physically visit the library to access information. For this benefit to be fully gained, it is prudent to provide website information in a number of international languages. This issue is more relevant to African countries as the continent is populated with a number of official languages including French, English and Portuguese and also specifically to Ghana as it is surrounded by Francophone countries. Unfortunately, language has not been considered as an urgent matter in the development of academic library websites though all the libraries studied have their universities admitting international students and researchers. Among the nine library websites studied, only one provided the welcome message of the librarian in French, all other information on the other websites are in English only.

8.8.5: Quality of ISs (system) used by respondents

The research is based on the premise that the quality of an IS affects its use as was indicated in the by Delone and Mclean (2004) DeLone and McLean IS success theory. It was therefore prudent to determine the quality of the ISs used by staff with seven criteria; ease of use, ease of learning to the use of the IS, ease of accessing information from the IS, IS meeting unit's requirement, IS includes necessary features and functions, adaptability of IS user interface and IS response time which are all elements identified by Nelson, Todd, and Wixom, (2005) as factors that make ISs successful.

In indicating the ease of use, 42.3% rated it as easy to use, 39.6% as not easy to use, while 17.4% didn't express an opinion. The marginal difference of 2.7% is not convincing and should be addressed by system designers.

Responses on ease of learning to use the IS were not that different from ease of use. Just 42.3% of respondent find the systems easy to learn while the rest are not comfortable learning to use the IS to perform library functions.

In determining the ease of accessing information from the IS, the majority (60.4%) respondents reacted negatively indicating that it is not easy to access information. This might provide the reason for 60.4% of respondents indicating not generating information from the IS used. This provides a direct link between ease of use and actual use as such confirming the finding by Adeleke and Olorunsola (2010) that lack of skill affect the use of ISs in libraries and does not promote the use thereof (Baker, 2008).

The quality of the IS was also judged by its ability to meet the requirements of different library units. Only 45% agreed that the ISs meet their unit's requirements, while 33.6% disagreed and 20.8% did not commit. It means that the ISs used in the academic libraries studied have not been tailored enough to meet the specific needs of the units. This finding confirms the assertion of Kennan and Wilson (2006) that IS use in libraries are not able to satisfy the needs of every user. It also corresponds with 46.3% of respondents agreeing on the ISs having all the necessary features and functions. This can also be linked to Wasike and Njoroge (2015) concluding that library staff find it difficult to customize their ISs to meet specific needs.

Wasike and Njoroge (2015)'s assertion of library staff having difficulty in customizing IS to meet specific needs is again proven in this research with only 30.2% of respondents indicating easiness to adapt the user interface.

Although response time is not related to the user of an IS, respondents were asked to rate how quickly the system responds. In line with the trend of disagreeing, only 32.9% of the respondents agreed that the response time is quick.

258

From the above discussion, it is noted that none of the criteria used in determining system quality was scored significantly positive, implying that staff do not see the ISs used as having high quality attributes, and this affected the use thereof as was predicted by the DeLone and McLean IS success theory adapted. The effect of IS quality on use is also confirmed by the result of a strong positive correlation revealed between IS quality and use as presented in chapter 5. Thus the IS being used in academic libraries in Ghana can be deemed not of good quality. These findings oppose the standard outlined by Wu and Wang (2006) that a quality IS is one that operates within an acceptable response time with friendly interface and is easy to use.

8.8.6: System quality of website

To determine the quality of the websites as an IS, four major factors were considered; accessibility and speed, navigation, website aid and tools and link to e-resources.

8.8.6.1: Accessibility and speed

The analysis revealed that all the libraries have the link to their websites not more than three clicks from the home page. In fact, the majority of the libraries have their website link on the homepage of the main university website. Also all the library websites open within a period of eight seconds which is an indication that the websites can easily be accessed and they are free, however four libraries have dead links on their websites.

8.8.6.2: Navigation

With regards to navigational features, though not all the features were present on all the websites, majority of 67% of the websites have navigational features present by providing link to home page on every other page, page title to describe content and page titles appearing in the top window bar (89%). Thus the navigational feature provision on the sites can be rated

259

above average as over 60% of the sites provide enough navigational tools to aid users in their use of the library websites.

8.8.6.3: Website aids and tools

The availability of website aids and tools was very poor. It was only one website that possessed four out of the seven features that were used to access website aids and tools. It was noted that none of the websites had Frequently Asked Questions and Feedback form or email link. The only feature that was highly present is website search. This again is an indication of system managers not considering end users in the design of ISs. The absence of these valuable features means that users will find it difficult to use the website.

One other interesting finding is the total absence of feedback avenue for users which according to Beynon-Davies, Owens and Williams, (2004) is very important in ISs as it gives opportunity for end users to provide relevant information on their use experience which can be used to improve the IS.
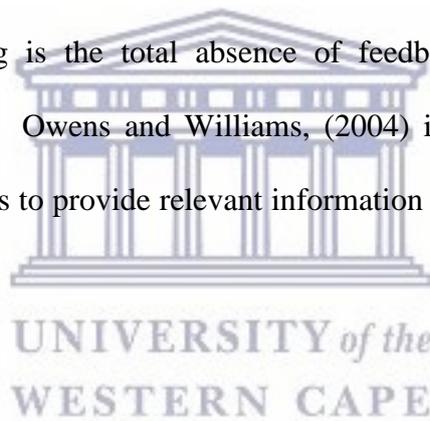
8.8.6.4: Link to e-resources

Assessment of the links provided on the websites to e-resources revealed that the libraries provided links to their internally acquired e-resources as is done by other libraries on the African continent in the report of Oladapo (2016). Most of them did not provide e-guides or manuals to aid the use of the e-resources and also links to other search engines and professional association and organization that can provide relevant information were absent.

This means that the ultimate aim of system quality which is to enhance ease of use to produce output leading to re-use of the system as stipulated by the DeLone and McLean IS success theory has not been fully implemented on the websites

260

8.8.7: Managerial support

This section discusses findings on the support library staff receive from their superiors to enhance the use of IS. This element is not part of the DeLone and McLean IS theory but has been added by the researcher and is reflected in the adapted theory modeled and presented in chapter 4.

8.8.7.1: Availability of IS policy

Data collated on the responses to the support respondents receive from top management on the use of ISs show that 41.6% of the respondents indicated that their libraries have an IS policy, 41.6%, a strategic plan and 41.7% an IS standard. This was corroborated by qualitative data from heads of libraries indicating four (44.4%) libraries having an IS policy. This is in line with the assertion of Anisimov and Reshetnikov (2011) that management of an IS is not well structured in organization and corroborates the finding of Makori (2013) and Mutula (2004) that in other parts of Africa, a number of libraries lack IS or ICT policies. The lack of a policy or lack of awareness of existing IS policies demotes the efficient use of the IS due to the absence of guidance on usage in general and for specific purposes. This underlines the need for the development of an IS standard to guide libraries in developing institutional and internal policies and standards.

8.8.7.2: Information provision on IS by management

Effective utilization of ISs in organizations is determined by the amount of information provided to staff before and after the installation of the IS. Information enables staff to understand the role of the IS in the organization and how it promotes the objectives of the organization. This is regarded by Baker (2008) as ensuring staff see the IS as their own. It is therefore essential for every management to provide adequate information to staff before the

261

IS is installed and when changes are made. Data from questionnaires reflect that only 26.8% of respondents were consulted before the installation of the IS, while only 38.9% were educated on the impact of the IS on their jobs. Thus information provision on or about the IS before installation was scored very low. This confirms Gbadamosi (2012)'s claim that library staff and system designers do not collaborate much during the design of ISs for library use and also that of Mugridge and Poehlmann (2015)'s that library staff did not receive enough information on IS changes and training opportunities.

Likewise, information provision after installation of ISs was provided to 31.5% of respondents when problems about the IS were discussed and 26.9% when their views on improving the IS were solicited. This means that the majority of the users of the IS in academic libraries in Ghana are not part of the feedback loop proposed by Beynon-Davies, Owens and Williams (2004) as an essential element of a successful IS.

8.8.7.3: Provision of resources

Both quantitative and qualitative data to determine the availability of resources to run the IS were collected. The quantitative data show that 49.7% and 38.9% of respondents confirmed the availability of qualified IT staff and required equipment respectively. This is in contrast to Skretas' (2005) prerequisite of resource provision as an internal factor for effective IS use, the level of support by management ranked low.

8.8.8: Maintenance of ISs

Maintenance of ISs was referred to by Delone and Mclean (2004) as service quality in the DeLone and McLean IS success theory it includes the total support given by service provider and the IS department. Boddy, Boonstra, and Kennedy (2005) assert that it is essential to ensure the quality of an IS through regular maintenance. To

262

determine maintenance carried out by the libraries studied, three factors were enquired about in the quantitative data. The first was on updating of the IS which revealed scores below 40% with regards to current versions being installed and the IS as well as computers and other devices regularly maintained. This is confirmed by the data from the interview with IT heads which indicated only 50% of them carry out updates regularly. These results are different from the findings of Mugridge and Poehlmann (2015) reflecting library staff being satisfied with maintenance work on the IS, but confirms Gbadamosi (2012)'s opinion that most ISs lack routine maintenance. Once the systems are not updated regularly, their original quality is lost affecting the use of the system and the quality of the information generated. The trend corresponds with the criteria used to determine the quality of the IS in section 8.8.5 which also drew below average scores confirming that libraries have not taken a serious look at activities that will enhance the management of the system as was proposed by Bajgoric (2006) as a necessary component of an IS.
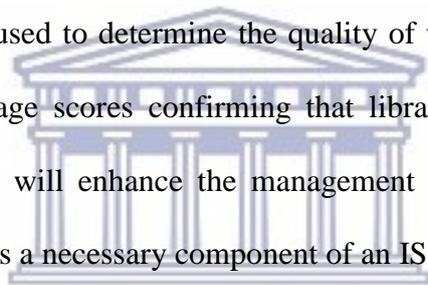
Training was considered by the researcher as an element of system maintenance as efficient use of the system will largely be determined by how well trained staff are in the use thereof. Responses revealed that training in general received low priority among the libraries studied. Only 30.9% of respondents intimated they were adequately trained before the installation of the IS, 33.5% receive refresher training regularly and 34.9% are trained when the system is upgraded. The lack of adequate training should be a major concern for library managers as there is adequate evidence in the literature proving African library staff's lack of adequate skills in the use of ICT (Adeleke and Olorunsola,(2010; Ani, Esin and Edem, 2005; Shivaputrappa and Ramesh,(2013as well as Shuva, 2014).

263

In contrast the head librarians denoted training their staff before IS installation and after installation through in-house training, workshops and seminars. The quantitative data on training from the questionnaires contradicts the qualitative data collected during interviews with head librarians. It can therefore be concluded that though staff are provided with some training opportunities, the amount of training is not considered enough to enable them to use the system independently and maximally. This is also evident from the interviews with IT heads who pointed towards being dependent on self-training and workshops to enhance their library IS project skills.

In rating how promptly IS managers attend to the difficulties and challenges encountered with ISs use, only 36.9% of respondents rated the response above average while only 32.2% rated responses to system failure above average. The lack of library staff's advanced skills to effectively utilize the ISs coupled with the slow response time to solve system challenges, might lead to extensive times when the IS is not utilized at all.

The low maintenance/service quality components of ISs used in academic libraries in Ghana is likely to have effect on quality and use of the IS as estimated by Delone and Mclean (2004) and explained by Nelson, Todd, and Wixom, (2005) that good IT service increase the quality of IS and services.

8.8.9: Use of IS and skill to use IS by staff

Use is defined by Delone and Mclean (2004) as the level of interaction of staff with an IS. Use of an IS is affected by system quality and information quality in the DeLone and McLean IS success model Fang, Chiu, and Wang (2011). Analysis of the results of this study proved that 45% of the respondents have always performed their jobs using the ISs that are available, while 45.6% regarded the IS as being always available and flexible to use. This data corroborated the qualitative data in that only three head librarians acknowledged to their staff

264

being happy to use the IS. This confirms Maguire's (2002) assertion that most ISs are underutilized and the libraries are therefore not getting maximum value due to lack of optimum utilization as suggested by Fattahi and Afshar,(2006). This also affirms the claim of Delone and Mclean (2004) that in the DeLone and McLean success "use" is affected by system quality and service quality as can be seen from discussions sections 8.8.5 and 8.8.8.

In determining their skills level to optimally use the IS, 34.9% of respondents are of the opinion they possess the required skills. However, as many as 75.2% acknowledged to needing training to enable them to use the ISs to the optimum. It corresponds with conclusions by Mouakket and Bettayeb (2005) and Spacey, Goulding and Murray (2003) that training and technical support affect IS use. It therefore means that apart from the below average system quality that affects the use of ISs in the libraries studied, the lack of and need for training are major factors affecting the use of ISs in the libraries studied.

It is also reflected in the challenges affecting IS use identified by respondents as lack of own adequate skills (69.8%), insufficient training (65.8%) and lack of IT skills by colleagues (68.5%). This is an indication that heads of libraries have not heeded the call of Bharati and Berg (2003:186) to ensure "employee IS performance" which they believe will enhance the quality of service rendered in an organization.

8.9: Challenges encountered with use of ISs

Both the questionnaires to library staff and interviews contained a question on challenges encountered with IS use.

Staff members identified regular system failure or downtime (65.1%) and slowness of the system (71.1%) as major challenges. Most respondents (71.8%) pinpointed insufficient

265

bandwidth as another major challenge. This is the result of the poor maintenance already reported on in section 8.12.6 which has a direct link with the inadequate usage of the systems.

As second challenge, both library staff (60%) and head librarians (78%) identified internet and power downtime. These have become a common challenge associated with IS use across most African countries - especially West Africa (Asogwa, 2014 as well as Eze, Awa, Okoye, Emecheta and Anazodo 2013)..

Another set of challenges was the availability of resources and IT personnel. All fourteen interviewees as well as 69.8% of library staff labeled the lack of modern ICT equipment as reason for ineffective use of the ISs.

The lack of qualified ICT staff was regarded as a challenge by 65.1% of questionnaire respondents 42.8% of interviewees.

It was however interesting to note that despite the fact that the over 70% of library staff indicated having challenges with IT skills and training, only four heads of libraries and IT units enumerated lack of skills and lack of training of staff as a challenge confronting the use of ISs in their libraries. It is an indication that the managers have not been able to determine the human effect of ISs in their libraries as strongly alerted to by Spacey, Goulding and Murray (2003).

It is worthy to note that resources availability, especially lack of personnel and equipment, coincide with Bajgoric (2006) stating that resources are compulsory elements of an IS. It is therefore possible for the researcher to conclude that the heads of libraries and IT units have not done use analysis of the IS to determine the major challenges that hinder staff from effectively using the system in order to provide solutions that will enhance use.

Apart from the challenges discussed above, three of the libraries studied have experienced major system down time caused by air conditioner malfunctioning, malfunctioned equipment and fiber cut. Also, five of the libraries had major challenges migrating from one LMS to another either through data loss or inability to migrate data. This has actually forced two of the libraries to use two different LMS (the new and the old) concurrently till they are able to manually load all data onto the new LMS they have acquired. The correlation test performed showed that, though there is a negative correlation between challenges and IS use, it was a moderate correlation.

8.10: Acceptance of hypotheses

The study stated four hypotheses as presented in chapter five.

8.10.1: H1: Management of ISs affects the quality of ISs in academic libraries in Ghana

The Spearman's correlation shows that there was a strong positive correlation between management and IS quality (rs = .553, n = 147, p < .001). The study therefore accepts H1.

8.10.2: H2: The quality of an IS affects the use of the IS in academic libraries in Ghana

Spearman's correlation indicates a strong positive correlation between the quality of an IS and the IS use (rs = .656, n = 147, p < .001). The study therefore accepts H2.

8.10.3: H3: IS use affects service provision in academic libraries in Ghana

The Spearman's correlation reflects a strong positive correlation between IS use and service provision (rs = .528, n = 147, p < .001). H3 as stated is accepted.

267

8.10.4: H4 Challenges affect the use of ISs in academic libraries in Ghana

H4 was stated to determine whether challenges encountered affect the use of ISs. Spearman's correlation depicts a moderate negative correlation between challenges encountered and IS use (rs = -.344, n = 147, p < .001). Thus, H4 as stated in this study is accepted.

8.11: Concluding summary

This chapter presented discussion of the three set of data collected and positioned the discussion in the context of relevant literature. The next chapter provides conclusion and answers the research questions.

268

CHAPTER NINE: CONCLUSION AND RECOMMENDATIONS

9. 0: Introduction

This chapter summarizes findings based on the research question, concludes the study by testing the hypothesis, presents a proposed standard guideline for IS use and management in Ghanaian university libraries, makes recommendations and points to further research.

The purpose of this study was to determine the types of ISs that are used in academic libraries in Ghana, how they are managed and how management practices affect the use of the IS by library staff. The study also aimed at developing a Ghanaian standard guideline that will serve as a guideline for academic libraries to manage and use ISs they have adopted efficiently. The study was therefore guided by the following research questions:
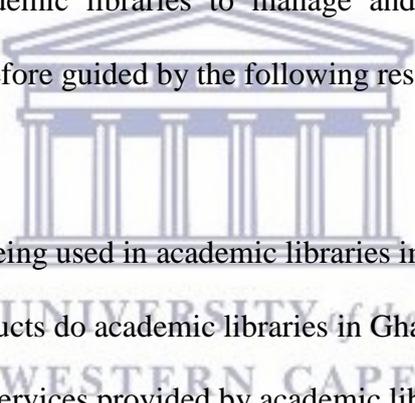
1. What types of ISs are being used in academic libraries in Ghana?

2. What services and products do academic libraries in Ghana provide using ISs?

3. How does an IS affect services provided by academic libraries in Ghana?

4. Which challenges are encountered in the use of ISs in the academic libraries?

5. a. Do academic libraries have strategic plans in place for managing ISs?

   b. What factors/aspects should be addressed by a standard guideline for managing ISs?

6. What opportunities exist to formulate a national IS standard guideline for Ghana?

In order to achieve the objectives stated above, the researcher provided a background and identified the problem that necessitated this study, namely that not much literature is available on library IS use in Africa and that Ghana lacks an IS standard for libraries. Chapter

269

two situated the study in the context of the wider literature where it was discovered that libraries have been among the earliest adopters of new computer technologies and the changing nature of information resources and user demands have placed a great responsibility on libraries to adopt emerging IT tools to serve users. This resulted in libraries now depending heavily on different types of ISs to provide services generating numerous benefits to the library industry. Despite the benefits, African libraries are confronted with financial, technological, infrastructural, human resources and organizational challenges which hinder effective IS usage.

The researcher collected three different sets of data to answer the research questions. A set of quantitative data was collected from library staff using a questionnaire design based on the elements identified in literature and the theory adapted for the study. The questionnaire was divided into the following major sections:

1. Use of Information Systems

2. Personal impact of IS use in library

3. Information-Quality of IS

4. System Quality of IS

5. Management Support for IS

6. Maintenance of IS

7. Use and future use of IS

8. Challenges encountered with IS use

Under each section of the questionnaire a number of comments were provided to measure the variable stated. Respondents were asked to measure the variable using the Likert scale strongly agree, agree, average, disagree and strongly disagree. The responses gathered were analyzed and presented in chapter five. Chapter six presented analysis of the qualitative data

270

collected through interviews with library and IT unit heads. With websites now been categorized as ISs, the researcher adapted the check list of Pareek and Gupta to determine, analyze and present in chapter seven the system, information and service quality of the websites libraries studied. The three different data sets collected were discussed in the context of the literature and presented in chapter eight.

In order to determine how IS management affects its usage, the DeLone and McLean Information Systems Success Model was adapted and presented in detail in chapter three. The DeLone and McLean theory stipulates that management of an IS affects the quality of the IS and that the quality of the IS determines how the system is utilized to the benefit of the libraries.

On the basis of the DeLone and McLean theory, and that of other scholars who have used it, the researcher came up with the following hypotheses:

H1 Management of ISs affects the quality of ISs in academic libraries in Ghana

H2 The quality of ISs affects the use of the ISs in academic libraries in Ghana

H3 IS use affects service provision in academic libraries in Ghana

H4 Challenges affect the use of ISs in academic libraries in Ghana

9.1: Types of ISs use

With regards to the types of ISs used in academic libraries in Ghana, the research findings revealed that, academic libraries have implemented a number of ISs for performing library tasks. The major ones include ILMS/LMS, DAM (DSPACE), office applications, website and social media.

271

Some ISs are categorized as stand-alone systems enabling the user to perform specific functions like word processing, systems for local or departmental functions which enable a specific unit within the library to perform a unique function. DSpace used for digitization is in this category. There are enterprise-wide types of ISs which are basically the ILMS/LMS that enables the different units within the library to use an integrated platform to enhance data sharing. There is also inter-organizational type of ISs; this type is not being used by the libraries studied as for instance none of the libraries has their LMS fully integrated into the main university system.

Using Laudon and Laudon (2014)'s categorization, the ILMS use in the libraries studied is categorized under Enterprise application which coordinates all library processes at the various levels of management right from acquisition through cataloguing to circulation.

Specifically, the LMS and DAM are Enterprise Resource Planning systems (ERP) that integrate several modules to support intra-organizational library collaboration and with the availability of Web-enabled catalogues and access to external data-warehouse of catalogues and knowledge base of other libraries the LMS used are next generation ERP or next generation library Management systems. The research did not find any library using Library Service platforms.

It was also noted that Ghanaian libraries are joining the trend noted in other parts of the world where most libraries are now moving from proprietary LMS to open source. The majority of the libraries are using open source software with most of them having changed from proprietary to open source LMS. All the libraries using DAM are using DSpace - an open source software.

The libraries use collaboration and communication systems such as websites, instant messaging and social media for sharing information on library services to both staff and

272

patrons and marketing library services. The most used social media platforms were identified as WhatsApp, YouTube, Facebook and Twitter. However, WhatApp and YouTube are used mostly for personal work related issues by the staff. Facebook and Twitter are the most used official social media sites, but recorded low usage among the library staff as compared to ones use for personal communication.

9.2: Services provided with ISs

Research question two sought to find answers to the services or functions and products academic libraries in Ghana provide using ISs.

The study revealed that the LMSs adopted by the libraries are used to perform functions of circulation, cataloguing, OPAC, acquisition and course reserve. The most used function is circulation, while acquisition and course reserve recorded very low usage rates.

Although Alexandrai, Koha and Sierra have the capability to support e-resource management, none of the libraries use the LMS to manage electronic collections. Sierra could also be used for creating the digital repository of the library, but only DSpace is used. This does not support the major purpose of the development of the next generation IS which is the provision of unified workflows.

It was noted that the libraries do not implement all the modules of the acquired LMS. Some are still using manual circulation methods. Information generation from the LMS is also very low.

The use of general office applications is common among the libraries and are even used for main library functions such as typing circulation reports, lists of electronic resources, usage statistics, patron lists and lists of dissertation available in the library.

273

The majority of the respondents have established an Institutional Repository. The intellectual outputs of the university are digitized and stored using DSpace and made available on the websites for international access.

The majority of the libraries have websites, but these are limited to the provision of information on the library services and opening hours as well as the OPAC. Some of the libraries provide "off-campus" access to the subscription based electronic resources, library "news alerts" and RSS. Interestingly no union catalogue or links to the catalogues of other libraries in the country or internationally is present. The use of the website for virtual services to patrons such as "Ask a librarian", purchase suggestions, user guidelines, new-arrivals, and reservation services is minimal. Modern features of websites including "my account", discovery, LibGuide s are reflected on only one library's website.

With regard to the use of social media for library services, the research revealed minimal use of major social media sites. Limited use of Facebook and Twitter to disseminate information on library resources and services to their patrons were recorded.

Though the libraries studied are using the IS they have adopted for different functions, services and products, it is very clear from the results of the study that none of the libraries is making maximum use of all the IS they have implemented. Despite the fact that the IS are not being fully utilized, IS use in the libraries have served it utility function as a substitute to routine manual task to enhance productivity.

9.3: Effect of ISs on library services

The third research question sought to determine the effect of IS use on library services and functions. The study brought to fore two major positive effects:

1. Effect on the individual's work

274

2. Effect on the general library function

It is noteworthy that one of the major findings of this research is that ISs positively affect staff ability to work effectively. The study revealed that IS use by library staff increase their level of knowledge through job related functions, helps in retaining and recalling information to perform task effectively and helps increase efficiency and productivity.

The implementation of an IS has achieved all IS roles; to automate library function, transfer data from one unit to another and transforming library processes and services. Libraries have also indicated the use of ISs such as social media to network with colleagues and patrons - though not to a very high extent. The major specific benefits that were noted in this study are:

1. Saving of time

2. Easy work processes

3. Speedy work process

4. Digital storage of data

5. Enhanced collaboration

6. Visibility of library

7. Global access to the contents of the library

9.4: Challenges encountered with IS use

To answer research question four, the determined the challenges that are encountered in the use of ISs in the academic libraries. The following challenges confronting libraries were discovered:

1. System failure

2. Internet and power challenges

3. Lack of resources

4. Lack of IT personnel

275

5. Lack of adequate ICT skill among library staff

6. Inadequate training for both library staff and ICT staff

7. Difficulty in migrating data from one LMS to another

The study thus revealed that the existence of an ISs in terms of assets, equipment and staff leaves much to be desired as lack of equipment, power, internet and personnel topped the list of challenges that users encounter.

9.5: Availability of strategic plan

Research question five sought to determine the availability of strategic plans for managing ISs as well as the factors that should be considered in drafting one. Only one library has an IS policy specifically for the library whiles less than half of the others are depending on the IS policies of their mother institutions. Interestingly, one librarian has never seen the IS policy but assumes the university has one.

Issues enumerated by respondents to be addressed in a national IS standard guideline are:

1. An IS policy should ensure maximum use of the IS

2. Funding should be made available for IS projects

3. Qualified IT and library staff should be employed

4. Adequate training should be given to staff

5. Modern and adequate infrastructure should be made available

6. Maintenance work should be carried out on ISs regularly

7. Provision should be made for legal and ethical issues

8. Security of the IS should be considered

9. Use of ISs to automate library functions should be made compulsory for all libraries

276

9.6: Opportunity for formulating an IS standard guideline

Research question six determined the opportunities available for formulating an IS standard guideline for academic libraries in Ghana.

The research findings have shown very clearly that academic libraries in Ghana need an IS standard guideline. All the libraries studied have implemented more than one IS to automate library activities. Despite the implementation of ISs, most of the libraries are not being guided by any standard on using and managing the ISs. Some libraries are not utilizing their ISs and perform tasks manually or with general office management systems. Most of the IT heads perform maintenance as and when they feel it is necessary or when the system breaks down. Lack of adequate skills on the part of library staff to fully use the IS coupled with inadequate management and system support, were clearly indicated.

The researcher therefore believes the availability of an IS standard guideline for libraries will be in the best interest of the three major in-house stake holders namely the head librarians, library staff and IT staff and that the standard guideline will help libraries to develop IS policy to guide each staff in the performance of specific tasks.

9.7: Proposed IS standard guideline for Ghanaian academic libraries

Based on the findings of this research, this section provides the proposed IS standard guideline for academic libraries in Ghana to serve as a benchmark for ensuring implemented ISs in libraries are used for the purpose for which they were acquired and managed properly to ensure future use and benefits to the library.

9.7.1: Purpose and function

The purpose of acquiring an IS should be defined and outlined for each IS acquired and every staff member made aware of this.

The functionalities and requirement of each IS adopted should be specifically stated. This will serve as a yardstick for measuring the performance of the IS.

9.7.2: Legal and ethical issues

The use of the IS should be situated within the code of conduct of the information professional and all data collected and use on patrons should be done within the personal data protection act of the country.

9.7.3: Financial provision

To ensure adequate financial provision of IS projects, every academic library should assign a specific percentage of the library's budget towards an IS project. This initiative will help the institutions to make funds available for IS projects. The percentage assigned should be reviewed regularly and taken into consideration local currency to foreign exchange rates as most of the IS tools are imported.

Academic libraries should endeavor to seek other sources of funding through aid and internally generated funds to finance library IS projects.

9.7.4: Level of integration

Academic library ISs should be integrated with the main university system used by staff and students and the learning management system adopted by the university.

278

9.7.5: Hosting of IS and security

Academic libraries should determine the means of hosting ISs; whether cloud-based or locally hosted. If locally hosted, it should be indicated if it will be hosted by the main university IT unit or in the library. Whichever option the library decides on, adequate facilities should be provided.

The library IS team should endeavor to provide current and robust internal and external security of the IS. This will ensure that physical IS infrastructure and data in the IS are secured. Appropriate levels of authorization should also be granted to each staff member in order to safe guard the integrity of data and the system at large.

9.7.5: Information provision on IS

Adequate information should be provided to each staff member on the use of the IS and how it can affect the staff's job and the total outcome of the library. This will help staff appreciate the benefits they are likely to gain from the use of the IS for their specific job roles and the total benefit of the use of the IS to the library.

Each job position should be associated with a specific IS function and staff should be adequately informed. This will enable staff to know exactly what functions to use the IS for in their line of duty.

Information should be given to all staff members anytime there is an upgrade or change in the IS associated with specific job performance to enable library staff be abreast with current changes to the IS to enable ease of use.

9.7.6: Design issues

The user interface of all ISs should be designed to be user friendly and format of output from ISs should be well structured to ensure clarity and use.

9.7.7: Maintenance and upgrades

Estimated schedules for maintenance work should be specifically outline and measures put in place to ensure the stated maintenance is carried out.

The life span of every major equipment including servers, workstations, and scanners among others should be clearly stated. This will ensure that equipment are replaced before they become obsolete.

9.7.8: Evaluation of ISs

Estimated schedules for evaluation of jobs performed with ISs should be provided. This type of evaluation can easily be done through report generation on each function for every user account created in the IS. This will ensure that staff will use the IS to perform their expected roles.

The performance of the IS itself should be evaluated using the purpose and functions outlined as yardstick. It is highly recommended that this should be done every three months in order to determine if the IS is performing as expected.

9.7.9: Training

Training should be made a core component of an IS. Training should be provided on general computer use skills and library IS use on three different levels;

    a. Pre-implementation training: this should be provided by the vendor/developer/ consultant in charge of the IS before implementation and during the implementation

280

process of the IS. This type of training should aim at giving the general knowledge and skills of using the IS to all staff members and also equip each staff with adequate skills to use the IS to perform specific job related functions. It is advisable for this type of training to equip core IT/IS staff with adequate knowledge and skills on installation and all functions of ISs so that they will serve as in-house trainers to other staff members in the future.

b. Refresher training: due to the fact that IS functionalities keep advancing, it is prudent for libraries to organize refresher training to all staff members using training methods that best meet the needs of the library. Libraries can organize in-house training using IT/IS staff who have been trained by vendors as proposed in point (a) above. No matter the method of training chosen by a library, it is highly recommended for each staff member to be retrained at least once in every three months to ensure library staff do not become obsolete in the use of the IS and other IT tools.

c. It is highly recommended that personal training sessions should be organized for individual staff who may have peculiar challenges with IS use. This is very necessary in the Ghanaian context since the majority of library staff indicated that they do not have advanced IT skills leading to the possibility of them to not utilize the training initiatives optimally or struggling to apply skills and activities after the training. This type of training will help them to feel more comfortable to express their weakness and be assisted to overcome them.

Due to the peculiar nature of the Ghanaian situation where IT professionals with expert knowledge on library ISs are generally not available, IS installation and training should be made a compulsory part of the purchasing agreement so that vendors will ensure the full enrolment of the IS before handing it over to the library. In the case of open-source software acquisition, consultation should be done with an expert team with knowledge of library IS

281

installation. This will help prevent the situation where IS projects are left in the hands of an individual IT staff member.

9.7.10: Level of authentication

The LMS/DAM use should ensure a two level authentication. Thus data entered should be approved by a senior level staff to ensure the integrity of the data in the IS.

9.7.11: Level of automation with ILMS and functions

Total automation of all library functions and services is highly recommended but due to the challenging demands of the Ghanaian environment, it is also recommended that at least all basic/core library functions namely acquisition, cataloguing, electronic resource management, circulation and OPAC should be the minimum level of automation in every academic library in Ghana with the ILMS adopted having the function of report generation.

9.7.11.1: Acquisition

The acquisition module should enable pre-order searching, ordering process, receiving, fund processing and payment.

9.7.11.2: Cataloguing

The cataloguing module should support an international machine readable cataloguing record standard. This will ensure that the bibliographic record of libraries can be shared and the database can be migrated to another ILMS.

9.7.11.3: Serial control

The serial control module should provide functions to support the processes of ordering, receiving, paying of current issues, cataloguing, indexing and creating of union list of serial publications.   It must also contain a search functionality allowing for different access points.

9.7.11.4: Electronic resource management

The electronic resource management module should enable libraries with a subscription management facility supported by a knowledge base, an A-Z searchable list, provide information on electronic resources held by the library and their subscription status, vendor access to provide support through trial, acquisition and licensing stages. The system should enable the library to generate usage statistics for each electronic resource.

9.7.11.5: Circulation

The circulation model should be used for the following minimum functions;

- Creation of user accounts
- Charge items
- Discharge items
- Calculate fines
- Payment of fines
- Assignment and modification of due dates of items
- Sending of automatic e-mails or SMS to patrons on overdue and other relevant messages

The circulation module of an ILM acquired by a library should also enable offline circulation in case of system failure or internet downtime. This is very essential in the Ghanaian environment where internet downtime is a common challenge. The offline and on-line

283

circulation modules should be programmed to synchronize automatically to avoid inaccuracies in the two data sets.

9.7.11.6: OPAC

The OPAC should be online and work well with major browsers to facilitate federated searching. All library materials including e-resources and IR records should be searchable via different search options or access points via the OPAC.

9.7.11.7: Report generation

The report module should provide statistical information on each record in the LMS as well as staff activity which can be used to determine productivity of staff and the performance of the IS.

9.7.11.8: Personalization feature

The ILMS adopted should provide a feature for end users to create personal accounts to keep track of library resource they use or are interested in. This feature should enable a user to keep record of all transaction performed with the ILMS. A user should be able to self-charge and discharge resources and also renew via the web portal of the library with this feature.

9.7.12: Use of DAM

- Every academic library should use the most current version of the DAM chosen. It is recommended that libraries keep to using one type of software as is the situation now to enable them to continue sharing their experiences.

- A minimum of two staff members should be trained and assigned to IR projects even in small libraries.

- Self-archiving should be encouraged among the academic community as it will reduce the work load of the library staff.

- Bibliographic details and metadata of materials uploaded should be linked with the OPAC and discovery services to enhance the use of the materials.

- The content of the materials should be uploaded in searchable format.

- Ghanaian academic libraries should endeavor to merge their IR to form a national academic repository for the country.

9.7.13: Social media accounts

Libraries should officially declare the social media handles they have created for official functions. To ensure active use of library social media handles, a staff member should be assigned to be in charge thereof and post information regularly. All other staff members and patrons should be encouraged to patronize the links.
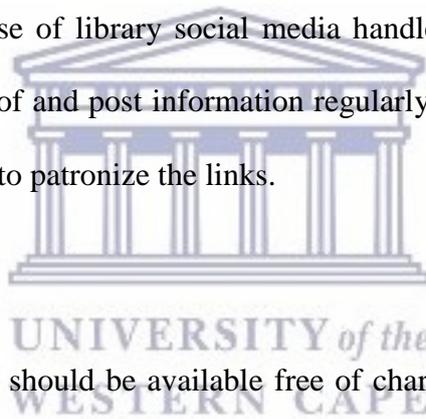
9.7.14: Library websites

All academic library websites should be available free of charge and link to the library site not more than three clicks from the university home page. It is highly recommended for the library link to be on the home page or at least under the academic link. The link should be appropriately titled "library".

Adequate navigational and search features should be provided.

The date of posting and authorizing institution (library) should be clearly stated on each page of the site.

Information available on the site should be updated at least every three months.

All libraries should provide the following functions and information on their website:

285

- Web site index

- Site map

- Library web site feedback form or e-mail link

- Web site search

- Frequently Asked Questions (FAQs)

- Mobile version (mobile catalogue)

- Webmaster link

- Library "news alerts"

- RSS feed

- Web 2.0

- User guidelines

- Virtual help desk or ask a librarian

- New-arrival section

- LibGuide s

- Myaccount

- Discovery services

- Library events calendar

- Image gallery of library providing pictures of every section of the library and other library activities

- Online tutorials

- Information and virtual request for off-campus access

- Information on different library sections

- Library services and technical services

- Link to e-resources including a research portal

- Information on library resources/collection

286

- Library general information

The library website should be provided in the two major international languages namely English and French to enable academics from neighboring Francophone countries and other parts of the world access to the information from the websites.

9.7.15: Staffing for IS projects

The library committee should setup a sub-committee to oversee IS issues in the library. This committee should be headed by the librarian and the head of IT unit should be made a member.

Every academic institution should assign one IT/IS staff to the library who will be directly in charge of all library IS issues. Big public universities can set up IT units within the library to provide IT support to the library team.

9.9: Conclusion

The aim of this study was to determine how academic libraries in Ghana are using and managing their ISs and also to determine the effect of management on IS use. Academic libraries in Ghana have adopted different ISs including LMS, DAM and social media to perform different library services, but they are not being used to their full potential.

Ghanaian academic libraries do not perform enough maintenance activities to ensure the effectiveness of the IS. This has led to the neglect of some ISs and has affected the quality of the IS in a number of the libraries studied. Likewise, management of the institutions have not put enough measures in place to ensure availability of both technical and human resources to aid the effective use of the IS. Information provision to library staff on IS issues and training opportunities to equip staff to utilize the IS were deemed inadequate.

287

These factors were proved by statistical evidence in this study as having effect on IS use. When an IS is being managed it increases the quality of the IS which ultimately affects the use of the IS. Thus the more quality features an IS possesses, the more staff will use the IS. The more the staff of the library use the IS, the more positive effect the IS has on library service delivery.

Though the study proved that the more challenges staff encountered with the IS, the less they used the IS, this effect was not very strong for the probable reasons that, users have no choice than to use the systems provided, staff are aware of the benefits of using the IS, most of the challenges are external to the system itself and is the reason why system quality rather highly affected the use of the IS. The study therefore accepted all four hypotheses stated in this study.

The findings thus show that the adoption of the MandD IS success model for this study was very appropriate as was discussed in chapter three. All variables identified in the theory have been appropriately used and estimated relationships were established and proven to be accurate through statistical means.

9.10: Contribution and originality of the study

This study provided a unique opportunity for testing the MandD success model in a Ghanaian IS use context with already existing challenges which are not common to the western world settings that have been used to test this theory.

The study has been able to provide evidence to fill the gap in the Ghanaian library literature on the extent to which ISs are being used in libraries and how they are managed.

288

The study developed an IS standard guideline for Ghanaian academic libraries base on first hand evidence of the peculiar needs of these libraries. This will serve as a guideline to help libraries make maximum use of ISs in academic libraries in Ghana.

9.11: Recommendations

One of the benefits of LMS use is the ability to establish a union catalogue that will serve as a visibility point for the collection of all academic libraries' resources which can be accessed by anybody from any part of the world. Academic libraries have been using LMS in Ghana for over ten years now. They should therefore establish a union catalogue.

Member libraries of CARLIGH should consider acquiring a common LMS and put a team of experts together to help roll over the system to all member libraries. This will help in the easy implementation of the system at a reduced cost for members and the assurance of availability of experts to help install the LMS.

Libraries should also ensure they have tested the IS they want to purchase to ensure they perform to their satisfaction before they are acquired. This will avoid the current situation of acquiring ISs and abandoning them later due to technical challenges.

Training of library staff in the use of ISs for specific library functions should be made a priority in libraries as the ability to use the system is a pre-requisite to the effect of the system.

IS projects and maintenance cost should be assigned a specific percentage of every libraries' budget. This will ensure that the IS, which has become a compulsory element of library process, is easily taken care of.

Every library should adopt an IS policy based on the standard that has been proposed in this study to ensure that ISs are properly managed and used for the specific purposes for which they have been acquired.

9.12: Recommendation for further studies

This study looked at how the management of ISs affects the use of these IS by library staff. It will be very beneficial to study how the management of ISs affect the use of the IS by library patrons since they are the ultimate aim for the adoption of the IS to satisfy their needs.

The current study and many others revealed the lack of adequate ICT skills by library staff which affect negatively the use of the IS. The researcher is recommending a further study to specifically investigate or test the ICT skills of library staff in order to propose or recommend the right training for fully and effectively use of ISs in the provision of library services.

In this study it was revealed that the libraries were using different types of LMS and abandoned one for another in certain cases. The researcher is therefore proposing a further study to investigate the functionality and usability of specific LMS in order to provide an independent view from that of the vendors to guide librarians in their choice of LMS for library functions.

REFERENCE LIST

4international colleges and universities. (2016). Top universities in Ghana. Retrieved July 30, 2016, from http://www.4icu.org/

Ada, Ş., and Ghaffarzadeh, M. (2015). Decision making based on management information system and decision support system. *European Researcher*, 93(4), 260–269. http://doi.org/10.13187/er.2015.93.260

Adanu, T. S. A. (2006). Planning and implementation of the University of Ghana library automation project. *African Journal of Library, Archives and Information Science*, 16(2), 101–108.

Adeleke, A. A., and Olorunsola, R. (2010). ICT and library operations: more on the online cataloguing and classification tools and techniques in Nigerian libraries. *The Electronic Library*, 28(3), 453–462. http://doi.org/doi.org/10.1108/02640471011052025

Adeyoyin, S. O. (2005). Information and communication technology (ICT) literacy among the staff of Nigerian university libraries. *Library Review*, 54(4), 257–266. http://doi.org/10.1108/00242530510593443

Adeyoyin, S. O. (2006). ICT literacy among the staff of West African university libraries: a comparative study of anglophone and francophone countries. *The Electronic Library*, 24(5), 694–705. http://doi.org/10.1108/02640470610707286

Adogbeji, O. B., and Adomi, E. E. (2005). Automating library operations at the Delta State University library, Nigeria. *Library Hi Tech News*, 22(5), 13–18. http://doi.org/10.1108/07419050510613800

Agyemang, F. G., Boateng, H., and Dzandu, M. D. (2015). Dialogic communication on universities in Ghana libraries' websites. *The Electronic Library*, 33(4), 684–697.

291

http://doi.org/doi.org/10.1108/EL-02-2014-0041

Ahenkorah-Marfo, M., and Akussah, H. (2016a). Being where the users are: readiness of academic librarians to satisfy information needs of users through social media. *Library Review*, 65(8/9), 549–563. http://doi.org/10.1108/LR-02-2016-0020

Ahenkorah-Marfo, M., and Akussah, H. (2016b). Changing the face of reference and user services: adoption of social media in top Ghanaian academic libraries. *Reference Services Review*, 44(3), 219–236. http://doi.org/doi.org/10.1108/RSR-01-2016-0001

Ahmad, N., and Mehmood, R. (2015). Enterprise systems: are we ready for future sustainable cities. *Supply Chain Management*, 20(3), 264–283. http://doi.org/10.1108/SCM-11-2014-0370

Akram, M. S., Malik, A., Shareef, M. A., and Goraya, A. S. M. (2019). Exploring the interrelationships between technological predictors and behavioral mediators in online tax filing: the moderating role of perceived risk. *Government Information Quarterly*, (February 2018), 1–15. http://doi.org/10.1016/J.GIQ.2018.12.007

Aksoy, A., Ozturk, N., and Sucky, E. (2012). A decision support system for demand forecasting in the clothing industry. *International Journal of Clothing Science and Technology*, 24(4), 221–236. http://doi.org/10.1108/09556221211232829

Alaraifi, A., Molla, A., and Deng, H. (2012). An exploration of data center information systems. *Journal of Systems and Information Technology*, 14(4), 353–370. http://doi.org/10.1108/13287261211279080

Aldholay, A. H., Isaac, O., Abdullah, Z., and Ramayah, T. (2018). The role of transformational leadership as a mediating variable in DeLone and McLean information system success model: the context of online learning usage in Yemen. *Telematics and*

292

Informatics, 35(5), 1421–1437. http://doi.org/10.1016/j.tele.2018.03.012

Alleyne, P., and Lavine, M. (2013). Factors influencing accountants' behavioural intentions to use and actual usage of enterprise resource planning systems in a global development agency. *Journal of Financial Reporting and Accounting*, 11(2), 179–200. http://doi.org/10.1108/JFRA-11-2011-0017

Amekuedee, J.-O. (2005). An evaluation of library automation in some Ghanaian university libraries. *The Electronic Library*, 23(3), 442–452. http://doi.org/10.1108/02640470510611508

Anbu, P. J. K., and Mavuso, M. R. (2012). Old wine in new wine skin: marketing library services through SMS-based alert service. *Library Hi Tech*, 30(2), 310–320. http://doi.org/doi.org/10.1108/07378831211239979

Andranovich, G. D., and Riposa, G. (2011). *Doing urban research*. Thousand Oaks: SAGE Publications, Inc. http://doi.org/http://dx.doi.org/10.4135/9781412983983

Anfara, V. A. (2012). Theoretical frameworks. In L. M. Given (Ed.), *The SAGE Encyclopedia of Qualitative Research Methods* (pp. 870–873). Thousand Oaks: SAGE Publications. http://doi.org/10.4135/9781412963909

Ani, O. E., Esin, J. E., and Edem, N. (2005). Adoption of information and communication technology (ICT) in academic libraries: a strategy for library networking in Nigeria. *The Electronic Library*, 23(6), 701–708. http://doi.org/doi.org/10.1108/02640470510635782

Anie, S. O., and Achugbue, E. I. (2009). Library information and communication technology in Nigerian universities. *Library Hi Tech News*, 26(7), 8–10. http://doi.org/10.1108/07419050911000490

293

Anisimov, D. E., and Reshetnikov, I. S. (2011). Management aspects in MES implementation projects. *Automation and Remote Control*, 72(6), 1319–1332. http://doi.org/10.1134/S0005117911060208

Ardalan, A., and Ardalan, R. (2009). A data structure for supply chain management systems. *Industrial Management and Data Systems*, 109(1), 138–150. http://doi.org/10.1108/02635570910926636

Aruldoss, M., Travis, Lakshmi M., and Venkatesan, Prasanna V. (2014). A survey on recent research in business intelligence. *Journal of Enterprise Information Management*, 27(6), 831–866. http://doi.org/10.1108/JEIM-06-2013-0029

Asemi, A., Akbari, A., Kheradmandnia, M., and Farazi, A. (2012). Investigating the level of desirability of information in management information systems in libraries in Iran. *The Electronic Library*, 30(6), 833–843. http://doi.org/10.1108/02640471211282136

Asogwa, B. E. (2014). Libraries in the information age: a measure of performance, competencies and constraints in academic libraries in Nigerian universities. *The Electronic Library*, 32(5), 603–621. http://doi.org/doi.org/10.1108/EL-07-2012-0097658

Awadh, A. (2016). User perceptions of ICT at the American University of Kuwait library. *Library Hi Tech*, *34*(1), 143–150. http://doi.org/doi.org/10.1108/LHT-09-2015-0087

Ayoku, O. A., and Okafor, V. N. (2015). Library ICT skills acquisition and competencies of librarians: implications for digital and electronic environment in Nigerian universities libraries. *The Electronic*, 33(3), 502–523. http://doi.org/doi.org/10.1108/EL-08-2013-0155

Baabdullah, A. M., Alalwan, A. A., Rana, N. P., Kizgin, H., and Patil, P. (2019). Consumer use of mobile banking (M-Banking) in Saudi Arabia: towards an integrated model.

International Journal of Information Management, 44(August 2018), 38–52. http://doi.org/10.1016/j.ijinfomgt.2018.09.002

Baccarne, R. (2019). Hello CRIS, can a library software solution help you? *Procedia Computer Science*, 146, 208–219. http://doi.org/10.1016/j.procs.2019.01.095

Back, G., and Bailey, A. (2010). Web services and widgets for library information systems. *Information Technology and Libraries*, 29(2), 76–86. http://doi.org/10.6017/ital.v29i2.3146

Bacon, C. J., and Fitzgerald, B. (2001). A systemic framework for the field of information systems. *The DATABASE for Advances in Information Systems*, 32(2), 46. http://doi.org/10.1145/506732.506738

Bailin, A., and Grafstein, A. (2005). The evolution of academic libraries: the networked environment. *Journal of Academic Librarianship*, 31(4), 317–323. http://doi.org/10.1016/j.acalib.2005.04.004

Baille, S., and Miller, R. (2011). Paradigm. In R. L. Miller and J. Brewer (Eds.), *The A-Z of Social Research* (pp. 221–222). London: SAGE Publications. http://doi.org/10.4135/9780857020024

Bajgoric, N. (2006). Information systems for e-business continuance: a systems approach. *Kybernetes*, 35(5), 632–652. http://doi.org/10.1108/03684920610662377

Baker, D. (2008). From needles and haystacks to elephants and fleas: strategic information management in the information age. *New Review of Academic Librarianship*, 14(1–2), 1–16. http://doi.org/doi.org/10.1080/13614530802518800

Balnaves, E. (2008). Open source library management systems: a multidimensional

295

evaluation. *Australian Academic and Research Libraries*, 39(1), 1–13. http://doi.org/10.1080/00048623.2008.10721320

Barbuti, N., Ferilli, S., Redavid, D., and Caldarola, T. (2014). An integrated management system for multimedia digital library. *Procedia Computer Science*, 38, 128–132. http://doi.org/10.1016/j.procs.2014.10.021

Baro, E. E., and Asaba, J. O. (2010). Internet connectivity in university libraries in Nigeria: the present state. *Library Hi Tech*, 27(9/10), 13–19. http://doi.org/10.1108/07419051011110603

Baro, E. E., Idiodi, E. O., and Godfrey, V. Z. (2013). Awareness and use of Web 2.0 tools by librarians in university libraries in Nigeria. *OCLC Systems and Services: International Digital Library Perspectives*, 29(3), 170–188. http://doi.org/10.1108/OCLC-12-2012-0042

Bassey, R. (2016). Adoption of software packages in university libraries in Nigeria. *Library Philosophy and Practice*, *Paper* 1342(April). Retrieved from http://digitalcommons.unl.edu/libphilprac/1342

Beeson, I., and Chelin, J. (2006). Information systems meets information science. *Italics*, 5(October), 125–129. http://doi.org/doi.org/10.11120/ital.2006.05020003

Bell, B. (2016). Training academic library staff using an online learning management system (LMS). *The Bottom Line*, 29(4), 237–240. http://doi.org/10.1108/BL-02-2016-0008

Belsis, P., Kokolakis, S., and Kiountouzis, E. (2005). Information systems security from a knowledge management perspective. *Information Management and Computer Security*, 13(04), 189–202. http://doi.org/10.1108/09685220510602013

296

Bergman, M. (2008). *Advances in Mixed Methods Research*. Thousand Oaks: SAGE Publications. http://doi.org/10.4135/9780857024329

Bernroider, E. W. N. (2008). IT governance for enterprise resource planning supported by the DeLone-McLean model of information systems success. *Information and Management*, 45(5), 257–269. http://doi.org/10.1016/j.im.2007.11.004

Beynon-Davies, P., Owens, I., and Williams, M. D. (2004). Information systems evaluation and the information systems development process. *Journal of Enterprise Information Management*, 17(4), 276–282. http://doi.org/10.1108/17410390410548689

Bharati, P., and Berg, D. (2003). Managing information systems for service quality: a study from the other side. *Information Technology and People*, 16(2), 183–202. http://doi.org/10.1108/09593840310478685

Biesta, G. (2017). Pragmatism and the philosophical foundations of mixed methods research1. In A. Tashakkori and C. Teddlie (Eds.), *SAGE Handbook of Mixed Methods in Social and Behavioral Research* (pp. 95–118). Thousand Oaks: SAGE Publications. http://doi.org/10.4135/9781506335193

Black, E. L., and Blankenship, B. (2010). Linking students to library resources through the learning management system. *Journal of Library Administration*, 50(5/6), 458–467. http://doi.org/10.1080/01930826.2010.488587

Boateng, H., Agyemang, F. G., and Dzandu, M. D. (2014). The pros and cons of library automation in a resource challenged environment: a case study of KNUST library. *Library Philosophy and Practice*, *Paper* 1061. Retrieved from http://digitalcommons.unl.edu/libphilprac/1061

Boddy, D., Boonstra, A., and Kennedy, G. (2005). *Managing information systems: an*

organizational perspective. Edinburg: Pearson Education.

Breeding, M. (2012). Automation marketplace 2012: agents of change. *Library Journal*, *March*. Retrieved from http://www.thedigitalshift.com/2012/03/ils/automation-marketplace-2012-agents-of-change/

Breeding, M. (2016). Library system report 2016. *American Library Magazine*. Retrieved from https://americanlibrariesmagazine.org/2016/05/02/library-systems-report-2016/

Brinkmann, S. (2012). Interviewing. In *The SAGE Encyclopedia of Qualitative Research Methods* (pp. 471–472). http://doi.org/10.4135/9781412963909

Brown, J. F., Nelson, J. L., and Wineburgh-Freed, M. (2005). Beginning to see the light: developing a discourse for electronic resource management. *The Serials Librarian*, 47(4), 137–147. http://doi.org/10.1300/J123v47n04

Brush, D. A., and Jiras, J. (2019). Developing an institutional repository using digital commons. *Digital Library Perspectives*, 35(1), 31–40. http://doi.org/10.1108/DLP-08-2017-0028

Cabrerizo, F. J., Morente-Molinera, J. A., Pérez, I. J., López-Gijón, J., and Herrera-Viedma, E. (2015). A decision support system to develop a quality management in academic digital libraries. *Information Sciences*, 323, 48–58. http://doi.org/10.1016/j.ins.2015.06.022

Calhoun, K. (2002). From information gateway to digital library management system: a case analysis. *Library Collections, Acquisitions, and Technical Services*, 26(2), 141–150. http://doi.org/10.1016/S1464-9055(02)00226-9

Campos, J. (2016). Managing the information systems in the industrial domain. *Cogent*

Business and Management, 3, 1–33. http://doi.org/10.1080/23311975.2016.1180967

Cannell, S., and Guy, F. (2001). Cross-sectoral collaboration in the choice and implementation of a library management system: the experience of the University of Edinburgh and the National Library of Scotland. *Program*, 35(2), 135–156. http://doi.org/doi.org/10.1108/EUM0000000006945

Chang, J. C., and King, W. R. (2005). Measuring the performance of information systems : a functional scorecard. *Journal of Management Information Systems*, 22(1), 85–115. http://doi.org/10.1080/07421222.2003.11045833

Cheek, J. (2012). Research Design. In *The SAGE encyclopedia of qualitative research methods* (pp. 762–763). SAGE Publications. http://doi.org/10.4135/9781412963909

Chelliah, J., Sood, S., and Scholfield, S. (2015). Realising the strategic value of RFID in academic libraries: a case study of the University of Technology Sydney. *The Australian Library Journal*, 64(2), 113–127. http://doi.org/10.1080/00049670.2015.1013005

Chen, J.-F., Chang, J.-F., Kao, C.-W., and Huang, Y.-M. (2016). Integrating ISSM into TAM to enhance digital library services: a case study of the Taiwan digital meta-library. *The Electronic Library*, 34(1), 58–73. http://doi.org/doi.org/10.1108/EL-01-2014-0016

Cheng, Y.-M. (2014). Why do users intend to continue using the digital library? An integrated perspective. *Aslib Journal of Information Management*, 66(6), 640–662. http://doi.org/doi.org/10.1108/AJIM-05-2013-0042622

Chiu, P.S., Chao, I.C., Kao, C.C., Pu, Y.-H., and Huang, Y.-M. (2016). Implementation and evaluation of mobile e-books in a cloud bookcase using the information system success model. *Library Hi Tech*, 34(2), 207–223. http://doi.org/doi.org/10.1108/LHT-12-2015-0113

299

Cho, J. (2011). Study on a SaaS-based library management system for the Korean library network. *The Electronic Library*, 29(3), 379–393. http://doi.org/10.1108/02640471111141115

Christie, C. A., and Fleischer, D. (2017). Social inquiry paradigms as a frame for the debate on credible evidence. In *Credible and Actionable Evidence: The Foundation for Rigorous and Influential Evaluations* (pp. 27–38). Thousand Oaks: SAGE Publications. http://doi.org/10.4135/9781483385839

Clossen, A. (2018). Integrating the library in the learning management system. *Library Technology Reports*, 54(5), 5. Retrieved from http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=0andsid=05e70fbf-a3eb-445e-92aa-5ef0caefaa00%40sessionmgr4007

Connell, R. S. (2013). Content management systems: trends in academic libraries. *Information Technology and Libraries*, 32(June), 42–55. http://doi.org/10.6017/ital.v32i2.4632

CARLIGH. (2015). Consortium of academic and research libraries in Ghana. Retrieved August 3, 2016, from http://www.carligh.org/

Conrado, S. P., Neville, K., Woodworth, S., and O'Riordan, S. (2016). Managing social media uncertainty to support the decision making process during emergencies. *Journal of Decision Systems*, 25(sup 1), 171–181. http://doi.org/10.1080/12460125.2016.1187396

Coyle, K. (2002). Open source, open standards. *Information Technology and Libraries*, *21*(1), 33–36. http://doi.org/10.1108/PROG-06-2012-0034

Cram, W. A., Brohman, M. K., Chan, Y. E., and Gallupe, R. B. (2016). Information systems

300

control alignment: complementary and conflicting systems development controls. *Information and Management*, 53(2), 183–196. http://doi.org/10.1016/j.im.2015.09.012

Creswell, J. W. (2003). *Research design: qualitative, quantitative and mixed approaches* (2nd ed.). Thousand Oaks: Sage publications.

Creswell, J. W. (2014). *Research design: qualitative, quantitative and mixed methods approaches* (4th ed.). Thousand Oaks: SAGE Publications.

Creswell, J. W. (2015). *A concise introduction to mixed methods research*. Thousand Oaks: SAGE Publications.

Creswell, J. W., and Clark, V. L. P. (2011). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks: SAGE Publications.

Cross, R. (2015). Implementing a resource list management system in an academic library. *The Electronic Library*, 33(2), 210–223. http://doi.org/10.1108/EL-05-2013-0088

Dalling, J., and Rafferty, P. (2013). Open source, open minds?: An investigation into attitudes towards open source library management systems in UK higher education libraries. *Program*, *47*(4), 399–423. http://doi.org/doi.org/10.1108/PROG-06-2012-0034

Daniel, J. (2012). Preparing to make sampling choices. In *Sampling essentials: practical guidelines for making sampling choices* (pp. 1–22). Thousand Oaks: SAGE Publications. http://doi.org/10.4135/9781452272047

Das, S., Agrawal, D., and El Abbadi, A. (2013). ElasTraS: an elastic, scalable, and self-managing transactional database for the cloud. *ACM Trans. Database Systems*, 38(1), 5:1-5:45. http://doi.org/doi.org/10.1145/2445583.2445588

Davarpanah, M. R. (2001). Level of information technology application in Iranian university

301

libraries. *Library Review*, 50(9), 444–450. http://doi.org/10.1108/EUM0000000006149

Delone, W. H., and McLean, E. R. (2004). Measuring e-commerce success: applying the DeLone and McLean information systems success model. *International Journal of Electronic Commerce*, 9(1), 31–47. Retrieved from http://www.jstor.org/stable/27751130

Delone, W. H., and McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of Management Information Systems*, 19(4), 9–30. http://doi.org/10.1080/07421222.2003.11045748

Deng, F., and Hickey, J. V. (2015). Anesthesia information management systems: an underutilized tool for outcomes research. *AANA Journal*, 83(3), 189–195. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/26137760

Detterbeck, K., and Sciangula, M. (2017). Innovation through collaboration: using an open-source learning management system to enhance library instruction and student learning. In T. Maddison and M. Kumaran (Eds.), *Distributed Learning* (pp. 221–238). Elsevier. http://doi.org/10.1016/B978-0-08-100598-9.00012-X

Diffin, J., Coogan, J., and Fu, L. (2013). Library systems documentation : pulling it together with SharePoint. *New Library World*, 114(9/10), 384–397. http://doi.org/10.1108/NLW-03-2013-0021

Dorman, D. (2001). Technically speaking. *American Library*, 32(6), 120. Retrieved from http://www.jstor.org/stable/25645958

Dreher, S. (2014). Social media and the world of work. *Corporate Communications: An International Journal*, 19(4), 344–356. http://doi.org/10.1108/CCIJ-10-2013-0087

302

Durrheim, K., and Painter, D. (2006). *Research in practice: applied methods for social sciences*. (M. T. Blanche, K. Durrheim, and D. Painter, Eds.). Cape Town: University of Cape Town Press.

Dygert, C., and Moeller, P. (2007). Linking the library and campus course management system. *The Serials Librarian*, 52(3–4,), 305–309. http://doi.org/10.1300/J123v52n03_09

Dzandza, P., and Alemna, A. (2011). Challenges and prospects of consortia: a case study of the consortium of academic and research libraries in Ghana (CARLIGH). *ALEXANDRIA*, 22(1), 19–37.

Evans, M. F., and Thomas, S. (2007). Implementation of an integrated information management system at the national library of Wales: a case study. *Program*, 41(4), 325–337. http://doi.org/doi.org/10.1108/00330330710831558

Eze, S. C., Awa, H. O., Okoye, J. C., Emecheta, B. C., and Anazodo, R. O. (2013). Determinant factors of information communication technology (ICT) adoption by government-owned universities in Nigeria: a qualitative approach. *Journal of Enterprise Information Management*, 26(4), 427–443. http://doi.org/doi.org/10.1108/JEIM-05-2013-0024//

Fang, Y., Chiu, C., and Wang, E. T. G. (2011). Understanding customers' satisfaction and repurchase intentions: an integration of IS success model, trust and justice. *Internet Research*, 21(4), 479–503. http://doi.org/doi.org/10.1108/10662241111158335

Fatma, A., Jedidi, A., and Gargouri, F. (2016). Semantic web service and pervasive information system conceptual adaptation. *International Journal of Pervasive Computing and Communications*, 12(14), 466–502.

303

http://doi.org/doi.org/10.1108/IJPCC-12-2015-0040

Fattahi, R., and Afshar, E. (2006). Added value of information and information systems: a conceptual approach. *Library Review*, 55(2), 132–147. http://doi.org/10.1108/00242530610649620

Feather, J., and Sturges, P. (Eds.). (2001). International encyclopedia of information and library science (3rd ed., pp. 2–4). Landon: Routledge.

Fitzgerald, B., and Savage, F. (2004). Public libraries in Victoria, Australia: an overview of current ICT developments, challenges, and issues. *OCLC Systems and Services: International Digital Library Perspectives*, 20(1), 24–30. http://doi.org/doi.org/10.1108/10650750410527304

Fleischman, G., Walker, K., and Johnson, E. (2010). A field study of user versus provider perceptions of management accounting system services. *International Journal of Accounting and Information Management*, 18(3), 252–285. http://doi.org/doi.org/10.1108/18347641011068992330

Froud, R. (2006). Unity reaps rewards: an integrated UK ILL and resource discovery solution for libraries. *Interlending and Document Supply*, 34(4), 164–166. http://doi.org/doi.org/10.1108/02641610610714731

Fu, P., and Fitzgerald, M. (2013). A comparative analysis of the effect of the integrated library system on staffing models in academic libraries. *Information Technology and Libraries*, 32(September), 47–58. http://doi.org/10.6017/ital.v32i3.3388

Gan, C. (2016). A survey of WeChat application in Chinese public libraries. *Library Hi Tech*, 34(4), 625–638. http://doi.org/10.1108/LHT-06-2016-0068

304

Garcha, R., and Buttlar, L. J. (1996). Profiling African libraries: automation in Ghana, Kenya and Nigeria. *Library Review*, 45(6), 25–35. http://doi.org/10.1108/00242539610125640

Gatenby, J. (2008). The networked library service layer: sharing data for more effective management and cooperation. *Web Magazine for Information Professionals*. Retrieved from http://www.ariadne.ac.uk/issue56/gatenby

Gbadamosi, B. O. (2012). Emerging challenges to effective library automation and an e-library : the case of Emmanuel Alayande college of education , Oyo , Nigeria. *Library Philisophy and Practice (e-Journal)*, 1–11. Retrieved from http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1997andcontext=libphilprac

Giboney, J. S., Brown, S. A., Lowry, P. B., and Nunamaker, J. F. (2015). User acceptance of knowledge-based system recommendations: explanations, arguments, and fit. *Decision Support Systems*, 72, 1–10. http://doi.org/10.1016/j.dss.2015.02.005

Gillingham, P. (2014). Repositioning electronic information systems in human service organizations. *Human Service Organizations: Management, Leadership and Governance*, 38(2), 125–134. http://doi.org/10.1080/03643107.2013.853011

Giri, R. (2012). NewGenLib 3: an integrated open source library management system that makes your library visible in web. *Library Hi Tech News*, 29(10), 4–12. http://doi.org/10.1108/07419051211294464

Gökşen, Y., Damar, M., and Doğan, O. (2016). Building management information systems to coordinate the university business processes: a proposed model for Dokuz Eylül University. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 30(2), 189–204.

Goswami, M., Singh, J., and Kumar, V. (2016). An enterprise based decision support system for engineering aggregate selection: a case study. *Journal of Engineering, Design and*

305

Technology, 14(4), 851–873. http://doi.org/10.1108/JEDT-02-2015-0004

Green, P. (2014). Implementing a next generation library system. *IATUL Annual Conference Proceedings*, (35), 1–6. Retrieved from http://EZproxy.loyno.edu/login?url=http://search.ebscohost.com/login.aspx?direct=truea nddb=lihandAN=97787038andsite=ehost-liveandscope=site

Groenewegen, H. W. (2004). Four decades of library automation: recollections and reflections. *The Australian Library Journal*, 53(1), 39–53. http://doi.org/doi.org/10.1080/00049670.2004.10721612

Guo, Y. J., Liu, Y. Q., and Bielefield, A. (2018). The provision of mobile services in US urban libraries. *Information Technology and Libraries*, 37(2), 78. http://doi.org/10.6017/ital.v37i2.10170

Gupta, M., Chandra, B., and Gupta, M. P. (2014). A framework of intelligent decision support system for Indian police. *Journal of Enterprise Information Management*, 27(5), 512–540. http://doi.org/10.1108/JEIM-10-2012-0073

Häkkinen, L., and Hilmola, O. (2008). Life after ERP implementation: long-term development of user perceptions of system success in an after-sales environment. *Journal of Enterprise Information Management*, 21(3), 285–310. http://doi.org/doi.org/10.1108/17410390810866646

Han, Z., and Liu, Y. Q. (2010). Web 2.0 applications in top Chinese university libraries. *Library Hi Tech*, 28(1), 41–62. http://doi.org/10.1108/07378831011026689

Harinarayana, N. S., and Raju, N. V. (2010). Web 2 . 0 features in university library web sites. *The Electronic Library*, 28(1), 69–88. http://doi.org/10.1108/02640471011023388

Harwell, M. R. (2014). Research design in qualitative/quantitative/mixed methods. In C. F. Conrad and R. C. Serlin (Eds.), *The SAGE handbook for research in education: pursuing ideas as the keystone of exemplary inquiry* (pp. 147–164). Thousand Oaks: SAGE Publications. http://doi.org/10.4135/9781483351377

Hassoun, M., and Bernaoui, R. (2015). Algerian university libraries and the digital age: new communication behaviors. *Library Management*, 26(1/2), 58–69. http://doi.org/10.1081/E-ELIS3-120043523

Heikkilä, T. (2015). A decision support system to evaluate the business impacts of machine-to-machine system. *Benchmarking: An International Journal*, 22(2), 201–221. http://doi.org/doi.org/10.1108/BIJ-11-2012-0080

Hossain, M. A. (2016). Assessing m-Health success in Bangladesh: an empirical investigation using IS success models. *Journal of Enterprise Information Management*, 29(5), 774–796. http://doi.org/doi.org/10.1108/JEIM-02-2014-0013

Howard, H. A. (2018). Academic libraries on social media: finding the students and the information they want. *Information Technology and Libraries*, 37(1), 8. http://doi.org/10.6017/ital.v37i1.10160

Hsu, M. H., Chang, C. M., Chu, K. K., and Lee, Y. J. (2014). Determinants of repurchase intention in online group-buying: the perspectives of DeLone and McLean is success model and trust. *Computers in Human Behavior*, 36, 234–245. http://doi.org/10.1016/j.chb.2014.03.065

Hühn, O., Markl, C., and Bichler, M. (2009). On the predictive performance of queueing network models for large-scale distributed transaction processing systems. *Information Technology and Management*, 10(2–3 Special issue), 135–149.

307

http://doi.org/10.1007/s10799-009-0056-3

Husain, S., and Nazim, M. (2015). Use of different information and communication technologies in Indian academic libraries. *Library Review*, 64(1/2), 135–153. http://doi.org/doi.org/10.1108/LR-06-2014-0070998

Huvila, I., Holmberg, K., Kronqvist-Berg, M., Nivakoski, O., and Widén, G. (2013). What is lLibrarian 2.0 – new competencies or interactive relations? A library professional viewpoint. *Journal of Librarianship and Information Science*, 45(3), 198–205. http://doi.org/10.1177/0961000613477122

Ibegbulam, I., and Eze, J. U. (2016). Training needs of paraprofessional library staff in university libraries in South-East Nigeria. *Library Management*, 37(8/9), 482–495. Retrieved from https://doi.org/10.1108/LM-03-2016-0019

Irani, Z., and Love, P. E. D. (2000). The propagation of technology management taxonomies for evaluating investments in information systems. *Journal of Management Information Systems*, 17(3), 161–173. http://doi.org/10.1080/07421222.2000.11045650

Isaacs, E., Walendowski, A., Whittaker, S., Schiano, D. J., and Kamm, C. (2002). The character, functions, and styles of instant messaging in the workplace. In *Proceedings of CSCW* 2002 (pp. 11–20). http://doi.org/10.1145/587078.587081

Iwhiwhu, B. E., and Eyekpegha, E. O. (2009). Digitization of Nigerian university libraries from technology challenge to effective information delivery. *The Electronic Library*, 27(3), 529–536. http://doi.org/10.1108/02640470910966943

Johnson, B., and Gray, R. (2017). A history of philosophical and theoretical issues for mixed methods research. In A. Tashakkori and C. Teddlie (Eds.), *SAGE Handbook of Mixed Methods in Social and Behavioral Research* (pp. 69–94). Thousand Oaks: SAGE

308

Publications. http://doi.org/10.4135/9781506335193

Joo, S., Hofman, D., and Kim, Y. (2018). Investigation of challenges in academic institutional repositories: a survey of academic librarians. *Library Hi Tech*. http://doi.org/10.1108/LHT-12-2017-0266

Kakai, M., Musoke, M. G. N., and Okello-Obura, C. (2018). Open access institutional repositories in universities in East Africa. *Information and Learning Science*, 119(11), 667-681. http://doi.org/10.1108/ILS-07-2018-0066

Kalaian, S. A. (2011). Research design. In *Encyclopedia of survey research methods* (pp. 725–731). SAGE Publications. http://doi.org/10.4135/9781412963947

Kari, K. H., and Baro, E. E. (2014). The use of library software in Nigerian university libraries and challenges. *Library Hi Tech News*, 31(3), 15–20. http://doi.org/dx.doi.org/10.1108/02640470510611508

Karthik, B., Rakesh, R. D., Kamble, S. S., Kharat, M. G., and Kamble, S. J. (2015). Decision support system framework for performance based evaluation and ranking system of carry and forward agents. *Strategic Outsourcing: An International Journal*, 8(1), 23–52. http://doi.org/10.1108/SO-02-2015-0008

Keast, D. (2011). A survey of Koha in Australian special libraries: open source brings new opportunities to the outback. *International Digital Library Perspectives*, 27(1), 23–39. http://doi.org/10.1108/10650751111106537

Kebede, H. W. (2014). Adoption of Web 2.0 in academic libraries of top African universities. *The Electronic Library*, 32(2), 262–277. http://doi.org/10.1108/EL-07-2012-0077

Kennan, M. A., and Wilson, C. (2006). Institutional repositories: review and an information

309

systems perspective. *Library Management*, 27(4/5), 236–248. http://doi.org/10.1108/01435120610668179

Khan, S., Timmings, C., Moore, J. E., Marquez, C., Pyka, K., Gheihman, G., and Straus, S. E. (2014). The development of an online decision support tool for organizational readiness for change. *Implementation Science*, 9(56), 1-7. http://doi.org/10.1186/1748-5908-9-56

Kingsley, I. (2018). Use of social media by Alaskan libraries. *PNLA Quarterly*, 82(3/4), 62–73. Retrieved from https://arc.lib.montana.edu/ojs/index.php/pnla/article/view/1341/1064

Kirsch, J. (2014). Systems librarian. Retrieved July 24, 2019, from http://www.systemslibrarian.co.za/ils-standards-&-features.html

Koizumi, M., and Widdersheim, M. M. (2019). Specialties and strategies in academic libraries: a cluster analysis approach. *Library Management*, 40(1/2), 45–58. http://doi.org/10.1108/LM-10-2017-0114

Koltay, T. (2019). Accepted and emerging roles of academic libraries in supporting research 2.0. *The Journal of Academic Librarianship*, 45(2), 75–80. http://doi.org/10.1016/j.acalib.2019.01.001

Kouzari, E., and Stamelos, I. (2018). Process mining applied on library information systems: a case study. *Library and Information Science Research*, 40(3–4), 245–254. http://doi.org/10.1016/j.lisr.2018.09.006

Krsticev, D. B., Tešendic, D., and Verma, B. K. (2016). Inventory of a library collection using android application. *The Electronic Library*, 34(5), 856–868. http://doi.org/10.1108/EL-08-2015-0150

Kumar, A. (2014). Students opinion about the success of mobile technology in libraries: a

310

case study of Jawaharlal Nehru University (JNU), New Delhi. *New Library World*, 115(9/10), 471–481. http://doi.org/doi.org/10.1108/NLW-10-2013-0075

Kumar, S. B., and Biradar, B. (2010). Use of ICT in college libraries in Karnataka, India: a survey. *Program*, 44(03), 271–282. http://doi.org/doi.org/10.1108/00330331011064267620

Kvale, S. (Ed.). (2011). Introduction to interview research. In *Doing Interviews* (pp. 2–10). London: SAGE Publications. http://doi.org/10.4135/9781849208963

Kwanya, T., Stilwell, C., and Underwood, P. G. (2012). Intelligent libraries and apomediators: distinguishing between Library 3.0 and Library 2.0. *Journal of Librarianship and Information Science*, 45(3), 187–197. http://doi.org/10.1177/0961000611435256

Landrum, H., and Prybutok, V. R. (2004). A service quality and success model for the information service industry. *European Journal of Operational Research*, 156(3), 628–642. http://doi.org/10.1016/S0377-2217(03)00125-5

Laudon, K. C., and Laudon, J. P. (2014). *Management Information Systems: managing the digital firm*. Boston: Pearson Education.

Leem, C. S., and Kim, I. (2004). An integrated evaluation system based on the continuous improvement model of IS performance. *Industrial Management and Data Systems*, 104(2), 115–128. http://doi.org/doi.org/10.1108/02635570410522080

Lepkowski, J. M. (2011). Population. In *Encyclopedia of Survey Research Methods* (p. 591). SAGE Publications. http://doi.org/10.4135/9781412963947

Li, S., Jiao, F., Zhang, Y., and Xu, X. (2019). Problems and changes in digital libraries in the

311

age of big data from the perspective of user services. *Journal of Academic Librarianship*, 45(1), 22–30. http://doi.org/S0099133318302532

Liang, X., and Chen, Y. (2018). Libraries in internet of things (IoT) era. *Library Hi Tech*. http://doi.org/10.1108/LHT-11-2017-0233

Lin, C., and Tseng, S. (2005). The implementation gaps for the knowledge management system. *Industrial Management and Data Systems*, 105(2), 208–222. http://doi.org/10.1108/02635570510583334

Lin, H.-F. (2007). Measuring online learning systems success: applying the updated DeLone and McLean model. *Cyberpsychology and Behavior*, 10(6), 817–820. http://doi.org/10.1089/cpb.2007.9948

Link, B., and Back, A. (2015). Classifying systemic differences between software as a service- and on-premise-enterprise resource planning. *Journal of Enterprise Information Management*, 28(6), 808–837. http://doi.org/10.1108/JEIM-07-2014-0069

Lwoga, E. T. (2013). Measuring the success of library 2.0 technologies in the African context: the suitability of the DeLone and McLean's model. *Campus-Wide Information Systems*, 30(4), 288–307. http://doi.org/doi.org/10.1108/CWIS-02-2013-0011 Permanent

Madhusudhan, M., and Singh, V. (2016). Integrated library management systems. *The Electronic Library*, 34(2), 223–249. http://doi.org/10.1108/EL-08-2014-0127

Magara, E. (2002). Applications of digital libraries and electronic technologies in developing countries: practical experiences in Uganda. *Library Review*, 51(5), 241–255. http://doi.org/doi.org/10.1108/00242530210428746341

Maggetti, M., Gilardi, F., and Radaelli, C. M. (2017). *Designing Research in the Social*

312

Sciences. Thousand Oaks: SAGE Publications. http://doi.org/10.4135/9781473957664

Maguire, S. (2002). Identifying risks during information system development: managing the process. *Information Management and Computer Security*, 10(3), 126–134. http://doi.org/10.1108/09685220210431881

Makori, E. O. (2013). Adoption of radio frequency identification technology in university libraries: A Kenyan perspective. *The Electronic Library*, 31(2), 208–216. http://doi.org/doi.org/10.1108/02640471311312384

Makori, E. O., and Mauti, N. O. (2016). Koha enterprise resource planning system and its potential impact on information management organizations. *Library Philisophy and Practice (e-Journal)*, *1378*, 1–25. https://doi.org/http://digitalcommons.unl.edu/libphilprac/1378

Malik, A., and Mahmood, K. (2013). Infrastructure needed for digital reference service (DRS) in university libraries: an exploratory survey in the Punjab, Pakistan. *Library Review*, 62(6/4), 420–428. http://doi.org/doi.org/10.1108/LR-12-2012-0129

Mapulanga, P. (2013). Digitising library resources and building digital repositories in the University of Malawi Libraries. *The Electronic Library*, 31(5), 635–647. http://doi.org/10.1108/EL-02-2012-0019

Marnewick, C. (2017). The reality of adherence to best practices for information system initiatives. *International Journal of Managing Projects in Business*, 10(1), 167–184. http://doi.org/dx.doi.org/10.1108/IJMPB-05-2016-0045

Martins, J., Branco, F., Gonçalves, R., Au-Yong-Oliveira, M., Oliveira, T., Naranjo-Zolotov, M., and Cruz-Jesus, F. (2018). Assessing the success behind the use of education management information systems in higher education. *Telematics and Informatics*,

313

(May), 1–12. http://doi.org/10.1016/j.tele.2018.10.001

Matayong, S., and Mahmood, A. K. (2013). The review of approaches to knowledge management system studies. *Journal of Knowledge Management*, 17(3), 472–490. http://doi.org/10.1108/JKM-10-2012-0316

McCarthy, P. J., and Ortiz, J. T. (2010). Globalisation in academic libraries: a reflective comparison of academic libraries at Cork Ireland, and Chihuahua, Mexico. *Library Management*, 31(7), 505–520. http://doi.org/doi.org/10.1108/01435121011071201

McGarvey, V. (2018). Staffordshire University's Koha journey: taking an integrated approach to supporting an open source library management system. *Insights: The UKSG Journal*, *31*, 1–7. Retrieved from http://10.0.6.93/uksg.411%0Ahttps://up.idm.oclc.org/login?url=http://search.ebscohost.com/login.aspx?direct=trueanddb=lihandAN=133436558andlang=esandsite=ehost-liveandscope=site

Miller, R. (2011). Research design. In R. L. M. and J. Brewer (Ed.), *The A-Z of social research* (pp. 263–268). Thousand Oaks: SAGE Publications. http://doi.org/10.4135/9780857020024

Mitchell, A. M. (2007). E is for entropy: electronic resource management systems. *The Serials Librarian*, 51(3–4), 31–37. http://doi.org/doi.org/10.1300/J123v51n03_03

Mitchell, V. (2003). Implementing the first library management system at Merthyr Tydfil public libraries: an overview and impact on staff. *Program*, 37(2), 103–108. http://doi.org/10.1108/00330330310472894

Molina-Azorin, J. F. (2019). Mixed methods. In *The SAGE handbook of qualitative business and management research methods: history and traditions* (pp. 102–118). Thousand

314

Oaks: SAGE Publications. http://doi.org/http://dx.doi.org/10.4135/9781526430212

Moropa, R. (2010). Academic libraries in transition: some leadership issues-a viewpoint. *Library Management*, 31(6), 381–390. http://doi.org/doi.org/10.1108/01435121011066144

Morris, A., Thornley, L., and Snudden, K. (2001). Self-issue and return systems: experiences in the UK. *The Electronic Library*, 19(1), 7–18. http://doi.org/doi.org/10.1108/EUM0000000005398

Moturi, C., and Mbiwa, P. (2015). An evaluation of the quality of management information systems used by SACCOs in Kenya. *The TQM Journal*, 27(6), 798–813. http://doi.org/doi.org/10.1108/TQM-05-2015-0065

Mouakket, S., and Bettayeb, A. M. (2005). Investigating the factors influencing continuance usage intention of learning management systems by university instructors: the blackboard system case. *International Journal of Web Information Systems*, 11(4), 491–509. http://doi.org/doi.org/10.1108/IJWIS-03-2015-0008

Mugridge, R. L., and Poehlmann, N. M. (2015). Internal customer service assessment of cataloging, acquisitions, and library systems. *OCLC Systems and Services: International Digital Library Perspectives*, 31(4), 219–248. http://doi.org/10.1108/OCLC-12-2014-0037

Muller, M. J., Raven, M. E., Kogan, S., Millen, D. R., and Carey, K. (2003). Introducing chat into business organizations. In *Proceedings of the 2003 international ACM SIGGROUP conference on Supporting group work - GROUP '03* (pp. 50–57). http://doi.org/10.1145/958160.958168

Muthanna, A., and Sang, G. (2019). State of university library: challenges and solutions for

Yemen. *The Journal of Academic Librarianship*, 45(2), 119–125. http://doi.org/https://doi.org/10.1016/j.acalib.2019.01.010

Mutula, S. (2004). IT diffusion in Sub-Saharan Africa: implications for developing and managing digital libraries. *New Library World*, 105(7/8), 281–289. http://doi.org/doi.org/10.1108/03074800410551039

Mutula, S. M. (2008). Information and computer technology management challenges in the networked world: implications for libraries in Africa. *Journal of Interlibrary Loan, Document Delivery and Electronic Reserve*, 19(1), 57–73. http://doi.org/doi.org/10.1080/10723030802533879

Mutula, S. M. (2012). Library automation in sub Saharan Africa: case study of the University of Botswana. *Program*, 46(3), 292–307. http://doi.org/10.1108/00330331211244832

Myrtidis, A., and Weerakkody, V. (2008). A study of information systems investment evaluation in the Greek banking sector. *Information Technology for Development*, 14(1), 11–30. http://doi.org/10.1002/itdj.20085

Nasarwanji, A., Pearce, D., Khoudian, P., and Worcester, R. (2009). The impact of manufacturing execution systems on labor overheads. In *Proceedings of the World Congress on Engineering* (Vol. I). Retrieved from http://www.iaeng.org/publication/WCE2009/WCE2009_pp734-737.pdf

Negi, D. S. (2014). Using mobile technologies in libraries and information centers. *Library Hi Tech News*, 31(5), 14–16. http://doi.org/10.1108/LHTN-05-2014-0034

Nelson, R. R., Todd, P. A., and Wixom, B. H. (2005). Antecedents of information and system quality: an empirical examination within the context of data warehousing. *Journal of Management Information Systems*, 21(4), 199–235.

316

http://doi.org/10.1080/07421222.2005.11045823

Nielsen, H. J. (2005). New media and new roles of librarianship: illustrated by a literary website of Danish libraries. *New Library World*, 106(11/12), 510–518. http://doi.org/doi.org/10.1108/03074800510634991

Nisha, F., and Parichi, R. (2015). Greenstone digital library management system-a functional review based on selected criteria. *Library Hi Tech News*, 32(10), 16–21. http://doi.org/10.1108/LHTN-06-2015-0041

Niu, L., Lu, J., Zhang, G., and Wu, D. (2013). FACETS: A cognitive business intelligence system. *Information Systems*, 38(6), 835–862. http://doi.org/10.1016/j.is.2013.02.002

O'Brien, J. . (2004). *Management Information Systems: managing information technology in the business enterprise* (6th ed.). Boston: McGraw-Hill.

O'Brien, J. . (2005). *Introduction to information systems* (12th ed.). Boston: McGraw-Hill.

Ohri, A., and Singh, P. K. (2013). GIS based environmental decision support system for municipal landfill site selection. *Management of Environmental Quality*, 24(5), 583–598. http://doi.org/10.1108/MEQ-08-2012-0056

Oladapo, A. T. O. J. (2016). A comparative analysis of available features and Web 2 . 0 tools on selected Nigerian and South African university library websites. *The Electronic Library*, 34(3), 504–521. http://doi.org/10.1108/EL-10-2014-0182

Omekwu, C. O., and Echezona, I. R. (2009). Emerging challenges and opportunities for Nigerian libraries in a global information environment. *Library Review*, 58(8), 482–492. http://doi.org/doi.org/10.1108/00242530910978181

Omeluzor, S. U., and Oyovwe-tinuoye, G. O. (2016). Assessing the adoption and use of

317

integrated library systems (ILS) for library service provision in academic libraries in Edo and Delta states, Nigeria. *Library Review*, 65(8/9), 578–592. http://doi.org/10.1108/LR-01-2016-0005

Otunla, A. O., and Akanmu-Adeyemo, E. A. (2010). Library automation in Nigeria: the Bowen university experience. *African Journal of Library, Archives and Information Science*, 20(2), 93–102.

Pace, A. (2009). 21st century library systems. *Journal of Library Administration*, *49*(6), 641–650. http://doi.org/10.1080/01930820903238834

Panetto, H., and Cecil, J. (2013). Information systems for enterprise integration, interoperability and networking: theory and applications. *Enterprise Information Systems*, 7(1), 1–6. http://doi.org/doi.org/10.1080/17517575.2012.684802

Pareek, S., and Gupta, D. K. (2013). Academic library websites in Rajasthan: an analysis of content. *Library Philosophy and Practice*, (913), 1–23. Retrieved from http://digitalcommons.unl.edu/liphilprac/913

Park, J., and Park, J. (2015). Enterprise resource planning and efficiency. *Managerial Finance*, 41(4), 405–415. http://doi.org/10.1108/MF-07-2014-0182

Pastorella, F., Borges, J. G., and De Meo, I. (2016). Usefulness and perceived usefulness of decision support systems (DSSs) in participatory forest planning: The final users' point of view. *IForest*, 9(JUNE2016), 422–429. http://doi.org/10.3832/ifor1356-008

Pereira, M. F. H. H. A. (2016). Empirical study about the role of social networks in SME performance. *Journal of Systems and Information Technology*, 18(4). http://doi.org/doi.org/10.1108/JSIT-06-2016-0036

Petter, S., and McLean, E. R. (2009). A meta-analytic assessment of the DeLone and McLean IS success model: an examination of IS success at the individual level. *Information and Management*, 46(3), 159–166. http://doi.org/10.1016/j.im.2008.12.006

Pilemalm, S., Lindgren, I., and Ramsell, E. (2016). Emerging forms of inter-organizational and cross- sector collaborations in e-government initiatives – implications for participative development of information systems. *Transforming Government: People, Process and Policy*, 10(4), null. http://doi.org/doi.org/10.1108/TG-12-2015-0055

Pirshahid, S. E., Naghshineh, N., and Fahimnia, F. (2016). Knowledge and use of Web 2.0 by librarians in university libraries of East Azerbaijan, Iran. *The Electronic Library*, 34(6), 1013–1030. http://doi.org/10.1108/EL-10-2014-0192

Ponelis, S. R., and Adoma, P. (2018). Diffusion of open source integrated library systems in academic libraries in Africa: the case of Uganda. *Library Management*, 39(6–7), 430–448. http://doi.org/10.1108/LM-05-2017-0052

Pournaghi, R. (2017). GIS as a supporting instrument for making decisions about the library sources collection management. *Collection Building*, 36(1), 11–19. http://doi.org/10.1108/CB-06-2016-0014

Pruett, J., and Choi, N. (2013). A comparison between select open source and proprietary integrated library systems. *Library Hi Tech*, 31(3), 435–454. http://doi.org/10.1108/LHT-01-2013-0003

Rafiq, M., and Ameen, K. (2013). Digitization in university libraries of Pakistan. *International Digital Library Perspectives*, 29(1), 37–46. http://doi.org/doi.org/10.1108/10650751311294546

Rah, J. A., Gul, S., and Wani, Z. A. (2010). University libraries : step towards a web based

319

knowledge management system. *VINE*, 40(1), 24–38. http://doi.org/10.1108/03055721011024900

Ram, S., Anbu, J. P., and Kataria, S. (2011). Responding to user's expectation in the library: innovative Web 2.0 applications at JUIT library: a case study. *Program*, 45(4), 452–469. http://doi.org/doi.org/10.1108/00330331111182120

Ramzan, M. (2004). Levels of information technology (IT) applications in Muslim world libraries. *The Electronic Library*, 22(03), 274–280. http://doi.org/doi.org/10.1108/02640470410541688

Ramzan, M., and Singh, D. (2009). Status of information technology applications in Pakistani libraries. *The Electronic Library*, 27(4), 573–587. http://doi.org/10.1108/02640470910979543

Ravichandran, T., and Lertwongsatien, C. (2014). Effect of information systems resources and capabilities on firm performance : a resource- based perspective. *Journal of Management Information Systems*, 1222(September 2015), 237–276. http://doi.org/10.1080/07421222.2005.11045820

Redden, C. S. (2010). Social bookmarking in academic libraries: trends and applications. *Journal of Academic Librarianship*, 36(3), 219–227. http://doi.org/10.1016/j.acalib.2010.03.004

Reitz, J. M. (2004). *Dictionary of library and information science*. Cunnecticut: Libraries Unlimited.

Rennecker, J., and Godwin, L. (2003). Theorizing the unintended consequences of instant messaging productivity. *Sprouts: Working Papers on Information Environments, Systems and Organizations*, 3(3), 137–168. Retrieved from

320

http://sprouts.case.edu/2003/030307.pdf

Robbins, S., Engel, D., and Bierman, J. (2006). Using the library intranet to manage web content. *Library Hi Tech*, 24(2), 261–272. http://doi.org/10.1108/07378830610669628

Romero, D., and Vernadat, F. (2016). Enterprise information systems state of the art: past, present and future trends. *Computers in Industry*, 79(2015), 1–11. http://doi.org/10.1016/j.compind.2016.03.001

Rowley, J. (2014). Designing and using research questionnaires. *Management Research Review*, 37(05), 308–330. http://doi.org/doi.org/10.1108/MRR-02-2013-0027

Rowley, J., and Hartley, R. (2008). *An Introduction to managing access to information* (4th ed.). Hampshire: Ashgate.

Rubin, V. L., Chen, Y., and Thorimbert, L. M. (2010). Artificially intelligent conversational agents in libraries. *Library Hi Tech*, 28(4), 496–522. http://doi.org/10.1108/07378831011096196

Salam, M. A., and Khan, S. A. (2016). Simulation based decision support system for optimization. *Industrial Management and Data Systems*, 116(2), 236–254. http://doi.org/10.1108/IMDS-05-2015-0192

Shafique, F., and Riedling, A. (2013). Survival avenues for Pakistani libraries in the era of emerging technologies: adoption of library 2.0 and library 3-D. *The Electronic Library*, 31(4), 412–432. http://doi.org/doi.org/10.1108/EL-02-2011-0025

Shaikh, A. A., and Karjaluoto, H. (2015). Making the most of information technology and systems usage: a literature review, framework and future research agenda. *Computers in Human Behavior*, 49, 541–566. http://doi.org/10.1016/j.chb.2015.03.059

321

Shapiro, G. M. (2011). Sample. In *Encyclopedia of Survey Research Methods* (pp. 776–777). SAGE Publications, Inc. http://doi.org/10.4135/9781412963947

Shapiro, S. (2012). Marketing the library with content management systems : a case study of Blackboard. *Library Hi Tech News*, 29(3), 10–11. http://doi.org/10.1108/07419051211241859

Sharma, S. K., and Sharma, M. (2019). Examining the role of trust and quality dimensions in the actual usage of mobile banking services: an empirical investigation. *International Journal of Information Management*, 44, 65–75. http://doi.org/10.1016/j.ijinfomgt.2018.09.013

Sherriff, G., Benson, D., and Atwood, G. S. (2019). Practices, policies, and problems in the management of learning data: a survey of libraries' use of digital learning objects and the data they create. *Journal of Academic Librarianship*, 45(2), 102–109. http://doi.org/10.1016/j.acalib.2018.12.005

Shivaputrappa, F. K., and Ramesh, R. N. (2013). Evaluation of librarianship and ICT skills of library and information professionals working in the engineering college libraries in Karnataka, India. *Program*, 47(4), 345–369. http://doi.org/doi.org/10.1108/PROG-07-2012-0041

Shuva, N. Z. (2014). Are university libraries in Bangladesh ready to be digital? *OCLC Systems and Services: International Digital Library Perspectives*, 30(2), 108–131. http://doi.org/10.1108/OCLC-04-2013-0010

Siddique, N., and Mahmood, K. (2015). Status of library software in higher education institutions of Pakistan. *International Information and Library Review*, 47(3–4), 59–65. http://doi.org/10.1080/10572317.2015.1087796

Siddique, N., and Mahmood, K. (2016). Combating problems related to library software in higher education institutions of Pakistan: an analysis of focus groups. *Malaysian Journal of Library and Information Science*, 21(July), 35–51. http://doi.org/doi/abs/10.1080/10572317.2015.108779

Singh, M., and Sanaman, G. (2013). Open source integrated library management systems comparative analysis of Koha and NewGenLib. *The Electronic Library*, 30(6), 809–832. http://doi.org/10.1108/02640471211282127

Siriwongworawat, S. (2003). Use of ICT in Thai libraries: an overview. *Program*, 37(1), 38–43. http://doi.org/doi.org/10.1108/00330330310460581

Skretas, G. (2005). Factors affecting the full use of library and information management systems by library personnel. *Program*, 39(2), 139–146. http://doi.org/10.1108/00330330510595715

Smet, E. De. (2012). Special features of the advanced loans module of the ABCD integrated library system. *Program*, 45(3), 323–332. http://doi.org/10.1108/00330331111151629

Spacey, R., Goulding, A., and Murray, I. (2003). ICT and change in UK public libraries: does training matter? *Library Management*, 24(1/3), 61–69. http://doi.org/doi.org/10.1108/01435120310454520

Stilwell, C., and Hoskins, R. (2012). Integrated library management systems: a review of choices made and their sustainability in South Africa. *Information Development*, 29(2), 154–171. http://doi.org/10.1177/0266666912454067

Swanepoel, M., Toit, A. Du, and Van Brakel, P. A.. (2001). Management of information technology in academic information services. *Aslib Proceedings*, 53(6), 224–237. http://doi.org/10.1108/EUM0000000007056

323

Takahara, Y., Liu, Y., Chen, X., and Yano, Y. (2005). Model theory approach to transaction processing system development. *International Journal of General Systems*, 34(5), 537–557. http://doi.org/10.1080/03081070500192504

Tedd, L. A. (2006). Program: record of the first 40 years of electronic library and information systems. *Program*, 40(1), 11–26. http://doi.org/doi.org/10.1108/00330330610646780

Teddlie, C., and Tashakkori, A. (2017). Overview of contemporary issues in mixed methods research. In C. Teddlie and A. T. Edited (Eds.), *SAGE handbook of mixed methods in social and behavioral research* (pp. 1–42). Thousand Oaks: SAGE Publications. http://doi.org/10.4135/9781506335193

Texas State Library. (1995). Library Automation Standards and Guidelines. *ERIC*, 1–10. Retrieved from https://files.eric.ed.gov/fulltext/ED409909.pdf

Thompson, E. S., and Pwadura, J. (2014). Library automation at the University for Development Studies: challenges and prospects. *New Review of Academic Librarianship*, 20(1), 66–77. http://doi.org/10.1080/13614533.2013.842929

Trkman, M., and Trkman, P. (2009). A wiki as intranet: a critical analysis using the Delone and McLean model. *Online Information Review*, 33(6), 1087–1102.

Trobia, A. (2011). Questionnaire. In *Encyclopedia of survey research methods* (pp. 653–655). SAGE Publications. http://doi.org/10.4135/9781412963947

Tsao, W.-C., Hsieh, M.-T., and Lin, T. M. Y. (2016). Intensifying online loyalty! the power of website quality and perceived value of the consumer/seller relationship. *Industrial Management and Data Systems*, 116(9), Pre-print. http://doi.org/doi.org/10.1108/IMDS-07-2015-0293%0AD

Tung, F.-C., Lee, R. M. S., Chen, R. C.-C., and Hsu, R. Y.-S. (2009). An extension of financial cost and tam model with IDT for exploring users ' behavioral intentions to use the CRM information. *Social Behavior and Personality*, 37(18), 621–626. http://doi.org/10.2224/sbp.2009.37.5.621

Tyagi, A. K., and Senthil, V. (2015). Library automation in India: assessment of library services platforms. *DESIDOC Journal of Library and Information Technology*, 35(6), 408–416. http://doi.org/doi.org/10.1007/s11274-015-1903-5

Upasani, O. S. (2016). Advantages and limitations of open source software for library management system functions: the experience of libraries in India. *Serials Librarian*, 71(2), 121–130. http://doi.org/10.1080/0361526X.2016.1201786

Vanharanta, H., and Kantola, J. (2015). Proactive vision for strategy making. *Procedia Manufacturing*, 3, 587–594. http://doi.org/10.1016/j.promfg.2015.07.272

Vezzetti, E., Alemanni, M., and Macheda, J. (2015). Supporting product development in the textile industry through the use of a product lifecycle management approach: a preliminary set of guidelines. *International Journal of Advanced Manufacturing Technology*, 79(9–12), 1493–1504. http://doi.org/10.1007/s00170-015-6926-4

Vezzetti, E., Violante, M. G., and Marcolin, F. (2014). A benchmarking framework for product lifecycle management (PLM) maturity models. *International Journal of Advanced Manufacturing Technology*, 71(5–8), 899–918. http://doi.org/10.1007/s00170-013-5529-1

Wang, X., Li, J., Yang, M., Chen, Y., and Xu, X. (2018). An empirical study on the factors influencing mobile library usage in IoT era. *Library Hi Tech*, 36(4), 605–621. http://doi.org/10.1108/LHT-01-2018-0008

Wang, Y., and Dawes, T. A. (2012). The next generation integrated library system: a promise fulfilled. *Information Technology and Libraries*, 31(3), 76–85. http://doi.org/10.6017/ital.v31i3.1914

Wang, Y. S., and Liao, Y. W. (2008). Assessing eGovernment systems success: a validation of the DeLone and McLean model of information systems success. *Government Information Quarterly*, 25(4), 717–733. http://doi.org/10.1016/j.giq.2007.06.002

Wang, Y. S., Tseng, T. H., Wang, W. T., Shih, Y. W., and Chan, P. Y. (2018). Developing and validating a mobile catering app success model. *International Journal of Hospitality Management*, 77(December 2016), 19–30. http://doi.org/10.1016/j.ijhm.2018.06.002

Ward, P. (2007). Ten reasons more law firms choose customer relationship management systems. *Of Counsel*, 26(11), 12–16.

Warren, J. (2007). Directors' views of the future of cataloguing in Australia and New Zealand: a survey. *Australian Academic and Research Libraries ISSN:*, 38(4), 239–251. http://doi.org/10.1080/00048623.2007.10721306

Wasike, J. M., and Njoroge, L. (2015). Opening libraries to cloud computing: a Kenyan perspective. *Library Hi Tech*, 32(03), 21–24. http://doi.org/doi.org/10.1108/LHTN-09-2014-0072

Wentz, E. A. (2017). The literature review. In *How to design, write, and present a successful dissertation proposal* (pp. 81–95). Thousand Oaks: SAGE Publications. http://doi.org/10.4135/9781506374710

Wojick, M. (2016). Internet of things - potential for libraries. *Library Hi Tech*, 34(2), 404–420. http://doi.org/10.1108/LHT-10-2015-0100

Wu, A., Thompson, S., Vacek, R., Watkins, S., and Weidner, A. (2016). Hitting the road towards a greater digital destination: evaluating and testing DAMS at University of Houston libraries. *Information Technology and Libraries*, (June), 5–19. http://doi.org/10.6017/ital.v35i2.9152

Wu, J. H., and Wang, Y. M. (2006). Measuring KMS success: a respecification of the DeLone and McLean's model. *Information and Management*, 43(6), 728–739. http://doi.org/10.1016/j.im.2006.05.002

Xia, J. (2014). Library space management : a GIS proposal. *Library Hi Tech*, 22(4), 375–382. http://doi.org/10.1108/07378830410570476

Xie, I., and Matusiak, K. K. (2016). Digital library management systems. In *Discover Digital Libraries* (pp. 171–203). Elsevier. http://doi.org/10.1016/B978-0-12-417112-1.00006-5

Xie, I., and Stevenson, J. (2014). Social media application in digital libraries. *Online Information Review*, 38(4), 502–523. http://doi.org/10.1108/OIR-11-2013-0261

Xie, K., Liu, Z., Fu, L., and Liang, B. (2019). Internet of things-based intelligent evacuation protocol in libraries. *Library Hi Tech*. http://doi.org/10.1108/LHT-11-2017-0250

Xinli, H. (2015). Effectiveness of information technology in reducing corruption in China: A validation of the DeLone and McLean information systems success model. *The Electronic Library*, 33(1), 52–64. http://doi.org/doi.org/10.1108/EL-11-2012-0148

Xu, W., Yang, Z., and Wang, X. (2015). A technical and business perspective on wireless sensor network for manufacturing execution system. *Mathematical Problems in Engineering*, 2015, 1–15. http://doi.org/doi.org/10.1155/2015/267195

Yang, S. Q. (2013). From integrated library systems to library management services: time for

change? *Library Hi Tech News*, 30(2), 1–8. http://doi.org/10.1108/LHTN-02-2013-0006

Yang, X., Wei, Q., and Peng, X. (2009). System architecture of library 2.0. *The Electronic Library*, 27(2), 283–291. http://doi.org/10.1108/02640470910947629

Zainab, A. M., Kiran, K., Karim, N. H. A., and Sukmawati, M. (2018). UTAUT'S performance consistency: empirical evidence from a library management system. *Malaysian Journal of Library and Information Science*, 23(1), 17–32. http://doi.org/10.22452/mjlis.vol23no1.2

Zhang, X. (2013). The evolution of management information systems: a literature review. *Journal of Integrated Design and Process Science*, 17(2), 59–88. http://doi.org/10.3233/jid-2013-0009

Zhao, X., Hwang, B.-G., and Low, S. P. (2016). An enterprise risk management knowledge-based decision support system for construction firms. *Engineering, Construction and Architectural Management*, 23(3), 369–384. http://doi.org/10.1108/ECAM-03-2015-0042

Zhu, Q. (2016). The application of social media in outreach of academic libraries' resources and services. *Library Hi Tech*, 34(4), 615–624. http://doi.org/10.1108/LHT-05-2016-0055

Zubkov, A., and Shcherba, A. (2012). The Concept of network-centric control- a revolutionary step in the theory and technique of information systems. *TCSET*, February (21–24), 40–41.

328

APPENDIX A: ETHICAL CLEARANCE FROM UWC

<u>Ms P Dzandza</u> (Library and Information Science)

       Study project: Use and management of information systems in academic libraries in Ghana

       Registration no: HS/17/3/21

       Ethics: *Approved*

UNIVERSITY *of the* WESTERN CAPE

329

APPENDIX B: QUESTIONNAIRE

Dear Respondent,

This questionnaire seeks to solicit your views for a PhD degree at the Department of library and Information Science, University of the Western Cape on the topic: USE AND MANAGEMENT OF INFORMATION SYSTEMS (IS) IN ACADEMIC LIBRARIES IN GHANA.

A consent form from the University of the Western Cape has been provided to solicit your consent to participate in this research. Kindly note that by completing the form you agree to take part in this study.

You are assured that all responses will be strictly used for academic purposes and your responses will be treated with confidentiality.

Please do not indicate your name on the questionnaire

Thank you for your cooperation.

Patience Emefa Dzandza

pedzandza@ug.edu.gh
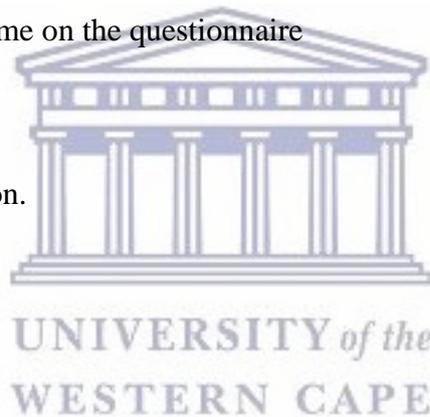
Section A: Background of Respondent

1. In which of the following libraries do you work?

   a. UG   b. KNUST   c. Central   d. VVU   e. WUC

       f. PUC   g. Ashesi   h. MUC   i. RUC

2. Which staff rank do you belong to?

   a. Senior staff   b. Senior member

3. What is your highest level of education?

   a. Diploma   b. Bachelors   c. MA/MSc   d. MPhil   e. PhD

4. In which section of the library do you work?

   a. Reference   b. circulation   c. cataloguing   d. acquisition   e. electronic support

   f. Other…………………………………………………

5. What is your knowledge level of ICT in general?

   a. Excellent   b. Good   c. Average   d. Poor   e. Very poor

6. What is your knowledge of ICT applications in libraries?

   a. Excellent   b. Good   c. Average   d. Poor   e. Very poor
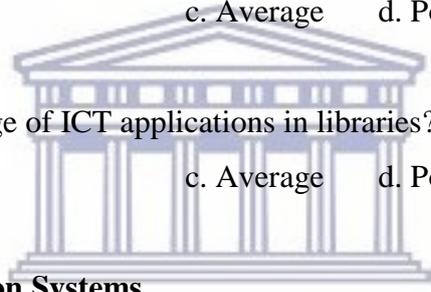
Section B: Use of Information Systems

7. Do you use the library management system to perform any functions?

   a. Yes   b. no

8. If yes, which functions do you use the library management system to perform? You may choose more than one.

   a. Acquisitions

   b. Cataloguing

   c. Circulation

   d. Course Reserves

   e. OPAC

   f. Serials management

   g. Other ……………………………………………………………….

331

8b. Describe briefly how you use the system to perform the functions in 8 above

………
………
………
………
………

9. Do you have a line supervisor?

    a. Yes   b. no

10. Do you generate information with the library management system for your supervisor?

    a. Yes   b. no

11. If yes, what type of information do you generate with the system?

………
………
………
………
………
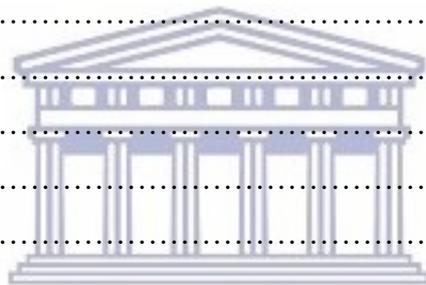
12. Do you use a word processor (Microsoft word) for your daily office activities?

    a.   Yes   b. no

13. If yes, please indicate what specifically you use it for

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

14. Do you use database tools (Microsoft Access) for your daily office activities?

    a.   Yes   b. no

15. If yes, please indicate what specifically you use it for

………
………
………
………

332

16. Do you use spreadsheets (Microsoft Excell) for your daily office activities?

 a. Yes b. no

17. If yes, please indicate what specifically you use it for

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

18. Do you use presentation tools (Microsoft PowerPoint) for your daily office activities?

 a. Yes b. no

19. If yes, please indicate what specifically you use if for

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

20. Please indicate any other office suite you use in your official line of duty and what you use it for

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

21. Do you use Twitter for you daily office activities?

 a. Yes b. no

22. If yes, please indicate what specifically you use it for

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

23. Do you use Facebook for you daily office activities?

 a. Yes b. no

24. If yes, please indicate what specifically you use it for

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

25. Do you use LinkedIn for you daily office activities?

    a.   Yes   b. no

26. If yes, please indicate what specifically you use it for

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

27. Do you use Xing for you daily office activities?

    a.   Yes   b. no

28. If yes, please indicate what specifically you use it for

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………
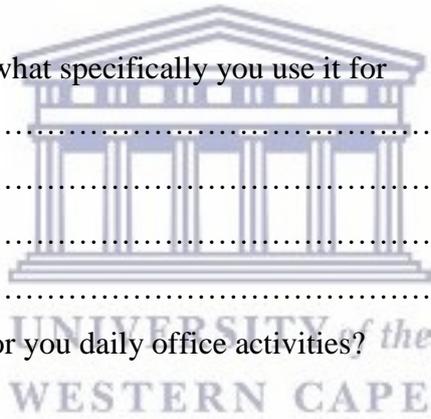
29. Do you use Google+ for you daily office activities?

    a.   Yes   b. no

30. If yes, please indicate what specifically you use it for

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

……………………

31. Do you use Snapchat for you daily office activities?

    a.   Yes   b. no

32. If yes, please indicate what specifically you use it for

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

33. Do you use Tumblr for you daily office activities?

    a.   Yes   b. no

34. If yes, please indicate what specifically you use it for

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

35. Do you use YouTube for you daily office activities?

    a.   Yes   b. no

36. If yes, please indicate what specifically you use it for

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

37. Do you use WhatsApp for you daily office activities?

    a.   Yes   b. no

38. If yes, please indicate what specifically you use it for

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………
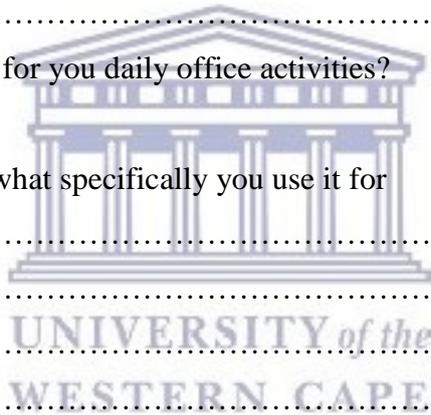
39. Please indicate any other social media tool you use in your daily official work and

what you use it for……………………………………………..

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

40. What specific information system do you use **MAINLY** in your work duties?

    a. Library Management System

    b. Library Service platform

    c. Digital Asset Management System (eg. DSpace)

    d. Content Management System (eg. LibGuide)

    e. Office Suite

    f. Social Media

335

g. Institutional Email

h. Other ……………………………………………………………

Please evaluate the IS you indicated in question 40 with comments and scale from all the sections below:

Section C: Personal impact of IS use in library

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
41. I have learnt much through the presence of the IS					
42. The IS enhances my awareness and recall of job related information					
43. The IS enhances my effectiveness on the job					
44. The IS increases my productivity					
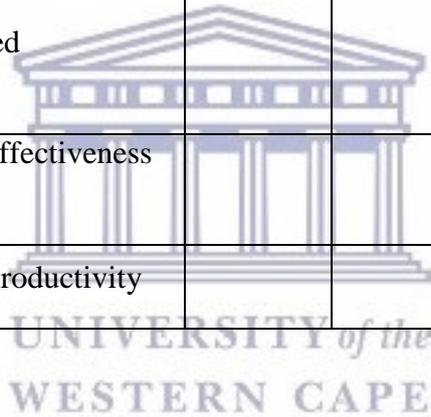
45. Please provide reasons for the responses you provided in section C

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

…………………

336

Section D: Information-Quality

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
46. Information available from the IS is important for decision making					
47. The IS provides output that seems to be exactly what is needed					
48. Information needed from the IS is always available					
49. Information from the IS is in a form that is readily usable					
50. Information from the IS is easy to understand					
51. Information from the IS appears readable, clear and well formatted					
52. Though data from the IS may be accurate, outputs sometimes are not					
53. Information from the IS is concise					
54. Information from the IS is always timely					
55. Information from the IS is unavailable elsewhere					

56. Please provide reasons for the responses you provided in section D

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

337

Section E: System Quality

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
57. Data from the IS often needs correction					
58. Data from the IS is current					
59. The IS is missing key data					
60. The IS is easy to use					
61. The IS is easy to learn					
62. It is often difficult to get access to information that is in the IS					
63. The IS meets my unit's requirements					
64. The IS includes necessary features and functions					
65. The IS always does what it should					
66. The IS user interface can be easily adapted to one's personal approach					
67. The IS system is always up-and-running as necessary					
68. The IS system responds quickly enough					
69. The IS requires only the minimum number of fields and screens to achieve a task					

338

70. Please provide reasons for the responses you provided in section E

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

Section F: Management Support

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
71. There is a strategic plan regarding IS use and management in the library					
72. There is a policy regarding IS use and management in the library					
73. There is a standard regarding IS use and management in the library					
74. Staff are consulted before IS are procured and installed					
75. Staff are informed and educated on the impact the IS can have on their job performance and overall library output					
76. Staff views are solicited on how to improve the use of IS in the library					
77. The management encourages using the system and appreciates the optimal use of the system to meet its goal					

339

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
78. The management discusses problems regarding the system					
79. Qualified IT staff have been employed					
80. All the necessary computing devices needed to utilize the IS have been provided					

81. Please provide reasons for the responses you provided in section F

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………

Section G: Maintenance
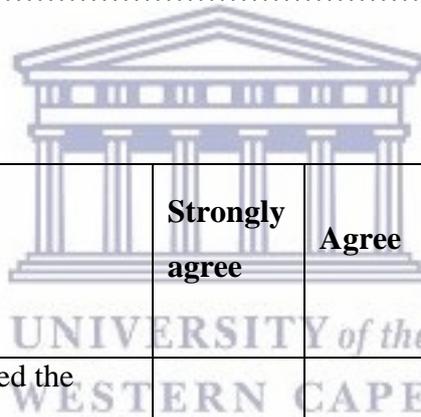
Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
82. The library has installed the current version of the IS I use in my line of duty					
83. Information from the IS is up-to-date.					
84. I received adequate training on the use of the IS before its installation or before I assumed duty					
85. I receive refresher training on the use of the IS					

340

	Strongly agree	Agree	Average	Disagree	Strongly disagree
86. I am trained any time the IS is updated or changed					
87. Regular maintenance work is carried out on the IS					
88. Regular maintenance work is carried out on computers and related devices					
89. When I encounter challenges with IS I am attended to promptly once I call for help					
90. When there is a system break down, the IS unit responds promptly					

91. Please provide reasons for the responses you provided in section G

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

Section H: use and future use of IS

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
92. I always do my job using the IS.					
93. I find the IS is available and flexible to always use.					
94. I have enough training to continue using the IS					
95. I will need more training if I want to use the system to the optimum					

341

96. Please provide reasons for the responses you provided in section H

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

Section I: Challenges encountered with IS use

Impact Measures	Strongly agree	Agree	Average	Disagree	Strongly disagree
97. The library experiences regular system downtime or failure					
98. The IS is usually slow					
99. We lack modern IT equipment					
100. I have inadequate IT skills and this hinders my efficient use of the IS					
101. I received insufficient training on the use of the IS and this hinders my efficient use of the IS					
102. Most of my colleagues have insufficient IT skills and this hinders the cooperate use of the IS					
103. There is a lack of qualified IT staff to provide support services					
104. We experience regular downtime from our Internet					

342

service provider					
105. We have insufficient bandwidth					
106. We experience regular Power outages/surges					

107.   Please provide reasons for the responses you provided in section I

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

108.   Please specify any other challenges you experience with the use of IS in your line of duty:

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………

109.   Please indicate what should be included/what librarians would like to see in an envisaged **national IS standard** for Ghana

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

………………………………..

343

110.   Please feel free to provide any other comment

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………...

....

....

....

UNIVERSITY *of the*
WESTERN CAPE

APPENDIX C: INTERVIEW SCHEDULE FOR LIBRARY HEADS

1. What types of IS are you using in your library?

   LMS

   ILS

   DAM

   CMS

   Electronic Security System

   Social media

   Office Suite

   Others…………………………………..
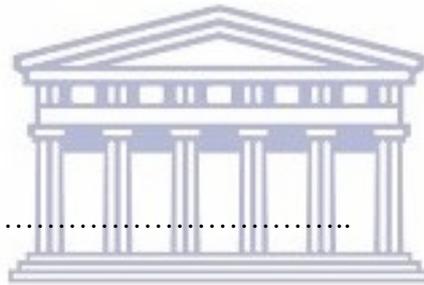
2. What are the main reasons of adopting such systems?

3. Do you use any open source IS? Why?

4. What informed the choice of the specific ISs you are using?

5. When were the systems implemented?

6. Can you give a little historical background to the implementation of the systems?

7. Did you have the support of you institution regarding the use of ISs?

8. Did you receive enough funding for the implementation of the systems?

9. What was the source of funding?

10. Have you ever changed your library management systems? Why or why not?

11. What was the intended purpose for implementing the specific ISs?

12. What specific functions do you use the ISs to perform?

13. Do you think your staff have the required ICT skills to use computerized system?

14. What benefits have the library gained from the use of the specific IS?

15. Has the use of the IS enhance staff performance? Explain?

16. Are the expectations of the library regarding the use of ISs being met?

17. How do you ensure the ISs are being used for the specific reasons for which there were acquired?

18. How do you measure the performance of the ISs?

19. Has the use of the ISs ever been evaluated?

20. How was the evaluation done?

21. What were the results of the evaluation

22. Has the performance of the IS ever been evaluated?

23. How was the evaluation done?

24. What were the results of the evaluation

25. Do you have an IS management policy in place? Give reasons

26. What factors will you want an IS management policy to address?

27. In your opinion, do you think your staff are happy using the system and do you think they will like to continue using it? Please provide reasons, supply reasons

28. If not, which system(s) would they prefer?

29. What type of training was given to staff with regards to the use of the IS?

30. Are there continues training programmes?

31. What forms do they take?

32. What are the challenges encountered with the use of IS in your library?

33. Any other comments?

APPENDIX D: INTERVIEW SCHEDULE FOR IT HEADS

1. What type of IS do you have in the library?

   LMS

   ILS

   DAM

   CMS

   Electronic Security System

   Social media

   Office Suite

   Others………………………………………..

2. Are the systems cloud base or hosted on local servers?

3. Are all the systems and data from the different system integrated fully and consistent? How?

4. With regards to the Library management system, which modules in the system are you using?

5. Have you been able to integrate the library management system into the university's wide information systems? If yes how?

6. What services do you provide as a library from the library website

7. How do you use the library website to enhance service delivery?

8. From your professional point of view, do you think the library is making maximum use of the IS available? Why?

9. Does the library have enough equipment to run the system fully?

10. How often do you experience system breakdowns?

11. What are the causes of such down times?
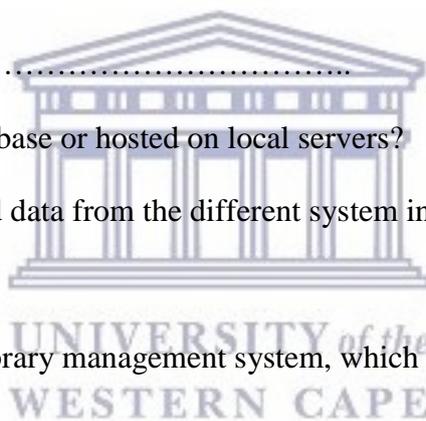
12. What do you understand by IS maintenance as an IT professional?

13. How do you improve the IS?

14. How often do you carry out maintenance work?

15. How do you think the use of the system can be improved?

16. What forms of training did you and other library staff receive regarding the use of the IS?

17. What challenges do you encounter with the system?

18. Any other comments?