



eReadiness of Public University Libraries in Malawi with Special Reference to the Use of Mobile Phones in the Provision of Library and Information Services

By

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ABSTRACT

It was observed that public university libraries in Malawi were failing to adequately serve their clients due to, among others, inadequate ICT infrastructure and limited opening hours. The use of mobile phones in the provision of library and information services was viewed as an alternative solution to this challenge. This study was, therefore, undertaken to investigate the eReadiness of public university libraries in Malawi to use mobile phones in the provision of library and information services. The study addressed the following questions: What is the level of preparedness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services? What electronic information resources and services are currently available in public university libraries in Malawi that can potentially be adopted and used through mobile phones? What is the current status of providing and accessing library and information services through mobile phones in public university libraries in Malawi? What are the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services? What factors influence the adoption and use of mobile phones by library staff, students and academic staff in providing and accessing library and information services?

The study was underpinned by two theories: Unified Theory of Acceptance and Use of Technology (UTAUT), and Technology, Organization, and Environment (TOE) Framework. The study used the pragmatic paradigm, mixed methodology and case study design to understand the research phenomenon. The population of the study comprised students, academic staff, university/college librarians and ICT Directors. The samples of the population studied were 370 students, 255 academic staff, 5 university/college librarians and 5 ICT Directors. Qualitative data was collected through interviews from university/college librarians and ICT Directors while quantitative data was collected from students and academic staff using questionnaires. Qualitative data was analysed using Nvivo whilst quantitative data was analysed using IBM SPSS Software version 23.

Findings of the study reveal that libraries surveyed had most of the ICT infrastructure necessary for offering library and information services through mobile phones. Students and academic staff possessed mobile phones which they could use to access information services

offered by the libraries. Moreover, the mobile telecommunications network was pervasive in the country making the delivery and access to library services through mobile phones easier. However, ICT policies were not available whilst human resources and requisite skills were inadequate to provide effective library and information services through the use of mobile phones. The results further revealed that institutions surveyed had e-resources such as OPAC, e-books, e-journals, and repositories of local content that could be implemented through mobile phones. Findings also revealed that COM Library had fully implemented library and information services offered through mobile phones but MZUNI, KCN, The Polytechnic and LUANAR were all planning either to introduce or fully implement these services. The attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services were largely positive. Network quality, service costs, and response times were factors that influenced the use of mobile phones in providing library and information services.

The overall conclusion from this study was that public university libraries in Malawi were generally e-ready to offer library and information services through mobile phones notwithstanding certain infrastructure and skills issues that must be addressed. Consequently, the study recommended that public university libraries in Malawi that had not implemented the delivery of library services through mobile phones should speed up their implementation. The study further recommended that infrastructure and skills issues that were discovered should be addressed to ensure effective operations of library and information services provided through mobile phones. The researcher recommends that a much broader study covering all students in the four public universities in order to provide a holistic picture of the eReadiness of public university libraries in Malawi to offer library and information services through mobile phones.

DECLARATION

I, **Aubrey Harvey Chaputula**, declare that:

1. The research reported in this thesis, except where otherwise indicated, is my original research.
2. This thesis has not been submitted for any degree or examination at any other university.
3. This thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.
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Professor Stephen Mutula

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DEDICATION

This thesis is dedicated to my loving wife, Bertha, and my two adorable children: son, Brian and daughter, Dalitso. Am proud of all of you.

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LIST OF ABBREVIATIONS

A	- Attitudes
APP	- Application
AU	- Actual Use
ARL	- Association of Research Libraries
ATLAS	- Automatically Tuned Linear Algebra Software
BI	- Behavioural Intention
CCTV	- Closed Circuit Television
CHANCO	- Chancellor College
COM	- College of Medicine
C-TAM-TPB	- Combined TAM and TPB
CSPP	- Computer Systems Policy Project
DOI	- Diffusion of Innovation
DTPB	- Decomposed Theory of Planned Behaviour
ECAR	- EDUCAUSE Center for Analysis and Research
EE	- Effort Expectancy
FC	- Facilitating Conditions
GPS	- General Positioning System
HaaS	- Hardware as a Service
HE	- Higher Education
IGNOU	- Indira Gandhi National Open University
ICT	- Information and Communications Technology
IaaS	- Infrastructure as a Service
IDT	- Innovation Diffusion Theory
ILS	- Integrated Library System
IUM	- International Islamic University of Malaysia
IM	- Instant Messaging
IS	- Information Systems
IT	- Information Technology
ITM	- Initial Trust Model
ITU	- International Telecommunications Union
JNU	- Jawaharlal Nehru University
KCN	- Kamuzu College of Nursing

LIS	- Library and Information Science
LMS	- Library Management System
LUANAR	- Lilongwe University of Agriculture and Natural Resources
MACRA	- Malawi Communications Regulatory Authority
MALICO	- Malawi Library Consortium
MI	- McConnell International
MIT	- Massachusetts Institute of Technology
MK	- Malawi Kwacha
MM	- Motivational Model
MMS	- Multi-Media Service
MPCU	- Model of PC Utilization
MTL	- Malawi Telecommunications Limited
MUST	- Malawi University of Science and Technology
MVOD	- Mobile Video On Demand
MZUNI	- Mzuzu University
NUST	- National University of Science and Technology
ODL	- Open Distance Learning
OPAC	- Online Public Access Catalogue
OIT	- Oriental Institute of Technology
PaaS	- Platform as a Service
PC	- Personal Computer
PE	- Performance Expectancy
PEOU	- Perceived Ease of Use
PVT	- Private Virtualization Theory
PU	- Perceived Usefulness
QDAP	- Qualitative Data Analysis Program
QR	- Quick Response
RFID	- Radio Frequency Identification
RGU	- Robert Gordon University
SaaS	- Software as a service
SMS	- Short Message Service
SCT	- Social Cognitive Theory
SI	- Social Influence
SPSS	- Statistical Package for the Social Sciences

SN	- Subjective Norms
TTF	- Task-Technology-Fit
TAM	- Technology Acceptance Model
TOE	- Technology-Organization-Environment
TNM	- Telecom Networks Malawi
TPB	- Theory of Planned Behavior
TEEAL	- The Essential Electronic Agriculture Library
TRA	- Theory of Reason Action
UCOL	- Universal College of Learning
UK	- United Kingdom
UIUC	- University of Illinois at Urbana-Champaign
UNCTAD	- United Nations Conference on Trade and Development
UNISA	- University of South Africa
URL	- Uniform Resource Locator
USSD	- Unstructured Supplementary Service Data
USA	- United States of America
UTAUT	- Unified Theory of the Acceptance and Use of Technology
WAP	- Wireless Application Protocol

CHAPTER ONE

BACKGROUND TO THE STUDY

1.1 Introduction

Lou (2010) defines eReadiness as the ability of a country, enterprise or organisational unit to be prepared, willing to adopt, use and benefit from e-innovations such as e-business, e-procurement, and e-learning, among others. In other words, eReadiness refers to the extent to which a society, country or an organisation is prepared to partake competitively in the digital age. Such an eReady society, country or organisation will have in place an enabling ICT infrastructure (mobile, WiFi and broadband Internet connectivity), human capacity, relevant policy and regulatory framework, and a conducive business environment (Mutula and van Brakel, 2006a). The proliferation of mobile phones the world over, has particularly made these tools important determinants of eReadiness of societies, countries or organisations in the digital dispensation. A country, society or organisation that is e-ready is bound to register greater usage of ICTs. On the contrary, uptake of ICTs would diminish in an environment in which these indicators are lacking.

Mutula and van Brakel (2006a) observe that several e-readiness tools have emerged through the efforts of development agencies, research organisations, academia, business enterprises and individuals following the development of the first e-readiness tool by the Computer Systems Policy Project (CSPP) in 1998. Since the focus of e-readiness has been on government activities, most of the e-readiness tools developed measure the e-readiness concept at national level in such areas as business, governance, procurement, learning, and more. Consequently, this has led to the development of concepts such as e-business, e-procurement, and e-learning, among others, to denote the kind of activities taking place in these areas. According to Mutula and van Brakel (2006a), some of the organisations that have been in the forefront in developing e-readiness assessment tools include: McConnell International (MI), a global technology policy and management consulting firm (with its Ready?Net.Go tool), the Centre for International Development at Harvard University (with its Network Readiness Index tool), the United Nations Conference on Trade and Development (UNCTAD) (with its ICT Development Index), the Economist Intelligent Unit (with its E-readiness Rankings), and the Mosaic Group (with the Framework for Assessing the Diffusion of the Internet). Though these organisations differ in their perspective of e-

readiness, the tools they have developed to assess an organisation's e-readiness "on average, measure the level of infrastructure development; connectivity; internet access; applications and services; network speed; quality of network access; ICT policy; ICT training programs; human resources; computer literacy; and relevant content" (Toufani and Montazer, 2011, p.472). In studying the e-readiness status of public university libraries in Malawi to provide library and information services through the use of mobile phones, the study focused on these factors as they are equally applicable in the mobile phone environment.

The term "library and information science" combines two terminologies namely "library" and "information science". The former denotes a term that came into wide usage in the middle part of the 15th century to refer to buildings that were set up by religious institutions to house their written works and records (Chowdhury et al., 2008). The latter, conversely, is a term that came into wide usage in the early 1970s in response to changes recorded in the field of librarianship (Bawden and Robinson, 2012). Librarianship had traditionally been viewed as a job that involved the acquisition, organisation and dissemination of information resources using mainly crude and traditional methods (Chowdhury et al., 2008). However, the advancement of technology has led to increased use of computers and telecommunication technologies in information handling, storage, retrieval and dissemination (Vickery and Vickery, 2004). In light of these changes, some professionals have embraced the term "information science" whilst others have adopted the term "library and information science" to refer to the field. Nonetheless, this thesis uses the term "library and information science" to refer to the field of librarianship, and "library and information service" to refer to the services that are provided in this field.

The potential of the mobile phone as a tool for the delivery of library and information services has long been underscored by a number of scholars (Paterson and Low, 2011; Smith and Caruso, 2010; Lippincott, 2010). An ECAR (2010) nation-wide study of undergraduate students' use of technology trends in the USA higher educational institutions revealed a marked increase in the number of students who owned and accessed Internet from a handheld device (most commonly smartphones) from 33.1% in 2009 to 48.8% in 2010. Another renowned scholar, Joan Lippincott, predicted in her 2010 article titled "A mobile future for academic libraries" that mobile phones will have a profound impact on library service delivery in the future considering that mobile phones had become part and parcel of people's lives. Findings of a study by Paterson and Low (2011) involving 1716 university students in

the UK indicated that students were willing to access library services using mobile phones, strengthening the case for the delivery of library services through this medium. Increasingly, libraries are offering their reference services through a number of mobile phone applications (Luo, 2014) and also creating webpages that are accessed through mobile phones (Bridges et al., 2010; Wilson and McCarthy, 2010).

Although progress towards the adoption and use of mobile phones in libraries is being made, there is still a long way to go before they are fully integrated in library services because mobile phone use in libraries is at a very early stage of adoption. Projects aimed at offering both user and reference library services through web accessible through mobile phone undertaken at both Ryerson University Library (Wilson and McCarthy, 2010) and Oregon State University Library (Bridges et al., 2010) were successfully implemented. Moreover, a project aimed at offering reference services through mobile phone text messages undertaken at San Jose State University was not widely utilised by users, a development that was attributed to the lack of awareness (Luo, 2014). In the context of Malawi, no studies on the use of mobile phone to provide library and information services are available. From the broader African perspective, a few university libraries have adopted the use of mobile phones in libraries, and that the libraries that are using mobile phones use them mainly for SMS text messaging (Anbu and Mavuso, 2012; Sekyere, 2011). A study conducted by Sekyere (2011) involving 79 academic libraries in ten West African countries found that none of the libraries surveyed used mobile phones in service delivery. However, a recent study conducted by Baro et al. (2014) covering 36 Nigerian University libraries found that less than half of the libraries used mobile phone SMS for reference services. A pilot SMS project conducted by Anbu and Mavuso (2012) at the University of Swaziland revealed that SMS was used successfully to market library services.

A number of factors have been found to influence mobile phone use in the provision of library and information services. A study by Kobus et al. (2013) focusing on ownership and on-campus use of mobile IT devices of Dutch University students found that ownership was high for all students including those with lower incomes implying that ownership of smartphones is not influenced by level of income. Another study by Karim et al. (2010) on mobile phone adoption of students and staff (academic and non-academic) involving 201 respondents at a university in Malaysia found that gender, age and occupation were the main factors that affected mobile phone ownership and use. Although the two studies discussed did

not find income to be a factor in mobile phone ownership, findings of other studies have discovered that income affects usage (Hsiao, 2013; Song and Lee, 2012). A web-based survey conducted by Hsiao (2013) on android smartphone adoption and intention to pay for mobile Internet in Taiwan found that male users, including people with higher incomes, were more likely to read e-books on their smartphones. Similarly, a study by Song and Lee (2012) indicated that costs of handsets and monthly data plans prevented some students from owning more than one mobile device at the College of Business of the University of Illinois.

1.2 Public University Libraries in Malawi

This study focusses only on public university libraries because they are older, better resourced and well-managed than private university libraries in Malawi. Malawi has four public universities. They include University of Malawi (UNIMA), Mzuzu University (MZUNI), Lilongwe University of Agriculture and Natural Resources (LUANAR), and the Malawi University of Science and Technology (MUST). Although a total of seven libraries exist, this study covers only five of them namely: MZUNI, LUANAR, and three constituent colleges of UNIMA namely; The Polytechnic, College of Medicine (COM) and Kamuzu College of Nursing. Libraries selected for the study are affiliated to older and well-established institutions except MUST which was established in 2013, and is yet to have students in third and fourth year levels. CHANCO Library, on the other hand, was not included in the study because permission was not secured to access the respondents.

Most public university libraries in Malawi are open for a maximum period of 14 hours in a day during the week, and 4 hours during weekends, mainly due to human resource constraints. Although the impact of this on library operations has not been ascertained, related studies carried out in public libraries in the United Kingdom indicated that a reduction in the number of opening hours negatively impacts on book borrowings (Breslin and McMenemy, 2006; Grindlay and Morris, 2004). Limited number of opening hours could further limit access to library resources and services as most public university libraries in Malawi are not fully automated. Studies further show that computer facilities and print collections are limited in public university libraries in Malawi (Chaputula, 2012; Bates et al., 2011; Harle, 2010). These challenges have come about due to the inadequacy of funding over the years (Chaputula, 2012; Mapulanga, 2011). The shortage of computers has contributed to the under-utilisation of e-resources (Malemia, 2014). Furthermore, most students

(undergraduate and postgraduate) stay off-campus and commute or walk to access the library hence may not make use of the library at night.

1.3 Statement of the Problem

Public university libraries in Malawi are under-resourced especially with regard to ICT infrastructure such as computers (Chaputula, 2012; Bates et al., 2011; Harle, 2010). In addition, libraries open for limited hours most of the days because of limited human capacity. Moreover, most students stay off-campus (Official student enrolment statistics, February, 2015) and have limited access to the library most of the time. This is exacerbated by the fact that the library collections are in limited supply (Mapulanga, 2011).

The use of mobile phones to provide library and information services in Malawi has the potential to enhance access to library resources beyond the normal opening hours hence can assist to overcome the obstacles of time and space (Malik and Mahmood, 2013), and bring convenience to library users (Ballard and Blaine, 2013). This would also help provide access to e-resources by those who do not have access to institutional computer facilities thereby assist to erase the challenge of PC shortage which is common in many libraries of developing countries (Palumbo, 2014).

This study, therefore, investigated the eReadiness of public university libraries in Malawi to use mobile phones to provide library and information services. It is expected that the outcome from the study would pave the way for policy, practical and managerial interventions in areas of infrastructure development, capacity building, awareness creation, institutional framework and budgetary support to prepare the ground for using mobile phones to provide library and information services in public university libraries in Malawi.

1.4 Purpose of the Study

The purpose of this study was to investigate the level of eReadiness and preparedness of public university libraries in Malawi to use mobile phones in the provision of library and information services.

1.4.1 Objectives of the Study

The following key research objectives were addressed:

1. To examine the extent of preparedness of public university libraries in Malawi in terms of policy, infrastructure, human capacity and acceptance to adopt and use mobile phones in providing library and information services.
2. To investigate the factors that are likely to influence the potential adoption and use of mobile phones in the provision of library and information services both positively and negatively.

The study also addressed the following broader issues around the research problem: eReference services, eReadiness, technology acceptance, diffusion of innovation, mobile phone technology, library and information services, and university libraries.

1.4.2 Research Questions

The major research question this study addressed was: What is the level of eReadiness of public university libraries in Malawi in using mobile phones in the provision of library and information service?

In order to address the above major question, the study addressed the following specific research questions:

1. What is the level of preparedness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services?
2. What electronic information resources and services are currently available in public university libraries in Malawi that can potentially be adopted and used through mobile phones?
3. What is the current status of providing and accessing library and information services through mobile phones in public university libraries in Malawi?

4. What are the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services?

5. Which possible factors influence the adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services?

1.5 Significance of the Study

Creswell (2013) indicates that significance of a study is among others determined by: (1) how it fills the observed deficiencies or gaps in the existing scholarly literature; (2) how it heightens awareness and creates dialogue of experiences which have been forgotten and overlooked; and (3) how it leads to better understanding or insights to something leading to improvements in practice. In other ways, significance of a research study is measured by the impact it has on organisations, individuals and the society at large.

In the same vein, it is hoped that the findings of this study will have a positive impact on various players in various sectors ranging from the academia, industry and society. With regard to industry, it is hoped that the outcome from the study would pave the way for policy, practical and managerial interventions in areas of infrastructure development, human capacity building, awareness creation, institutional framework and budgetary allocation to prepare the ground for using mobile phones to provide library and information services in public university libraries in Malawi. It is anticipated that this would lead to information provision anywhere and anytime through mobile phones to benefit not only the information seeker but also public university libraries in Malawi.

The ITU (2016) statistics show that the mobile phone is the most easily accessible ICT gadget to many people on the African continent as the penetration of both laptop and desktop computers remains low. Moreover, results of the literature review indicate that not many university libraries have adopted the use of mobile phones in the delivery of library and information services. Findings of this study, therefore, could be used as a tool for raising awareness amongst librarians and other relevant stakeholders on how they can leverage mobile phones to deliver library and information services in a timely and cost effective way. This could help boost output in the tertiary education sector on the continent.

The preliminary literature reviewed exposed three notable gaps. Most notably, the use of mobile phones in the provision of library and information services was still in its infancy, especially in developing countries. Moreover, research is concentrated in the developed and transitional economies such as the USA, Malaysia, China, and Japan. Methodologically, most of the studies undertaken were case studies and surveys. This study used a multi-case study design to investigate the use of mobile phones in the delivery of library and information services. The present study adds to the body of literature on the use of mobile phones in the delivery of library and information services from the Third World perspective especially Africa.

1.6 Scope and Delimitations of the Study

The study examined the eReadiness of public university libraries in Malawi in terms of policy, infrastructure, human capacity and acceptance to potentially adopt and use mobile phones in providing library and information services. It also investigated factors that are likely to influence the adoption and use of mobile phones in the provision of library and information services.

The study covered undergraduate students in the third, fourth and fifth year levels; postgraduates and academic staff. Whilst the response rate amongst the undergraduates was generally good, that of postgraduates was not very impressive. The lower than expected response rate amongst postgraduates was influenced by small populations in most of the institutions studied. Furthermore, most of the respondents could not be traced on campus. The researcher also had challenges accessing or even administering questionnaires to academic staff as majority had very busy schedules.

1.7 Outline of the Thesis

The outline of the thesis is as follows:

Chapter 1: Introduction

Covers background to the study, overview of academic libraries in Malawi, statement of the problem, research objectives, research questions, delimitations, significance of study, theory, preliminary literature and methods.

Chapter 2: Theoretical Framework

Discusses the TOE framework and UTAUT theory stating why they are suitable for this study.

Chapter 3: Literature Review

Presents empirical and theoretical literature covering themes of the research questions, constructs of the theory, and broader issues of the research problem. The literature is sourced from books, journals, conference proceedings, technical papers and more. Gaps in literature are adduced, and how this study helps to address them provided.

Chapter 4: Methodology

Covers research paradigms, research approaches/methods, research design, study population, sampling technique and research sample, data collection instruments, data collection methods, data analysis, validity and reliability testing, and ethical consideration.

Chapter 5: Presentation of Research Findings

Presents findings from the data analysis logically based on research questions, constructs of the theory, and broader issues of the research problem

Chapter 6: Discussion of Research Findings

The chapter discusses findings in relation to the research questions, constructs of the theory, and broader issues of the research problem using extant literature and theory.

Chapter 7: Summary, Conclusion and Recommendations

This chapter provides summary, conclusions and recommendations. Further areas of research are suggested as is the originality and contribution of the study to policy, practice and theory provided.

CHAPTER TWO

THEORETICAL FRAMEWORK

2.1 Introduction

Theory is “an interrelated set of constructs (or variables) formed into propositions, or hypotheses, that specify the relationship among variables (typically in terms of magnitude or direction)” (Creswell, 2009, P.51). Theories have long been commonly associated with quantitative studies although they are also increasingly being used by both qualitative and mixed methods researchers. In quantitative studies, theoretical frameworks form the basis of hypotheses that are developed (Sekaran and Bougie, 2010). Therefore, theories are introduced early in the research process. Besides anchoring the study, as is the case in quantitative research, the role of theory in qualitative and mixed method studies is that of providing an orienting lens for the study of topics of the advocacy or emancipatory nature that include gender, class or race (Creswell, 2009). Theory, thus, plays an important role of illuminating research across the three categories.

More frequently, the concept theoretical model is used interchangeably with theory. Though the two concepts are related, they are typically not the same. A conceptual model describes how the concepts in a model are related to each other (Sekaran and Bougie, 2010). Moreover, models are often presented in diagrammatical form, and their role is to help the reader to visualise what is implied in a theory which it represents. In this way, a model can be of great help in achieving clarity and focussing on key issues in the nature of phenomena (Cohen et al., 2007). Theory, on the other hand, is the opposite of a conceptual model. It is “a set of interrelated constructs (variables), definitions, and propositions that presents a systematic view of phenomena by specifying relations among variables, with the purpose of explaining natural phenomena” (Kerlinger, 1979 cited by Creswell, 2009, p.51). The main similarity between model and theory is that both present ideas that have been scientifically tested and proven. They differ in that while theory presents phenomena in words, a model presents it in diagrammatical form.

This study sought to establish the eReadiness of public university libraries in Malawi in the use of mobile phones in the provision of library and information services. To achieve this objective, the study addressed the following specific research questions:

1. What is the level of preparedness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services?
2. What electronic information resources and services are currently available in public university libraries in Malawi that can potentially be adopted and used through mobile phones?
3. What is the current status of providing and accessing library and information services through mobile phones in public university libraries in Malawi?
4. What are the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services?
5. What factors influence the adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services?

The role of theory in this study was to provide an orientation lens whereby variables in the research questions were aligned with variables in the two theoretical frameworks used, namely the Unified Theory of the Acceptance and Use of Technology (UTAUT) and the Technology-Organisation-Environmental (TOE) framework. Several other theories were reviewed such as the Technology Acceptance Model (TAM), and Diffusion of Innovation (DOI) Theory. Following a review of the four theories, it was found that none of them could adequately cover issues which the study sought to address. For this reason UTAUT and TOE framework were jointly used to underpin this study. UTAUT was chosen to act as a basis for studying technology adoption at individual level (students, academic staff and library staff) whilst TOE framework was used to study technology adoption at organisation level (public universities). The four theories are subsequently discussed.

2.2 The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is the most influential and widely used model for technology acceptance (Özbek et al., 2014; George and Kumar, 2013). Although the model has become generalised as a tool for studying technology or Information System (IS) usage, even at organisational level (Lucas et al., 2007), the model was primarily developed with the

aim of understanding why people accept or reject computers at a personal level (Sheikhshoaei and Oloumi, 2011; Lucas et al., 2007; Davis et al., 1989).

TAM was introduced by Davis in the late 1980s (Akman and Mishra, 2015; Özbek et al. 2014; Saricam, 2014; Wentzel et al., 2013; Bradley, 2012; Cua, 2012; Davis et al., 1989). TAM was tested and validated in the stages of its development. Davis first introduced the concept of technology acceptance in his doctoral thesis at the Sloan School of Management, Massachusetts Institute of Technology (MIT) in 1986. However, the TAM model was subjected to further tests and validation in two main studies in 1989 (Davis, 1989; Davis et al., 1989). These tests confirmed the validity of the two main constructs of the model which are perceived usefulness (PU) and perceived ease of use (PEOU).

TAM is grounded in the Theory of Reason Action (TRA) (Teo and Jarupunphol, 2015). TRA is a theory based in social psychology, and was jointly formulated by Fishbein and Ajzen in 1975. TRA argues that an individual's behaviour is a function of both the individual's attitude toward a specific behaviour and the social influences and norms surrounding it (Zhou, 2008). The model has four main components that attempt to explain people's use of technology. These are beliefs, attitudes (A) and subjective norms (SN), behavioural intention (BI) and actual behaviour or use (Bradley, 2012). TRA states that there is a causal connection between the four components in that beliefs shape attitudes which in turn affect behavioural intention and ultimately actual behaviour or use. A person's attitudes are, furthermore, influenced by subjective norms which Kwon and Chidambaram (2000) have described as social pressure exerted by the person to perform (or not perform) the behaviour.

TAM differs from TRA in that it omits the SN element of TRA, and most importantly, replaces the component of beliefs with two new constructs: Perceived usefulness (PU) and perceived ease of use (PEOU). PU is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p.320). PEOU, in contrast, refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p.320). PU and PEOU both directly influence the user's attitude toward using new information technology which in turn leads to the user's behavioural intention (BI) to use (Bradley, 2012). Besides directly influencing attitude, PU also influences BI which leads to computer usage. According to Davis et al. (1989, p.986), the PU-BI relationship is based on the idea that "within organisational settings, people form

intentions towards behaviours they believe will increase their job performance, over and above whatever positive or negative feelings may be evoked towards the behaviour per se.” This is so because enhanced performance is instrumental to achieving various rewards that are extrinsic to the content of the work, such as pay increments and promotions.

A number of studies (Davis, 1989; Davis et al., 1989) have found that PU is more influential than PEOU in driving usage behaviour. Davis (1989) argues that usefulness is strongly linked to usage than ease of use; stating that users are driven to adopt an application primarily because of the functions it performs for them, and how easy or hard it is to get the system to perform those functions. He goes on to say that although difficulty of use can discourage adoption of an otherwise useful system, no amount of ease of use can compensate for a system that does not perform a useful function. TAM further posits that PEOU has an effect on PU but not the other way round. This finding has been confirmed in a recent study by Park et al. (2009). Conspicuously missing in TAM from the original TRA is the construct of SN. Davis et al. (1989) justifies the decision to exclude the SN to the uncertainty of the theoretical and psychometric status of the construct.

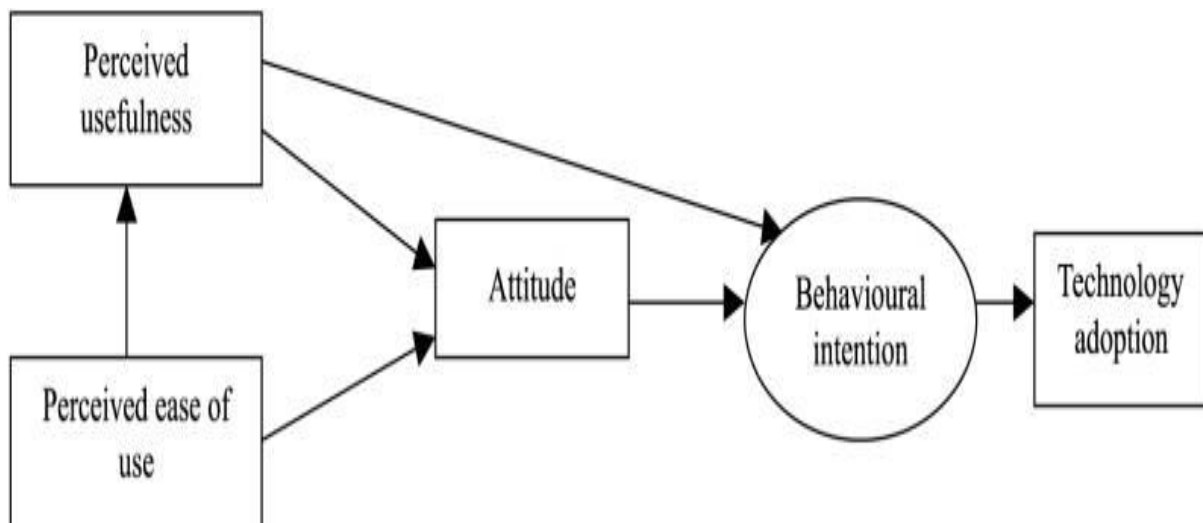


Figure 2. 1: The Technology Acceptance Model (TAM) (Source: Davis et al., 1989).

2.2.1 Strengths of the TAM

According to Davis et al. (1989, p. 985), the goal of TAM is “to provide an explanation of the determinates of computer acceptance that is general, capable of explaining user behaviour

across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified.” To a greater extent, TAM has managed to live up to this expectation. To begin with, TAM has proven to be a powerful model in explaining usage behaviour. Legris et al. (2003) reviewed research done with this model and underscored its value for understanding the use of IT. Their findings showed that this model can predict about 40% of the factors that influence the use of IT. Another study conducted by Meister and Compeau (2002) revealed that TAM has routinely explained up to 40% of usage intentions and 30% of system usage. Similarly, Davis et al. (1989) conducted a study involving 107 MBA students at the University of Michigan to measure students’ attitudes towards a word processing software, Write One. A questionnaire was administered to the students soon after introduction to the program and at the end of the semester. The aim was to measure their attitudes towards the software using TAM and TRA. The results of the study indicated that TRA accounted for 32% of variance at the beginning of first semester and 26% of the variance at the end of second semester. TAM, on the other hand, explained 47% and 51% of BI’s variance respectively. It was again observed that TRA explained 7% of A’s variance during the first semester and 30% during the second semester whilst TAM explained 37% and 36% during these periods. Findings of these studies show that TAM is more powerful than some of its competitors, TRA in particular. Secondly, the main constructs of the model, PU and PEOU, have been tested and found to have a direct and indirect effect on both attitudes and BI hence having positive effect on actual usage (Bradley, 2012). In this, the model helps to explain user behaviour in system usage.

TAM has been described by Igbaria et al. (1995) as simple, having high validity (Chau, 1996), being parsimonious and powerful model that can be used for the explanation and prediction of usage intentions and acceptance behaviour (Yi & Hwang, 2003). Moreover, TAM has proven to have reliable and valid constructs (Chin and Todd, 1995), and is an adequate model in predicting students’ IT usage and learning satisfaction (Cheng et al., 2015). According to Saricam (2014), the advantage of TAM is the capability of the model in identifying why a particular system is not accepted and, in showing how appropriate corrective steps can be taken. This could in turn lead to wider adoption and use of information systems (IS), a development that cannot only benefit organisations, but also individuals using them. Probably the best summary of the model is the one that was provided by King and He (2006) who described TAM as powerful, highly reliable, valid and robust predictive model that may be used in a variety of contexts. The positive reviews that TAM

has received, to a great extent, indicates that the model has largely lived up to the expectations of Davis et al. (1989) who created it.

2.2.2 Weaknesses of TAM

Although TAM and its extensions have proven over time to be the most influential technology adoption model (Wentzel et al., 2013), it has its own weaknesses. Venkatesh (2000), for instance, argued that the application of the TAM beyond the workplace raises problems because its core constructs do not fully reflect the variety of task environments and how well the technology meets the requirements of that task. Park (2010) argues further that because the original model was intended to be general and parsimonious, it lacked an ability to identify antecedent variables that could influence PU and PEOU. Moreover, TAM is limited in scope in that its two constructs mainly focus on the technology itself thereby leaving out other important aspects in the adoption process. Scholars such as Bagozzi (2007) have indicated that TAM has neglected group, social and cultural aspects of technology adoption whilst Van de Wijngaert & Bouman (2009) and Wentzel et al. (2013) found that personal characteristics, fun and context characteristics play an important role in technology adoption. The limited scope of the model is further reflected in its performance. Bradley (2012), for instance, observed that most studies reviewed based on TAM explained about 40% of the variance in usage intentions and behavior.

As previously discussed, the other weakness levelled against TAM was that it lacked an ability to identify antecedent variables that could influence PU and PEOU (Park, 2010). Venkatesh and Davis (2000) and Venkatesh and Bala (2008) have attempted to address this weakness through the development of TAM2 and TAM3 respectively. In TAM2, Venkatesh and Davis (2000) posited that subjective norm, image, job relevance, output quality, result demonstrability, and perceived ease of use are determinants of PU. In TAM3, Venkatesh and Bala (2008) added computer self-efficacy, perceptions of external control, computer anxiety, computer playfulness, perceived enjoyment and objective usability as determinants of PEOU (Venkatesh and Bala, 2008). The expanded TAM models have proven more powerful than the original model. TAM2, for instance, accounts for 60% of the variance in the drivers of user intentions (Baker, 2010). TAM3, on the contrary, had an explanatory power of between 43% and 67% of use intention (Venkatesh and Bala, 2008). Nevertheless, UTAUT explained up to 69% of the variance in use intention. It is for these reasons that TAM and its extensions

have been overlooked in this study as the researcher searches for a model that has greater coverage and more explanatory power.

2.3 DIFFUSION OF INNOVATION (DOI) THEORY

Diffusion of innovation (DOI) theory describes the process through which new ideas, practices, or technologies are spread into a social system (Rogers, 2003). Rogers (2003, p. 12) defines innovation as ‘an idea, practice, or object that is perceived as new by an individual or other unit of adoption’. Diffusion, on the other hand, is defined as “the process in which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 2003, p. 5).

DOI posits that there are four key elements that explain the diffusion of innovations within a particular context. These elements are: (1) innovation (2) communication channels (3) time (4) social system. Although Everett Rogers is credited for popularising the DOI theory through his book which was first published in 1962, the ideas around which Rogers built on his theory were first championed by the French sociologist, Gabriel Tarde, as early as 1903, and later expanded through the works of Ryan and Gross in 1943 and Coleman et al. in 1957 (Cua, 2012; Hornor, 1998). Tarde’s research introduced two key concepts of DOI: the innovator and adopter, and also concluded that human interactions (communication) are fundamental aspects of the diffusion process. On the contrary, Ryan and Gross (1943 cited in Cua, 2012) introduced the idea of the early majority, late majority, and laggards whilst Coleman et al., focusing on opinion leaders, examined diffusion as a social process originating with the media in 1957 (Cua, 2012). DOI has become such a popular theory such that the book that introduced the theory is now in its 5th edition.

2.3.1 Innovation

There are several attributes of an innovation that can either inhibit or aid its adoption. These are relative advantage, compatibility, complexity, trialability, and observability. Relative advantage is defined as ‘the degree to which an innovation is perceived as being better than the idea that it supersedes’ (Rogers 2003, p.229). This implies that the more advantages an innovation brings, the more likely or rapidly it will be adopted. The same attribute applies to compatibility whereby the perception of the innovation as being compatible with previous

experiences and values of adopters will aid its rapid adoption. It can, therefore, be concluded that both relative advantage and compatibility have a positive effect on adoption. Complexity, on the other hand, has a negative effect on adoption because the more complex the innovation is, the less likely it will be accepted (Grgurović, 2014). Complexity is defined as ‘the degree to which an innovation is perceived as relatively difficult to understand and use’ (Rogers, 2003, p. 257). The fourth attribute, trialability, is the degree to which a user can try out the innovation. This attribute too aids adoption in that users who are able to try out an innovation, possibly before adoption or purchase, would be able to know more about the innovation. Most notably, the first two attributes of relative advantage and compatibility, that are known to assist in adoption, are explored hence the adopter would be able to make a more informed opinion about a particular innovation. Observability applies to the degree to which the innovation can be observed before adoption. This attribute is closely related to trialability. Both attributes are similar in that the adopter has a close encounter with the innovation, something that may help the adopter in making the right decision regarding whether to adopt or reject an innovation.

2.3.2 Communication Channels

Communication channels are a crucial element in the adoption and diffusion of an innovation because they are a means through which potential adopters learn about an innovation, and more importantly, facilitate the innovation-decision process which essentially are the stages an individual goes through from the first contact with an innovation to its complete adoption (Grgurović, 2014). According to Barrette (2015), both the channel and source of communication affect diffusion. In terms of channel, adopters often receive initial information about the innovation through mass media channels, and subsequently through interpersonal interactions. Rogers (2003) argues that although mass media channels allow for more widespread dissemination of information, interpersonal channels are more influential on decision-making. Possibly the secret behind this, lies in the fact that the innovation-decision process includes some sort of persuasion which may only work effectively if the person passing on the information has direct contact with the one receiving the message. This is advantageous because the message may be modified based on need.

Grgurović (2014) indicates that communication is most likely to occur between homophilous individuals (people who share similar attributes, activities, beliefs, and so forth). However,

the challenge for diffusion is that innovators of technology tend to be heterophilous (dissimilar) with the majority of potential adopters because they have more technological literacy than later adopters. It is, therefore, recommended that good candidates to communicate with potential adopters and facilitate adoption must be people who bridge the technological literacy gap yet are homophilous with potential adopters in other respects. Ideally, the change agents should be community's opinion leaders who are known to have a big influence over their communities.

2.3.3 Time

Time is a very important element in the innovation-diffusion process as it spells out how the innovation is taken up by various groups within the social setting. Time is required for the diffusion process, particularly because it takes time for individuals to make decisions about whether or not to adopt an innovation (Winter, 2013). For instance, it may take a few months for one group to make a decision about adopting a particular innovation but for others this may take several years. Rogers (2003) describes five adopter categories based on the time when the individual adopts an innovation in relation to other individuals: innovators, early adopters, early majority, late majority, and laggards.

Innovators are the members of the system who are the first to introduce the new idea, and they require a shorter adoption period than any other category. They comprise 2.5% of the population (Cheng et al., 2004). Some other attributes which are associated with the innovators are:

- (1) Venturesome, desire for the rash, the daring, and the risky
- (2) Control of substantial financial resources to absorb possible loss from an unprofitable innovation.
- (3) The ability to understand and apply complex technical knowledge, and
- (4) The ability to cope with a high degree of uncertainty about an innovation.

The second group of the early adopters comprise of 13.5% of the population (Cheng et al., 2004). They are the first to try the idea out, and serve as role models to other individuals (Rogers 2003). Rogers identified the Early Adopters as:

- (1) Integrated part of the local social system,
- (2) Having greatest degree of opinion leadership in most systems,

- (3) Serve as role models for other members or society,
- (4) Respected by peers, and
- (5) Successful.

The early majority make up 34% of the population (Cheng et al., 2004). Rogers identified the following as characteristics of the early majority:

- (1) Interact frequently with peers,
- (2) Seldom hold positions of opinion leadership,
- (3) One-third of the members of a system, making the early majority the largest category.
- (4) Deliberate before adopting a new idea.

The late majority make up 34% of the population just like the early majority (Cheng et al., 2004). Characteristics of the Late Majority include:

- (1) Make up one-third of the members of a system
- (2) Subjected to pressure from peers
- (3) Look at economic necessity of an innovation
- (4) Are skeptical, and
- (5) Cautious.

Laggards make up 16% of the population (Cheng et al., 2004). Rogers identified the following characteristics in the Laggards:

- (1) Possess no opinion leadership,
- (2) Isolates themselves,
- (3) Make reference to the past,
- (4) Are suspicious of innovations,
- (5) Innovation-decision process is lengthy, and
- (6) Have limited resources.

2.3.4 The Social System/Context

The social context refers to the social network surrounding a potential adopter, opinion leaders within that network, and organizational characteristics (Greenhalgh et al., 2004; Rogers, 2003). Barrette (2015) observes that different social structures may encourage or impede diffusion of particular innovations depending on the community's social norms, individual's innovativeness, their relative status, and their access to and effectiveness within

the community's networks. Both Greenhalgh et al. (2004) and Rogers (2003) postulate that it becomes increasingly likely that other members of a social network will adopt an innovation once it has been adopted by some individuals within the social network, especially if the early adopters hold positive opinions of the innovation. The role of opinion leaders is especially stated as being crucial in this regard. Opinion leaders, according to Rogers (2003), do not necessarily hold official leadership positions, but their influence often stems from informal leadership roles that are ascribed to them by peers. Opinion leaders, among others, have more exposure to people outside the immediate social network, greater accessibility to others, higher levels of innovativeness, and somewhat higher socioeconomic statuses than do others in the social network. These are attributes that make them better able to influence people within their social setting.

User's awareness of community social norms and the community's support for innovation are another important driver of innovation (Barrette, 2015). Besides, certain organisational characteristics make it more or less likely that an innovation will be adopted. Greenhalgh et al. (2004) wrote about a number of aspects of the organisational climate that influence adoption rates. These include the size of the organisation, the availability of resources, the organisational hierarchy, the organisation's capacity for new knowledge, and the general climate of openness to change.

2.3.5 Innovation Adoption Process

According to Hornor (1998), Rogers identifies five main stages in the innovation adoption process. These are: (1) awareness, (2) interest, (3) evaluation, (4) trial, and (5) adoption. In the awareness stage "the individual is exposed to the innovation but lacks complete information about it". At the interest or information stage "the individual becomes interested in the new idea and seeks additional information about it". At the evaluation stage the "individual mentally applies the innovation to his present and anticipated future situation, and then decides whether or not to try it". During the trial stage "the individual makes full use of the innovation". At the adoption stage "the individual decides to continue the full use of the innovation".

Various actors, particularly, opinion leaders play a critical role in the adoption process. Rogers emphasises the importance of various communication channels at various stages of the diffusion process. Change agents are another factor in the diffusion process. Change agents success is seen to depend on effort, compatibility, empathy, ability to motivate adopters and successful exploitation of opinion leaders (Chaudhuri, 1994).

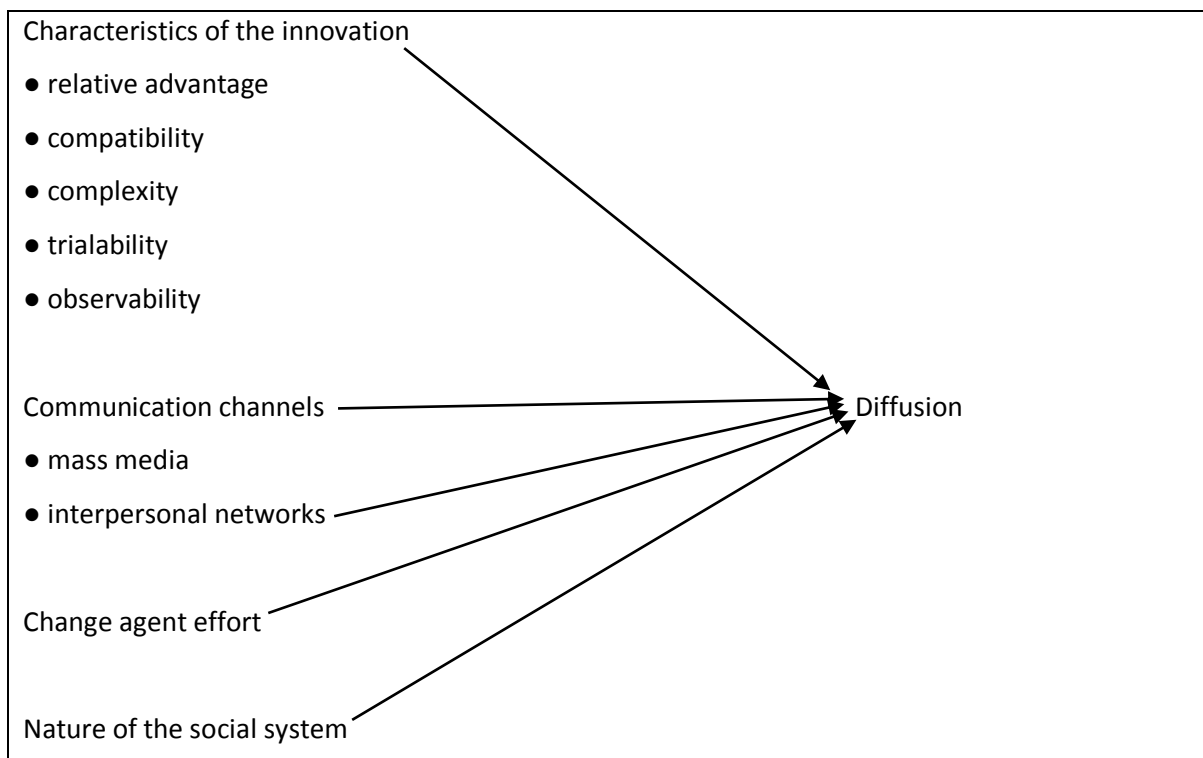


Figure 2. 2: Diffusion Elements in the Rogers Framework (Source: Chaudhuri, 1994)

2.3.6 Strengths of the DOI Theory

Diffusion of innovation theory holds that innovation diffusion is “a general process, not bound by the type of innovation studied, by who the adopters [are], or by place or culture” (Rogers, 2004, p. 16), such that the process through which an innovation becomes diffused has universal applications to all fields that develop innovations. This makes the model ideal or tied to the study of specific innovations.

Another notable aspect of the DOI theory is that it is well established and widely used in information technology (IT) diffusion-related research (Prescott & Conger, 1995). The popularity of the model is reflected in the fact that it has been used and revised several times

(Cheng, 2004). Moreover, it is also the basis of most of the models that attempt to explain the factors affecting whether an innovation will be shared and adopted by other individuals and organisations (Aizstrauta et al., 2015).

Furthermore, DOI offers a broader and more comprehensive explanation of technology adoption. According to Barrette (2015), whilst TAM offers empirical evidence of the factors influencing a user's intention to adopt a new technology, DOI considers how individuals reach the decision point, how they implement the technology after adopting it, and whether and how they decide to continue using it. Such an approach gives technology advocates a clearer understanding of the complexities and scope of the technology adoption process.

2.3.7 Weaknesses of the DOI Theory

DOI assumes that a new idea, product, or service is favourable and would be adopted at different times by the different categories of the adopters of the innovation (innovators, early adopters, early majority, late majority and laggards). Cua (2012) says that this is not always the case in real life arguing that although DOI postulates that 16% of the population has a favourable attitude toward innovation: the innovators (2.5%), and the early adopters or opinion leaders (13.5%); and the remaining 84% are negatively biased: 34% (misleadingly called the "early majorities") can still be convinced to reduce their innovation resistance while the remaining 50% (so-called late majorities and laggards) remain non-adopters to the end. Rogers (2003) further notes that there is nothing "early" about the 34% majority, and the late majorities and laggards may actually never become adopters. This implies that DOI fails to fully explain the rate at which different categories of people adopt innovations as implied in the model.

Despite its popularity, researchers such as Fich-man and Kemerer (1997) and Newell et al. (2001) have criticised the DOI for its bias towards the technological component of the adoption process. The two scholars have argued that other relevant contingent factors beyond the technical features of an innovation should be considered for deeper understanding to emerge. Bose and Luo (2011) have argued further that although DOI theory is a powerful descriptive tool, it is less strong in its explanatory power, and less useful still in predicting outcomes and providing guidance as to how to accelerate the rate of adoption. The DOI is not

used to underpin this study because of these weaknesses notwithstanding its discussed strengths.

2.4 UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT)

Decades of sustained information systems research had given rise to a number of theories and models. Some of the most prominent theories/models include the Technology Acceptance Model (TAM) devised by Davis et al. in 1989, the Diffusion of Innovation (DOI) Theory introduced by Rogers in 1962 and the Theory of Reasoned Action (TRA) formulated by Fishbein & Ajzen in 1975. Although there was an abundance of theories in the field of information systems, it was observed that most of them were very much similar to each other; and more importantly, most of them had a much lower explanatory power as they only explained between 17 and 53% of the variance in use intentions (Venkatesh et al., 2003). The Unified Theory of Acceptance and Use of Technology (UTAUT) was, therefore, proposed and validated as a means of countering these two challenges, as it firstly, provided a unified theoretical basis to facilitate research on information system/information technology adoption and diffusion (Williams et al., 2012; Venkatesh et al., 2003); and secondly, it proved to be a more superior model as it provided an explanatory power of up to 70%.

UTAUT was developed by Venkatesh et al. in 2003 through the review, mapping and integration of eight dominant theories and models (Williams et al., 2012). The models include the Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975), the Technology Acceptance Model (TAM; Davis, 1989), the Motivational Model (MM; Davis, Bagozzi, & Warshaw, 1992), the Theory of Planned Behaviour (TPB; Ajzen, 1991), the Combined TAM and TPB (C-TAM-TPB; Taylor & Todd, 1995), the Model of PC Utilization (MPCU; Thompson, Higgins, & Howell, 1991), the Innovation Diffusion Theory (IDT; Moore & Benbasat, 1991; Rogers, 1995), and the Social Cognitive Theory (SCT; Bandura, 1986) (Magsamen-Conrad et al., 2015; Wang and Wang, 2010). These models originated from different theoretical disciplines such as psychology, sociology and information systems (Kijisanayotin et al., 2009; Venkatesh et al., 2003).

UTAUT was developed on the basis that constructs of existing theories were similar in nature, therefore, it was logical to map and integrate them to create a unified theoretical basis

(Venkatesh et al. 2003). A critical analysis of the constructs of UTAUT (performance expectancy, effort expectancy, social influence and facilitating conditions) lay credence to such assertions as they do not only bear resemblance to some of the constructs of the models on which the model/theory is based but also show the similarity of some of the models. For instance, perceived usefulness (TAM/TAM2 AND C-TAM-TPB), extrinsic motivation (MM), job-fit (MPCU), relative advantage (IDT), and outcome expectations (SCT) relate to the construct of performance expectancy. On the other hand, perceived ease of use (TAM/TAM2), complexity (MPCU), and ease of use (IDT) capture the concept of effort expectancy. Furthermore, social influence is represented as subjective norm in TRA, TAM2, TPB/DTPB, social factors in MPCU and image in IDT. Finally, facilitating conditions is represented by three different constructs namely perceived behavioural control (TPB/DTPB, C-TAM-TPB), facilitating conditions (MPCU), and compatibility (IDT) (Venkatesh et al. 2003).

UTAUT identifies four key drivers of the adoption of information systems: performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC) (Martin and Herrero, 2012). The theory centres on two key issues namely behavioural intention (BI) and actual usage (AU). PE, EE and SI influence BI which in turn influences AU. Empirical studies have shown that FC, on the other hand, does not have any influences on BI but directly influences AU (Venkatesh et al. 2003). Besides the four main constructs of the model (PE, EE, SI and FC), UTAUT also identifies the moderating effect of four other factors such as gender, age, experience and voluntariness of usage (Keong et al., 2012).

Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in a job (Venkatesh et al., 2003). Venkatesh et al. (2003) have described PE as “the strongest predictor of intention, and remains significant at all points of measurement in both voluntary and mandatory settings” (p.447). Moreover, both age and gender have been proven to have a strong moderating effect on PE. Dwelling on previous research (Minton and Schneider 1980), Venkatesh et al. (2003) state that research on gender differences indicates that men tend to be task-oriented, and therefore, performance expectancies which focus on task accomplishment, are likely to be especially salient to men. Similarly, age is theorised to play a moderating role. Research on job related attitudes (Porter 1963 cited by Venkatesh et al., 2003, p. 450) suggest that younger workers may place more importance on extrinsic rewards.

Effort expectancy is defined as the degree of ease associated with the use of the system (Venkatesh et al., 2003). This construct is significant in both voluntary and mandatory contexts. However, each one is significant only during the first time period (post training), becoming nonsignificant over periods of extended and sustained usage. Effort oriented constructs are expected to be more salient in the early stages of a new behaviour, when process issues represent hurdles to be overcome, and later become overshadowed by instrumentality concerns (Davis et al., 1989; Szajna, 1996; Venkatesh, 1999). Venkatesh and Morris (2000) citing studies by Bem and Allen (1974) and Bozionelos (1996) suggest that effort expectancy is more salient for women than men. Moreover, a study conducted by Plude and Hoyer (1985) indicated that increased age is associated with difficulty in processing complex stimuli and allocating attention to information on the job. Furthermore, prior research supports the notion that constructs related to effort expectancy will be stronger determinants for women (Venkatesh and Morris, 2000) and for older workers (Morris and Venkatesh, 2000). These findings, therefore, point to the fact that gender, age and experience play a moderating effect on the construct of effort expectancy.

Social influence is defined as the extent to which a person perceives that important others believe he or she should use a new information system (Venkatesh et al., 2003). The social influence construct is only significant in mandatory contexts and becomes nonsignificant in voluntary settings. A study conducted by Venkatesh and Davis (2000) revealed that even in mandatory settings, social influence appears to be important only in the early stages of individual experience with the technology, with its role eroding over time and eventually becoming nonsignificant with sustained usage. Moreover, theory suggests that women tend to be more sensitive to other's opinion, and, therefore, find social influence to be more salient when forming an intention to use new technology (Miller, 1976; Venkatesh et al., 2000), with the effect declining with experience (Venkatesh and Morris, 2000). A meta-analytical review of age effects by Rhodes (1983) concluded that affiliation effects increase with age, suggesting that older workers are more likely to place increased prominence on social influence, with the effect declining with experience (Morris and Venkatesh, 2000). To this end, it can be concluded that gender, age, experience and voluntariness all play an important moderating effect on social influence which in turn affects BI.

Facilitating conditions are defined as the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system (Venkatesh et al., 2003). Venkatesh et al. (2003) point out that issues related to the support infrastructure, which is a core concept within the construct of facilitating conditions, are largely captured within the construct of effort expectancy. If effort expectancy is not present in the model (as is the case with TPB/DTPB), then one would expect facilitating conditions to become predictive of intention. The presence of the construct of effort expectancy in the UTAUT model, however, implies that facilitating conditions do not play a significant role in influencing behavioural intention. On the contrary, facilitating conditions play a role in influencing actual usage of an information system. According to Bergeron et al. (1990), the effect of facilitating conditions on usage increases with experience as users of technology find multiple avenues for help and support throughout the organisation, thereby removing impediments to sustained usage. Hall and Mansfield (1975 cited by Venkatesh et al., 2003, p. 454) further noted that older workers attach more importance to receiving help and assistance on the job. This is further underscored in the context of complex IT use given the increasing and physical limitations associated with age. This then leads us to conclude that facilitating conditions influence usage behaviour with the joint moderating effect of age and experience.

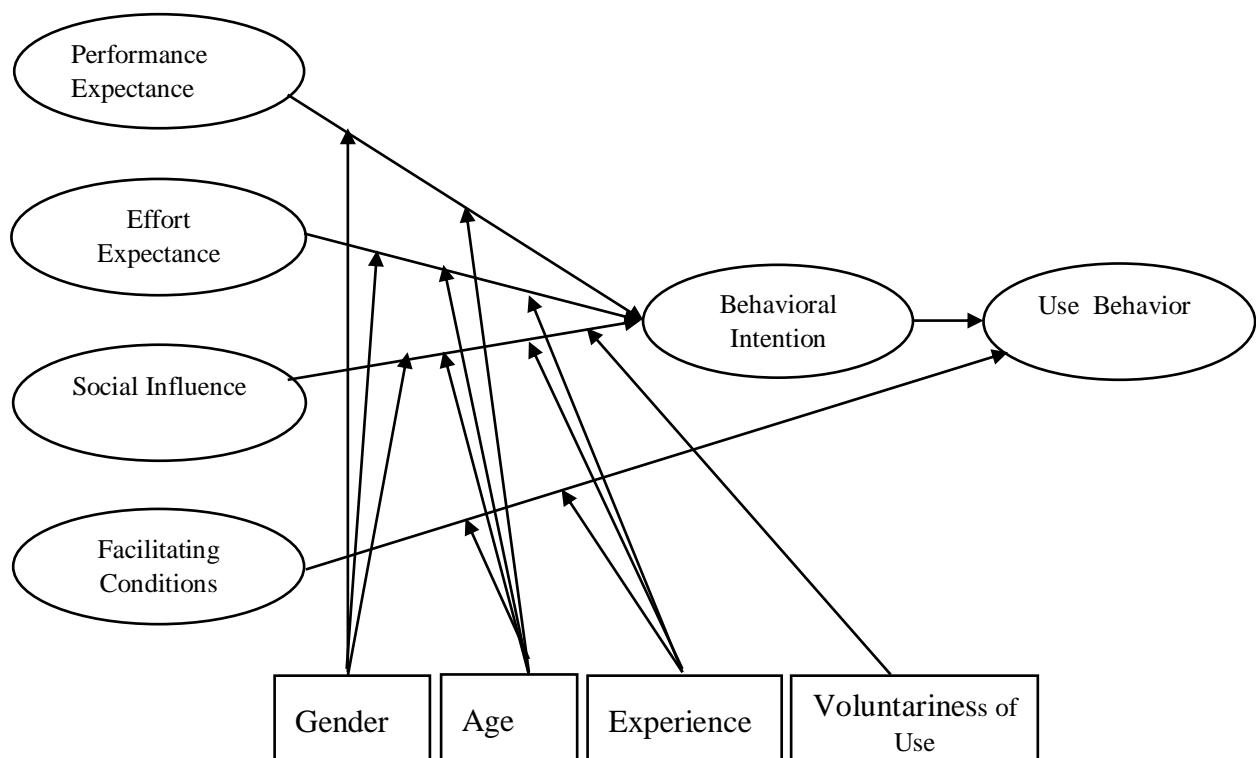


Figure 2. 3: UTAUT (Source: Venkatesh et al., 2003)

The UTAUT model also includes four moderators of key behaviours. These are gender, age, voluntariness, and experience. Validation tests on the model by Venkatesh et al. (2003) have shown that age impacts all the four constructs of the model namely performance expectancy, effort expectancy, social influence and facilitating conditions. Gender, on the other hand, impacts performance expectancy, effort expectancy and social influence whilst experience of use impacts on effort expectancy, social influence and facilitating conditions. Voluntariness of use, which is the last moderator of key behaviours, has been seen to impact only on social influence (Venkatesh et al., 2003).

2.4.1 Strengths of the UTAUT Model

UTAUT is founded on so many models and thus providing the researcher with a broader view of all existing models. Secondly, UTAUT is a much stronger model hence a better tool for information systems research. Studies conducted by Venkatesh et al. (2003) over a six-month period indicated that the eight models that make up UTAUT individually explained between 17 and 53% of the variance in use intentions. On the contrary, UTAUT provided an explanatory power of up to 70%. This signifies that UTAUT is a more powerful model than those models it intended to replace.

2.4.2 Weaknesses of the UTAUT Model

UTAUT was mainly developed with the aim of addressing the challenges that were observed in the other previous models. Most notably, one of the limitations which Bradley (2012) observed in TAM, which happens to be one of the eight models that make up UTAUT, is that it is limited in scope in that its two constructs (PU and PEOU) mainly focus on the technology itself thereby leaving out other important aspects in the adoption process such as individual characteristics and environmental factors which have been proven to be critical factors in the adoption and use of technology. Whereas Venkatesh et al. (2003) managed to address this concern in UTAUT, other scholars, most notably Straub and Burton-Jones (2007), have claimed that the ten constructs of UTAUT are not parsimonious. This implies that the model too has its own shortfalls that must be addressed before it can be considered a valuable tool in information systems research.

2.4.3 Justification for the Use of UTAUT Model in the Present Study

UTAUT has been chosen to underpin this study. The decision to adopt UTAUT for this study was taken because it is broader in scope thereby making it possible for the research problem to be studied in greater detail. Chang (2013) argues that the UTAUT model, as well as TAM2, proposed by Venkatesh and Davis (2000) were merely extensions to the original technology acceptance model (TAM) (Davis, 1989). The basis of his argument centres on the notion that both UTAUT and TAM2 are based on the concept of behavioural intention leading to actual use of an information system. These are concepts which are central to TAM. Chang (2013) argues further that UTAUT and TAM2 only include external variables that might directly or indirectly impact the main components of the original technology acceptance model. Although Chang (2013) advances another argument, he/she does not dispute the fact that UTAUT is broader in scope. In fact he/she acknowledges that the model includes variables that directly and indirectly impact the main components of TAM. The use of UTAUT in this study is, therefore, justified on the basis that its broader coverage overcomes the criticisms that have been levelled against the individual models that it is comprised of.

The use of UTAUT in this study is, furthermore, justified on the basis that it is a more powerful model when compared to other competing models. As already discussed, empirical studies demonstrate that UTAUT has at least 70% explanatory power whilst the other eight models that make part of the model individually explained between 17 – 53% (Venkatesh et al., 2003). This means that UTAUT is more effective than the other integrated theories and models.

2.4.4 Uses of UTAUT in Research

UTAUT has been used in a number of ways in carrying out research. The generic model of UTAUT has been used in the study of the adoption of mobile devices (Carlsson et al., 2006), the use of MP3 player and internet banking (Im et al., 2011), ICT adoption in the health sector (Kijisanayotin et al., 2009), the use of ‘near field communication’ (NFC) adoption of mobile phone service (Chen and Chang, 2013), the use of mobile internet (Wang and Wang, 2010), authors’ readiness to self-archive in open access repositories (Singeh et al., 2013), the use of open access initiatives in universities (Dulle and Minishi-Majanja, 2011), tablet

adoption practices (Magsamen-Conrad et al., 2015), the use of English e-learning websites (Tan, 2013), consumer mobile shopping services adoption (Yang, 2010), the use of library electronic resources (Chang et al., 2015), website use by students (Van Schaik, 2009), the use of social media (Gruzd et al., 2012), online tax filing (Carter et al., 2011), e-commerce adoption (Escobar-Rodriguez and Carvajal-Trujillo, 2014; Martin and Herrero, 2012), mobile banking (Bhatiasevi, 2016), and more.

UTAUT has also been used in conjunction with other models to study technology adoption. Most notably, Oliviera et al. (2014) used a combined model of Task-Technology-Fit (TTF), UTAUT and the Initial Trust Model (ITM) in studying mobile banking. Hsiao and Tang (2014) used UTAUT together with four other models namely the theory of planned behaviour (TPB), the technology acceptance model (TAM), the decomposed TPB model (DTPB), and the combined model of TAM and TPB (C-TAM-TPB) to investigate college students' behavioural intentions to adopt e-textbooks for their studies. Rana et al. (2013) used the technology acceptance model (TAM), diffusion of innovation (DOI), DeLone and McLean IS success model, unified theory of acceptance and use of technology (UTAUT), and theory of planned behaviour (TPB) in studying e-government adoption. Chang (2013), on the other hand, used a combined model of UTAUT and the task technology fit (TTF) in a study of users' behavioural intention of using library mobile applications in university libraries.

Moreover, adaptations or extensions of UTAUT have also been used in a number of ways. Casey and Wilson-Evered (2012) used UTAUT and its extensions in the study of technology innovations in online family dispute resolution services in Australia. Bouwman et al. (2008) used an adaptation of the UTAUT model in the study of trends in mobile services in Finland. Teo et al. (2015) used an extension of the UTAUT model in the study of mobile payments (m-payment) in business transactions whilst Yuen et al. (2015) also used an adaptation of UTAUT in the study of internet banking acceptance. Other commercial studies done using extensions of the UTAUT model include evaluating the effects of mobile customer relationship management (CRM) on employees' performance (Kim et al., 2015), examining the continued usage of mobile instant messaging (IM) (Gan and Li, 2015), mobile payments (Upadhyay and Chattopadhyay, 2015; Thakur and Srivastava, 2014) and mobile office outsourcing (Lee et al., 2013).

Although studies quoted above show that the UTAUT model has been used extensively, the literature reviewed did reveal the use of the model in the study of mobile phone use in libraries. This study, therefore, attempts to bridge this gap by applying UTAUT in understanding the provision of library and information services through mobile phones in public university libraries in Malawi.

2.5 THE TECHNOLOGY–ORGANIZATION–ENVIRONMENT (TOE) FRAMEWORK

The technology-organisation-environment (TOE) framework is an organisational level theory that was introduced by Tornatzky and Fleischer in 1990 (Baker, 2012; Oliveira and Martins, 2011). TOE framework posits that technological adoption in an organisation is mainly driven by technological, organisational and environmental factors. Some scholars (Yang et al., 2015; Hsu et al., 2014; Ramdani et al., 2013) postulate that the TOE framework is grounded in Rogers' DOI theory. Hsu et al. (2014), specifically, argue that both the technological and organisational factors in the TOE framework are similar to other factors in the DOI theory such as innovation, communication channels and social system, and that Tornatzky and Fleischer only added the new component of the environmental context. This argument is made on the basis that most of the elements that make up the technological and organisational factors are largely drawn from the DOI theory.

2.5.1 The Technological Context

The technological context includes all of the technologies that are relevant to the firm (Baker, 2012). They include technologies that are already in use at the firm as well as those not currently deployed but are available in the marketplace hence capable of being used in future. According to Collins et al. (1988), a firm's existing technologies are important in that they set a broad limit on the scope and pace of technological change that a firm can undertake. On the other hand, innovations that exist but are not yet in use at the firm are equally important because they influence innovation in two main ways. Firstly, they demarcate the limits of what is possible; and secondly, they show firms ways or means through which technology can enable them to evolve and or indeed adapt to changes taking place.

According to Tushman and Nadler (1986), innovations taking place both within and outside an organisation produce incremental, synthetic and discontinuance changes. Innovations that produce incremental change introduce new features or new versions of existing technologies. Baker (2012) observes that such innovations represent the least amount of risk and change for the adopting organisation possibly because in most instances it involves upgrades to systems or machinery that is already in use. In the library setting, this could involve upgrading from a lower version of a library management system (LMS) such as KOHA 3.1.0.03.000 to a higher or more advanced version such as KOHA 3.2.0.1. Whilst incremental changes represent the least amount of change pursued by an organisation, innovations producing synthetic change represent moderate change, where existing ideas or technologies are combined in a novel manner (Baker, 2012). In the library setting, this could involve migration from the manual card catalogue to the automated catalogue. This is a situation whereby the concept of bibliographic record search in a library is presented in a more enhanced and simplified way than is the case with the card catalogue. Innovations that produce a discontinuous change represent significant departures from current technology or processes. A typical example in this regard involves the adoption of cloud computing in a library, something that could affect the way a library stores and processes its data hence significantly transform the way it operates. The generally held view is that industries that are characterised by technological innovations that cause incremental and even synthetic change allow a measured pace of adoption. On the contrary, innovations that produce discontinuous change require organisations to make quick and decisive adoption decisions with the aim of maintaining or enhancing their competitive standing.

Some of the notable elements that comprise the technological context include compatibility, relative advantage, ease of use, cost and trialability (Al-Somali, 2015). All these elements are derived from the component of innovation of the DOI theory.

Relative advantage is defined as ‘the degree to which an innovation is perceived as being better than the idea that it supersedes’ (Rogers 2003, p.229). This implies that the more advantages an innovation brings, the more likely or rapidly it will be adopted. A study conducted by Low et al. (2011) revealed that the advantage an organisation anticipates to derive as a result of adopting a new technology substantially influences their attitude towards adoption. Furthermore, Moon and Kim (2001) empirically confirmed the significance of

relative advantage to attitude. This signifies that relative advantage is an important determinant in technological adoption.

Complexity is yet another important element that defines the technological context. Rogers (2003, p. 257) has defined complexity as ‘the degree to which an innovation is perceived as relatively difficult to understand and use’. This attribute is opposed to ease of use, and states that users will normally favour technologies that are easy to use hence complexity of an innovation threatens the possibility of an innovation coming into wide usage. Although Davis (1989) found that perceived usefulness, which is similar to relative advantage, has a higher effect on technological adoption and use than complexity, which is related to perceived ease of use, it is still important that innovators consider making their innovations easy to use. In the study by Davis (1989), perceived ease of use also has an effect on perceived usefulness. This means that making an innovation easy to use would lead to wider adoption of innovations because this element has both a direct and indirect effect on attitude toward usage behaviour.

The fourth attribute, trialability, is defined as “the degree to which an innovation may be experimented with on limited basis” (Rogers, 2003, p. 258). This attribute is closely related to observability which denotes that a user of an innovation has a closer look at an innovation before adoption. Trying out a particular innovation or indeed observing it function helps in dispelling some of the doubts or misconceptions that the potential adopter may have had in an innovation. Trialability and observability provide opportunities for one to interact with marketing executives promoting particular innovations whereby one could have a chance of asking questions pertaining to certain issues the potential adopter is not comfortable with. This could in a way speed up the decision-making process as the adopter may have had first-hand experience with the innovation he/she is trying to adopt.

2.5.2 Organisational Context

Organisational context addresses the traits and characteristics of the organisation that influences innovation adoption decisions (Hsu et al., 2014). Ramdani et al. (2013) have identified top management support, organisational readiness, experience and size as some of the critical organisational factors that influence technological adoption. Baker (2012), whilst

highlighting the same issues raised by Ramdani et al, has added intra-firm communication processes and the amount of slack resources available to the firm as being equally important.

A number of scholars (Ramdani et al., 2013; Baker, 2012; Jeyaraj et al., 2006) have described the role played by top management as being critical to the adoption of technology in any organisation. The role played by top management in technology adoption range from drawing up a strategic plan that recognises the role played by technology in the sustenance of the organisation, decision-making on what type of technology(ies) the organisation should adopt, and facilitating technology adoption and implementation. Ramdani et al. (2013) has indicated that the decision maker in technology adoption is likely to be in the top management team. This means that the decision maker's support is vital for adoption to take place. Jeyaraj et al. (2006) has also weighed in the discussion by describing top management support as one of the best predictors of organisational adoption of technology although they do not specify the actual role played by management. Thong (1999), however, points out that the management's role in technology adoption is that of articulating a vision for the organisation. In this regard, the role played by management could, therefore, be described as mainly involving planning. Baker (2012) also prescribes communication as the management team's role in technology adoption. In this particular case, he describes the role of management as involving the following activities:

- (1) describing the role of innovation within the organisation's overall strategy;
- (2) indicating the importance of innovation to subordinates;
- (3) rewarding innovation both formally and informally;
- (4) emphasizing the history of innovation within a firm; and
- (5) building a skilled executive team that is able to cast a compelling vision of the firm's future.

The communication role played by management as described above could hence be described as happening both during the planning stage, evidenced by the manager's efforts to make workers understand the role of innovation in the organisation's strategy, and also during the implementation stage, evidenced by the building of a skilled executive team plus rewarding innovation.

Organisational readiness is yet another important pillar. Iacovou et al. (1995, p. 467) has defined organisational readiness as "the availability of the needed organisational resources for adoption". Technological adoption is a resource-intensive exercise. Therefore,

organisations that are keen to make it a reality would have to invest heavily in both human and financial resources. Whilst skilled human resources are essential in setting up and also running systems that makes an organisation to realise its technology goals, financial resources are necessary to put up the requisite infrastructure, pay for cost of operations and also train or indeed recruit human resource teams that manage that infrastructure. Skilled human resources and adequate financial resources are viewed as important drivers of technology projects, and their absence most often affects the implementation of such projects (Cragg and King, 1993). The rate at which these resources are made available for the implementation of technology projects at a particular organisation would largely be driven by level of commitment of top management, size of the organisation, and also the amount of financial resources available to a firm.

Organisational structure and previous experience with technology have also been identified as important elements in technology adoption. Baker (2012) observes that organic structures which are also referred to as decentralised structures are best-suited to the adoption phase of the innovation process. On the contrary, mechanistic or centralised structures that emphasise on formal reporting relationships and clearly defined roles for employees are best-suited to the implementation phase of the innovation process. Previous experience with technology also plays a role in technology adoption. Dholakia and Kshetri (2002) in this regard posit that firms that have experience in using technology are more likely to adopt new technologies unlike those that have no prior experience. The explanation given for this trend is that incremental costs and knowledge required to adopt new technologies are smaller for organisations that already own related technologies or infrastructure. For instance, the incremental costs of adopting the use of mobile phones in the delivery of library and information services would be much less if a library already has some form of automation. This is such the case because such a library would already have well-trained technical support staff, technical infrastructure, and also core library staff who are computer literate. Moreover, smartphones, to a large extent, work in a similar pattern to computers hence it would be easier to train staff on how to use them in the delivery of library and information services. Similarly, the existing technical support staff could be used to plan, implement and run the new system albeit with some limited training whilst some of the technical infrastructure could also be utilised for the same program.

Trends have shown that larger organisations are more likely to adopt technology than is the case with smaller organisations. This has led researchers to conclude that size could be a factor in technology adoption (Harris et al. 2015; Sophonthummapharn, 2009). However, Kimberly (1976 cited by Baker, 2012, p.234) has criticised such findings arguing that “size is often a proxy for more specific and more meaningful underlying organisational factors such as the availability of specific resources”. Yap (1990) and more recently Levenburg et al. (2006) have added credence to this analogy by suggesting that larger firms have a greater need, resources, skills and experience, and the ability to survive failures than smaller firms. Although there is a difference of opinion on this particular issue, the impact of size of an organisation on technology adoption cannot be overlooked.

2.5.3 The Environmental Context

Baker (2012) defines environmental context as the structure of the industry, the presence or absence of technology service providers, and the regulatory environment. All of these factors affect technology adoption in various ways. With regard to the structure of the industry, two main players that include business partners and clients tend to have a great influence in terms of what type of technologies an organisation adopts. In case of the library and information field, a library could be forced to adopt technologies such as the use of mobile phones in providing library and information services to properly serve the information needs of its clients. This could be done either in response to the changing information seeking patterns of its clients or based on demand. Again, a library could be forced to adopt certain technologies with the aim of keeping pace with other players in the same field. This is what DiMaggio and Powel (1983) have described as mimetic pressure, which is defined as the influences of structurally equivalent organisations that have initiated an innovation successfully. Currently, a popular innovation in many academic libraries is an ‘information commons’. An information commons is a room that is furnished with computers and other ICTs, and serviced by a reference librarian whose function is to facilitate higher level research activities. In some institutions, it mainly caters for postgraduate students, academic staff and other researchers whilst in others it is open for use by all. The popularity of this innovation has driven many academic libraries to set up similar facilities in their libraries. Besides mimicking others and responding to the needs of clients, some libraries could also be forced to adopt certain innovations as a means of enhancing collaboration with their partners. A

typical example in this case is the setting up of a union electronic catalogue to facilitate the sharing of bibliographic resources amongst members of a particular consortium.

The presence or absence of technology service providers affects technological adoption both negatively and positively. This aspect could be likened to the element of facilitating conditions in the UTAUT model. Venkatesh et al. (2003) have defined enabling conditions as the degree to which an individual believes that an organisational and technical infrastructure exists to support technology use. Now that a lot of technology-based companies have a global reach, outsourcing and engagement of third parties to provide technical support to clients is increasingly becoming a popular occurrence. A study that was conducted by Premkumar and Roberts (1999) indicated that firms are more willing to adopt new ICTs if they are assured of adequate third-party's support. This implies that the absence of third party support could negatively impact on technology adoption. In a related development, Levin et al. (1987) found out that technology support service providers that must pay high wages for skilled labour are often compelled to innovate through labour-saving innovations. This shows that technology support service has both an internal and external effect on innovation. The effect is internal for the technology support service providers and external for the potential adopters of innovation.

Baker (2012) observes that government regulation can have either a beneficial or a detrimental effect on innovation. Various governments, in exercise of their duties, formulate and enact laws that may either spur or slowdown innovation. The impact of these measures could have national, regional or global implications on innovation depending on the influence that government enjoys. A typical example in this case is a situation whereby a global political and economic player enacts a legislation that bans exportation of certain technologies to a particular country. If the country targeted by that legislation is dependent on importation of those technologies, then this could negatively affect technological adoption in that country. In the Malawian situation, the effect of government legislation has equally been critical, and mainly visible through the enactment of the appropriation bill which guides the implementation of the national budget. In the 2015/16 budget, the government introduced new tax measures on mobile phone short message service (SMS) and internet data usage. In previous budgets, the government has also reduced import duty on mobile phone handsets and other ICTs. Whilst the previous measures have helped to increase the mobile phone penetration rate from 49,000 subscribers (0.43%) in the year 2000 (ITU, 2014) to 5,323,613

subscribers (36.49%) in 2013 (MACRA, 2014), the current ones could negatively affect the usage of mobile phone services considering that call tariffs are still higher in the country when compared with other neighbouring countries (Research ICT Solutions, 2015).

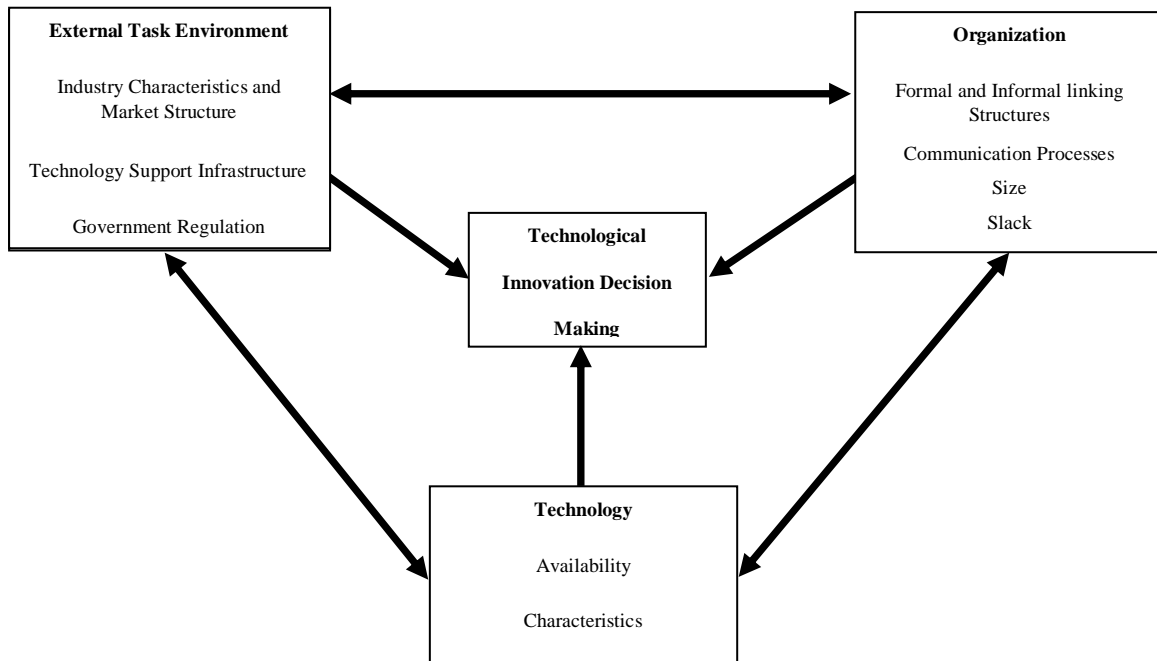


Figure 2. 4: The Technology – Organisation – Environment (TOE) Framework (Source: Baker, 2012)

2.5.4 Strengths and Uses of the TOE Framework in Research

The main strength of the TOE framework over other competing models is that it encourages the researcher to take into account the broader context in which innovation takes place (Bose and Luo, 2011; Zhu et al., 2003). This is evidenced by the fact that the framework looks at technology from three main contexts: technology representing the innovation side, organisation representing the adopter’s side and environment in which the adoption occurs. Although the TOE framework is seen as flexible, Oliviera and Martins (2011) is of the view that it is still built upon a solid theoretical foundation and consistently supported by empirical results.

Furthermore, the TOE framework is flexible and adaptable in various contexts. Zhu & Kraemer (2005) observe that the TOE framework is a generic theory that only suggests different sources of influence without specifying the variables in each context unlike most of the other theories and models. This enables researchers to choose different technological, organisational and environmental factors for different innovations. It is, therefore, not surprising that the framework has been used in a variety of contexts. Most notably, the TOE framework has been used in the study of e-business/e-commerce adoption (Al-Somali et al., 2015; Awiagah et al., 2016; Osakwe et al., 2016; Ramdani et al., 2013; Yeh et al., 2015); adoption of cloud computing (Hsu et al., 2014; Alshamaila et al., 2013; Nkhoma and Dang, 2013; Low et al., 2011); e-readiness at firm level (Aboelmaged, 2014); adoption of software as a service (Safari et al., 2015; Yang et al., 2015); internet adoption among SMEs (Alam, 2009); mobile commerce (Martín et al., 2012); radio frequency identification (RFID) (Thiesse et al., 2011); knowledge management diffusion (Lin , 2014); mobile business (Picoto et al. 2014), and more.

The TOE framework has also been used in conjunction with other models in studying technology adoption in other fields. Bose and Luo (2011) used the TOE framework, the Private Virtualization Theory (PVT), and DOI in developing an integrated model for assessing firms' potential to undertake green IT initiatives via virtualisation. Awa et al (2010) used the constructs of TAM and TOE in the study of the uptake of SMEs. Gangwar et al. (2015) used an integrated TAM-TOE model in studying the determinants of cloud computing adoption. Xiong and Qureshi (2012), on the other hand, used an integrated model of TOE and TAM in a study of factors affecting information and communications technology adoption of small businesses in China and the United States. However, searches in five major LIS databases such as Emerald Insight, SAGE Journals, Taylor and Francis, Science Direct and even Google Scholar did not yield any results showing the TOE framework being used in the study of mobile phone use in libraries. This study could, therefore, be one of the few available studies that have applied the TOE framework in studying mobile phone use in the provision of information services academic libraries more so in Malawi.

Since the present study explores technology adoption and use at both organisational (public university libraries) and individual level (students, academic staff and library staff), being an organisation level theory, the TOE framework is viewed as an appropriate model for use in this study as it will be used as a basis for studying technology adoption by the public

university libraries in Malawi. Technology adoption and use at individual level will be covered by the UTAUT theory.

Table 2.1: Mapping of research questions to theoretical constructs

Research question	Theoretical model	Constructs
1. What is the level of preparedness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services?	TOE	1. Technological context 2. Organisational context 3. Environmental context
2. What electronic information resources and services are currently available in public university libraries in Malawi that can potentially be adopted and used through mobile phones?	TOE	1. Technological context 2. Environmental context
3. What is the current status of providing and accessing library and information service through mobile phones in public university libraries in Malawi?	TOE	1. Technological context 2. Environmental context
4. What are the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services?	UTAUT	1. Attitudes 2. Perceptions 3. Usage
5. Which possible factors influence the adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services?	UTAUT	1. Performance expectancy (2) Effort expectancy (3). Social influence (4) Facilitating conditions (5) Moderators of key behaviours: gender, age, experience, voluntariness

2.6 Summary

This chapter provided an in-depth discussion of related theories and models that underpin this study. Theories that have been discussed include the diffusion of innovation (DOI) theory, technology acceptance model (TAM), unified theory of the acceptance and use of technology (UTAUT) and technology-organisation-environment (TOE).

The discussion centred on what each one of the four theories posit, their strengths and weaknesses, how the theories have been used in related studies and the suitability of each one of those theories in the present study. A critique of the four theories revealed that none of them is capable of being used alone in this study. It was further noted that TAM and UTAUT are theories that were developed to be used in the study of technology adoption at individual level although some have used them differently. However, UTAUT was seen to have an edge over TAM and its extensions (TAM2 and 3) in that it is broader and has a higher explanatory power. It is for these reasons that UTAUT was chosen to be used as the basis for studying technology adoption at individual level.

Further critiques of DOI and TOE revealed that the two theories are mainly deployed to study information system adoption and use at organisation level. TOE was seen to be similar to DOI in many respects mainly because it has its roots in DOI. However, TOE is broader than DOI, and more importantly, better suited to the present study than DOI. The framework has, therefore, been selected to be used as a basis for studying technology adoption at organisational level.

The theories and models that have been discussed in this chapter lay the ground for the next chapter which focusses on literature review. Discussion of the theoretical framework identified the following as key issues:

- technology acceptance,
- diffusion of innovation,
- mobile phone technology,
- attitudes to adoption of technology
- factors that influence the adoption and use of technology

Furthermore, the research questions identified the following additional key issues:

- e-readiness of university libraries
 - ICT infrastructure,
 - policy framework and
 - human capacity
 - financial capacity
- library and information services deployed through use of mobile phones in university libraries
- current status of providing library and information services through mobile phones

The literature review will, therefore, focus on these areas including other pertinent issues identified through the research questions.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This section presents an overview of the available empirical and theoretical literature. A number of scholars (DaCosta, 2012; Sekaran and Bougie, 2010; Creswell, 2009; Blaxter et al., 1996) have defined the term literature review in different ways. However, this study adopts Blaxter et al.'s definition who have defined literature review as a critical summary and assessment of the range of existing materials dealing with knowledge and understanding in a given field. As implied in this definition, literature review is not just a matter of citing studies conducted in a particular field, but involves a critical assessment of such sources, thoroughly analysing sources, and constructing an account that integrates and explains relevant sources (Kaniki, 2006).

Literature review is a very important component of any study, and serves several functions. One of such functions, according to Marshall and Rossman (1999), is to relate the study to the larger ongoing dialogue in the literature about the topic, filling in gaps, and extending prior studies. In this way, the researcher does not run the risk of wasting time and effort to redo a study that was already done (Sekaran and Bougie, 2010). In other studies, a literature review incorporates the theoretical and conceptual framework which sets the stage for the development of hypotheses (Connaway and Powell, 2010). However, in this study the theoretical framework is articulated in Chapter 2 which precedes this chapter which is still an acknowledgement that theoretical framework is very much part of the literature review. The inclusion of the theoretical framework in literature review ensures that important variables that are likely to influence the problem situation are not left out of the study (Sekaran and Bougie, 2010). Another important aspect of the literature review is that it provides the framework for establishing the importance of the study as well as a benchmark for comparing the results of a study with other findings (Creswell, 2003).

Bless and Higson (2000) warn researchers against being overly influenced by the results of previous studies. The two scholars observe that literature review may prejudice the manner in which researchers may conduct their assessment in their studies. Consequently, this may

influence them to accept whatever happened before without making critical judgement which is a deterrent to visualising new opportunities.

3.2 Sources of Literature

Research literature is derived from a wider number of sources. These include books, academic and professional journals, reports, theses and dissertations, conference proceedings, unpublished manuscripts, internet sources, and more. Conference proceedings can be useful in providing the latest research or research that has not been published but the challenge is that not all conference papers undergo rigorous reviews leading to publication as is the case with journal articles (Sekaran and Bougie, 2012). It is, therefore, advisable that such papers be critically assessed before they are used. Books and PhD theses are another rich source of information. The advantage of both sets of sources is that they contain an exhaustive source of literature in a specific field. More importantly, such sources undergo rigorous scrutiny before they are made available for use. However, the drawback with both books and PhD theses is that they are not very much up-to-date. The Internet is another valuable source of information that may be incorporated in a literature review. However, the researcher should exercise great care in selecting and using such sources because the quality of information posted on the web cannot be guaranteed. Similarly, Connaway and Powell (2010) caution against the use of non-research reports and opinion pieces in the review of literature. The two scholars advise that such sources should only be used when they are really worthwhile.

The literature reviewed in this chapter was derived from journal articles accessed from online databases such as Emerald Insight, Science Direct, Sage, and Taylor and Francis. The decision to use such sources was made because these databases provide an exhaustive source of literature relevant to the topic of study. Moreover, these databases contain up to date information that made it possible for the researcher to keep track of recent developments in the field of study. Other sources of literature, though fewer in volumes, originated from conference proceedings that were accessed through Google Scholar, books accessed from the University of KwaZulu-Natal (UKZN) Library, and Internet sources accessed from university, organisational and company websites.

The literature review was informed by research questions, constructs of theoretical models underpinning the study, and broader issues around the research problem. This study was

guided by the following major research question: What is the level of eReadiness of public university libraries in Malawi in using mobile phones in the provision of library and information service? To address the above question, the study addressed the following specific research questions:

1. What is the level of preparedness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services?
2. What electronic information resources and services are currently available in public university libraries in Malawi that can potentially be adopted and used through mobile phones?
3. What is the current status of providing and accessing library and information services through mobile phones in public university libraries in Malawi?
4. What are the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services?
5. What factors influence the adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services?

The study was further underpinned by two theoretical frameworks: The Unified Theory of the Acceptance and Use of Technology (UTAUT) and the Technology-Organisation-Environmental (TOE) framework. The themes on which literature is reviewed, therefore, include the adoption and use of mobile phones by university students and academic staff; ICT infrastructure, policy framework and human capacity relevant for the adoption and use of mobile phones in providing library and information services; library and information services currently offered through mobile phone; attitudes of library staff, students and academic staff towards the use of mobile phones in the provision of library and information services; and factors influencing the adoption and use of mobile phones by students and academic staff in accessing library and information services.

The chapter is organised as follows: 3.1 Introduction; 3.2 Sources of literature; 3.3 E-readiness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services; 3.4 Adoption and use of mobile phones by university

students and academic staff; 3.5 The current status of providing library and information services through mobile phones; 3.6 Attitudes of library staff, students and academic staff towards the use of mobile phones to deliver and access library services; 3.7 Summary and gaps in the literature.

3.3 E-readiness of Public University Libraries in Malawi in Terms of ICT Infrastructure, Policy Framework and Human Capacity for the Adoption and Use of Mobile Phones in Providing Library and Information Services

Literature reviewed in this section focusses on the level of preparedness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services. These issues deal with the eReadiness status of the libraries, and address the first research question: What is the level of preparedness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services? The section also deals with the technological context (discussed in section 2.5.1), organisational context (discussed in section 2.5.2), and environmental context (discussed in section 2.5.3) of the Technological-Organisational-Environmental (TOE) framework. Aspects pertaining to the technological context were captured in questions 1-5 in Appendix 1: Interview guide for university/college ICT directors, and questions 1-7 in Appendix 2: Interview guide for university/college librarians.

Issues concerning the organisational context, on the other hand, were captured in questions 11-19 and 23-26 in Appendix 1, and 10-14 in Appendix 2 respectively. Finally, issues concerning the environmental context were captured in questions 6-10 in Appendix 1; questions 4-9 in Appendix 3: Questionnaire for students; and again questions 4-9 in Appendix 4: Questionnaire for academic staff respectively.

3.3.1 The Concept of E-readiness

E-readiness is a broad and multifaceted concept. Lou (2010) defines it as the ability of a country, enterprise or organisational unit to be prepared, willing to adopt, use and benefit from e-innovations such as e-business, e-procurement, e-learning, and more. The World

Economy Forum (2002 cited by Potnis and Pardo, 2011, p.346), on the other hand, defines e-readiness as a country's state of readiness to gain the benefits offered by ICTs generally in terms of policy, infrastructure and ground-level initiatives. Berthon et al. (2008) further define e-readiness as a country's ability to promote and support digital business and information and communication technology (ICT) services. Going through the three definitions given above, one would notice some common traits in all of them. Most notably, all of them talk of eReadiness as being concerned with leveraging ICTs with the aim of gaining a competitive edge in business and improving service delivery at organisational level. Moreover, the latter two definitions talk of e-readiness as a country-level initiative implying that governments have a role to play in its advancement. However, as implied in the definition given by Lou (2010) above, e-readiness is also an organisational-level initiative whereby a business enterprise may make use of ICTs to boost productivity, or merely to enhance service delivery in the case of a non-profit making organisation such as a public university library.

Mutula and van Brakel (2006a) observe that several e-readiness tools have emerged through the efforts of development agencies, research organisations, academia, business enterprises and individuals following the development of the first e-readiness tool by the Computer Systems Policy Project (CSPP) in 1998. Since the focus of e-readiness has been on government activities, most of the e-readiness tools developed so far measure the e-readiness concept at national level in such areas as business, governance, procurement, learning, and more. Consequently, this has led to the development of concepts such as e-business, e-procurement, and e-learning, among others, to denote the kind of activities taking place in these areas. According to Mutula and van Brakel (2006a), some of the organisations that have been on the forefront in developing e-readiness assessment tools include: McConnell International (MI), a global technology policy and management consulting firm (with its Ready?Net.Go tool), the Centre for International Development at Harvard University (with its Network Readiness Index tool), the United Nations Conference on Trade and Development (UNCTAD) (with its ICT Development Index), the Economist Intelligent Unit (with its E-readiness Rankings), and the Mosaic Group (with the Framework for Assessing the Diffusion of the Internet). Though these organisations differ in their perspective of e-readiness, the tools they have developed to assess an organisation's e-readiness "on average, measure the level of infrastructure development; connectivity; internet access; applications and services; network speed; quality of network access; ICT policy; ICT training programs;

human resources; computer literacy; and relevant content” (Toufani and Montazer, 2011, p.472). In reviewing literature on the topic of study, the researcher mainly focussed on ICT infrastructure, human capacity and ICT policy because these were deemed relevant to the adoption and use of mobile phones in the delivery and access to library services. However, other aspects such as applications and services, network speed, and quality of network access were also addressed to a lesser extent.

3.3.2 E-readiness Status of Public University Libraries in Relation to ICT Infrastructure

ICT infrastructure is vital in determining the e-readiness status of a library with regard to the offering of library and information services. A number of studies (Li, 2013; Jetty and Anbu, 2013; Wang et al., 2012; Bridges et al., 2010) have shown that libraries are making use of mobile internet, SMS and MMS in the delivery of both user and reference services. The successful implementation of such services require computer hardware and software, campus networking equipment, and a robust mobile telecommunications network. Whilst students and academic staff may use service provider mobile network service to access SMS and Internet-based services on their mobile devices, other services such as video streaming as provided at the Oriental Institute of Technology (OIT) Library in Taiwan (Wang et al., 2012) may prove very costly on this platform. University provided WiFi connection, which can be accessed whilst students and academic staff are on campus, may help to overcome this challenge. A university may, therefore, have to invest in such type of infrastructure to promote mobile phone access to such services. Although the university managed ICT infrastructure is of primary importance in deciding whether a library is ready or not to offer library services through use of mobile phones, the external or national mobile telecommunications infrastructure is equally important. This is because in deciding whether or not to commence offering of such services, a library would be interested to know whether its clients (in this case students and academic staff) would be able to access the services offered. A mobile telecommunications network that has broader coverage, performs reliably, is easy to connect to, offers high speed internet access, and has broader service offering is, therefore, desirable. A library will also be interested to know if its clients have the requisite skills to access the services on offer before making a decision on whether or not to offer its services through the use of mobile phones.

3.3.2.1 Mobile Telecommunications Sector in Malawi

Literature shows that Malawi has made great strides with regard to the growth of the mobile telecommunications sector over the past twenty years that could facilitate the offering of library and information services through the use of mobile phones that may be offered by public university libraries in the country. In particular, progress has been registered in the areas of infrastructure development, penetration and uptake, roll out of new services, enhancement of service quality, policy and regulatory framework, and tariff reduction.

Mobile telephone services were first introduced in the country in 1995 with only one market player called Telecom Networks Malawi (Batzilis et al., 2010). However, the door was open to other players not long afterwards that by 1998 a second mobile phone service provider called Celtel (now Airtel) was licenced (Clarke et al., 2003). Currently (November, 2016), there are four mobile phone operators in the country (TNM, Airtel, MTL and Access), a development that can be attributed to the converged licensing regime effected in 2013 that in effect opened up the telecommunications sector by allowing fixed-line operators to provide mobile phone services and vice versa (Research ICT Solutions, 2015). Results of a MACRA (2015a) survey indicated that Airtel was the dominant player with 55.9% market share. It was closely followed by TNM with a 43.7% market share while MTL and Access contributing the remaining 0.3%.

The coming in of the other players into the mobile telecommunications sector helped lower tariffs. For example, the cost of making a voice call in between networks that was US\$0.35/minute in 1998 reduced to US\$0.25 in 2002 (Clarke et al., 2003), and declined further to US\$0.19 (MK90)/minute in 2014 (Research ICT Solutions, 2015).

Progress has also been registered in the area of penetration and uptake. With regard to uptake, Malawi had achieved a 99.55% land coverage of mobile cellular network by 2012 (Nyirenda, 2012). This means that mobile phone subscribers could use their phones from almost any point in the country. Similarly, a MACRA (2014a) report indicate that the number of mobile phone subscribers had risen to 5,290,044 (36.49%) by the end of 2014 from 49,000 (0.43%) in the year 2000 (ITU, 2014). However, results obtained in a MACRA (2014b) survey which may be more reliable compared to the earlier report whose findings may also account for multiple subscribers, reveal that the number of mobile phone subscriptions was 34% with the

majority of the subscribers (69.8%) residing in urban areas and the rest (29.1%) residing in rural areas. Furthermore, 30% of individuals who owned mobile phones reported to have mobile phones capable of accessing Internet (smartphones). This study further indicated that the majority of mobile phone owners (61%) owned one active sim card while 39% owned multiple active sim cards. Other interesting findings from the MACRA (2014b) study show that mobile phone ownership was higher among those aged between 25 and 50, males, and those with tertiary and post tertiary education.

Further developments have been recorded in policy and regulatory environment. In this case, the Malawi Communications Regulatory Authority (MACRA) was established in 1998 with the aim of regulating the telecommunications sector. Likewise, the National ICT Policy was launched in 2013 (Malawi Government, 2013). All these are other notable success stories in the sector that promise not only to drive further the growth of the ICT sector but also mobile phone services in the country.

In spite of the progress made, there are several challenges that must be addressed. The MACRA quality of service report for the fourth quarter covering October to December 2015 whilst applauding operators for making progress in achieving network quality, hinted that challenges in relation to call setup success rate, call drop rate, SMS success rate, GPRS content activation success rate, and more (MACRA, 2015b) still remain. Poor network performance could limit both mobile phone use and its impact in an area in which it is deployed, including libraries. Moreover, although overall voice call tariffs have declined over time, a study conducted by Research ICT Solutions (2015) found that call tariffs were still higher in Malawi compared to neighbouring countries. This means that the country still has a long way to go before it achieves a level of competitiveness in terms of pricing and making services affordable to users.

3.3.3 E-readiness Status of Public University Libraries in Relation to Human Resources

Human resource is another important element for determining the e-readiness status of libraries with respect to the delivery of services through the use of mobile phones. Lessons learnt from projects aimed at offering library and information services through mobile phone undertaken at both Ryerson University Library (Wilson and McCarthy, 2010) and Oregon State University Library (Bridges et al., 2010) indicate that joint teams of experts that

included professional librarians and ICT personnel worked together in overseeing the successful implementation of such projects. The role of librarians was to plan and oversee the implementation of the whole project in terms of determining the content to be displayed on the mobile websites, soliciting views of users in terms of content and services to include on mobile website, and assessment of use after project implementation. The role of the ICT team was to offer technical support in terms of building the website and managing it. It can, therefore, be seen that the presence of various individuals with different types of expertise played a critical role in the successful implementation of such projects.

A preliminary study done in the institutions surveyed revealed that they possess the requisite human resource complement both in the library and the ICT departments. However, it is not known whether the staff is adequate to enable them successfully manage the provision of library and information services through mobile phones. It is also feared that the available staff may lack the necessary skills to enable them successfully manage the delivery of library and information services through mobile phones. This study will, therefore, help expose the magnitude of the existing challenges, and offer possible solutions to those challenges.

3.3.4 E-readiness Status of Public University Libraries in Relation to Availability of Policy

Policy is equally important in project implementation. Evans et al. (2000) define policy as a statement intended to guide and channel staff thinking in making decisions. Policies may also be looked at as rules or instructions that are intended to facilitate decision making (Stueart and Moran, 2002). Policies are advantageous in that they help in ensuring consistency in decision making, particularly in an environment whereby several decision makers exist. However, the downside of policies is that they are limiting in that they do not give much room for the decision maker to operate in as the decision making process is bound by the policy.

Several types of policies exist. These include originated, appealed, implied and imposed policies (Stueart and Moran, 2002; Evans et al., 2000). An originated policy is one that is developed to guide the general operations of an organisation. This sort of policy is internally influenced as it is initiated by top management, and is meant to guide the operations of the

organisation as it strives to achieve its objectives. An appealed policy is another kind of policy that mainly arises from a situation where there is no policy. This sort of policy is, therefore, formulated in response to appeals from those affected by the lack of policy to sort out challenges that may have come about due to the absence of the policy. Implied policy is yet another type of policy that exists in an organisation. This type of policy is mainly unwritten hence informal, and arises from the actions that people see about them hence believe to constitute policy. The final type of existing policy is what is called an imposed policy which normally comes from outside entities which an organisation must work with. These entities include companies, donor agencies, and government, among others.

Policies, as already discussed, play a crucial role in the operations and activities of a library organisation and are important in determining the e-readiness status of a library with regard to the offering of library and information services through the use of mobile phones. For instance, policies that govern the allocation of financial resources could positively impact on the a library's ability to offer services through mobile phones if such policies favour allocation of adequate resources to the library to enable it carry out its activities. On the other hand, such activities could be negatively affected if resources are inadequate. Similarly, policies on human resource recruitment and training could either negatively or positively impact on the e-readiness status of the library to offer services through mobile phones as this could affect the availability of well-trained human resources to manage the project. Policies pursued by external entities such as publishers, donor agencies and government could equally have both a positive and negative impact on a library's ability to offer services through the use of mobile phones. For instance, a library's ability to offer services though mobile phones could be affected if publishers formulated policies that restricted access to e-resources. This could particularly be a major limiting factor if e-resources were the main resource users wished to access on the mobile phone platform. Furthermore, favourable or unfavourable government policies on mobile telecommunications, recruitment and training, particularly to subvented organisations or even funding could also greatly affect a library's ability to offer services through mobile phones.

Malawi launched the national ICT policy in 2013. This development would likely assist in the implementation of ICT projects including library and information services through mobile phones. However, most of the institutions surveyed seem not to have operational ICT policies

a development that could negatively impact the management of library and information services through mobile phones as the service may lack a framework for regulation.

3.3.5 E-readiness Measuring Tools

The various e-readiness measuring tools such as those developed by McConnell International (MI), the Centre for International Development at Harvard University, and more as articulated by Mutula and van Brakel (2006b), largely use quantitative approaches to assign countries numerical scores depending on how well they have performed on specific components of e-readiness parameters. This has resulted in the classification of countries based on the progress made towards meeting such parameters. The classification used is similar to that used in the Diffusion of the Innovations Theory that categorises various individuals based on the time they take to adopt particular innovations hence innovators, contenders, followers and laggards. Mutula and van Brakel (2006b) indicate that countries with most of the elements of e-readiness in place are identified as “leaders or innovators”. On the other hand, countries that have both a satisfactory infrastructure and business environment but are lacking in some other areas are recognised as “contenders”. “Followers” are countries that lack the sophistication of the “leaders” and “contenders” but have recognised the importance of ICTs and are hence moving towards establishing the necessary infrastructure to support it. Finally, “laggards” are countries that are at risk of being left behind as they face serious infrastructural challenges to take advantage of the opportunities that come with ICTs.

Literature on mobile phone adoption and use in libraries the world over portrays a trend similar to that discussed above as it shows great disparities between the developed and developing countries. Europe and North America seems to have taken a leading role, followed by the transitional economies in Asia whilst developing countries, particularly those in Africa, seem to have been left behind (Sekyere, 2013). Nevertheless, the criteria discussed above could prove problematic in assessing the e-readiness status of libraries as scholars such as Bomhold (2014) have found that even within the developed countries there is still a large number of libraries that are yet to adopt the use of mobile phones in service delivery. Moreover, the service offered in libraries already using mobile phones in service delivery is highly varied and unpredictable. This implies that the various e-readiness measuring tools discussed earlier may not provide the best criteria for assessing the e-readiness status of

libraries with respect to the use of mobile phones in the delivery of library and information services, more especially at national level. This is because these tools take the “one size fits all” perspective that overlooks unique context characteristics (Potnis and Pardo, 2011). The researcher, therefore, used the respondents’ own assessment of the availability of the e-readiness measuring parameters discussed (ICT infrastructure, human resources and availability of policy) mainly obtained from the interviews, and findings on the same parameters based on data obtained from questionnaires to pass judgement on the e-Readiness status of public university libraries to offer services through the use of mobile phones.

3.4 Adoption and Use of Mobile Phones by University Students and Academic Staff

Literature reviewed in this section tackles issues pertaining to the adoption and use of mobile phones by university students and academic staff, and addresses research question 5: Which possible factors influence the adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services? Issues pertaining to the adoption and use of mobile phones by students and academic staff are at the centre of this study as the delivery of library and information services is only possible if students and academic staff have relevant tools with which to access those services. Moreover, the constructs of the UTAUT model: (1) Performance expectancy discussed in section 2.4.1.1; (2) Effort expectancy discussed in section 2.4.1.2; (3) Social influence discussed in section 2.4.1.3; (4) Facilitating conditions discussed in section 2.4.1.4; and (5) Moderators of key behaviours: gender, age, experience, and voluntariness discussed in section 2.4.1.5 are used to explain adoption and use of information technologies. The construct of performance expectancy was addressed in Appendix 1: Interview guide with ICT directors, questions 7-10 while the constructs of performance expectancy and effort expectancy were addressed in questions 9-13 in Appendix 3: Questionnaire for students and Appendix 4: Questionnaire for Academic Staff. On the other hand, the construct of social influence was addressed in question 11 in Appendices 3 and 4. Finally, the construct of facilitating conditions was addressed in Appendix 2: Interview guide with university/college librarians, questions 8-11. This construct was further addressed by cross-tabulating issues of age and gender for students and academic staff captured in questions 1-3 in appendices 3 and 4, with mobile phone ownership and usage captured in appendices 3 and 4 respectively.

3.4.1 Adoption and Use of Mobile Phones by University Students

Generally, there is a dearth of literature focusing on mobile phone ownership and use across the world. The same scenario obtains for students and academic staff. Two reasons could be blamed for this state of affairs. Firstly, mobile phones only came into wide usage over the past fifteen to twenty years (ITU, 2014) despite the fact that the first commercial mobile telephone system was commissioned in 1979 (Lacohee et al., 2003). This implies that the technology has not yet reached maturity. Secondly, the pervasiveness of mobile phones implies that not many researchers tend to ask respondents whether they own a mobile phone or not. For instance, the annual EDUCAUSE survey of undergraduates' use of technology, which is an authoritative source of undergraduate students' ownership and use of ICTs in the USA, stopped asking about student ownership of cell phones in 2008 because ownership has pervaded the whole student population (Lippincott, 2010; Salaway et al., 2008). On the contrary, the study has been asking about ownership of internet-capable handheld devices that include smartphones for the past few years so that they can monitor this emerging trend (Lippincott, 2010). This trend is not only noticeable in the EDUCAUSE studies but also other related studies conducted in various parts of the world (Becker et al., 2013; Nowlan, 2013; Song and Lee, 2012). The majority of the available studies on mobile phone adoption and use were undertaken in the USA. However, relatively fewer studies focussing on the developed world such as the United Kingdom, Spain, Finland and China including some countries in the developing world such as India, Malaysia and South Africa are also available. On the contrary, studies focussing on Africa are few. In light of this gap, the literature obtained from each of the three regions will be reviewed separately.

3.4.1.1 Adoption of Mobile Phones Amongst University Students in the USA

EDUCAUSE Center for Analysis and Research (ECAR) has been running a yearly survey of higher learning institutions in the USA since 2004 with the aim of tracking undergraduate students' ownership and use of Information and Communication Technologies (ICTs). Besides laptop computers, personal computers (PCs) and other mobile devices such as tablet computers (Ibads), the study has also meticulously tracked the ownership of mobile phones, particularly smartphones, over the years (Dahlstrom and Bichsel, 2014). The ECAR studies have grown in scope over the years from 12 participating institutions in 2004 to 213 in 2014. The coverage has grown too, from 4,123 students when it first started in 2004, to 75,306 in

2014. Although the number of participating institutions and students slightly dropped to 161 and 50,274 respectively in 2015 (Dahlstrom et al., 2015), ECAR studies still remain the most authoritative and widely quoted studies for scholars, not only in the field of ICT, but other disciplines as well. It is for this reason that the discussion of mobile phone penetration in the USA centered much on the findings of these studies, although other relevant studies were reviewed.

As already indicated, ECAR studies stopped asking about student ownership of cell phones in 2008 based on the understanding that they are pervasive (Lippincott, 2010). The last time this was done in 2007, the mobile phone penetration amongst undergraduate students was 86.1% (85.3% for males and 86.6% for females) (Caruso and Salaway, 2007). This presents a challenge in determining the penetration rate of mobile phones amongst the student population in USA higher education institutions considering that the other available studies do not have the same coverage as that of ECAR studies.

One of the few available case studies on mobile phone ownership amongst students was conducted by Becker et al. (2013) at Hunter College in New York, that involved 613 students. The challenge with this study, however, was that it made use of an open survey method implying that anybody could participate thus calling into question the representativeness of the sample. Nevertheless, the findings of this study indicated that 98.7% of the students owned mobile phones. These results were similar to those obtained in an ITU (2014) report which revealed that the mobile phone penetration in the USA had reached 98.41%. However, the ITU usually collect statistics based on mobile phone subscriptions in a particular country, hence these do not accurately reflect the actual number of subscribers because such figures also incorporate multiple subscribers (Balakrishnan and Raj, 2012). This is why in some other countries such as South Africa (149.68%), Morocco (131.71%) and Chile (133.26%) the number of subscribers exceed the population. A properly conducted survey of actual phone owners is the best way of sorting out this issue. Another study aimed at determining mobile phone ownership was conducted by Booth (2009) at Ohio University. This email-based survey attracted 5,299 responses. This study mainly involved undergraduate students (81%). It is, therefore, not surprising that the majority of the respondents (66%) were 22 years old or younger. The other participants to this study were as follows: 12% were aged between 23 and 27 years, 5% belonged to the 27 to 30 year category, and the remaining 6% represented those aged 31 years and older. This study found that 94% of the respondents

owned a cell phone. The mobile phone ownership in this study was understandably lower than that reported in a study conducted by Becker et al. (2013) at Hunter College in New York (98.7%) as it was done much earlier, but was higher than that recorded in the ECAR 2007 study (86.1%). Again the variation in the time frame could explain the differences in these studies. The shortcoming of this study is that the questionnaires were distributed “primarily by an all-student email message, generating a non-random sample that likely represents a section of the Ohio University student body modestly skewed towards greater technology competency” (Booth, 2009, p. 42). Booth further notes that the statistical validity and reliability of the survey results cannot be considered explicitly “scientific” because its respondent base was self-selected.

Literature on smartphone penetration is more readily available than that of feature phones for reasons already discussed. A smartphone, according to Litchfield (2010), is a phone that runs an open operating system, and is permanently connected to the Internet. A smartphone uses either WiFi or telecommunication service providers’ networks to access the Internet (Song and Lee, 2012). Lippincott (2010) adds that besides Internet capability, a smartphone embraces functionalities that are similar to those of a computer. Smartphones, therefore, have a QWERTY keyboard, either physically or virtually, for typing. They also have most of the basic functions of the feature phone that includes the call function, SMS text messaging, and camera (Yu, 2012).

Information gathered from a number of sources (Salisbury et al., 2015; Dahlstrom et al., 2015; Dahlstrom and Bichsel, 2014; Becker et al., 2013; Kobus et al., 2013; Song and Lee, 2012) show that the number of smartphones has grown tremendously amongst undergraduate students in the USA over the past ten years. The ECAR (2004) study, for instance, found that only 1.1% of American undergraduate students owned a smartphone in 2004. Recent ECAR studies (Dahlstrom et al., 2015; Dahlstrom and Bichsel, 2014) show that smartphone ownership has grown exponentially over the past three years; shooting up from 76% in 2013 to 86% in 2014 before leapfrogging further to 92% in 2015. Results from the ECAR (2014) study indicate that smartphone ownership was 3% higher than it was predicted to grow that year. This signifies that the penetration of smartphones was growing at a very fast pace. The study further notes that smartphone ownership for undergraduates did not vary much by student demographics or institution type, but those who ranked high on ECAR’s tech-inclination classification were more likely to own smartphones.

Another notable finding from recent ECAR studies is that multiple ownership of mobile devices is becoming commonplace amongst undergraduate students. For instance, the ECAR (2014) study indicate that among the 99% of students who owned a smartphone, 8% owned just one device, 92% owned at least two devices whilst 59% owned three or more devices. The ECAR (2015) show that the number of students who owned only a smartphone had dropped to 3% whilst the rest owned two or more devices. Some of the most notable devices which students owned besides smartphones were tablet PCs (Apple Ipad and Samsang Galaxy Tab) whose penetration rate increased from 47% in 2014 to 56% in 2015 and E-readers whose penetration rate was approximately 24% in 2014.

The Pearson Student Mobile Device Survey is another yearly nationwide study that gives a picture of mobile device ownership amongst USA undergraduate students. Findings of the 2015 study show that 85% of the students owned smartphones (Poll, 2015). This figure represents a mere 1% increase from that recorded in 2014. Despite the increase, the growth of smartphone ownership amongst undergraduate students was now showing signs of easing considering that 2014 recorded a 12% jump in growth from 72% in 2013. Comparatively, these results do not differ much with those obtained in the ECAR (2015) study which had put smartphone ownership at 92% (Dahlstrom et al., 2015). Similarly, the Pearson study showed tablet PC ownership to be on the upward spiral, rising from 38% in 2013 to 45 % in 2014 before hitting the 52% mark in 2015 (Poll, 2015). However, the tablet computer ownership was almost 4% lower when compared with that obtained in the ECAR (2015) study. Although the Pearson study had a similar geographical coverage to the ECAR studies, it used an online survey methodology which is less reliable when compared to the ECAR studies that use random stratified sampling methods. The sample (1,211) was equally on the lower side when compared to that drawn in an ECAR (2015) study (50,274). Whereas the ECAR study indicates that it had an approximate 1% margin of error, the Pearson study omits this information. In spite of these shortfalls, the results do not seem to differ much.

Besides these nationwide studies, there are also some other case studies that have been conducted to gauge smartphone ownership among students in USA universities or colleges. One of such studies was conducted by Song and Lee (2012) to determine mobile device ownership among international business students of the University of Illinois at Urbana-Champaign (UIUC). This web-based survey that yielded 101 valid responses revealed that

82.2% of the respondents owned a smartphone whilst 24.8% owned a tablet PC. Four issues are worthy noting in this study. Firstly, the findings reflect the trend in previous studies (Booth, 2014; Dahlstrom and Bichsel, 2014) whereby smartphones had a higher penetration rate compared to tablet PCs. Secondly, the study shows that students were moving towards multiple ownership of mobile devices to take advantage of the unique capabilities of each device. Whilst this study indicates that 21% of the respondents owned both a smartphone and a tablet PC, it also reveals that over 61% of non-smartphone owners were considering purchasing a smartphone within the next six months, while 53% of non-tablet PC owners were likely to purchase a tablet PC. This signifies that the number of people owning multiple devices was bound to increase. Thirdly, when these findings are compared with findings of the ECAR (2012), which is the same year when this study was conducted, one notices that both smartphone and tablet PC ownership among international business students of the University of Illinois (82.2% for smartphones and 24.8% for tablet PC) was much higher than that of American students (62% for smartphones and 15% for tablet PC). Looking at the larger picture, one would notice that Americans have generally lagged behind people from other countries in accepting the mobile phone. For instance in 2012, the mobile phone penetration in America was at 96.01%. On the contrary, other countries such as Austria (160.54%), Finland (172.32%) and Hong Kong, China (229.24%) had penetration rates that were almost double the figure recorded in the USA (ITU, 2014). Fourthly, the study had, furthermore, reinforced the dominance of Apple brands in the American market which accounted for a third of total smartphone ownership and closely followed by Android devices. The ECAR (2012) study, however, indicates that 44% of the respondents owned an iPhone whilst 46% owned android devices. Apple dominance in the smartphone and tablet market had widened further in 2014 as 58% of the undergraduate students indicated that they owned an iPad while 54% of the smartphone owners indicated that they owned an iPhone and only 43% of the respondents indicated that they owned an Android phone (Dahlstrom and Bichsel, 2014).

3.4.1.2 Adoption of Mobile Phones Amongst University Students in the Developed and the Developing World

The developed world comprises of countries such as USA and Canada in North America, and the majority of Western European countries including Australia and Japan in Asia (United Nations World Economic Situation and Prospects, 2014). On the other hand, the developing

world comprises of countries not included on this list, most prominently, China, India and South Africa, among others.

The literature on mobile phone ownership among students in the developing world is sparse. However, a number of studies, nevertheless, exist that tend to discuss mobile phone ownership in general (Kumar, 2014; Zheng et al., 2014; Bradley and Holley, 2012). In a longitudinal study of first-year Business School students at London Metropolitan University, Bradley and Holley (2010) tracked mobile phone ownership among students between the years 2005 - 2009. The results indicated that mobile phone ownership among students was always high for most of the years as it ranged from 98.6% in 2005 to 100% in 2009. The study further noted that the number of internet enabled phones increased considerably from 56.5% in 2005 to 80% in 2009 whilst phones with Wi-Fi capability equally shot up from a meagre 1.4% in 2005 to 50% in 2009. This study did not make a distinction between feature phones and smartphones. However, the increase in phones with WiFi capability implies that the number of smartphones was on the increase.

In a related study, Kumar (2014) sought to find out the opinions of students about the success of mobile technology in libraries. This study which was conducted at Jawaharlal Nehru University (JNU) in New Delhi, India involved a randomly selected sample of 180 students. Results of this study indicated that 93.89% (96.84% males and 90.59% females) of the students had either a smartphone or an ordinary phone. More importantly, this study revealed addictive tendencies associated with mobile phones among the students whereby the majority of the respondents (71.6%) could keep a mobile phone close at all times while (82.25%) stated that they could survive without food for one day but not without a mobile phone. This study further noted that the larger percentage of female students displayed addictive tendencies to mobile phones than male students.

Comparatively, the two studies reviewed above differ and also resemble those conducted in the USA in certain areas. As already discussed, the ECAR (2007) study had put the mobile phone penetration amongst undergraduate students at 86.1% (85.3% for males and 86.6% for females). However, the study conducted by Bradley and Holley (2012) in the UK the same year indicated that mobile phone penetration was at 98.5%. This signifies that mobile phone penetration among USA undergraduate students was slightly lower than that of their counterparts in the UK. On the other hand, results of the ECAR (2007) study resemble those

obtained in a study conducted by Kumar (2014) in India, in that in both studies male students had a higher percentage of mobile phone ownership although the two studies were conducted in two different environments and also within a seven year difference.

Studies focusing solely on smartphone ownership also exist in the developing and the developed world (Zheng et al., 2014; Kobus et al., 2013; Nowlan, 2013). An online survey of Dutch University students involving 3,132 participants conducted in November 2011 by Kobus et al. (2013) indicated that 67.9% of students owned a smartphone. Contrary to findings of previous studies conducted in the USA (Dahlstrom and Bichsel, 2014; Song and Lee, 2012), this study registered a very low tablet PC ownership of only 10.9 %. Another important finding of this study was that ownership of smartphones was not related to one's income but this became an important factor in tablet PC ownership. Similarly, a study by Song and Lee (2012) found that the high total cost of ownership (i.e. costs for handsets and monthly data plans) was the main reason why 39% of the respondents did not own a tablet PC.

Another study conducted in China by Zheng et al. (2014) revealed that 86% of college students in that country owned a smartphone, and only 2% of students owned ordinary cell phones without internet browsing features. This study relates to the previous one conducted by Kobus et al. (2013) in that both show high penetration rates of smartphones. The gap that exists between the penetration rates of the two studies could be the result of time difference as the two studies were conducted two to three years apart. Likewise, a study conducted by Nowlan (2013) at the University of Regina in Canada showed that a large portion of the students surveyed (95.4%) used smartphones. iPhone, Blackberry, and Android devices were the most common devices which the respondents owned. Nonetheless, this study is unique in that it was the first study to record smartphone penetration at such high levels. However, the studies did not clearly specify the sampling procedure used other than just stating that the survey was open to all. This perhaps implies that an online questionnaire was used. As already indicated, online questionnaires lead to collection of data from a convenient sample which is not very reliable (Grinnel and Unrau, 2008). Although the response rate was quite high (62%), questions may still be raised about the reliability of the findings.

3.4.1.3 Adoption of Mobile Phones Amongst University Students in Africa

ITU (2014) statistics indicate that mobile phone penetration in Africa is high. However, mobile phone ownership and use among university students remain largely unexplored. Consequently, there is paucity of literature focusing on this subject. Lately, there seems to be some interest that is building up on the topic mainly in West Africa and South Africa that tends to give a glimpse of what the situation might be like in the rest of Africa. Therefore, literature reviewed in this section was mainly drawn from the two Regions.

The literature that focusses on the West Africa Region is mainly drawn from Ghana and Nigeria. One of these studies conducted by Akeriwa et al. (2015), dwelt on the use of mobile technologies for social media-based library services at the University of Development Studies Library in Ghana. This study, which involved 155 graduate students found that 117 of the 119 respondents owned a mobile phone, representing a 98.3% penetration rate. Although mobile phone ownership was this high, tablet PC ownership was low (7.1% penetration rate). Findings further show that Apple's Ipad had a higher penetration rate of 5.8% whilst Samsang's Galaxy Tab only had a penetration rate of 1.3 %. These findings reflect those obtained in studies by Booth (2014), Salisbury et al. (2015) and Song and Lee (2012) which indicated that Apple brands had a larger market share as opposed to Android devices.

Fasae and Adegbilero-Iwari (2015) adopted a descriptive survey design to study the use of mobile devices by science students in privately-owned Afe Babalola University and Joseph Ayo Babalola University in Nigeria. Eighty (80) questionnaires were administered to a purposively selected sample. Findings of this study indicated that 83.8% of the respondents used smartphones while 31.3% used tablet computers. In yet another study, Anyanwu et al. (2012) investigated the use of mobile phones for research among undergraduates at Federal Polytechnic Nekede and Imo State Polytechnic, Umuagwo. Questionnaires were distributed to a purposively selected sample of 200 students, 161 of which were retrieved. The study found out that 154 (95.7%) of the participants made use of their mobile phones for research while 7 (4.3%) did not use their mobile phones for research. Although this study did not specifically investigate mobile phone ownership but rather usage, the findings imply that the respondents were using their own phones for research, and those who were doing this were many.

Findings highlighting a high penetration rate of mobile phones, and smartphones in particular as seen above, are not surprising as Palumbo (2015) had previously observed that smartphones were making inroads in Africa. Although these studies did not indicate the dominant smartphone brands among the student community, Palumbo predicted that the availability of cheap Chinese brands which were available for as little as US\$100 could spearhead the proliferation of smartphones in the Nigerian market. Moreover, Jidenma (2011 cited by Palumbo, 2015, p. 180) projected that smartphone usage in Africa was bound to increase to 265 million users by 2015 hence the high penetration of smartphones among undergraduate students in Nigeria could be termed as a fulfilment of this prediction.

Literature on mobile phone ownership among university students in the Southern Africa Region is drawn from South Africa, Zimbabwe and Zambia. Findings of mobile phone ownership in South Africa reflect those observed in studies conducted in West Africa whereby the mobile phone usage among university students was discovered to be high. Coetsee and Weiner (2013 citing Howard 2012) indicated that a 2007 study found that 98.5% of South African university students had a mobile phone. Another study conducted by Thinyane (2010) involving 270 students at Rhodes and Fort Hare Universities revealed that 98.1% of the students owned a mobile phone with some students owning more than one mobile phone. The researcher did not come across studies focusing on smartphone ownership among South African students but the study by Thinyane (2010) indicated that most of the students owned mobile phones with advanced features such a camera (88.9%) and Bluetooth (73.7%). Multiple device ownership was also seen to be a common trend among South African university students which is not only a reflection of the prevailing situation in West Africa but also other parts of the world.

Mobile phone penetration among university students in Zambia and Zimbabwe have also been found to be high. A study conducted by Kakana and Kanyengo (2009) that drew a convenient sample of 178 students from the University of Zambia revealed that close to 98% of the students owned a mobile phone. Dewah and Mutula (2013) conducted a study on mobile phone access and use among students at the National University of Science and Technology (NUST) in Zimbabwe, targeting fourth year undergraduates and master's students. The study found out that all the students surveyed owned a mobile phone. Findings of this study further revealed that Nokia phones (57%) were the most popular brand among students whilst smartphone ownership was the highest (73%). The high penetration of

smartphones among students is a reflection of current trends in the mobile phone market the world over (Dahlstrom and Bichsel, 2014; Nowlan, 2013). However, the high prevalence of Nokia phones, though similar to the prevailing situation in Malaysia (Balakrishnan and Raj, 2012), was in sharp contrast to the European and USA market where Apple and other Android phones were dominant (Booth, 2014; Johnson et al., 2013; Kobus et al., 2013).

3.4.2 Mobile Phone Ownership Among Academic Staff

Literature on mobile phone ownership among academic staff is hard to find as there are not many published studies on this subject. Of the four studies found in the literature reviewed (Brooks, 2015; Boruff and Storie, 2014; Johnson et al., 2013; Ruleman, 2012) only one (Brooks, 2015) focused solely on academic staff whilst the rest also involved students. Furthermore, out of the three other studies that dealt with students and academic staff, only one of them (Ruleman, 2012) made separate computations of academic staff and students' ownership and usage of mobile phones. This implies that only two studies (Brooks, 2015; Ruleman, 2012) presented a detailed and more specific picture of academic staff ownership of mobile phones whilst the other two studies included academic staff as part of the larger study.

An ECAR (2015) study of ICT ownership and use amongst faculty (academic staff) in the USA covered 139 colleges and universities, obtaining responses from 13,276 faculty members. Results of this study indicated that both smartphone (89%) tablet PC (80%) ownership was very high (Brooks, 2015). Considering that ownership of other mobile devices was equally high, it can therefore be concluded that dual and multiple ownership of mobile devices was a norm amongst academic staff in the USA. When these findings are compared with those obtained from the student survey in the same year, one notices that smartphone ownership amongst students (92%) was slightly higher when compared to that of academic staff (89%). However, tablet PC ownership (80%) was far higher when compared to that of students (56%).

Ruleman (2012) carried out a web-based survey at the University of Central Missouri between May and September 2010 with the aim of determining the technology user characteristics of students and faculty (academic staff). Findings of this study revealed that students (59%) owned more smartphones than faculty (43%) which is a reflection of findings

obtained in the ECAR (2015) study. According to Ruleman (2012), these findings signify that cost was not a factor in mobile phone ownership as academic staff tend to have higher disposable incomes than students. Kobus et al. (2013) made similar findings. Two other North American studies, one conducted by Boruff and Storie (2014) and another one by Johnson et al. (2013) had also shown mobile phone ownership to be high among its respondents that included students and academic staff. A web-based survey conducted by the former with participants from four Canadian universities: McGill University, University of Alberta, University of Calgary, and University of Ottawa revealed that 1,120 (92.6%) of the participants owned mobile phones. Another web-based survey conducted by the latter at the University of Florida in 2010 attracted 3,526 responses from undergraduate and graduate students, academic staff and other staff. Results of the study indicated that 87.2% of the respondents owned smartphones. As it has been observed in other USA-based studies (Dahlstrom and Bichsel, 2014; Song and Lee, 2012), the majority of the respondents (27.9%) owned iPhones. However, this study differed with other studies in that other phones (17.2%) had a higher penetration as opposed to Android devices (16.3%) which normally had the second highest penetration rate in the USA market (Becker et al., 2013; Song and Lee, 2012).

3.4.3 Uses of Mobile Phones Among Students and Academic Staff

The question of how a mobile phone is used is mainly determined by the kind of functionality or features it embraces, status of the user, user's information needs, and more. Mobile phones are becoming more sophisticated each passing day following the release of new models. The feature phone embraces most of the basic functions such as voice calling, SMS text messaging, alarms, games, and others. Smartphones, on the contrary, have computer like capabilities (Hsiao, 2013; Lippincott, 2010), hence able to perform more functions than most feature phones. Besides the functionalities embedded in feature phones, smartphones are also able to do video calling, send and receive e-mails and multi-media messages (MMS), capture still images and videos, use a GPS navigation system, and others (Yu, 2012; Lippincott, 2010).

3.4.3.1 Uses of Mobile Phones Among Students

A critical analysis of the available literature reveals that students use their mobile phones in so many ways. Some of the popular uses are general, educational, and library-related

activities. A Bradley and Holley (2010) study that reported first-year students' uses of mobile phones at London Metropolitan University from 2005 to 2009 revealed students' heavy use of the communicative function of mobile phone (calls and SMS text messaging). The use of the internet search function for research purposes was found to be equally on the increase. Another study conducted by Song and Lee (2012) of international students enrolled at the College of Business at the University of Illinois indicated that students' uses of mobile phones fell into five broad categories. These are (1) communication (such as e-mail, video communications, text messaging); (2) social networking (such as Facebook, Twitter, blogs); (3) information search (such as news, online libraries, databases, current events); (4) entertainment (such as videos, music, games); and (5) other (such as scheduling, shopping, banking). These results signify that the mobile phone was a device that impacted on every segment of the students' lives. These findings were corroborated in an ECAR (2014) study of undergraduate USA students. This study identified the top five education-related activities the students performed using their mobile phones as communicating with other students about class-related matters outside class sessions; checking grades; looking up information while in class; using the course or learning management system; accessing information about events, student activities, and clubs/organizations; and reading e-texts (Dahlstrom and Bichsel, 2014). However, the main difference between the two studies is that whilst social networking featured highly in the study conducted among students at the University of Illinois, it did not feature at all in the ECAR (2014) national study of undergraduate students. Since the two studies differed in terms of focus in that the former looked at general uses of smartphones whilst the latter looked at educational uses, the implication could be that social networking tools may not be used much among USA university students for educational purposes. It is also worth noting that much as students were very keen to use mobile phones for educational purposes, their attempts were frustrated by the actions of academic staff who either created very few assignments that incorporated mobile technology or banned the use of mobile phones in class, as they feared that they would distract students from the learning process (Brooks, 2015; Dahlstrom and Bichsel, 2014; Dahlstrom and Brooks, 2014).

Balakrishnan and Raj (2012) carried out a mixed methods study that used both questionnaires and 24 hour diaries to study, among others, usage patterns of mobile phones among Malaysian University Students. Results of the study indicate that most of the students (97.7%) used their mobile phones 5 to 10 times daily regardless of application (call, internet search, text messaging, and others). The study further shows that students made the majority

of their calls (96.3%) to close friends and families while the rest were random calls. Most of the calls (54.5%) were made with the aim of making, confirming and cancelling appointments related to studies and social activities, fewer (23.7%) for gossiping, for maintaining social relationships (18.3%) and other activities (3.5%). Likewise, most of the calls (98.8%) were received from close friends and family, and the rest (1.2%) were random calls. Although results of this study acknowledge that students used more than one mobile phone application, most of its findings centre on the call function unlike other studies reviewed earlier that show use of more mobile phone features (Song and Lee, 2012; Bradley and Holley, 2010). Findings of this study resemble previous ones as they highlight the use of the mobile phone to students as that of facilitating educational and social activities. Though the study's findings are illuminating, the methodological approach is prone to error. The use of a 24 hour diary as a data collection method for phone usage is faulty because measuring students' uses of mobile phones over such a short period of time may give wrong results. It is possible that some of the students may not feel the need to make calls during that time. Moreover, some other activities are time-oriented. For instance, students may make more calls to colleagues on class related activities during a week day and not weekends. Social activities may also happen frequently during weekends so students may make more calls related to this activity during that time.

Similar to the study by Bradley and Holley (2010), a study of mobile phone usage among Finish undergraduate students conducted by Haverila (2013) found that the call and SMS functions were the most heavily used applications as they were used on a daily basis. The two studies, however, differed in that while the former indicated that Internet use was on the rise, the latter found it to be moderately used. Other results from the study conducted by Haverila (2013) showed that the calendar accounted for the second heaviest use while music, notes and calculator were moderately used with most of the respondents using them 2-3 times a week. This study showed gender differences too in terms of mobile phone usage whereby female users were found to be heavier users of the calendar, internet, music and email. Nonetheless, results of the study did not show any differences in terms of usage of the call and SMS function between males and females contrary to previous studies (Henderson et al., 2002; Jackson et al., 2001) whose findings revealed that females used mobile phones for interpersonal communication (calling and SMS) more than males. Furthermore, the research findings did not find any differences in usage of games between males and females hence

contradict findings of a study by Reinhard and Dervin (2009 cited by Haverila, 2013, p. 181) who found out males to be heavy users of games than females.

3.4.3.2 Uses of Mobile Phones Among Academic Staff

Karim et al (2010) carried out a survey on mobile phone appropriation of students and staff at the International Islamic University of Malaysia (IIUM) involving 201 participants. Findings of this study indicated that the main purposes for using the mobile phone were to contact family, for scheduling purposes, for emergency contact or personal safety, to socialise with friends, to discuss with colleagues (job-related matters), for education purposes and for business-related purposes. On the other hand, SMS, alarm clock, voice call, calendar, address book, camera and music were the most common features that were used. Similarly, studies conducted by Haverila (2013) and Bradley and Holley (2010) found SMS to be a heavily used application. However, both studies differ from the present one in that while calls were the other heavily used feature, the present study found that it did not feature among the most used functions. The study by Karim et al (2010) further showed some variations in terms of mobile phone usage between students and academic staff. Besides being overall heavier users of mobile phone features outlined above, students were also found to use mobile phones more for scheduling purposes, for emergency contact, to socialise with friends, and for education purposes than academic staff. Academic staff, conversely, used mobile phones for business-related purposes more than students. The findings of this study partly agree with those obtained in another Malaysian study conducted by Balakrishnan and Raj (2012) who found that most of the students made calls on education-related and social activities. The only difference between the two studies is that while education was the main reason for making calls in the study done by Balakrishnan and Raj (2012), social contact featured highly in this study under review. The study conducted by Karim et al (2010) also found that age and gender had a moderating effect on usage. In this regard, women were found to use SMS, alarm clock, camera, and music more than males. While all the respondents showed a very high use of mobile phones for family contact, those with ages between 25 and 35 (mean 4.80) and those between 35 and 50 (mean 4.67) showed significantly higher usage for family contact than those with age 18-24 (mean 4.51) and those above 50 years (mean 4.38). Since the study found that most of the students fell within the age ranges of 18-24, it can therefore be concluded that academic staff used mobile phones more for family contact than the students.

Another study conducted by Ruleman (2012) at the University of Central Missouri found that academic staff and students differed sharply in their use of mobile phones. This study revealed that almost half of the students (46%) used their mobile phone to access the Internet on a daily basis and almost a third (30%) spent three hours or more per week online on their mobile phone. Faculty did not use the Internet much but almost one-third (32%) went online on a daily basis and 22% spent three hours or more per week accessing the Internet with their mobile phone. However, only few students (15%) and academic staff (7%) still used their phones even when a laptop was available. Similarly, a study conducted by Karim et al (2010) found that students used mobile phones more than academic staff.

3.5 The Current Status of Providing and Accessing Library and Information Services Through Mobile Phones

The literature review covered in this section addresses research question number 3 that investigates the current status of providing and accessing library and information services through mobile phones in public university libraries in Malawi. The section also covers two constructs of the TOE framework: The technological context which is covered in section 2.5.1 and the environmental context covered in section 2.5.3. Appendix 2: Interview guide for university/college librarians captures this aspect in questions 1-4 and 19-22 respectively; Appendix 3: Questionnaire for students captures this aspect in questions 9-15 respectively whilst in Appendix 4: Questionnaire for Academic Staff this concept is again captured in questions 9-15 respectively.

3.5.1 The Use of Mobile Phones in the Delivery and Access to Library and Information Services

As already discussed, mobile phone (feature phones) ownership among university students had almost reached saturation point by the year 2010 with over 90% of students in many parts of the world owning one (Bradley and Holley, 2010; Caruso and Salaway, 2007). However, two significant developments took place at around the same time which had some implication on the use of mobile phones in the delivery of library services. Firstly, an ECAR (2010) study indicated that the penetration of handheld devices (most of them being smartphones) had reached 62.7%; and secondly, the ECAR (2010) study further observed a marked increase in

the number of students who owned and accessed Internet from a handheld device from 33.1% in 2009 to 48.8% in 2010 (Smith and Caruso, 2010). The increase in smartphone ownership implied that libraries could offer a wider range of services to their clients as most library services are Internet-based. Owing to these developments, Joan Lippincott a renowned Library and Information Science (LIS) scholar, predicted in her 2010 article titled “A mobile future for academic libraries” that mobile phones would have a profound impact on library service delivery in the future. The use of mobile phones (feature phones and smartphones) in the delivery of library services is advantageous both to the library and its clients because it helps overcome the obstacles of time and space (Malik and Mahmood, 2013) hence convenient (Ballard and Blaine, 2013).

Large scale surveys detailing the use of mobile phones in the delivery of library services are few, and in other cases such studies are a bit dated which makes it harder to figure out the current state of such services in various geographical regions of the world. However, the increasing number of case studies focussing on the topic (Salisbury et al., 2015; Wei et al., 2015; Johns-Masten and Mann, 2013; Nowlan, 2013; Villa et al., 2010) makes one conclude that more and more libraries are adopting the use of mobile phones in the delivery of their services.

A number of USA-based studies focussing on the delivery of library services through the use of mobile phones have been reported in the literature (Bomhold, 2014; Jackson, 2013; Aldrich, 2010). Aldrich (2010) used a mixed-method study to evaluate progress made within the Association of Research Libraries (ARL) move to the mobile web at 111 English-speaking ARL libraries. Findings of this study revealed that only 39 of the 111 libraries had mobile web sites for either the university or library, and 24 (21%) had mobile web pages for the library. The study further indicated that library hours (75%), staff directories (67%), and library catalogs (67%) were the common services offered on the mobile websites. A follow-up study conducted by Jackson (2013) involving 99 ARL libraries revealed that great progress had been made from the previous study. Findings of this study indicated that the total number of libraries that had mobile web sites jumped from 21.6% in 2009/2010 to 80% in 2012. A more recent study conducted by Bomhold (2014) which focussed on 73 public research universities under the Carnegie Corporation found that 52 (71.2%) of the libraries had some sort of mobile accessibility to library services. Bomhold, however, noted that the type of access provided was mixed. In total, 39 (53.4%) had university apps with access to

the library; 7 (9.6%) had university websites that were optimised for mobile use; 4 (5.5%) had university apps that provided a link to an optimised library website; and 2 (2.7%) had no university app or mobile website, but the library area of the web site was optimised. With regard to content, most of the libraries provided catalogue access (98.1%), hours (80.8%), maps (78.8%), ask-a-librarian (76.9%), contact information (73.1%), database access (69.2%) and library account access (51.9%). Overall, these USA-based studies show that libraries have made a lot of progress in gaining some mobile presence within a short period of time.

The researcher did not come across surveys that quantified the number of libraries that are currently offering library services through mobile phones in European University Libraries. The state of library service offering through the use of mobile phone discussed in this section is hence based on available case studies. A study conducted by Villa et al. (2010) to explain the mobile services developed by the Rector Gabriel Ferrate Library of the Technical University of Catalonia in Barcelona, Spain, indicate that the library had developed a website optimised for mobile phone. The functionalities available through mobile website then included what's new, general information, directory, mobile OPAC, laptops, study rooms, mobile information resources, ask-a-librarian, and more. A UK-based online survey conducted by Paterson and Low (2011) that attracted 1,716 participants found that Edinburgh University did not offer library services through mobile phones that time. However, students had positive attitudes to the use of mobile phones. The students indicated the following as some of the services they found useful hence ready to access them if they were provided on a mobile optimised website: checking PC availability in the library (55%), search library catalogue (60%), search databases (52%), view own library record (60%), reserve items on loan (54%), request an item through interlibrary loan (38%), locate a shelfmark (49%), and others. Other European University libraries that are known to have had some mobile presence included the Cambridge University Library and the Amsterdam University Library (Paterson and Low, 2011).

In the Asia-Pacific Region, literature shows that Chinese University Libraries were adopting the use of mobile services at a rapid pace too. Li (2013) reported that as of September 2011, only 14 of the 39 Chinese Universities (35.9%) that belong to the 985 Project provided library and information services through mobile phones. However, the number of libraries with some mobile presence had increased to 36 (92.3%) by August 2014 (Wei et al., 2015). Likewise, a Wei et al. (2013) study revealed that libraries of several key universities across

China that included the Beijing Institute of Technology, South China University of Technology, Chongqing University, and Peking University, were providing mobile services. The main service offering included SMS, WAP, and APP. Yee (2012) carried out another survey in November 2010 to get a picture of mobile service offering of academic libraries in Australia. The survey revealed that Australian academic libraries were making efforts to optimise their websites for mobile phones but at a very slow pace with only 10 out of 23 universities (43.5%) providing mobile friendly services by then. Checking of the catalogue was the most popular service available whilst the booking of library classes, study rooms and PCs are some of the services that were least offered on the mobile phone platform.

Some studies related to mobile phone use in libraries have also been done in Africa. One of such studies undertaken by Sekyere (2010) investigated virtual reference services offered by 79 academic libraries in ten West African countries. This study found that none of the libraries surveyed made use of mobile phones in service delivery. This implies that though libraries in various parts of the world were largely moving towards adopting the use of mobile phones in the delivery of library services, libraries in the West Africa Region had been left far behind. There are also indications that some libraries are now making efforts to rectify the trend. A recent study conducted by Baro et al. (2014) involving 36 university libraries in Nigeria revealed that the majority of the libraries received reference services through mobile phones. Literature further shows that some university libraries have adopted the use of mobile phones in the Southern Africa Region, and are using them mainly for SMS text messaging, accessing Quick Response (QR) codes and bibliographic searches (Mohamed, 2014; Anbu and Mavuso, 2012; Mbambo-Thata, 2010). A pilot SMS project conducted by Anbu and Mavuso (2012) at the University of Swaziland revealed that SMS could be used successfully to market library services. Similarly, a study by Mbambo-Thata (2010) indicated that AirPac was successfully used as a tool for information access in an Open Distance Learning (ODL) environment at the University of South Africa (UNISA) Library. Mohamed (2014), on the other hand, conducted a pilot study on the use of QR Codes at the Brand van Zyl Law Library at the University of Cape Town. Findings of the study revealed that students were generally unfamiliar with QR Codes until they had participated in the needs assessment. The study concluded that this challenge would be overcome with time. In the context of Malawi, no studies on the use of mobile phones to provide library and information services are known to have been undertaken.

Although progress towards the adoption and use of mobile phones in libraries is being made, there is still a long way to go before they are fully integrated in library services because mobile phone use in libraries is at a very early stage of adoption. Projects aimed at offering both user and reference library services through the mobile web (website accessible through mobile phone) undertaken at both Ryerson University Library (Wilson and McCarthy, 2010) and Oregon State University Library (Bridges et al., 2010) were successfully implemented, though no rigorous evaluation has been undertaken from the user's side to determine their effectiveness. Moreover, a project aimed at offering reference services through mobile phone text messages undertaken at San Jose State University was not widely utilised by users, a development that was attributed to the lack of awareness (Luo, 2014).

3.5.2 Service Offering

Mobile phones embraces so many functionalities and applications. For this reason, mobile phones have for long been used for making voice calls, and to a lesser extent sending and receiving SMSs. However, with the advent of smartphones, the range of functions that mobile phones are able to perform are on the increase. According to Lippincott (2010), mobile phones have become much more versatile in recent years allowing communication between and among individuals in at least three ways that are now considered mainstream: voice, texting, and e-mail. The nature of mobile phone functionalities and applications university libraries are making use of to delivery services to their clients is addressed in this section.

3.5.2.1 Quick Response (QR) Codes

Quick Response (QR) codes were created and freely released by Denso-Wave in 1994 in Japan (Mohamed, 2014; Walsh, 2009). They contain far more information than a normal barcode within a limited space because they store information both horizontally and vertically unlike conventional barcodes that store information only in a horizontal manner (Lo et al., 2013; Walsh, 2011). QR codes most commonly contain a universal resource locator (URL) but other information can be used within the codes such as telephone numbers or up to 700 words of text (Elmore and Stephens, 2012). To access the content of a QR code, one needs a mobile phone with a camera that also has a freely downloadable QR scanner (application). When the scanner is open and projected to the QR code, it will access the content of the code

such as go to the web address, so in effect can link to video, audio or web pages that display further information.

Walsh (2009) observes that QR codes are more popular in Japan than any other part of the world, consequently most mobile phones sold there have a QR reader software already installed. According to Pulliam and Landry (2010), QR codes embrace the following characteristics that make their use advantageous. (1) QR code is dynamic. If a QR code is linked to a URL, and the URL changes, you can revise the underlying data without having to alter the code's image. (2) QR code is well-designed, with a higher capacity than other matrix codes. (3) QR code also supports great size variability and error correction capabilities such that up to 30% of damaged or obscured data can be restored. (4) QR code is enriching in that it ties the physical object to the digital object. They also can deliver content with a great depth of interactivity.

QR codes have predominantly been exploited in the commercial sector for marketing campaigns, job advertisements, fliers and public notices (Mohamed, 2014). However, of late university libraries are also using them in a number of ways. One of such uses is the marketing of library resources. In this regard, Ashford (2010) reported that the University of Amsterdam Library uses QR Codes to promote their mobile library catalogue by appending the code to their promotional materials. Similarly, the Rockhurst University Library uses QR codes to promote its events and services, advertise the hours for the library, share how to find the Ask a Librarian chat service, and promote library exhibits (Lo et al., 2013). Harvard University libraries, conversely, use QR codes mainly as a reference tool. In this case, QR codes are linked to finding aids such as call-number maps and floor plans as well as to online research guides (Wilson, 2012). QR codes are further used to promote the circulation of print books. Dempsey (2011) reports that the top 400 circulating books at Miami University Libraries have QR codes on the front cover that links users to a website of books by the author on the subject. This helps to expose such books to these readers, and increases the likelihood that such readers would also read these books. QR code uses at Huddersfield University, according to Walsh (2011), include providing a link from print to electronic journal holdings and books, and bringing external resources into the library. With regard to the former, QR codes are pasted on boxes containing print journals and books that links patrons to electronic copies of these materials. As for the latter, shelf ends display QR codes linking to external resources that may be of use to students in a particular discipline.

Although university libraries are making efforts to promote the use of QR codes by embedding them in library services, the response from patrons has been muted whilst usage has largely been low. Ratajeski and Kraft (2015), for instance, used QR codes to promote e-books at the Alumni Library at the Cleveland Clinic and Falk Library of the University of Pittsburgh. The study concluded that the total number of QR code scans in a two-year time span (February 2012– February 2014) were very low. A number of other related studies (Mahomed, 2014; Lo et al., 2013; Schultz, 2013) have all shown that library patrons have a positive attitude towards the use of QR codes in libraries although there seems to be a knowledge gap pertaining to what QR codes are, and the usage itself has been low for libraries that are currently using them. A study conducted by Schultz (2013) on the appropriateness of using QR codes at Ryerson University Library and Museum of Inuit Art in the USA indicated that approximately 19% of the patrons interviewed knew exactly what QR codes were with another 47% knowing what they were only after showing them the application saying they knew them but didn't know their name. Though knowledge of QR codes was slightly higher, usage was very low as the 32 participants observed during the study, only 1 patron was seen scanning the QR code at the museum during the site visit and another one indicated that he had scanned it on another visit. Additionally, more than half of the patrons not observed using QR codes stated that they had not used them before. Over 50% of the respondents expressed positive feelings about QR codes.

Another study conducted by Elmore and Stephens (2012) at Loughborough University Library revealed that although awareness and use of QR codes in the UK was increasing, usage was still low. For instance, over the four-week period in which this project was done, the QR codes were accessed only 33 times in total. On average, one code was scanned every day of the pilot project. Yet another study done by Mohamed (2014) at the University of Cape Town Library in South Africa found that some students had problems in grasping what QR codes were. The study also found that the library was not using QR codes at the time but 90% of the respondents indicated their willingness to use them if they were introduced. Overall, a good number of the respondents in the studies reviewed in this section seem not to be aware of what QR codes are. This reflects what Walsh (2009) observed that only few people outside of Japan are aware of QR codes. He, therefore, advised that libraries need to market QR codes if they are to make effective use of them.

3.5.2.2 Short Message Service (SMS)

Created in 1993 (Anbu and Mavuso, 2012), SMS is one of the oldest, reliable and widely used mobile phone applications today (Jetty and Anbu, 2013). SMS text messages are limited to 160 characters (Luo, 2011) something that could be a limitation to those who may want to express themselves more. However, this has not proven to be a deterrence in their use. On the contrary, SMS use has blossomed over the years, and is particularly popular amongst the youth within the 18-29 age group (Herman, 2007). SMS offers a cheaper, efficient and more convenient way of communication than voice calls hence preferable to many users (Tomaszewski, 2011; Goh and Liew, 2009). Besides, SMS also helps to overcome language difficulties. In this case, Herman (2007) found that international students enrolled at Southbank Institute in Australia who had language difficulties used SMS language such as U R (you are)/C U (see you)/L8 (late) instead of more formal English to communicate with reference librarians.

The popularity of SMS text messaging means that many libraries are now making use of the application to deliver library services in a platform favoured by their clients (Hua et al., 2015; Li, 2013; Ruppel and Vecchione, 2012). According to Wang et al. (2012), SMS text message alerts can be used by a library to offer services such as due-day reminder service, renewal-request service, overdue notification service, request arrival notification service (reminds patrons about the availability of reserved items), and more. SMS can also be used for the news and event reminder service whereby the SMS service sends reminders to patrons about important news, exhibitions, instructions, and more. The service is also used for the new title notification service whereby patrons get informed of newly acquired titles. Chandhok and Babbar (2011) further note that library patrons can use the SMS service to request for an overview of outstanding fines, checking the availability of resources, requesting the opening hours of the library, and mobile instructions. The services outlined above fall within the user (due-day reminder service, renewal-request service), reference (checking the availability of resources, requesting the opening hours of the library), and instructional categories (mobile instructions). According to Anbu and Mavuso (2012), university libraries are increasingly using the SMS technology because it offers immediate response, more engagement and interaction. The immediacy or synchronous nature of SMS text reference is, however, a subject of discussion among scholars with Luo (2011) identifying it as falling somewhere between synchronous and asynchronous. This is supported by research data as findings from a study

by Pearce et al. (2010) indicated that the average response time of SMS reference was more than two hours even during hours of operation.

According to Luo (2011), there are two main models through which libraries deliver text reference services to their clients. The first one involves the use of a dedicated mobile device (usually as smartphone), and the second one involves the use of computer applications like e-mail or instant messenger to process users' texted questions. Both of these models have their own advantages and disadvantages. In terms of the former, the small screen size of the mobile phone could pose challenges in handling a huge number of reference queries received. The advantage of this model is that the mobile nature of the phone implies that the reference librarian may easily keep in touch with library patrons all the time. As for the latter, the use of a dedicated computer terminal means that it is easier to respond to reference queries received. The disadvantage of using this model in the context of Malawi where electricity is unreliable and Internet networks are often interrupted means that the performance of the service would be greatly compromised.

SMS use in university libraries is booming with evidence of libraries in various parts of the world such as Swaziland (Anbu and Mavuso, 2012), China (Li, 2013), Australia (Herman, 2007), Taiwan (Wang et al., 2012) and USA (Luo, 2011) adopting its use. A study by Wang et al. (2012) documented the use of the SMS service combined with the mobile web-based services at the Oriental Institute of Technology (OIT) Library in Taiwan. Results of system log analysis indicated that the usage of these services helped reduce the number of overdue occurrences, average amount of overdue fines, average amount of overdue fines per transaction, and average overdue rate. The use of these services also indirectly increased the number of items borrowed by patrons. Results of questionnaire analysis further show that 71.3% and 87.5% of the respondents were strongly satisfied with the due-day reminder and renewal-request services respectively. Another SMS reference service undertaken at San Jose State University reported in a study conducted by Luo (2011) revealed that the majority of the respondents used the service. The study further indicated that majority of the users of the service were highly satisfied, and unsurprisingly, most of the respondents (88.9%) indicated that they would be willing to use the service again. Other related studies focussing on the use of SMS by Anbu and Mavuso (2012) at the University of Swaziland in Swaziland and another one by Jetty and Anbu (2013) at Bundelkhand University in India were a success. In both instances, SMS alerts to students and faculty resulted in higher downloads of materials

due to increased awareness of available resources. It was also encouraging to note that most of the users were in favour of continuing the use of the SMS Alert Service after completion of the pilot projects.

Although the SMS service in university libraries has so far proved to be a success, it has its own limitations. The 160 character limit inherent in SMS text messaging implies that longer questions or responses are not possible. If anything, these will have to be sent as multiple questions or responses. Studies conducted by Hill et al. (2007) at Southwest Louisiana University and Murray (2010) at Murray State University have also shown that reference questions received via SMS text message were different in nature than traditional reference questions received by phone, email or chat in that they tended to be short answer questions hence lacking in sophistication. Consequently, patrons who have used this service are sometimes advised to continue their conversation via more traditional channels such as coming to consult librarians in person or use voice telephone conversations to access more assistance. This poses questions about the effectiveness of SMS reference as a stand alone service. Additionally, SMS reference is characterised by delayed responses. A study conducted by Pearce et al. (2010) indicated that the average response time of SMS reference was more than two hours even during hours of operation. This signifies that SMS text messaging does not guarantee quick responses as opposed to other reference channels such as telephone voice calls. Delays in responding to client queries also raises the possibility that some of the queries posed may end up not being responded to at all.

3.5.2.3 Mobile Web-Based Library Services

Kroski (2008) defines the mobile Web as “the World Wide Web accessed through a mobile device, ranging from a cellular phone to an iPod Touch. It is not only restricted to websites that are optimised for mobile devices but includes the entire Web. Both Becker (2015) and Caniano and Catalano (2014) agree that the introduction of the iPhone in 2007 ushered in a new era in as far as mobile Internet is concerned because it eliminated most of the issues that had plagued mobile devices of the time. These issues ranged from poor user interfaces and slow connectivity to small screens (Bridges et al., 2010). The impact of the iPhone and other related smartphone devices is quite evident from the the ECAR (2010) study which observed a marked increase in the number of students who owned and accessed Internet from a handheld device from 33.1% in 2009 to 48.8% in 2010 (Smith and Caruso, 2010). Caniano

and Catalano (2014) were, however, quick to state that besides the good things, the advent of the iPhone brought with it new challenges as well. These included the need to integrate the new technologies, and the ability to move seamlessly between platforms (mobile to desktop and back again). Nevertheless, these are challenges the LIS community should gladly accept as smartphones in general, have simplified access to the Internet which in turn have added a whole new dimension in information access and dissemination, particularly in areas where broadband Internet access is limited such as Africa.

Encouraged by the increase in Internet access from mobile phones (Smith and Caruso, 2010), and the positive user response to the use of mobile phones to access library services (Paterson and Low, 2011), university libraries are now beginning to offer their services through the mobile web (Bomhold, 2014; Felts Jr., 2014; Ballard and Blaine, 2013; Becker et al., 2013; Bridges et al., 2010). Irrespective of differences in terms of setting, mobile web-based services have largely remained uniform. The service offering has mainly consisted of library hours and location, events, patron account, Ask a librarian, and databases. However, some libraries have added a unique touch to their service offering by including services not offered in other libraries to complement the common services. The Oriental Institute of Technology Libraries in China, for instance, provided three mobile web services that included library SMS services, mobile video on demand (MVOD) system, and preview and reservation service of new titles which have proved popular to its clients (Wang et al., 2012). However, the needs of users vary according to settings. For example, a study conducted by Bridges and Rempel (2013) at Oregon State University Library comprising of 115 respondents found that most users were interested in viewing the library's hours (47%), finding a book (25%), locating resources on a topic (21%), reserving study rooms (13%) and checking computer availability (10%). Conversely, a study by Caniano and Catalano (2014) comprising of 130 students at Hofstra University revealed that most of those using mobile devices to access the library accessed research databases (44 %), Google Scholar (26%), Journal Finder (24%), the catalogue (24%), course reserves (18%), and interlibrary loan (15%). It is, therefore, imperative to clearly identify the needs of library users through proper needs assessment mechanisms to ensure that the library mobile web service offering addresses those needs. The literature further shows that libraries that have forsaken this concept have experienced low usage of their mobile web site in spite of heavy marketing campaigns (Felts Jr., 2014). On the contrary, libraries that did a proper needs assessment

before designing and launching their mobile websites have experienced good usage trends (Ballard and Blaine, 2013; Wang et al., 2012; Bridges et al., 2010).

Kroski (2008) indicates that a mobile phone can access any web content, be it mobile-optimised or ordinary websites. However, the challenge posed by ordinary websites is that they do not load properly on most mobile phones such that, in some instances, the user is forced to keep scrolling back and forth across the page to view the content (Nowlan, 2013). To overcome this challenge, Mairn (2012) encourages libraries to develop websites that are optimised for mobile phones. Some scholars (Caniano and Catalano, 2014; Ballard and Blaine, 2013) even advocate for the development of apps for the library to act as a platform for the offering of mobile web-based services for the library. In terms of the mobile website, libraries ought to make a number of technical considerations in developing them. Peters (2011), for instance, indicates that libraries should strive to make their services accessible to all mobile users, regardless of the device, and operating system. These sentiments are made in the context that other mobile websites do not display well on the screens of other mobile phone brands. To overcome this challenge, it is advisable that the development of the mobile website should be preceded by a survey on what type of devices the potential users possess. This will ensure that the mobile website developed is compatible with the devices owned by the patrons. In a related development, Ryan (2010) recommends that different versions of a website that embraces the diversity of mobile device ownership among library patrons be developed to optimise usage of the library website. In line with this, Ryerson University Library in Toronto, Canada, developed native applications for the iPhone and Blackberry which were found to have the highest penetration at the university (Wilson and McCarthy, 2010).

Another important consideration when designing a mobile website is to decide on what type of content to be accessed through the website. In this case, Houghton (2012) advises all those embarking on this exercise to focus first on listing critical information about the library, and then include the various services that your partners (content providers, local resources) also offer. The final step, could involve inserting an auto-redirect script on the standard Web site so that visitors are automatically directed to the mobile-friendly site. However, making assumptions of what your patrons may or may not like could prove counter-productive as was the case at the Coastal Carolina University Library where a mobile website that was created did not initially attract much usage. It was only after introducing some value-added services

such as discovery services, chat and SMS capabilities, and computer availability maps that the library witnessed remarkable increase in usage (Felts Jr., 2014). The right course of action to follow in implementing such a project is that taken by Bridges et al. (2010) who whilst implementing a similar project at Oregon State University Libraries took a consultative process that included libraries' administration, faculty, staff and literature review on the topic. Consulting literature pertaining to similar projects and faculty who represented the client base of the library, made it possible for the library to include content and services which the clients appreciated. This ensured that only relevant content found its way to the mobile site.

3.5.2.4 Cloud Computing

Cloud computing is a term used to refer to networked computers that deliver IT services over the internet to many users in an on-demand environment (Thomas, 2011). In this context, data are not stored on one's personal computer but are hosted elsewhere to be made accessible in any location and at anytime (Scale, 2009). Cloud computing technology support ubiquitous computing (Jingru, 2013) implying that any content that is stored in the cloud can be accessed using any Internet capable device that includes mobile phones. Importantly, all devices within the cloud are synchronised such that a user working on a document on one device, say a laptop, can easily edit it on another device, like a tablet PC or smartphone, as long as it is connected to the Internet (Hand, 2007).

Three primary service models of cloud computing are identified in the literature. These are Software as a service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). The SaaS model is a situation whereby libraries pay for access and use application or cloud hosted device on any online device (Wasike, 2015). In this particular context, the user has no control over the hosting environment, storage conditions, the operating system, network and servers, and the cloud infrastructure (Mavodza, 2013). The most popular SaaS services include free email (Gmail, Hotmail, and Yahoo! Mail), office applications (Google Docs, Microsoft MS Office Online), and social networking tools (Youtube, Facebook, Twitter, and more).

The PaaS model, on the other hand, provides supply tools and an enabling environment to libraries to build, test, install and embrace their own software and web-based applications in

the cloud (Wasike, 2015). The operating systems and network access are managed by a data center and not libraries. Examples of PaaS providers include Google AppEngine, Windows Azure, and Force.com. The IaaS, also referred to as Hardware as a Service (HaaS), provides storage and computing services on many servers with an on-demand and “pay per use” formula. In this model, libraries have the responsibility of upgrading, making patches and managing the operating system (Wasike, 2015). IaaS providers include Amazon’s Elastic Compute Cloud (EC2) and Rack space.

Cloud computing concepts are widely appreciated and applied in university libraries the world over. This is evident through wider use of Yahoo! Mail and Gmail for communication purposes, and Facebook and Twitter for reference and marketing activities in libraries (Baro et al., 2014; Clements, 2009). Wang (2012) reported that California State University Libraries migrated their key library systems to vendors’ cloud-based servers (a public cloud) and to campus IT’s internally virtualized environment (a private cloud). Likewise, the University of Arizona Libraries migrated their Integrated Library System (ILS), Digital Libraries website, Interlibrary Loan system and repository software to cloud-based services (Han, 2010). Initiatives such as these means that library resources are distributed in the cloud with global mobile access to really achieve a global library network (Jingru, 2013). Moreover, shifting library core applications to cloud-based services reduces or eliminates most or the local technical needs in managing server hardware and operating systems that underlie the applications (Liu and Cai, 2013). In this way, the library can focus its attention on service delivery.

Cloud computing is not without challenges. Security and privacy concerns have become the major issues raised in relation to this emerging technology (Liu and Cai, 2013; Galvin and Sun, 2012). Since cloud computing services are transacted on third party servers, there are fears that the security of personal data is not guaranteed as the one who controls the server can always access the information stored on it. Cloud computing providers also face technical hitches that result in the disruption of service. Although commercial cloud providers tend to have better and more reliable data centres as well as more advanced and efficient disaster prevention measures, they still experience technical hitches that affect their services. A typical example in this case is where Amazon experienced a major outage in April of 2011 (Pepitone, 2011 cited by Galvin and Sun, 2012, p.425), an incident that left users without services for nearly 24 hours and took down some of the largest sites on the Internet. This

signifies that in any case, permanence of service offering in any environment (be it big or small organisations), cannot be guaranteed.

3.5.2.5 Other Mobile Phone-Based Library Services

The other service offerings in university libraries based on the mobile phone discussed in this section are context-aware computing, podcasts and movie services. Context-aware computing is designed to detect and recognise the specific circumstances of a particular user to better provide the appropriate information, knowledge, and content service associated with the user's task, and then process the information at his request and immediately express the processing results through his chosen device (Noh, 2013). The new generation of mobile phones are fitted with gadgets such as GPS (location detection), web browsers (able to gather information seeking trends of user), and more . Moreover, in many institutions one needs to register one's mobile device to access campus WiFi networks whilst libraries are also fitted with closed circuit television (CCTV) surveillance cameras. This means that it is possible to easily track a client's movements, type of information accessed, when the information was accessed, and more, which are some of the basic principles of context awareness. Noh (2013) states that a library that applies a context-aware system could be able to recognize users entering the library, and provide services tailored to each situation for both new and existing users. Such services could be in a form of reference services, loan services, research space, and a variety of other information spaces. The context-awareness-based library could further recognise users in need of emergency assistance by detecting the user's behavior, movement path, and temperature, hence be able to respond accordingly. Context awareness is not widely used in university libraries now but has great potential for the future.

Podcast and movies are the other applications used to offer services in university libraries. Some of the service offering through these apps include library instruction covering subjects such as utilisation of e-resources and referencing, library tours, and more. The video service was available at Murray State University Library who had put their Camtasia instructional videos on YouTube where it could be accessed via an iPhone app (Murray, 2010). The Universal College of Learning (UCOL) in New Zealand, on the other hand, has used podcasts to deliver library instruction (Jowitt, 2008). Murray (2010) states that both the podcast and video service facilitate convenient and ease of use of the library, not only to distant learning students, but also to students who access university education through the face to face mode

of instruction who might have missed scheduled information literacy sessions. Library patrons who use English as a second language could also find the ability to play back sections that may have originally been unclear to them very useful. Some of the notable challenges to the use of podcasts and movies include slow Internet connection speeds, length of time taken to download podcasts, vocal accents in the podcasts, and high cost of access due to high data usage.

3.6 Attitudes of Library Staff, Students and Academic Staff to the Use of Mobile Phones to Deliver and Access Library Services

The literature reviewed in this section focusses on the attitudes of library staff, students and academic staff to the use of mobile phones to deliver and access library and information services. The literature addresses research question number 4: What are the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services?

3.6.1 Attitudes of Students to the Use of Mobile Phones to Access Library Services

Studies focusing largely on students have been carried out to determine attitudes towards the use of mobile phones in libraries. These studies were carried out both in libraries that did not offer services through the use of mobile phones but were planning to do so like Jawaharlal Nehru University in India and Edinburgh University in the United Kingdom (UK) (Kumar, 2014; Paterson and Low, 2011), and in libraries that were already offering services through use of mobile phones such as Oregon State University (Bridges et al., 2010). These studies have shown that users were willing to use their mobile devices to access library services although the rate of actual use has tended to exhibit mixed results, with some libraries registering a positive response from users whilst others have experienced low responses. A study conducted by Kumar (2014) at Jawaharlal Nehru University (JNU) in India involving 180 students revealed that 89.44% of the respondents did not have problems if the library reached out to them through mobile phone. The study findings also showed that 81.67% of the respondents were willing to access the library catalogue via mobile phones. Services which the respondents wanted to access included library catalogue (76.84%), book reservations (74.74%), programmes, events, new additions, library news (72.63%), reminders

(66.32%), downloadable e-books and e-journal articles (68.42%) and booking library training sessions (64.21%).

Another study that examined student attitudes towards the use of mobile phones in the delivery of library services was conducted by Paterson and Low (2011) at Edinburgh University in 2010. This study which initially comprised of an online survey that attracted 1,716 participants, was followed up with two focus-group discussions of six undergraduate and five postgraduate students. Edinburgh University Library was not offering services through the use of mobile phones at the time of this study. However, findings drawn from both the survey and the focus-group discussions revealed that students wanted to be able to search the catalogue, view their library account, check PC availability in the library, book study rooms, and have access to a map or GPS for finding their way around the library building.

In yet another study, Walsh (2010) conducted a series of focus groups in 2009 at the University of Huddersfield to investigate students' attitudes towards the use of mobile phones in libraries. Results of this study indicate that students' attitudes towards text messaging from the library were overwhelmingly positive. Particularly, students welcomed the introduction of services such as overdue reminders direct to their phones. On the contrary, students had reservations about using the mobile web because of cost considerations. Based on these findings, Walsh recommended that libraries that were not offering their services through the use of mobile phones should concentrate on introducing text messaging based systems initially, with other services likely to be well received only if students can see an obvious and immediate benefit to using them.

The final study reviewed on this topic is an online survey that was conducted by Pažur (2014) in Croatia. The aim of this study was to determine the attitudes of scientists of the Rudjer Boškovic Institute towards the use of mobile devices in library services, and it attracted 240 responses from scientists of the institution including students and faculty of other Croatian universities. Results of the study indicated that 57% of the respondents had not visited the library website using their mobile device. However, 64% of the respondents wished the library website was optimised for mobile devices, and only 6% stated that it should not. Respondents to this study identified the following services as important hence wanted them

included on the mobile phone platform: Online databases (35%), Croatian Scientific Bibliography (30%), e-journals (35%), and library catalogue (34%).

Literature reviewed above indicates that overall university students had a positive attitude towards the use of mobile phones in the delivery and access to library services. Issues of students' reluctance to use the mobile web (as noted in the study conducted by Walsh, 2010) seems to have been resolved over time as a more recent study by Dahlstrom et al. (2013) had shown that students' use of the mobile web was on the increase. Although students' attitudes to the use of mobile phones in delivering library services seemed to be positive, studies conducted focussing on actual usage of mobile phones to access library services present a mixed picture, with others showing mobile phones being successfully used for the cause (Dahlstrom and Bichsel, 2014; Dahlstrom et al., 2013; Anbu and Mavuso, 2013) and others failing (Salisbury et al., 2015; Felts Jr., 2014). For instance, an ECAR (2013) study involving 113,035 university students in the USA showed a marked increase in the number of students who were accessing the library catalogue from their mobile phone from 65% in 2012 to 70% in 2013 (Dahlstrom et al., 2013). The 2014 ECAR study that attracted 75,306 responses (Dahlstrom and Bichsel, 2014) also noted that close to 70% of the respondents used the mobile phone to access library resources. Both of these studies indicated that students' use of mobile phones for library-related activities was very high.

Anbu and Mavuso (2012) investigated the possibility of using SMS in the delivery of library services at the University of Swaziland. The project involved sending a list of article alerts in a form of journal articles, table of contents, some important articles, library awareness quotations, library notices and new arrival notices to a selected group of 200 students and staff from the Faculty of Commerce. Findings of the study revealed that full-text downloads increased by almost 150% compared to that of the previous two months. On a year-to-year comparison, results showed an impressive 200% growth rate to that of the previous year. The survey conducted at the end of the project further indicated that 71% of the users who participated in the project indicated that their awareness about the database and various subjects covered during the course of the project increased more because of the SMS alerts. On the contrary, a number of other studies had shown that usage of services offered through mobile phones was not impressive. One of these studies was conducted by Salisbury et al. (2015) at the University of Arkansas in the USA involving 489 students. Findings of this study revealed that 66.3% of the respondents never accessed library resources using their mobile devices, 15.1% accessed one resource, 7.8% accessed two resources, and 6.5%

accessed three or more resources using their mobile devices. Limited usage of library resources registered in this study was blamed on lack of awareness. Similarly, a study conducted by Elmore and Stephens (2012) at Loughborough University Library revealed that student usage of QR codes in the library was low. In this study, QR codes were accessed only 33 times over the four-week period in which this project was done.

3.6.2 Attitudes of Academic Staff to the Use of Mobile Phones to Access Library Services

The researcher did not come across studies focussing on the attitudes of academic staff to the use of mobile phones to access library and information services. However, a study conducted by Aharoni (2013) revealed that individuals use a particular technology based on need hence “the more respondents perceive mobile technology as useful, the higher their behavioral intention to use [it]” (p. 366). Moreover, literature has shown that university students were willing to use mobile phones to access library services only when it helped them to meet their needs. Consequently, libraries that had made efforts to optimise their websites for mobile phones consulted the potential users (students) to find out what type of content they wanted to access from the mobile website (Paterson and Low, 2011; Bridges et al., 2010). Drawing on these findings, it is suggested that attitudes of academic staff to the use of mobile phones in accessing library services (positive or negative) would be determined by the usefulness of the content that may be offered on the mobile phone platform. If the content and services offered meet their needs, then it is likely that academic staff would develop positive attitudes to the use of mobile phones to access those services. Likewise, if the services do not meet their needs then it is likely that their attitudes would equally be negative. Moreover, creating awareness on the usefulness of mobile phones to access information services could equally help in creating positive attitude to their use.

3.6.3 Attitudes of Library Staff towards the Use of Mobile Phones to Deliver Library Services

Studies focussing on the attitudes of library staff to the use of mobile phones in the delivery of library services hardly exist in the literature. However, the literature shows that the number of libraries that are adopting the use of mobile phones in the delivery of mobile phones is on the increase in many parts of the world (Bomhold, 2014; Jackson, 2013; Aldrich, 2010; Anbu

and Mavuso, 2012; Villa et al.,2010). A critical analysis of these projects shows that librarians took a leading role in the implementation of these projects. This could be interpreted to imply that librarians have positive attitudes towards the use of mobile phones in the delivery of library services as they see it as a tool that would enable them reach out to their clients. Use of mobile phones have made it possible for libraries to offer services to their clients beyond the normal opening hours hence assist overcome the obstacles of time and space (Malik and Mahmood, 2013), and bring convenience to library users (Ballard and Blaine, 2013).

3.7 Summary and Gaps in the Literature

The literature surveyed seems to suggest that the use of mobile phones in the provision of library and information services, though not well-established, is beginning to take root in university libraries, particularly in the developed world. The literature review further revealed that ICT infrastructure, policy framework and human capacity, among others, play a very important role in determining a library's e-readiness status to offer library and information services through the use of mobile phones. It is, therefore, not surprising that countries that appear top on the e-readiness rankings (most of the developed countries) are the ones that have made significant strides in adopting the use of mobile phones in the provision of library services. The literature reviewed has further shown that attitudes of both library personnel (the provider) and students and academic staff (the consumers) are another important determining factor as to whether a library adopts the use of mobile phones in providing library and information services. Cognisant of this aspect, many libraries that have carried out projects aimed at using mobile phones in delivering library services, have as a first step, sought to find out if consumers (mainly students in many of the libraries) were willing to use their mobile phones to access library services, and what type of services they wished to access. Findings of such studies had largely shaped the service offering of those libraries.

The literature reviewed exposed several gaps in the literature in the area that was investigated. In the course of the literature review, it became evidently clear that most of the studies done focussing on the use of mobile phones to offer and access library services were done in developed countries such as USA, Canada, Australia, United Kingdom, Holland and Spain (Poll, 2014; Nowlan, 2013; Kobus et al., 2013; Bradley and Holley, 2012; Yee, 2012; Villa et al., 2010) and economies in transition such as Croatia, India, China, Malaysia, and

Taiwan (Pažur, 2014; Li, 2013; Sabaratnam and Ong, 2013; Chandhok and Babbar, 2011; Wang et al., 2012). However, studies focusing on countries in Africa were few, and were mainly done in countries like South Africa, Swaziland, Nigeria, Ghana, Zimbabwe, and Zambia (Baro et al., 2014; Mohamed, 2014; Dewah and Mutula, 2013; Anbu and Mavuso, 2012; Kakana and Kanyengo, 2009). No studies were found covering the subject in Malawi. Besides, most of the existing studies in literature investigated mobile phone use either from the user (clients) (Kumar, 2014; Hsiao, 2014; Paterson and Low, 2011) or from the information provider (libraries) perspectives (Hoivik, 2013; Jetty and Anbu, 2013; Sabaratnam and Ong, 2013; Vila et al., 2010), and only a few from both perspectives (Wang et al., 2012; Chu and Meulemans, 2008). The present study assessed the use of mobile phones in the provision of library services from the users' and service providers' perspectives.

Methodologically, most of the studies undertaken in both developed and developing countries on the use of mobile phone in providing library and information services seemed to use single case studies (Felts Jr., 2014; Johns-Masten and Mann, 2013; Schultz, 2013; Bridges et al., 2010; Wilson and McCarthy, 2010), desktop research (Keating, 2011; Walsh, 2009), and surveys (Salisbury et al., 2015; Bomhold, 2014; Luo, 2014; Aharony, 2013; Cummings et al., 2010). Multi-case studies were limited. The present study was a multi-case study that investigated the use of mobile phones in the provision of information services in public university libraries in Malawi.

Moreover, from the theoretical perspective, both the UTAUT model and the TOE framework which were used to underpin this study have been used in the study of library mobile applications in university libraries (Chiao-Chen, 2013), the use of library electronic resources (Chang et al., 2015), website use by students (Van Schaik, 2009), adoption of mobile phone service (Chen and Chang, 2013), the use of mobile internet (Wang and Wang, 2010), and more. The TOE framework, on the other hand, has been used in adoption of cloud computing (Hsu et al., 2014; Alshamaila et al., 2013; Nkhoma and Dang, 2013; Low et al., 2011); e-readiness at firm level (Aboelmaged, 2014); adoption of software as a service (Safari et al., 2015; Yang et al., 2015); and internet adoption among SMEs (Alam, 2009). However, there was paucity of studies that applied both UTAUT model and TOE framework jointly in the study of mobile phone use in the delivery of library and information services. The use of UTAUT model and TOE in this study, therefore, extends the usage of these widely used models into this emerging area of study to gain deeper understanding of the phenomenon that

was investigated. Furthermore, usage of these models helped to generate new knowledge on the adoption and use of mobile phone in the delivery of library and information services from a developing country context such as Malawi.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

Research, according to Mouley (1978 cited by Connaway and Powell 2010, p.2) is the process of arriving at dependable solutions to problems through the planned and systematic collection, analysis and interpretation of data. Sekaran and Bougie (2010), on the other hand, define research as a process of finding solutions to a problem after a thorough study and analysis of situation factors. Much as the two definitions differ in terms of wording, there are three things of critical importance that are common to both. Firstly, these definitions identify “a problem” as being central to all research. Secondly, the essence of carrying out research is to arrive at “dependable solutions”. Thirdly, such solutions ought to be arrived at in a “systematic way” or after “thorough study”. This implies the use of the right methodology. According to Walliman (2011), research methods are techniques that one uses to do research. Research methods involves making decisions pertaining to how research subjects will be identified and selected, how data will be collected and analysed. Therefore, research methodology is the use of the right methods and techniques to solve research problems.

This study addressed the following major research question: What is the level of eReadiness of public university libraries in Malawi in using mobile phones in the provision of library and information service? The following specific research questions were addressed:

1. What is the level of preparedness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services?
2. What electronic information resources and services are currently available in public university libraries in Malawi that can potentially be adopted and used through mobile phones?
3. What is the current status of providing and accessing library and information services through mobile phones in public university libraries in Malawi?
4. What are the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services?

5. What factors influence the adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services?

In keeping with good research practice as discussed above, the researcher dug into the literature to find the right methodology to use in carrying out this study. This, among others, involved choosing the right paradigm, research design, method, sampling techniques, data collection instruments and procedures, and data analysis techniques. Furthermore, the study strictly observed research ethics during the data collection stage.

This chapter is organised as follows: 4.1 Introduction; 4.2 Research paradigms; 4.3 Research approaches/methods; 4.4 Research design; 4.5 Population of the study; 4.6 Sampling techniques and research sample; 4.7 Data collection instruments; 4.8 Data collection procedures; 4.9 Instrument validation and reliability testing; 4.10 Data analysis; 4.11 Ethical considerations; and 4.12 Summary.

4.2 Research Paradigm

Any research endeavour is largely shaped by philosophical assumptions or beliefs espoused by the researcher. These beliefs are commonly referred to as paradigms. A paradigm, according to Bryman (1988, p.4), is a “cluster of beliefs and dictates which for scientists in a particular discipline influence what should be studied, how research should be done, and how results should be interpreted”. Babie and Mouton (1998) look at a paradigm from a slightly different angle and context. The two scholars define a paradigm as “models or frameworks for observation and understanding which shape both what we see and how we understand it” (p.645). Although the two definitions are largely stating the same thing, they differ in terms of the context within which these definitions were framed. Whilst the former exhibits a more positivist perspective by highlighting “scientists” as the drivers of research projects other than using “researcher” which is an all-encompassing term, the latter was framed from a constructivist or interpretivist angle. Concepts such as “observation” and “understanding” (interpretation) are mainly associated with the constructivist paradigm. The two definitions, however, agree on the point that a paradigm is key to any study as it acts as a guide on the type of design to use (survey or case study), type of methods to be used (quantitative or qualitative), and how data will be collected and analysed.

The choice of research paradigms used in a particular study are themselves influenced by a set of ontological, epistemological and axiological assumptions which one holds. Ontology is defined as the “nature of reality and its characteristics” (Creswell, 2013, p.20). In other ways, ontology represents a way of looking at social reality and ultimately how it should be studied (Morrison, 2012). Ontology presents two main divergent views pertaining to the study of social entities or phenomena which are objectivism and constructivism. Objectivism, also referred to as realism, is a position that “asserts that social phenomena and their meanings have an existence that is independent of social actors” (Bryman, 2004, p. 16). Simply put, a “real world” exists independent of humans and their interpretations of it (Neuman, 2011). This being the case, realism advocates for an objective way of studying reality which is cognisant to that of the natural sciences. Constructivism, also referred to as interpretivism, on the other hand, states that “social phenomena and their meanings are continually being accomplished by social actors” (Bryman, 2004, p.17). Constructivism, therefore, is mainly associated with the more subjective paradigms and methodological approaches (Connaway and Powell, 2010).

Axiological assumptions to research refer to the values or biases that the researcher brings to the study (Creswell, 2003). Scientific studies are supposed to be free from bias as they advocate for the elimination of bias in their conduct (De Vos et al., 2011). However, Bryman (2004) has pointed out the futility of this notion arguing that values can hardly be kept in check in any study. According to Bryman, biases are bound to intrude at one or a number of points in a study such as at the choice of research area, formulation of research proposal, interpretation of data or even the drawing of conclusions. Qualitative researchers, however, openly attest to the value-laden nature of their studies. Drawing on the findings of Denzin (1989), Creswell (2013) observes that the researcher’s presence is apparent in the text, more especially in interpretive biographies, where the author admits that the stories voiced represent an interpretation and presentation of the author. Although biases are hard to eliminate in almost all studies, the researcher should try as much as possible to minimise them as these have the potential to affect the credibility of overall results and findings. The researcher triangulated methods (used quantitative and qualitative methods) with the aim of reducing bias. Further attempts to limit bias were achieved by paying careful attention to details in the interpretation of data and drawing of findings.

Epistemology is an area of philosophy that is concerned with the creation of knowledge (Neuman, 2011). It focusses on what is acceptable knowledge or what are the most valid ways to reach the truth and how persons come to know what they know (Connaway and Powell, 2010). Different epistemological paradigms exist. However, for the purposes of this study only four broad categories will be discussed. These are the positivist/post-positivist, constructivism/interpretivist, advocacy/participatory and pragmatism. The researcher will wind up the discussion by indicating the paradigm that is best suited for the current study, and the justification for the choice.

4.2.1 Positivist/Post-Positivist Paradigm

Denscombe (2008) defines positivism as an approach to research that seeks to apply the natural science model of research to investigations of social phenomena and explanations of the social world. The key principles of this paradigm include objectivity, distance and control (Greenwood and Levin, 2003). Positivism states that true knowledge is that which can be arrived at through use of the senses and gathering facts that provide the basis for laws (De Vos et al., 2011; Bryman, 2004). These attributes, coupled with the elimination of bias, go a long way in achieving objectivity which is considered to be the most important pillar of this paradigm.

Post-positivism, conversely, came about as a direct challenge to positivism as an epistemological method that must be universally applied in all fields or disciplines of study. Whereas positivists argue that there is reality out there to be studied, captured and understood, post-positivists contend that reality can never be fully apprehended but only approximated (Guba, 1990). In other ways, post-positivists challenge the traditional notion of the absolute truth of knowledge (Phillips and Burbles, 2000). Moreover, post-positivists believe that not all methods are suitable or applicable in all contexts (Glicken, 2003). Creswell (2003), for instance, gives an example of the study of human beings as an area that may require the use of other methods that may not necessarily be purely scientific in nature. Consequently, post-positivists promote the use of multiple methods of inquiry which involve the use of both quantitative and qualitative methods (Creswell, 2013; De Vos et al., 2011; Denzin and Lincoln, 2003). In spite of the differences in the use of methods, post-positivists agree with positivists that research should comprise of a series of logically related steps,

employ rigorous methods and validity approaches, use multiple levels of data analysis, and where necessary employ computer programs to assist in data analysis (Creswell, 2013).

The positivist/post-positivist paradigms have been criticised for taking a narrow view to knowledge generation. The notion that there is only one way to doing credible research has been challenged but many scholars, particularly those engaged in qualitative forms of inquiry who have argued that “positivist methods are but one way of telling stories about society or the social world” (Denzin and Lincoln, 2003, p.15). Neuman (2011) further argues that positivist approaches are not suitable for the study of humans and their behaviour because they fail to take into account context and respondents’ experiences.

Both the positivist and post-positivist approaches were deemed not suited to this study. The current study investigated the eReadiness of public university libraries in Malawi to use mobile phones in the delivery of library and information services. The study examined the preparedness of public university libraries in Malawi in terms of policy, infrastructure, capacity and acceptance to potentially adopt and use mobile phones in providing library and information services; and also investigated factors that are likely to influence the potential adoption and use of mobile phones in the provision of library and information services. The use of purely scientific methods as advocated for in the positivist paradigm in this study could not have helped in achieving its objectives. The nature of this study which involved examining policies and identifying available infrastructure made the use of the positivist paradigm unsuitable. Although the current study deployed a mixed methods approach to data collection and analysis, the approach used in analysis differed slightly with that used in the post-positivist approach in that qualitative data was not quantified as is implied in this paradigm (Creswell, 2003), but analysed and presented thematically. This approach favoured the use of other paradigms that are subsequently discussed.

4.2.2 Social Constructivist/Constructionism/Interpretive Paradigm

Social constructionism is an epistemological position that asserts that human beings do not find or discover knowledge (as is implied in positivism) but rather actively construct or make it (Schwandt, 2003). Schwandt goes on to say that human beings invent concepts, models, and schemes to make sense of experience, and continually test and modify these constructions in the light of new experience. Social constructionism further states that

knowledge generation is mediated by both social and historical perspectives (Creswell, 2013). Social constructivist researchers employ different kinds of interviewing techniques to get respondents' accounts of a particular phenomenon or situation. The questions become broad and general signifying the use of both unstructured and semi-structured mode of interviewing aimed at enabling the participants to construct the meaning of a situation typically forged in discussions or interactions with other persons. It is also worthwhile to note that constructivist researchers "position themselves" in the study hence make subjective interpretations of the findings (Creswell, 2003). It is for this reason that studies of this nature are generally viewed as value-laden, implying that they are full of bias, a development that has drawn rebuke from positivist scholars (Neuman, 2011). Principally, studies modelled on this paradigm do not normally start with theories as is the case with positivist or post-positivist studies. On the contrary, researchers generate or inductively develop a theory or pattern of meaning at the end of the study (Creswell, 2003).

Constructivism has been criticised in other quarters as not a worthwhile form of inquiry. Probably the biggest criticism, that is not only directed at this type of research but also other forms of qualitative studies, emanates from positivists who have described constructivism as an attack of reason and truth (Denzin and Lincoln, 2003). It has further been argued that people's accounts of themselves, of others, and of events, are incomplete in that research participants may be unaware of the broader structures that govern the interpretations they give or of the conditions that underpin their actions (Morrison, 2012). Therefore, relying heavily on these accounts, as is the case with the constructivist paradigm, may lead to misleading results and conclusions.

As already discussed, the current study made use of mixed methods, meaning that both quantitative and qualitative methods were used to study the research problem. This signifies that use of interviewing as the only data collection technique as advocated for in this paradigm may not have helped in achieving the study objectives. Furthermore, the questioning techniques used in this study were not similar to those used in other constructivist studies. According to Creswell (2013), narrative, ethnographic and phenomenological studies including grounded theory mostly use deep and repeated questioning techniques (structured and semi-structured interviews) in their research. Such questioning techniques were not used in this study as only semi-structured interviews were carried out. It can, therefore, be

concluded that the design of this study made the use of the social constructivist paradigm inappropriate.

4.2.3 Advocacy/Participatory/Critical Paradigm

This paradigm encompasses several stances that include conflict theory, feminist perspectives, racialised discourse, queer theory, disabled inquiry, and more (Grogan and Simmons, 2012; De Vos et al., 2011; Creswell, 2003). Scholars who use this sort of inquiry have found fault with the positivist/post-positivist and constructivist paradigms. Creswell (2013), for instance, argues that post-positivists impose structural laws and theories that do not fit marginalised individuals or groups, and the constructivists do not go far enough in advocating action to help individuals. Similarly, Neuman (2011) has criticised the positivist paradigm for failing to deal with the meaning of real people and their capacity to feel and think, for ignoring social context, and for being anti-humanistic. These sort of criticisms have made scholars to devise a way of studying issues that fall under the themes outlined above which they call the critical lens theory or paradigm. This paradigm mainly makes use of qualitative methods of inquiry (Grogan and Simmons, 2012), and focusses on how injustice and subjugation shape people's experiences and understanding of the world (Patton, 2002).

The critical lens theory or paradigm is both emancipatory and collaborative in nature (Creswell, 2013; 2003). The paradigm is emancipatory in that it helps to free people from the constraints of irrational and unjust structures that limit self-development and self-determination. The aim, therefore, is to create political debate and discussions so that change can occur. The practicality and collaborative aspect of the lens stems from the fact that researchers tend to engage participants as active collaborators in their studies. Participants' engagement in the study range from helping in the design of the questions, collecting data, analysing it, and shaping the final report.

The critical lens theory or paradigm has also been criticised by scholars in other fields. The fiercest criticisms have emanated from scholars in the social constructivist field. According to Neuman (2011), social constructivist researchers have criticised the critical paradigm for being too subjective and relativist, treating people's ideas as more important than actual conditions (i.e. real poverty, oppression and violence). The paradigm has also been criticised for focussing too much on localised, micro-level short-term settings while ignoring the

broader and long-term structural conditions, and also for failing to take a strong value position or actively help people to see false illusions around them.

Just like the positivist/post-positivist and constructivist paradigms, the critical lens paradigm was not suitable for the current study. This is so because this study did not advance an action-oriented agenda related to gender, race, poverty, disability, sexual orientation, religious difference and/or other marginalising structures as is implied in the critical lens paradigm (Grogan and Simmons, 2012). On the contrary, the study examined the eReadiness of public university libraries to use mobile phones in the delivery of library and information services. Furthermore, whilst the critical lens theory mainly relies on qualitative approaches, the present study deployed a mixed methods approach. This means that both the agenda and methodological approach of the critical paradigm run parallel to those used in this study.

4.2.4 The Pragmatic Paradigm

Pragmatism is an approach to research practice that calls to researchers to mix research components in ways that will work for their research problem, question and circumstances (Hibberts and Johnson, 2012). Pragmatists agree that research always occurs in social, historical, political and other contexts hence mixed methods studies may include a postmodern turn, a theoretical lens that is reflexive of social justice and political aims (Creswell, 2003). In practice, a researcher using this worldview uses multiple methods of data collection to best answer the research question, employs multiple sources of data collection, focusses on the practical implications of the research, and emphasise the importance of conducting research that best addresses the research problem (Creswell, 2013).

A critical analysis of the research questions revealed that they can best be answered by collection of both qualitative and quantitative data. For instance, variables that make up the first research question probing level of preparedness of university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services can best be addressed by conducting in-depth interviews with university or college ICT directors and/or university or college librarians. Conversely, to determine factors that may influence adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services, as stated in the fifth research question, requires

administering a questionnaire to the three groups. It is for this reason that the pragmatic paradigm was preferred over the post-positivist, social constructivist and advocacy paradigms because it allows the researcher the flexibility of using methods that are best suited to the problem under investigation. In this particular case, mixed methodology.

This paradigm has been used in the work of a number of researchers (Chandhok and Babbar, 2011; McNeill et al., 2011; Paterson and Low, 2011). Paterson and Low (2011) assessed student attitudes towards mobile library services for smartphones at Edinburgh University in the United Kingdom. This study used a two-stage survey to collect data over an eight month period which was followed by two group discussions. The initial survey attracted 1,989 students whilst the follow-up survey attracted 1,716 participants. This was followed up with two discussion groups of six undergraduate and five postgraduate students. The focus group discussions were made up of eleven participants: Five post-graduate students and six undergraduate students. Similarly, McNeill et al. (2011) used the mixed methods approach to carry out a study that examined student uses of technology in learning. This study involved two phases: A photo ethnography to facilitate a detailed exploration of ten students' technology uses, and a university-wide survey involving 1,104 student. In another mixed methods study, Chandhok and Babbar (2011) used questionnaires and interviews to collect data from distance learners of Indira Gandhi National Open University (IGNOU) to explore the requirements for distance learners for various m-library services.

4.3 Research Approaches/Method

Research method refers to the tools or techniques used to collect, analyse and interpret data (Scott, 2012). Scholars such as Hibberts and Johnson (2012), Fouche and Delport (2011) and Creswell (2009) all agree on the existence of three main methods of inquiry. These are quantitative, qualitative and mixed methods. The type of approach or method used in a particular study are largely influenced by the researcher's philosophical or paradigmatic orientation. Hence those who are inclined to the positivist paradigm are bound to favour the use of predominantly quantitative methods, those who see the constructivist paradigm as the best epistemological strand are bound to use qualitative methods whilst those who fall within these two extremes or are pragmatically inclined tend to use mixed methods. A detailed discussion of the three methods comes next.

4.3.1 Quantitative Methods

Quantitative methods, which are invoked from the positivist/post-positivist perspectives (Creswell, 2003), have long been regarded as the standard form of inquiry over the years. They incorporate strategies such as true experiments, quasi-experiments, correlations and surveys. The nature of quantitative studies is that they quantify the variables in a phenomena, situation, problem or issue, and gather information using predominantly quantitative variables whilst the analysis is geared to ascertain the magnitude of the variation (Kumar, 2005). Here then, the goal is to describe the trends or explain the relationship between variables (Ivankova, Creswell and Plano Clark, 2007).

Moreover, quantitative methods are known to be highly structured (Leedy and Ormrod, 2005) in that concepts, variables, hypothesis and methods of measurement are defined before the study begins, and remains the same throughout. This aspect makes quantitative methods more appropriate for determining the extent of a problem issue or phenomena (Kumar, 2005).

Although quantitative studies have been in use for a long time, they have their own strengths and weakness too. Some of the notable strengths of the method as articulated by Hibberts and Johnson (2012) are:

- They are strong on internal (causal) validity, and replication is used to increase external (generalising) validity.
- Laboratory experiments can be conducted and analysed quickly.
- They are useful for studying large groups of people and providing the etic (i.e. objective outsider) perspective.

Some of the notable weaknesses of the quantitative method are:

- The categories of meaning and theories used by the researcher might differ from those used and accepted by local constituencies.
- Researchers sometimes exhibit tunnel (narrow) vision and confirmation bias.
- General research findings might not apply well for particular local contexts and particular individuals and might, in particular circumstances, be considered potentially superficial.

As it has already been alluded to, a research paradigm, among others, acts as a guide on the type of methodology to be applied (quantitative, qualitative or mixed methods), how the data will be collected and analysed, among others. In this particular context, the pragmatic paradigm has been chosen for use in this study. This paradigm calls for the use of methods that suit a particular study, and most often mixed methods of inquiry are used. Therefore, the quantitative methodology was deemed not suitable for use in this study as used alone it could not have helped to adequately address the research questions which this study addressed.

4.3.2 Qualitative Methods

Qualitative research stems from the anti-positivist, interpretivist approach (McRoy, 1995 cited by Fouche and Delpont, 2011, p.65). This sort of inquiry encompasses a wide range of approaches to research practice that include ethnographies, grounded theory, case studies and phenomenology (Creswell, 2003). Critical theory, feministic perspectives, disability studies, queer theory and other transformative frameworks also fall under the category of qualitative research. Consequently, this sort of method represents one of the most diversified approaches to research practice.

Although the huge array of approaches represent some differences in terms of how scholars in each category approach their studies, there are some aspects that tend to cut across all of them. Most notably, studies of this nature (qualitative) are used to answer questions about the complex nature of phenomena, with the purpose of describing and understanding the phenomena from the participants' point of view (Leedy and Ormrod, 2005). To achieve these objectives, qualitative researchers often times collect data from the field on their own (Creswell, 2013). They do this through the use of a number of methods such as interviews, observations, and documents. Their active involvement in the research process enables them to get a deeper understanding of the issues they are investigating, something that makes it easy for them to report multiple perspectives to the issues investigated. As opposed to quantitative studies, qualitative studies are largely unstructured (Kumar, 2005). This approach makes it easy for the researcher to explore issues or phenomena.

The qualitative method has a number of advantages. Some of these advantages as advanced by Hibberts and Johnson (2012) are:

- It enables in-depth study of selected cases and description of complex phenomena in local contexts.
- It can identify contextual and situational factors.
- Data are typically collected in naturalistic settings and are not ‘artificial’.

Qualitative studies also have their own weaknesses. These are:

- It is difficult to generalise findings to different people, contexts and situations.
- Data collection and analysis is often time consuming.
- Qualitative results are more prone to researcher biases, errors and idiosyncrasies than quantitative data analysis.

Research questions posed in this study could not have been adequately addressed through the use of purely qualitative methods as they also required the collection of quantitative data. Therefore, the method was deemed inappropriate for use in this study.

4.3.3 Mixed Methodology

This study made use of the mixed methodology. According to Teddlie and Tashakkori (2009), mixed methodologists work primarily within the pragmatist paradigm and are interested in both narrative and numeric data and their analysis. Researchers using this methodology collect, analyse and mix both quantitative and qualitative data in a single study or series of studies (Creswell and Plano Clark, 2007). Different terminologies such as integrative, combined, blended, mixed methods, multi-method and multi-strategy have been used by different scholars to refer to this method (Tashakkori and Teddlie, 2009). However, the term mixed methods has come to be accepted by different scholars across disciplines (Connaway and Powell, 2010; Teddlie and Tashakkori, 2009; Creswell and Plano Clark, 2007; Johnson and Onwuegbuzie, 2004; Creswell, 2009). Mixed methods research is relatively new having come into wider use over the past thirty years or so hence most of its designs are equally new.

A number of scholars (Hibberts and Johnson, 2012; Teddlie and Tashakkori, 2009; Creswell and Plano Clark, 2007) have studied mixed methods research, and argued for the use of the method. Some of the advantages of this methodology, according to these scholars, are:

- It provides strengths that offset the weaknesses of both quantitative and qualitative research, and, therefore, has the potential to provide better (stronger) inferences.
- It can provide fuller, deeper, and more meaningful answers to a single research question.
- It eliminates different kinds of bias, explains the true nature of phenomenon under investigation and improves various forms of validity or quality criteria.

Mixed methods research also has its own disadvantages. These are:

- It is difficult for a single researcher to understand and conduct both quantitative and qualitative research hence might require a research team.
- It is more expensive and time consuming to conduct.

In spite of the few weaknesses that are associated with this method, the researcher still opted to use it in this study as the advantages tend to outweigh the weaknesses. Moreover, Creswell and Plano Clark (2007) observed that these challenges are not insurmountable because certain strategies have been developed to address them.

Tashakkori and Teddlie (2009) and Creswell and Plano Clark (2007) are of the opinion that the study's research question(s) should be of primary importance – more important than either the method or theoretical lens, or paradigm, that underlies the method. Tashakkori and Teddlie (2009), in particular, emphasise that the use of qualitative and quantitative approaches and methods must be evaluated in terms of the quality of potential answers. Since research questions are derived from the statement of the problem, it can as well be said that the nature of the research problem should be taken into consideration in choosing what type of method to use in a study. The decision to deploy a mixed methodological approach was hence taken based on the nature of the research problem and questions that follow that required the researcher to collect both quantitative data (such as funding trends, available e-resources, and more) and qualitative data (such as verbal responses on the availability of policies, librarians' assessment of library staff attitudes towards the use of mobile phones in service delivery, and others). For instance, the main research questions 1, 2, 4 and 5 respectively captured in section 4.1 have some aspects of probing attitudes of library staff, academic staff and students towards the use of mobile phones in the delivery; access to library services; and factors that influence the use of mobile phones which were addressed by analysing qualitative data in a form of perceptions and observations solicited through

interviews conducted with the university/college librarians and ICT directors of the universities/colleges. Similarly, the third research question and some aspects of the fourth and fifth research questions focussing on attitudes of academic staff and students to the use of mobile phones in the delivery and access to library services and factors that may influence the use of mobile phones by both academic staff and students was addressed by analysing quantitative data in a form of mobile phone usage trends, ease of accessing library services using mobile phones, and more, collected through questionnaires administered to academic staff and students. The researcher believes that the flexibility of using both qualitative and quantitative methods in this study made it possible for the research questions to be answered in a more effective way (Tashakkori and Teddlie, 2009).

Mixed methods has been used by a number of other researchers in different studies. In a longitudinal study spanning a period of two years, Glackin et al. (2014) used the mixed methods approach to examine the impact of e-books and mobile devices on student learning at Boise State University in the USA. In this study, the researcher used a survey method to collect data from graduate social work students including undergraduate and graduate nursing students. Thereafter, the researcher conducted a sixty minute focus-group discussion with some of the students. In another study, Boateng (2011) investigated the impact of mobile phones on the micro-trading activities of traders in Ghana. In this study, a mixed methods approach consisting of a descriptive survey of 136 traders and a case study of two traders was adopted. Yet another study that made use of the mixed methods approach was conducted by Cawley and Hynes (2010) in Ireland. This study examined the social adoption of the mobile phone by Irish teenagers in city, town and rural settings. The study used original empirical data from a survey of teenage respondents and six focus groups.

4.3.3.1 Types of Mixed Research Design

Several authors (Teddlie and Tashakkori, 2009; Creswell and Plano Clark, 2007; Creswell, 2009) have developed several typologies of mixed methods research designs. These include the exploratory mixed methods design, explanatory mixed methods design, triangulation mixed methods design and the embedded mixed methods design. Each and every one of these designs are categorised according to two main dimensions: time orientation and paradigm emphasis. According to Hibberts and Johnson (2012), time orientation refers to when

researchers incorporate methods/strands from quantitative and qualitative research into their mixed design.

In practice, researchers can either use methods from each paradigm concurrently or sequentially. Paradigm emphasis, on the other hand, refers to the type of mixing of quantitative and qualitative methods and epistemological/paradigmatic assumptions (Hibberts and Johnson, 2012). In this particular case, the researcher has the option of using paradigms of equal status or a dominant status. The former implies that methods (quantitative and qualitative) are given equal status whilst the latter means that one method is given more prominence and the other method is just used to support the main method.

4.3.3.1.1 Sequential Explanatory Design

This design is characterised by the collection and analysis of quantitative data followed by the collection and analysis of qualitative data (Creswell, 2003). Priority is given to the quantitative data, and the two methods are integrated during the interpretation phase of the study. Qualitative data collected in the second phase of the study helps to explain or build upon initial quantitative results (Creswell and Plano Clark, 2007).

The advantages of this design are that it is easy to implement, describe and report. The main weakness of this design is that the two separate phases of the design takes long to implement. The researcher may also need to have mastery of both quantitative and qualitative techniques to implement it.

4.3.3.1.2 Sequential Exploratory Design

This is a two-phase design just like the previous one which starts with the collection and analysis of qualitative data followed by the collection and analysis of quantitative data. This design is particularly useful in instances where the researcher needs to develop and test an instrument when one is not available, when variables are unknown, when there is no guiding theoretical framework or when a researcher wants to explore a phenomenon in depth and then measure its prevalence (Creswell and Plano Clark, 2007). Both sets of data (qualitative and quantitative) are integrated during the interpretation stage but priority is given to the

qualitative aspect of the study (Creswell, 2003). The advantages and disadvantages of the explanatory design also apply to this design.

4.3.3.1.3 Nested/Embedded Mixed Design

The embedded mixed design is one in which one data set provides a supportive, secondary role in a study based primarily on the other data set (Delpont and Fouche, 2011). In this design, the two data sets may be collected either at the same time (as in concurrent nested design) (Creswell, 2003) or at different times. The priority can be given to either the quantitative or the qualitative phase. This design is particularly useful when, for instance, a researcher needs to embed qualitative data within a dominant quantitative experimental design by collecting qualitative data through interviews with the respondents, in order to follow up on the results of the experiment.

4.3.3.1.4 Concurrent Triangulation Design

Concurrent triangulation method is a one-phase design in which the researcher uses both quantitative and qualitative methods during the same time frame and with equal weight to best understand the phenomenon of interest (Delpont and Fouche, 2011). Although theoretically it is acknowledged that both methods are given equal weight, Creswell (2003) argues that in practice greater weight is put on one of the two methods (quantitative or qualitative). Concurrent triangulation method also involves the concurrent, but separate, collection and analysis of quantitative and qualitative data in order to compare and contrast the different findings to see the extent to which they do or do not agree with each other. The data collected is usually integrated in the interpretation of the results.

This method has several advantages. Most notably, the method can result in well-validated and substantiated findings whilst data collection happens in a shorter time frame (Creswell, 2003). The method also has its limitations. Firstly, it requires great effort and expertise to adequately study a phenomenon with two separate methods. Secondly, a researcher may not be clear on how to resolve discrepancies that may arise in the results (Delpont and Fouche, 2011; Creswell, 2003).

Triangulation in a study is not only restricted to methods but goes well beyond this. Triangulation also includes mixing of data sources, use of multiple theories to explain and interpret data, and even using multiple researchers to collect and analyse data (Sekaran and Bougie, 2010). All this is done not only to provide corroborating evidence (Creswell, 2013) but also to make use of different expertise as mixed methods is known to be a complex undertaking requiring a diversity of skills to accomplish (Delpont and Fouche, 2011).

The present study made use of the concurrent triangulation design (methodological triangulation) whereby both quantitative and qualitative methods were accorded equal weighting. Data sets were also triangulated. In practice, quantitative data, collected through self-completion questionnaires administered to students and academic staff, and qualitative data, collected through semi-structured interviews conducted with the university/college librarians and ICT directors, were collected at the same time. Such type of data were integrated during analysis and interpretation of the results. The study also made use of theoretical triangulation whereby the UTAUT model and the TOE framework were used jointly to provide a theoretical lens to the study.

4.4 Research Design

Research design is an outline, plan or strategy used to investigate the research problem (Christensen et al., 2011). It, among other things, specifies how the data will be collected and analysed. Several research designs exist. These include experimental design, surveys, single-case and multi-case study designs, ethnography, and phenomenology. Each of these designs may also incorporate elements of the other design(s). For instance, a case study may incorporate aspects of a survey in its design or vice versa.

This study made use of the case study approach. Case study research, according to Creswell (2013), is a qualitative approach in which the investigator explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information, and reports a case description and case themes. The concept of a case study as a stand-alone methodology has drawn mixed reactions from a number of scholars. Some of them, particularly Stake (2005) and Fouche and Schurink (2011), have argued that case study is not necessarily a methodology but a choice of what is to be studied. They take this stand on the premise that

case studies adapt to a wide range of methodological frameworks such as life history, grounded theory, and phenomenology. However, other scholars (Creswell, 2013; Yin, 2009; Denzin and Lincoln, 2005) hold a contrary opinion as they look at case study as a methodology on its own. This is a view that is shared by this researcher, and that is why the case study was chosen as a methodology that underpinned this study.

The case study method was deemed suitable for this study because it provides an opportunity for a problem to be studied in depth in its real life context, and also allows the use of multiple sources of evidence (Sekaran and Bougie, 2010; Pickard, 2007). It was hoped that a detailed examination of the issues being studied would lead to a detailed, descriptive and informative report whilst methodological triangulation would help bridge issues of validity and reliability (Bush, 2012).

As already indicated, investigations in case studies may involve a single case or multiple cases (Creswell, 2013). The present study was a multi-case investigation at five study sites.

These are:

- Mzuzu University (MZUNI) which is located in Mzuzu City in Northern Malawi.
- Lilongwe University of Agriculture and Natural Resources (LUANAR) located just outside the City of Lilongwe in Central Malawi.
- Three constituent colleges of the University of Malawi (UNIMA) namely:
 - Kamuzu College of Nursing (KCN) located within the City of Lilongwe in Central Malawi.
 - The Polytechnic located within the City of Blantyre in Southern Malawi, and
 - College of Medicine (COM) located within the City of Blantyre in Southern Malawi.

Although these cases were studied as separate units, it was hoped that results drawn from each of these cases would provide a basis for comparison with the other cases because they were generally similar in that they are funded by the government, and also have comparable administrative structures. It was, therefore, hoped that results drawn from this study could be similar in certain aspects.

The multi-case study design has been used by other previous researchers in various fields. For instance, Naftali and Findlater (2014) used this design to study mobile experiences of smartphone users with motor impairments in the USA. The study involved conducting an online survey involving 16 respondents, an in-depth interview, two weeks of diary entries, and a 3 hour contextual session that included neighbourhood activities. More importantly, the researchers also engaged in a detailed multi-case study involving four expert smartphone users. Similarly, Odero-Musakali and Mutula (2007) used the multi-case study design to examine Internet adoption and assimilation in Kenyan university libraries. In another study, Grøtnes (2009) used cases from the Android mobile operating system and the service platform developed by the Open Mobile Alliance to illustrate the differences in open innovation processes.

Whilst case study is considered a methodology on its own, there is overlap that exists among the different research methodologies (Christensen et al., 2011). Consequently, each of the different designs may also incorporate elements of the other design(s). Therefore, this study adopted a survey design within the case study. The rationale for using the survey within the case study was to help in gauging opinions and feelings of participants such as students and academic staff on issues of using mobile phone to offer library and information services in public university libraries in Malawi.

Literature identifies several types of case studies. These include descriptive, explanatory, evaluative and multi case studies (Bassegy, 2012; Fouche and Schurink, 2011). A descriptive case study is also referred to as an intrinsic case study, and it strives to describe, analyse and interpret a particular phenomenon (Yin, 2003). Descriptive case studies are conducted with the aim of producing a detailed description of a case. Explanatory case studies are also called instrumental case studies. The main purpose for carrying out this kind of study is both to develop and test a theory. Evaluative case studies are another form of case study which are undertaken to explore the worthwhileness of a particular program. Multi-case studies or collective case studies, on the other hand, are studies that focus on a particular situation or phenomenon but are extended to several cases. Although there are distinct categories of case studies, Fouche and Schurink (2011) argue that these designs tend to overlap. Moreover, researchers tend to use more than one design in a study. The study being undertaken, however, was an evaluative case study. This determination is made on the basis that the

information collected was meant to help in determining the eReadiness status of the libraries to offer library and information services through mobile phones.

4.5 Population of the Study

Population refers to the entire group of people, events or things of interest that the researcher wishes to investigate (Sekaran and Dougie, 2010). Study population sets boundaries or limits to what can be studied. The population for this study comprised of academic staff (teaching staff), students, university librarians, and directors of Information Communication Technology (ICT) units in the respective universities. In terms of students, the study covered undergraduate students in year three and four and postgraduate students at Mzuzu University (MZUNI), Kamuzu College of Nursing (KCN) and Lilongwe University of Agriculture and Natural Resources (LUANAR). In addition, undergraduate students in year three, four and five at the Polytechnic and College of Medicine (COM) were also covered. The latter two institutions had some programmes running for five years while in the other institutions programmes were running for a maximum period of four years. The study did not cover postgraduate students at the Polytechnic and COM as initially planned because of accessibility challenges.

Though there were students from years 1 - 4 or 5 in these institutions who could be studied, the research was restricted to those in years 3, 4 and 5. A decision to limit the study to these groups of populations was made because these students were involved in more intensive research activities.

The study population also covered the university or college librarians. The decision to include the university or college librarians was taken because they were overall managers of the libraries hence responsible for making key policy and operational decisions. They were, therefore, in a better position to provide information that was used to address the research phenomenon. Likewise, ICT directors of the universities/colleges were included because they managed the networks of the case study libraries besides planning for other ICT requirements. They were, therefore, in a position to provide information that helped to answer the first research question that probed the level of preparedness of university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services.

The target population of the study was 6, 216. This comprised of 5 university or college librarians, 741 academic staff, 5,465 students and 5 ICT directors. The study population was distributed as shown in Table 4.1.

Table 4. 1: The Population of the Study (Source: Official enrolment statistics and staff records, February, 2015)

Study site	Type of population					
	Students			Academic staff	University or College Librarian	IT Directors
MZUNI	Year 3	514	1189	176	1	1
	Year 4	603				
	Postgraduates	72				
KCN	Year 3	168	361	71	1	1
	Year 4	110				
	Postgraduates	83				
Polytechnic	Year 3	932	2176	211	1	1
	Year 4	693				
	Year 5	163				
	Postgraduates	388				
COM	Year 3	287	680	119	1	1
	Year 4	227				
	Year 5	98				
	Postgraduates	68				
LUANAR	Year 3	461	1059	164	1	1
	Year 4	526				
	Postgraduates	72				
Total			5465	741	5	5

4.6 Sampling Technique and Research Sample

Sampling, Sekaran and Dougie (2010) write, is the process of selecting the right individuals, objects or events as representatives for the entire population. Sampling is commonly used by researchers for two main reasons. Firstly, sampling is done for feasibility purposes (Sarantakos, 2000) because practically it is impossible to collect data and test or examine each and every element where studies involve large numbers of people say 1000. Even in cases where this is practical, time, human, financial and material resources would be huge. Secondly, sampling is done to enhance accuracy of results (Strydom, 2011; Sekaran and Dougie, 2010). Studying larger populations could yield large amounts of data. This could pose challenges in handling and analysis, a development that could ultimately lead to errors. In contrast, the use of manageable samples could lead to more accurate results because “time, money and effort can be concentrated on producing better quality results, better instruments, more in-depth information, and better trained interviewers or observers” (Strydom, 2011, p.224).

4.6.1 Types of Sampling Techniques

There are two broad types of sampling techniques. These are probability and non-probability sampling. Techniques that fall under probability sampling include simple, systematic, stratified and cluster sampling. Those that fall under non-probability sampling include convenience, purposive, quota and snowball sampling. Probability and non-probability sampling differ in that in probability sampling, elements have an equal chance of being selected whilst this is not the case in non-probability sampling. The other difference between these methods is that results drawn from probability samples are capable of being generalised to the entire population whilst those from non-probability samples cannot (Sekaran and Dougie, 2010). This study discusses in detail simple random sampling, stratified sampling and purposive sampling because they were used in this study.

4.6.1.1 Simple Random Sampling

In this form of sampling, every element of the population has an equal chance of getting selected (Connaway and Powell, 2010; Jackson, 2003). Using this method, a sample can be drawn using lots or computer-generated random numbers. According to Sekaran and Dougie (2010), the advantage of this sampling design is that it has the least bias, and also offers the

most generalisability. The drawback of this method is that the sampling process could become cumbersome and expensive. Furthermore, in some instances an updated listing of the population which acts as the sampling frame may not always be available leading to the use of older ones which may not be accurate.

4.6.1.2 Stratified Random Sampling

This sampling method involves a process of stratification or segregation, followed by random selection of subjects from each stratum (Sekaran and Dougie, 2010). This type of sampling is suitable for heterogeneous populations because the inclusion of small subgroups percentage-wise can be assured (Strydom, 2011). In using this method, the strata should be defined in such a way that each element appears in only one stratum. Selection within the different strata still occurs randomly.

The student and academic staff populations covered by this study were heterogeneous. Among others, they were of different sexes and age groups; they belonged to different faculties and departments; and the students were at different levels of study (years 3, 4, 5 or postgraduate). This aspect made the use of stratified random sampling technique appropriate for this study because it gave an opportunity for each group or strata to be well represented in the sample (Israel, 2012). This helped the researcher to easily work out some correlation tests to find out the significance of certain aspects within the data collected.

4.6.1.3 Purposive Sampling Technique

In purposive sampling, elements are chosen from specific types of people who can provide the information either because they are the only ones who have it or conform to some criteria set by the researcher (Sekaran and Dougie, 2010). This form of sampling is often used when a limited number or category of people have the information that is being sought. Purposive sampling leads to greater depth of information from a smaller number of carefully selected cases (Tashakkori and Teddlie, 2009). University/college librarians and ICT directors were purposively sampled in the study because they conform to this criteria. The hope was that they would provide information that would shed more light on the issues that were investigated.

4.6.1.4 Sampling Tables

Sampling tables present another popular way of sampling. Sampling tables provide the sample sizes for a given set of criteria (Israel, 2013). Among others, they specify samples that can be drawn for given population sizes at varying levels of precision and confidence intervals.

4.6.1.4.1 Sampling Methods Used in this Study

Published Table 4.2 below as provided by Israel (2013) was used to sample the academic staff and student populations who were administered with the questionnaire. The table contains scientifically worked out figures that specify a sample that can be drawn out from a specified population with precision levels of $\pm 3\%$, $\pm 5\%$, $\pm 7\%$ and $\pm 10\%$ where confidence level is 95% and $P=0.5$. Using a precision level of $\pm 5\%$, the researcher drew a sample of 370 for the student population and 255 for the academic staff. This sample was distributed across the study sites proportionately according to their population sizes. Full breakdown is provided in Table 4.3.

Table 4. 2: Table for Selecting Sample Sizes [An Abridged Version] (Source: Israel 2013)

Size of population	Sample Size (n) for Precision (e) of:			
	$\pm 3\%$	$\pm 5\%$	$\pm 7\%$	$\pm 10\%$
500	A	222	145	83
600	A	240	152	86
700	A	255	158	88
4,000	870	364	194	98
5,000	909	370	196	98
6,000	938	375	197	98

100,000	1,099	398	204	100
>100,000	1,111	400	204	100
a = Assumption of normal population is poor (Yamane, 1967). The entire population should be sampled.				

Furthermore, purposive stratified sampling technique was applied to the student sample. University or college librarians of the case study libraries and ICT directors were purposively selected and were interviewed.

Table 4. 3: Research Sample

Study site	Students		Academic staff		University or College Librarian	IT Directors
	Population	Sample	Population	Sample		
MZUNI	1189	81	176	61	1	1
KCN	361	24	71	24	1	1
Polytechnic	2176	147	211	73	1	1
COM	680	46	119	41	1	1
LUANAR	1059	72	164	56	1	1
Total	5465	370	741	255	5	5

4.7 Data Collection Instruments

Decisions pertaining to the choice of data collection instruments to use are guided by the type of research approach used in a study. As already indicated, this study made use of the mixed methods approach, signifying that both quantitative and qualitative methods were used. These two methods use different methods of collecting data which also implies the use of different data collection instruments. Instruments that are associated with quantitative data collection include questionnaires, structured observation schedules, structured interviewing schedules and checklists (Delpont and Roestenburg, 2011) whilst those associated with qualitative data

collection methods include interview protocols/guide/schedules, tape recorders, notebooks, and more.

4.7.1 Questionnaires

A questionnaire is a pre-formulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives (Sekaran and Dougie, 2010). Questionnaires are the most commonly used instrument, particularly in surveys. Questionnaires containing both closed and open-ended questions were administered to academic staff and students (See appendices 5 and 6). Such instruments mainly collected data related to mobile phone ownership, uses, and attitudes towards the use of mobile phones in providing and accessing library services.

Questionnaires were used in this study because they make it possible for the researcher to harvest data from a larger sample than would be possible using any other technique (Pickard, 2007). Samples drawn from both the academic staff and student populations were large (369 for students and 255 for academic staff). The use of other methods like structured interviews may not have suited a sample of this magnitude because it would have made the work more tedious. However, questionnaires can easily be administered to such a large sample hence the choice of this instrument.

Questionnaires are categorised mainly based on how they are administered hence personally distributed, mailed and electronically distributed questionnaires. Mailed questionnaires are those that are normally sent through post. Such type of questionnaires have the advantage of assuring anonymity of respondents and reaching a wide geographical area. The advantage of mailed questionnaires is that they are cheap to administer. However, their disadvantage is that they attract an extremely low response rate, sometimes hardly going beyond 30% (Delpont and Roestenburg, 2011; Sekaran and Dougie, 2010). Rossouw (2003), however, notes that this percentage can go as high as 70% in certain instances with follow-ups. Mailed questionnaires were not used in this study owing to the poor response rates noted above, and also due to other logistical challenges. Other types of questionnaires which guarantee a higher response rate were explored and used.

Advances in technology has presented alternative means of administering questionnaires. Telephones, emails and websites are all exploited for the sake of administering questionnaires. The advantages of using these electronic facilities vary according to context. In more developed economies, these technologies have facilitated the administration of surveys by helping researchers to reach out to more people easily, faster and cheaply. However, this may not be the case in least developed economies, and Malawi in particular, where this study was conducted. ITU (2014) statistics indicated that both land line density and mobile phone penetration was low. Personal computer (PC) ownership and internet usage have also been discovered to be low. These factors meant that the researcher could have faced challenges in using these technologies to administer the questionnaires hence questionnaires administered using this strategy (webhosted, emailed and telephone administered questionnaires) were not used.

Owing to the challenges outlined above, self-completed questionnaires were used in this study. Self-completed questionnaires were viewed as a valuable tool because they guarantee a higher response rate of as much as 100 % in certain instances. In this study, an 85.4% student response rate and 87.8% academic staff response rate was achieved. Moreover, self-completed questionnaires help assure anonymity of the respondents whilst at the same time enabling the one administering the instrument to establish rapport and motivate the respondent (Sekaran and Dougie, 2010). Although the researcher faced the prospect of spending more time in the field thereby incurring more expenses through the use of this data collection instrument, he still proceeded to use it because the advantages of using self-completion questionnaires far outweighed the disadvantages.

4.7.2 Interview Guides/Protocols

Interview guides or protocols are another data collection instrument that were used in this study (See appendices 3 and 4). Interview guides were viewed as an ideal data collection instrument because they accorded the researcher the opportunity of asking supplementary questions (Coleman, 2012; Pickard, 2007). The interview guides contained open-ended questions which helped in getting a deeper and more detailed account of the issues investigated. In this study, interview guides were used in conducting semi-structured interviews with the university/college librarians and ICT directors. Interview guides mainly

collected qualitative data related to the interviewees' assessment of relevant infrastructure, human resource requirements, and policy issues, among others.

Whilst interview guides are used to guide the conduct of the whole interview, tape recorders and notebooks are used to capture or record the proceedings of the interview. According to Smith (1995), tape recorders enables the researcher to capture a fuller record of the interview than notes taken during the interview process. The other advantage of using a tape recorder is that the researcher can always playback the recording to get greater clarity of the notes the researcher took during the interview. Greeff (2011) advise that permission be obtained from the interviewees where a tape recorder is used for data capture. Creswell (2013) recommend the use of a lapel mic for both interviewer and interview or an adequate mic sensitive to the acoustics of the room for audiotaping the interviews.

In this study, proceedings of the interviews were audio-recorded using mobile phone, and notes were also hand-written in notebooks as a form of backup. In compliance with University of KwaZulu-Natal research code of ethics, the researcher asked for permission from the interviewees before commencement of recording. Moreover, interviewees were also asked to sign an informed consent letter for interviews as evidence that they gave consent for recording of the interviews.

4.8 Instrument Validation and Reliability Testing

Christensen et al. (2011) define research validity as the correctness or truthfulness of an inference that is made from the results of a research study. On the contrary, reliability is a matter of achieving consistency in the research scores. Suter (2012) argues that validity is of primary concern to all researchers because reliability is of little consequence if the measure is not a valid one.

Whittemore et al. (2001) argue that reliability and validity of research findings are largely dependent on how the overall research was conducted. They hence advise that careful attention should be paid to all aspects of the study ranging from the problem statement formulation and framing of research questions, research design, data collection and analysis, and ultimately presentation. In spite of this, much of the available literature focussing on validity and reliability has dwelt on methodology, particularly on data collection and analysis

(Creswell, 2013; Connaway and Powell, 2010; Mouton, 1996). Therefore, discussion in this section focusses on the measures the researcher used to ensure validity and reliability of the research findings.

4.8.1 Adapting Questions from Well-Established Researchers

One of the commonly accepted practices in the Social Sciences is the adoption of tools commonly used by well-established researchers. The rationale behind this practice is that such tools may have been tested before they were used, and hence their validity is assured. In keeping with this, the researcher enhanced the content validity of the data collected through the interview guides by adapting questions from the McConnell International (MI)'s Ready?Net.Go! (2001).

4.8.2 Pilot-Testing

Pilot-testing is another commonly used measure of ensuring validity of research instruments. Walliman (2011) defines a pilot-test as a pre-test of the questionnaire or other type of survey on a small number of cases in order to test the procedures and quality of responses. Although the focus of this definition is on the questionnaire, ideally, all research instruments need to be pilot-tested. A pre-test gives the researcher an opportunity to identify items that are misunderstood by the participants, do not obtain the information that is needed, to practice analysis of the items in preparation of the actual task, and more. (Bell and Woolner, 2012; Muijs, 2012; Connaway and Powell, 2010). Besides gaining some valuable experience in analysing data hence getting an insight of what to expect from the actual study, the pilot-test also enables the researcher to refine the data collection instruments.

Taken from the perspective of Muijs (2012), pilot-testing is a two-stage process. The first stage is where the researcher asks peers or other experts to comment on the appropriateness of the items in the data collection instruments. This stage is also referred to as peer-review or debriefing (Creswell, 2013). Feedback received from this exercise leads to the second stage which is refining the items before they are actually pilot-tested. The peer review or debriefing stage of the pilot-study was conducted at Mzuzu University. The researcher asked senior colleagues from the Library and others from the Department of Library and Information Science to go through the questionnaires and interview guides.

A number of scholars (Muijs, 2012; De Vos and Strydom, 2011; De Vaus, 2002) recommend pilot-testing to be conducted with people who resemble those to whom the questionnaire will be administered, and the range of interviewers to represent experience of those who will finally administer the questionnaire. Connaway and Powell (2010) add that in the pre-test, the sample should be scientifically selected. In light of this, all research instruments were pilot-tested at Chancellor College (CHANCO), a constituent college of the University of Malawi, and the Malawi University of Science and Technology (MUST), both of which were not part of this study. The pretesting was done by the researcher as he led the data collection team. Leman (2010) recommends running a pilot test to 50 respondents whilst De Vaus (2002) indicates that a number of between 75 and 100 respondents provides a useful pilot-test. However, the researcher conducted a pilot test, each comprising of 50 students and academic staff as recommended by Leman (2010) in order to get a manageable sample. The interview guide for the university/college librarians was pilot-tested on the College Librarian of CHANCO and University Librarian of MUST whilst the interview guide for the ICT directors was pilot-tested on the ICT directors of the same institutions as there were no other comparable institutions to pre-test these instruments.

Data collected from the pre-tested questionnaires were analysed using SPSS Version 23. The researcher used the data to experiment on the generation of various statistical results such as graphs, pie charts and tables. Comments obtained from the research subjects and researcher's own observations from the questionnaires were used to improve the instruments whereby other questions were omitted whilst others were rephrased. Similarly, comments from interviewees and observations made by the researcher were used to improve the format and content of the interview guides.

4.8.3 Triangulation

Triangulation refers to the use of a variety of methods and techniques of data collection in a single study (Mouton, 1996). According to Creswell (2013), triangulation is not only restricted to methods but also include the use of multiple or different investigators and theories. The aim is to provide corroborating evidence from different sources to shed light on a theme or perspective. It is essentially a means of cross-checking data to establish its validity

(Bush, 2012). The underlying assumption, according to Mouton (1996), is that the various methods complement each other hence their respective shortcomings can be balanced out.

In this study, the researcher triangulated methods, data sources, and even theories. In terms of methods, the researcher used both quantitative and qualitative methods. Quantitative methods involved the collection of quantitative data through the use of questionnaires administered to students and academic staff. Conversely, qualitative methods involved collection of qualitative data through the interviews conducted with university/college librarians and ICT directors. In other instances, the researcher asked similar questions to different respondents (i.e. the issue of attitudes was examined across all the respondents) with the aim of corroborating the findings. Similarly, the researcher triangulated data sources (qualitative and quantitative data) in the interpretation of findings on a similar theme. For instance, in trying to establish the existence of ICT infrastructure for the provision and access to library and information services, the researcher triangulated data obtained from university/college librarians and students and academic staff whose findings pointed to the high prevalence of mobile phones amongst students and academic staff. Finally, the researcher triangulated theories whereby the UTAUT theory and TOE framework were used to underpin this study.

4.8.4 Cronbach's Alpha

Several procedures for establishing reliability of quantitative research instruments exist. They include test-retest, split-half technique, and internal consistency. Cronbach's Alpha, whose coefficients range from 0 to 1, is often used to obtain the reliability coefficient of an instrument when the internal consistency technique is used. A number of scholars (Lwoga and Questier, 2014; Delpont and Roestenburg, 2011; Cavana et al., 2001) all agree that coefficients that are closer to 1 are deemed to be of high reliability. Generally, coefficients that are less than 0.6 are considered as poor hence not suitable for use in a study whilst those in the range of 0.7 are considered as acceptable whilst those over 0.8 are considered as good (Cavana et al., 2001).

Reliability of some of the questionnaire items in this study were determined by calculating the Cronbach's Alpha values of the variables in the questions. As shown in Table 4.4, all the Cronbach's Alpha values were either closer to 0.7 or were over that mark. This shows that the items in the questionnaires used in this study had high levels of internal consistency.

Table 4. 4: Cronbach's Alpha Values for Questionnaires Administered to Students and Academic Staff

Questions	Cronbach's Alpha value for students	Cronbach's Alpha value for academic staff
Main uses of mobile phones	0.745	0.723
Why use mobile phones over other available means i.e. laptop computers	0.672	0.671
Why use of mobile phone is good for offering library services	0.763	0.730
Services to be prioritised for offering on the mobile platform	0.859	0.827
Challenges respondents face/would likely face in accessing mobile library services	0.762	0.788

4.8.5 Member Checking

The researcher also used another technique called member checking to validate the research findings. This is a commonly used technique in qualitative studies, and has been described by Lincoln and Guba (1985, p.314) as “the most critical technique for establishing credibility”. Member checking involves taking data, analyses, interpretations and conclusions back to the participants so that they can judge the accuracy of the account (Creswell, 2013). The aim is to enable participants check not only the accuracy of the findings but even the language used. In implementing this technique, the researcher sent the university/college librarians and ICT directors findings drawn from the interviews conducted with them through email so that they could verify its accuracy.

4.9 Data Collection Procedures

The researcher personally collected data from the field with the assistance of six other research assistants. Concurrent mixed methods procedure was used in this study which means

that both quantitative and qualitative data was collected at the same time (Creswell, 2009). The data collected was integrated in the interpretation of the overall results.

Research data is collected in a number of ways including observations, interviews, documents, and audio-visual materials (Creswell, 2013). These data collection procedures apply to both quantitative and qualitative methods. The question of whether they are used to collect qualitative or quantitative data depends on how they are used. For instance, if a researcher using the observation method records the behaviour observed in prose or in a descriptive way, it becomes qualitative. If, on the other hand, frequency counts are used to record the same behaviour, the data becomes quantitative. Questionnaires are another data collection procedure which are mainly associated with quantitative methods (Delpont and Roestenburg, 2011). This particular study used questionnaires and interviews to collect data.

4.9.1 Structured Interviews

As already indicated, interviews can be used to collect both quantitative and qualitative data. In terms of soliciting quantitative data, an instrument called a structured interview is used. A structured interview contains closed questions as is the case with most questionnaires. However, the difference between structured interviews and questionnaires, according to Coleman (2012), is that the former is administered by the researcher who records the answers rather than the respondents being asked to do this. The data collected could be analysed using quantitative data analysis software such as SPSS. Structured interviews are sometimes favoured over questionnaires in cases where the researcher wishes to boost the response rates. However, this instrument was not used in this study because it is not ideal for obtaining detailed and in-depth answers.

4.9.2 Un-structured Interviews

Unlike structured interviews, in unstructured interviewing the interviewer conducts the interview without a planned sequence of questions to be asked to the respondents (Sekaran and Dougie, 2010). In this form of interview, the interviewer only has a set of initial questions to start the process but the content of the interview depends on the individual being interviewed, the empathy of the interviewer, and the rapport that grows between them (Coleman, 2012). Unstructured interviews are exploratory in nature, and are used by the

researcher to identify issues to be pursued further through more detailed interviews (Greeff, 2011). This form of interviewing was not used in this study as the researcher wanted a more focussed and detailed way of soliciting information from the interviewees to ensure that the research questions were adequately answered.

4.9.3 Semi-Structured Interviews

Semi-structured interviews are the commonest type of interviews that are used by qualitative researchers. The researcher used this sort of interviewing technique in conducting interviews with the university/college librarians and ICT directors. This was done to gain a detailed picture of the participant's beliefs, perceptions or accounts of the issues investigated (Greeff, 2011). Interview protocols used in semi-structured interviewing normally have major questions, sub-questions and possible follow-up questions (Coleman, 2012). Although a set of predetermined questions are available, the researcher is merely guided other than dictated by them hence he/she is at liberty to pose other follow-up questions if the need arises. The researcher used a protocol that met the criteria set out above in conducting the interviews. The interviews were conducted in the respondents' offices at a mutually agreed upon date and time. Such interviews were personally conducted by the researcher.

4.9.4 Questionnaires

Quantitative data was collected through the use of self-completed questionnaires. The questionnaires contained both open-ended, and closed questions. Open ended questions make it possible for the researcher to solicit adequate answers to complex issues and richness of detail (Neuman, 2006). On the contrary, closed questions are easier to respond to and also analyse (Delpont and Roestenburg, 2011). The inclusion of both sets of questions in the questionnaire greatly assisted the study by boosting the response rate (as the questionnaires were fairly easy to complete), guaranteeing moderately adequate detail, and also making the questionnaires easier to analyse.

The researcher personally administered questionnaires to academic staff. Academic staff who were randomly selected using university/college staff registries were reached in their offices, and asked to participate in the study. Questionnaires were given to those who accepted to participate, and collected at an agreed upon time after they had completed them. This was

done to ensure that respondents had adequate time to respond to the questionnaires. Necessary follow-ups were done to respondents who could not complete the questionnaires within the agreed upon time with the aim of boosting the response rate.

Five research assistants were recruited, and they helped in administering questionnaires to students who were randomly sampled using university/college students' registry lists. The research assistants helped in locating where the sampled students could be found, and the best time to administer the questionnaires. Just like academic staff, the student respondents were given adequate time to read through and complete the questionnaires. Follow-ups were also done with the aim of boosting the response rate. A record of all questionnaires issued out and those collected was kept by everyone involved in field work to ensure smooth execution of the work.

4.10 Data Analysis

The use of mixed methods in this study implied that the researcher ended up with both qualitative and quantitative data after field work which needed to be analysed. After data collection, the question of how the researcher proceeds with the analysis of the data obtained is largely guided by how the study was designed. Tashakkori and Teddlie (2009) have outlined seven reasons that influence the design of a mixed methods study. These include complementarity (where mixed methods are used to gain complementary views about the same phenomenon); completeness (where mixed methods is used to get a complete picture of the phenomenon); developmental (where questions of one strand emerge from the inferences of a previous one i.e. sequential mixed methods); expansion (where mixed methods are used to expand or explain the understanding obtained in a previous strand of study); corroboration (where mixed methods are used to assess credibility of inferences obtained from one approach); compensation (where mixed methods enable the researcher to compensate for the weaknesses of one approach by using the other); and diversity (where mixed methods are used with the hope of obtaining divergent pictures of the same phenomenon). In this particular study, mixed methods were used as a way of achieving completeness of the study. This is evidenced from the fact that only one type of data set was collected from each of the study groups (academic staff, students, university/college librarians and university/college ICT directors).

The researcher analysed data collected from this study mainly through use of data analysis software. Several data analysis software are available on the market. Some of these are used for analysing qualitative data (Qualitative Data Analysis Program [QDAP], NVivo, QDA Miner) and others quantitative data (IBM Statistical Package for the Social Sciences [SPSS], and Automatically Tuned Linear Algebra Software [ATLAS]). Qualitative data collected from the research was analysed using NVivo software whilst quantitative data was analysed using IBM SPSS Version 23 software. According to QSR International (2014), NVivo, among others, allows users to classify, sort and arrange information; examine relationships in the data; and combine analysis with linking, shaping, searching and modelling. NVivo was chosen over the other competing softwares (QDAP and QDA Miner) because it accommodates a wide range of research methods including mixed methods research. Walting et al. (2012) has also observed that NVivo is a widely used software which makes it appropriate for use in this study. SPSS is another widely used program for statistical analysis in Social Science. According to Neuman (2007), SPSS includes many ways of manipulating quantitative data, and also contains most statistical measures such as tables and graphs which made it ideal for use in this study. SPSS was used to generate frequency and percentage distribution graphs, tables, and pie charts; cross-tabulation tables; and Chi-square tables. These statistical measures gave an insight into the variables that were measured in this study. After analysis, both quantitative and qualitative data were integrated in the interpretation and discussion of findings. This signify triangulation of data sources.

As already indicated, the questionnaires used in this study contained a combination of closed-ended and open-ended questions. The commonly accepted practice is that closed-ended questions are analysed statistically whilst open-ended questions are content-analysed (Tashakkori and Teddlie, 2009). The researcher quantified the qualitative data collected from the questionnaires. Similarly, quantitative data that was collected from the interviews was content analysed. Tashakkori and Teddlie (2009) have described the two processes as quanticising and qualiticising respectively. The decision to quanticise qualitative data and qualiticise quantitative data was made to ensure that the researcher had one data set per method to simplify the task of analysis.

4.11 Ethical Consideration

Research ethics are rules that are intended to help keep participants safe from harm, build trust with participants and ensure trustworthy outcomes from the research which will benefit society (Busher and James, 2012). This definition is mainly participant-centred. Walliman (2011), however, takes a much broader view to research ethics as he looks at the concept as covering honesty and integrity in the research process while at the same time also protecting the interests of the participants or respondents. In terms of honesty and integrity, Walliman calls on researchers to properly acknowledge reference sources used in their work hence avoid plagiarism, present truthful data, and also avoid bias in their interpretations. Walliman further calls to researchers to ensure that their respondents or participants are protected. The researcher's conceptualisation of research ethics is based on the Walliman perspective.

According to Creswell (2013), the researcher has to contend with ethical issues at three main stages: during the collection of data in the field, during analysis, and during dissemination. This is a view that is shared by Sieber (2009). Some research activities, and in other instances their outcomes, may cause physical, emotional or even economic harm to respondents. Physical harm could result from injury whilst psychological harm could result from stress emanating from the data collection methods used or indeed stigmatisation from being associated with negative results of a particular study. Research results may also result in economic harm whereby, for instance, customers stop purchasing a particular product because of some publicised negative outcomes of a research study. This being the case, it is important that the researcher exercises extreme caution, and adhere to a strict ethical code of conduct throughout the process of the study. Among others, the researcher should identify vulnerable groups, if a study involves the study of human beings, and how sensitive topics could be tackled. This would ensure that research data are collected, analysed and disseminated in conditions that do not harm anybody. Adherence to good ethical principles would also benefit the researcher as research subjects would cooperate and freely give out the information the researcher is looking for.

Research ethics calls for respondents' voluntary informed consent to participate in a study (Sieber, 2009). Busher and James (2012) says that fundamental democratic rights calls to researchers to gain participants' voluntary informed consent to participate in any research exercise whilst guaranteeing them the right to withdraw at any time from it. Voluntary means

without threat or undue influence. In practical terms, the researcher is called upon not to tie participation in any study to benefits that the subjects may not afford such as health services, and stress that the participants are free to withdraw any time (Sieber, 2009). Informed, on the other hand, means knowing what a reasonable person in the same situation would want to know before giving consent, including who the researcher is and why the study is being done. Research is meant to be of mutual benefit to researchers and participants hence researchers should make it clear to participants at the beginning of the project how they and other people might benefit from it (Robson and Robson, 2002). Finally, consent means explicit agreement to participate. It is important that researchers work towards gaining participants' consent as this is a critical aspect in good research practice. Good interpersonal communication skills would help much in achieving this objective.

Besides voluntary informed consent, privacy, confidentiality and anonymity are fundamental aspects of the research process. Sieber (2009) summarises the three as follows: privacy is about people, confidentiality is about data and anonymity means no identifiers. The right to privacy from research inquiry is protected by the right to refuse to participate in research. Privacy issues tend to arise mainly during the data collection exercise in the field. This being the case, the researcher is obliged to seek the participant's voluntary informed consent to participate in the study. Failure to do this would lead to the infringement of the participant's rights.

The researcher addressed research ethics in a number of ways. Firstly, by gaining the gatekeeper's permission to enter the study site. This study was conducted at five educational institutions namely Mzuzu University, Lilongwe University of Agriculture and Natural Resources, Kamuzu College of Nursing, College of Medicine and The Polytechnic. The researcher was aware that failure to gain proper access to these institutions would have been tantamount to the invasion of privacy. Although the researcher already secured permission to conduct research at these institutions as a prerequisite for the issuance of the ethical clearance certificate by the University of KwaZulu-Natal Ethics Committee, he still notified relevant authorities or gatekeepers of his intention to collect data. Data was only collected when permission was granted. Secondly, the researcher and research assistants exercised courtesy during data collection. Academic staff that were sampled were approached in their offices during consultation or office hours only to minimise the disruption this exercise may have

had on their activities. Similarly, students that were sampled to participate in the study were approached outside class and practical hours to minimise disruptions to their academic activities. Thirdly, the researcher and research assistants sought voluntary informed consent of the respondents. Both academic staff and student respondents approached were introduced to the nature and objectives of the study, and later asked for their voluntary participation in the study. Those who agreed to participate were asked to sign the voluntary informed consent document attached to the questionnaire before responding to the research questions. However, some of the respondents chose not to sign the voluntary informed consent form. Reasons why others chose not to do this are not clear but others whom the researcher spoke to were either too busy to do it or did not want to be identified. Yet others indicated that they did not see the need for them to indicate their names on the informed consent form.

Confidentiality, Sieber (2009) writes, is an extension of the concept of privacy, and it is concerned about personal data and an agreement as to how the data are to be handled in keeping with the subject's interests in controlling the access of others to information about themselves. In the voluntary informed consent document which the respondents were asked to sign before collection of data, the researcher assured respondents that the data they provided in the questionnaires would be treated with utmost confidentiality. The University of KwaZulu-Natal Ethics Policy has guidelines on how research data are to be handled. One of the guidelines is that data collected be kept at the researcher's academic department after analysis, and these materials be shredded off after the expiry of five years. In keeping with this guideline, the researcher took all data sets to the Department of Information Science upon completion of the study, and will make provision for their destruction after the expiry of the five-year period.

Anonymity means that the names and other unique identifiers of the subjects are never attached to the data or known to the researcher (Sieber, 2009). Anonymity in research is pursued to protect the identity of respondents from possible negative effects such as stereotyping. This study collected data using questionnaires and interview guides. Although respondents wrote their names and signed the informed consent form accompanying the questionnaires, quantification of the data meant that there was no danger of identifying particular individuals. Furthermore, findings arrived at also made reference to the two study groups. The researcher also conducted interviews with university/college librarians and ICT

directors. During the interpretation of data and discussion of findings, the researcher made reference to these positions other than names of particular individuals to ensure anonymity.

Proper acknowledgement of reference sources, truthfulness in the way the researcher handles various aspects of the study and unbiased interpretation of data have been identified as hallmarks of ethical good conduct in research (Walliman, 2011). The researcher ensured that all these aspects were taken into consideration throughout the conduct of this study. Therefore, all in-text reference sources, used wholesome or paraphrased, were properly acknowledged. Furthermore, all in-text reference sources were included in the reference list and vice versa. Moreover, the researcher endeavoured to be truthful at all times with the aim of upholding the integrity of the study. Furthermore, the researcher did not manipulate data sources collected but exercised objectivity in interpretation.

4.12 Summary

This study was underpinned by the pragmatic paradigm. It used the multi-case study design whereby the study was undertaken at five study sites. Both quantitative and qualitative methods were used. Academic staff and students were sampled using a combination of sampling tables and stratified random sampling whilst university/college librarians and ICT directors were purposively sampled. Data was collected through use of questionnaires and interviews. Questionnaires were administered to academic staff and students whilst semi-structured interviews were conducted with university/college librarians and ICT directors. Quantitative and qualitative data was analysed separately using SPSS and NVivo respectively. Such data were integrated in the interpretation of results and discussion of findings. The study applied ethical principles to the latter by among others engaging in ways that protected the respondents from physical and psychological harm, and also handling data collected in a confidential manner. Moreover, the study properly accredited all reference sources used in the study, and reported findings objectively.

CHAPTER FIVE

PRESENTATION OF FINDINGS

5.1 Introduction

This chapter covers the analysis of data and presentation of findings. Mouton (1996) asserts that data analysis in quantitative studies refers to the stage in the research process where the researcher, through the application of various statistical and mathematical techniques, focusses separately on specific variables in the data set. This is done with the aim of reducing data to an intelligible and interpretable form so that the relations of the research problem can be studied and tested, and conclusions drawn (Fouche and Bartley, 2011). On the other hand, data analysis in qualitative studies, involves organising the data, conducting a preliminary read-through of the database, coding and organising themes, representing the data, and forming an interpretation of them (Creswell, 2013). Guest et al. (2012) observe that since text and image data is so rich, not all of it can be used in the qualitative study. This being the case, they advise that researchers undertaking this type of a study should “winnow” the data (i.e. leave out other data that may not be very important to the study).

This study investigated the eReadiness of university libraries in Malawi in using mobile phones in the provision of library and information service. The study addressed the following research questions:

1. What is the level of preparedness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services?
2. What electronic information resources and services are currently available in public university libraries in Malawi that can potentially be adopted and used through mobile phones?
3. What is the current status of providing and accessing library and information services through mobile phones in public university libraries in Malawi?
4. What are the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services?

5. What factors influence the adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services?

This chapter is organised using the research questions outlined above. Data collected through interviews were transcribed verbatim in MS word. The transcripts were refined and coded into themes and further analysed using the Nvivo. Data collected through questionnaires were analysed using IBM SPSS Version 23 to generate tables, graphs, pie charts and other statistics.

5.2 Response Rate

Research response rate refers to the total number of research subjects that participate in the research by either completing a research instrument, such as a questionnaire, or participating in planned activities that yield research data such as interviews. According to Saunders et al. (2012), the response rate is calculated as the total number of responses divided by the total sample after ineligible respondents have been excluded, and is usually expressed as a percentage. There is no consensus amongst scholars on what constitutes an adequate response rate. Whilst Dillman (2000) has advocated for 50% as the minimal acceptable level, Fowler (1984) recommends 60%, and De Vaus (1986) insists 80% should be the acceptable response rate.

Baruch and Holtom (2008) and Baruch (1999) carried out studies in an attempt to resolve the controversy surrounding the question of what constitutes an appropriate response rate. They concluded that the average response rate for studies that made use of data collected from individuals was 52.7% while the average response rate for studies that made use of data collected from organisations was 35.7%. They further found that surveys which are completed in person or on a drop-in basis have a higher response rate (62.4%) than internal mail (55.5%) or regular mail (44.7%). These findings suggest that the method of administering the data collection instrument has an effect on the response rate. Nevertheless, higher response rates lead to results that have greater credibility among key stakeholders (Rogelberg and Stanton, 2007).

The overall response rate in the current study on eReadiness of university libraries in Malawi in using mobile phones in the provision of library and information service was impressive. All the ten interviews that were scheduled for the university/college librarians and ICT directors were done representing a 100% response rate. The interviews provided vital information that addressed research question number 1 on the level of preparedness of public university libraries in Malawi from ICT infrastructure, policy and human capacity perspectives. The interviews also helped address research question number 2 that investigated electronic information resources and services provided in public university libraries in Malawi that have the potential for implementation through mobile phones.

The study also achieved a good response rate from the questionnaires that were administered to students and academic staff. In total, 316 students out of 370 responded to the questionnaire representing an 85.4% response rate. In contrast, 224 academic staff out of 255 responded to the questionnaire representing an 87.8% response rate.

Statistics showing students' response rates presented in Figure 5.1 below show that the study achieved an overall response rate of 78 (21%) at Mzuzu University, 24 (6%) at Kamuzu College of Nursing, 120 (32%) at The Polytechnic, 46 (12%) at College of Medicine, and 48 (13%) at LUANAR. However, response rates at institutional level show that the study achieved a 100% response rate at Kamuzu College of Nursing (24, 100%) and College of Medicine (46, 100%) respectively. Equally impressive response rates were achieved at Mzuzu University (78, 96.2%) and The Polytechnic (120, 81.6%). But the response rate was slightly lower (48, 66.6%) at LUANAR.

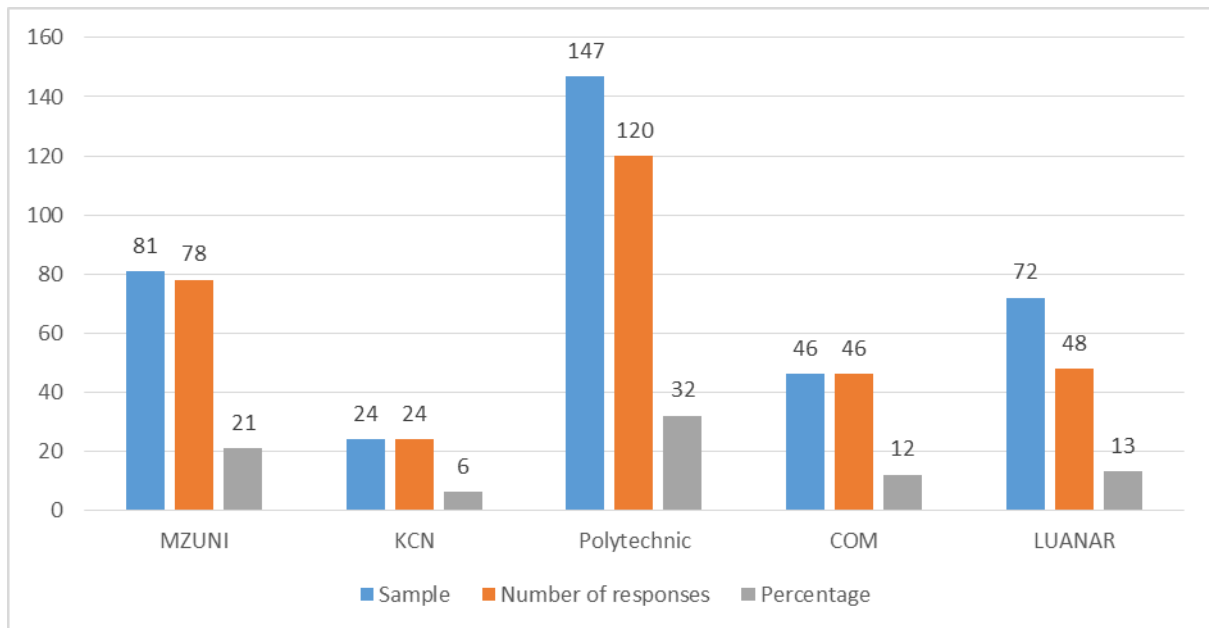


Figure 5. 1: Response Rate of the Students (MZUNI, n=78; KCN, n=24; Polytechnic, n=120; COM, n=46; LUANAR, n=48)

Key: MZUNI = Mzuzu University
 KCN = Kamuzu College of Nursing
 COM = College of Medicine
 LUANAR = Lilongwe University of Agriculture and Natural Resources

Source: Survey data, 2016

Findings of overall academic staff response rates captured in Figure 5.2 show that the study achieved a 61 (24%) response rate at Mzuzu University, 19 (7%) at Kamuzu College of Nursing, 63 (25%) at The Polytechnic, 30 (12%) at College of Medicine, and 51 (20%) at LUANAR. At institutional level, the highest response rate (61, 100%) was registered at Mzuzu University. Similarly, high response rates were registered at LUANAR (51, 91.0%) and The Polytechnic (63, 86.3%) respectively. Kamuzu College of Nursing (19, 79.1%) and College of Medicine (30, 73.1%) respectively registered the lowest response rates amongst the academic staff.

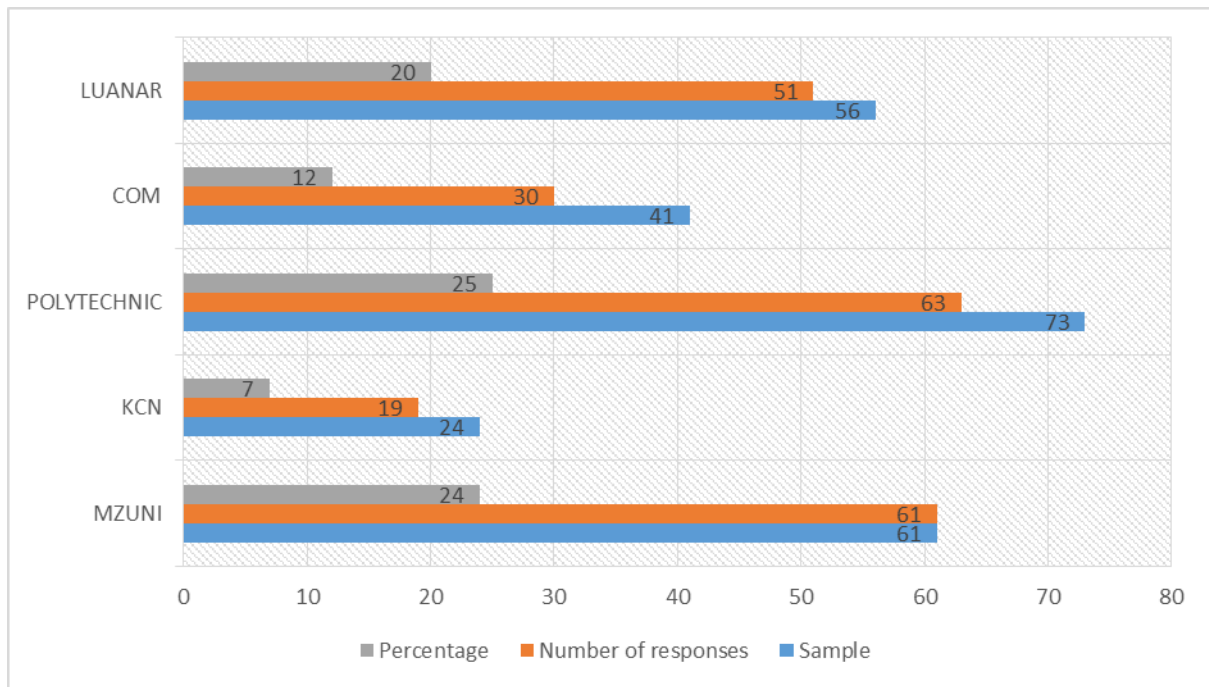


Figure 5. 2: Response Rate of Academic Staff (MZUNI, n=61; KCN, n=19; Polytechnic, n=63; COM, n=30; LUANAR, n=51)

Source: Survey data, 2016

When one considers that the average response rates achieved in related studies hover around 50% (55.6% for Baruch, 1999) and (52.7% for Baruch and Holtom, 2008), the response rates attained in this study (316, 85.4% for students and 224, 87.8% for academic staff) were very high.

5.3 Demographic Profile of the Respondents

The data that is presented in this section pertain to the demographic characteristics of the respondents. It, among others, covers the faculties the respondents belonged to, gender, age category, position or rank (for the academic staff), and year of study (for the students).

5.3.1 Faculty Affiliation of the Respondents

An analysis of the data presented in Table 5.1 indicates that the students' respondents were drawn from sixteen (16) faculties across the five (5) institutions covered by this study. These faculties are Health Sciences, Information and Communications, Environmental Sciences, and Education from Mzuzu University; Nursing and Midwifery from Kamuzu College of

Nursing; Education and Media Studies, Built Environment, Applied Science, Commerce, and Engineering from The Polytechnic; Biomedical Sciences and the Health Profession, and Medicine from College of Medicine; and Agriculture, Development Studies, Food and Human Science, and Natural Resources from LUANAR. In total, there were four faculties from Mzuzu University, one faculty from Kamuzu College of Nursing, five faculties from The Polytechnic, two faculties from College of Medicine, and four faculties from LUANAR.

Further analysis of the data shows that 37 (11.7%) respondents were drawn from the faculty of Biomedical Sciences and the Health Profession, 36 (11.4%) from the faculty of Education and Media Studies, and 33 (10.4%) from faculty of Commerce. Other faculties that had equally good representation in the study are Information Science and Communications 31 (9.8%), Built Environment 25 (7.9%), Food and Human Science 24 (7.6%), Nursing and Midwifery 24 (7.6%), and Education 20 (6.3%). The faculty of Development Studies 4 (1.3%) had the least representation in this study. These figures are shown in Table 5.1.

Table 5. 1: Distribution of the Student Respondents by Institution and Faculty (N=316)

Name of faculty	Indicate the name of your institution					Total
	MZUNI	KCN	Polytechnic	COM	LUANAR	
Health Sciences	14	0	0	0	0	14
	4.4%	0.0%	0.0%	0.0%	0.0%	4.4%
Information Science & Communications	31	0	0	0	0	31
	9.8%	0.0%	0.0%	0.0%	0.0%	9.8%
Environmental Sciences	13	0	0	0	0	13
	4.1%	0.0%	0.0%	0.0%	0.0%	4.1%
Education	20	0	0	0	0	20
	6.3%	0.0%	0.0%	0.0%	0.0%	6.3%
Nursing & Midwifery	0	24	0	0	0	24
	0.0%	7.6%	0.0%	0.0%	0.0%	7.6%
Education & Media	0	0	36	0	0	36

Studies	0.0%	0.0%	11.4%	0.0%	0.0%	11.4%
Built Environment	0	0	25	0	0	25
	0.0%	0.0%	7.9%	0.0%	0.0%	7.9%
Applied Science	0	0	18	0	0	18
	0.0%	0.0%	5.7%	0.0%	0.0%	5.7%
Commerce	0	0	33	0	0	33
	0.0%	0.0%	10.4%	0.0%	0.0%	10.4%
Engineering	0	0	8	0	0	8
	0.0%	0.0%	2.5%	0.0%	0.0%	2.5%
Biomedical Sciences	0	0	0	37	0	37
	0.0%	0.0%	0.0%	11.7%	0.0%	11.7%
Medicine	0	0	0	9	0	9
	0.0%	0.0%	0.0%	2.8%	0.0%	2.8%
Agriculture	0	0	0	0	11	11
	0.0%	0.0%	0.0%	0.0%	3.5%	3.5%
Development Studies	0	0	0	0	4	4
	0.0%	0.0%	0.0%	0.0%	1.3%	1.3%
Food & Human Science	0	0	0	0	24	24
	0.0%	0.0%	0.0%	0.0%	7.6%	7.6%
Natural Resources	0	0	0	0	9	9
	0.0%	0.0%	0.0%	0.0%	2.8%	2.8%
Total	78	24	120	46	48	316
	24.7%	7.6%	38.0%	14.6%	15.2%	100%

Source: Survey data, 2016

An analysis of data collected from the academic staff indicates that most of the respondents 33 (14.7%) emanated from the Faculty of Education. As was the case with students, the faculty of Biomedical Sciences and the Health Profession contributed a significant number of respondents 26 (11.6%) to this study although this time they ranked second. Faculties of Engineering and Applied Science both with 21 (9.4%) responses, nursing and Midwifery 19 (8.5%), Development Studies 19 (8.5%) and Agriculture 18 (8.0%) also had good representation. Conversely, faculties of Public Health and Family Medicine, Information Science and Communications, and Medicine, all with 2 (0.9%) responses and Veterinary Medicine 1 (0.4%) response were least represented. These findings are presented in Table 5.2.

Table 5. 2: Distribution of the Academic Staff by Institution and Faculty (N=224)

Faculty	Indicate the name of your institution					Total
	MZUNI	KCN	Polytechnic	COM	LUANAR	
Health Sciences	7	0	0	0	0	7
	3.1%	0.0%	0.0%	0.0%	0.0%	3.1%
Information Science & Communications	2	0	0	0	0	2
	0.9%	0.0%	0.0%	0.0%	0.0%	0.9%
Environmental Sciences	13	0	0	0	1	14
	5.8%	0.0%	0.0%	0.0%	0.4%	6.3%
Education	33	0	0	0	0	33
	14.7%	0.0%	0.0%	0.0%	0.0%	14.7%
Nursing & Midwifery	0	19	0	0	0	19
	0.0%	8.5%	0.0%	0.0%	0.0%	8.5%
Education & Media Studies	0	0	6	0	0	6

	0.0%	0.0%	2.7%	0.0%	0.0%	2.7%
Built Environment	0	0	7	0	0	7
	0.0%	0.0%	3.1%	0.0%	0.0%	3.1%
Applied Science	0	0	21	0	0	21
	0.0%	0.0%	9.4%	0.0%	0.0%	9.4%
Commerce	0	0	8	0	0	8
	0.0%	0.0%	3.6%	0.0%	0.0%	3.6%
Engineering	0	0	21	0	0	21
	0.0%	0.0%	9.4%	0.0%	0.0%	9.4%
Biomedical Sciences & Health Profession	0	0	0	26	0	26
	0.0%	0.0%	0.0%	11.6%	0.0%	11.6%
Medicine	0	0	0	2	0	2
	0.0%	0.0%	0.0%	0.9%	0.0%	0.9%
Agriculture	0	0	0	0	18	18
	0.0%	0.0%	0.0%	0.0%	8.0%	8.0%
Development Studies	0	0	0	0	19	19
	0.0%	0.0%	0.0%	0.0%	8.5%	8.5%
Food & Human Science	0	0	0	0	4	4
	0.0%	0.0%	0.0%	0.0%	1.8%	1.8%
Natural Resources	0	0	0	0	8	8
	0.0%	0.0%	0.0%	0.0%	3.6%	3.6%
Tourism & Hospitality Management	6	0	0	0	0	6
	2.7%	0.0%	0.0%	0.0%	0.0%	2.7%

Public Health & Family Medicine	0	0	0	2	0	2
	0.0%	0.0%	0.0%	0.9%	0.0%	0.9%
Veterinary Medicine	0	0	0	0	1	1
	0.0%	0.0%	0.0%	0.0%	0.4%	0.4%
Total	61	19	63	30	51	224
	27.2%	8.5%	28.1%	13.4%	22.8%	100%

Source: Survey data, 2016

5.3.2 Gender, Age Range and Year of Study of Students

Findings presented in Table 5.3 shows that most of the student respondents 205 (64.9%) were males whilst females 111 (35.1%) were few. These figures in a way reflect the demographic composition of the student population in Malawian universities which tend to be male dominated.

An analysis of the age range of the students indicates that the vast majority of the respondents 239 (75.6%) belonged to the 20-25 age bracket. Students whose age was Below 20 were, 14 (4.4%) and those who belonged to the following age groups: 26-30 (41 or 13.0%) and 31-35 (13 or 4.1%) were few. On the other hand, students aged 36-40, 3 (0.9%) and those Over 40 years old 6 (1.9%) formed a very small proportion of the research subjects. These findings are shown in Table 5.3, and signify that the student population was young.

With regard to year of study, the majority of the students that participated in this study 184 (58.2%) were in Year 4. Year 3 students were 76 (24.1%) whilst those in the fifth year of their study were 39 (12.3%). Year 1 and 2 students, who were made up of postgraduate students as the study did not involve undergraduate students at this level, made up the remaining 5.4% (11 or 3.5% for year 1 and 6 or 1.9% for year 2).

Table 5. 3: Gender, Age Range and Year of Study of Students (N=316)

Biographical information	Category	Frequency	Percentage
Gender	Male	205	64.9
	Female	111	35.1
	Total	316	100.0
Age range	Below 20	14	4.4
	20-25	239	75.6
	26-30	41	13.0
	31-35	13	4.1
	36-40	3	0.9
	Over 40	6	1.9
	Total	316	100.0
Year of study	Year 1	11	3.5
	Year 2	6	1.9
	Year 3	76	24.1
	Year 4	184	58.2
	Year 5	39	12.3
	Total	316	100.0

Source: Survey Data, 2016

5.3.3 Gender, Age Range and Year of Study of Academic Staff

Findings obtained from questionnaires administered to academic staff indicated that the majority of the respondents 170 (75.9%) were male whilst 54 (24.1%) or a quarter of all respondents were female. The findings further show that most of the academic staff mainly belonged to two age ranges: 31- 40 (80 or 35.9%) and 41-50 (72 or 32.3%). Academic staff within the age ranges of 20-30 (31 or 13.9%) and 51-60 (28 or 12.6%) also formed a considerable part of the respondents. However, those aged over 60 were few (12 or 5.4%). These findings suggest that most of the academic staff in the five institutions studied were in mid age or productive age group that tend to take keen interest in technology usage. Moreover, data shows that most of the academic staff 153 (68.3%) were lecturers whilst academic staff in other ranks: senior lecturers 25 (11.2%), staff associates 20 (8.9%), assistant lecturers 8 (3.6%), associate professors 17 (7.6%) and professors 1 (0.4%) had lower representation (Full details presented in Table 5.4).

Table 5. 4: Gender, Age Range and Year of Study of Academic Staff (N=224)

Biographical information	Category	Frequency	Percentage
Gender	Male	170	75.9
	Female	54	24.1
	Total	224	100.0
Age range	20-30	31	13.8
	30-40	80	35.7
	40-50	73	32.6
	50-60	28	12.5
	Over 60	12	5.4
	Total	224	100.0
Indicate your position	Staff Associate	20	8.9
	Assistant Lecturer	8	3.6
	Lecturer	153	68.3
	Senior Lecturer	25	11.2
	Associate Professor	17	7.6
	Professor	1	0.4
	Total	224	100.0

Source: Survey data, 2016

5.4 Findings

Findings of the study are presented in the following sections. The findings are organised in themes derived from the research questions presented in section 5.1. The themes are as follows: E-readiness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services; Electronic information resources and services that are currently available in public university libraries in Malawi that can potentially be adopted and used through mobile phones; The current status of providing and accessing library and information services through mobile phones; Attitudes of library staff, students and academic staff towards the use of mobile phones to deliver and access library services; Factors influencing the adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services. Findings from the questionnaires and interviews dealing with a common theme were combined and presented together.

5.5 E-readiness of Public University Libraries in Malawi in Terms of ICT Infrastructure, Policy Framework And Human Capacity for the Adoption and Use of Mobile Phones in Providing Library and Information Services

ICT infrastructure, policy framework and human capacity play an important role in facilitating the adoption and use of mobile phones in providing library and information services. This study, therefore, probed the e-readiness status of the five libraries in this study in relation to these factors. Each of the three factors was probed in depth separately by triangulating data collected from questionnaires administered to students and academic staff together with information collected through semi-structured interviews from university/college librarians and ICT directors.

5.5.1 ICT Infrastructure

Studies that examine projects undertaken to deliver library services through mobile phone have shown that the successful implementation of such services require computer hardware and software, campus networking equipment, and a robust mobile telecommunications network (Li, 2013; Jetty and Anbu, 2013; Wang et al., 2012; Bridges et al., 2010). Such type

of infrastructure does not only facilitate the delivery of services by libraries to their clients, but also access of the services libraries deliver by clients. Besides, students and academic staff who happen to be the main consumers of these services, require mobile phones and where necessary other mobile devices such as tablet computers to be able to access services libraries offer through use of mobile phones. The mobile telecommunications infrastructure is equally important as it acts as the media through which library services delivered through mobile phones are offered by libraries to clients and also accessed by clients. Therefore, this study examined the ICT infrastructure necessary for the adoption and access to library services offered through mobile phone. In the subsections that follow, an analysis of data collected from questionnaires will be presented first, followed by an analysis of data collected from the interviews.

5.5.1.1 Mobile Phone/Mobile Device Ownership

The research findings show that mobile phone ownership amongst students and academic staff was very high with many of them owning one or more devices. Findings shown in Figure 5.3 indicate that 315 (99.7%) students owned a mobile phone whilst only 1 (0.3%) indicated that he or she did not own a mobile phone. Whereas 215 (68.5%) students indicated that they owned only one mobile phone, a significant part of the student body 90 (28.7%) indicated that they owned two mobile phones. Still more, 7 (2.2%) students indicated that they owned three mobile phones and only 2 (0.6%) students pointed out that they owned more than three mobile phones. These findings imply that much as single ownership of mobile phone was prevalent, dual and multiple ownership was increasingly becoming a trend.

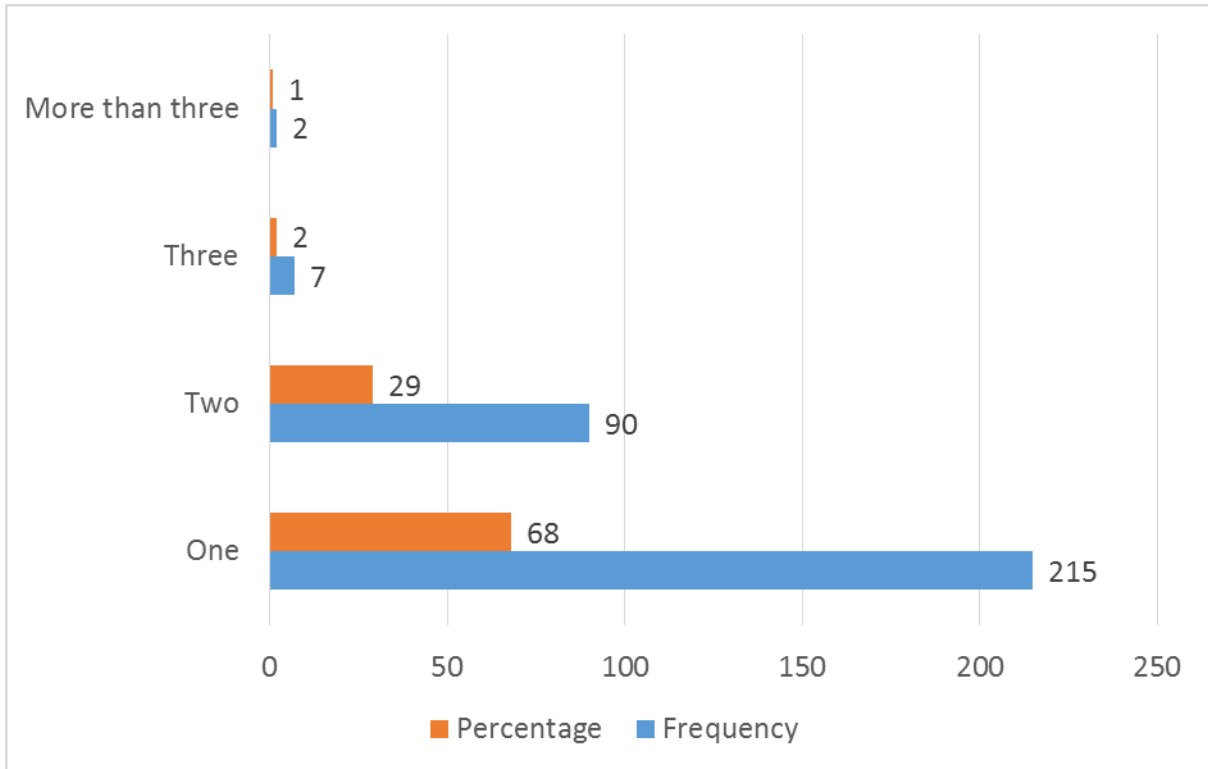


Figure 5. 3: Mobile Phone Ownership among Students (N=314)

Source: Survey data, 2016

An analysis of the responses given by academic staff indicate that all of them (224, 100%) owned a mobile phone translating into a 100% ownership rate. Moreover, 102 (45.5%) academic staff owned only one mobile phone whilst 122 (54.5%) owned two or more mobile phones. These findings show that besides having a higher ownership rate, academic staff also owned more mobile phones when compared to students. These findings are shown in Figure 5.4.

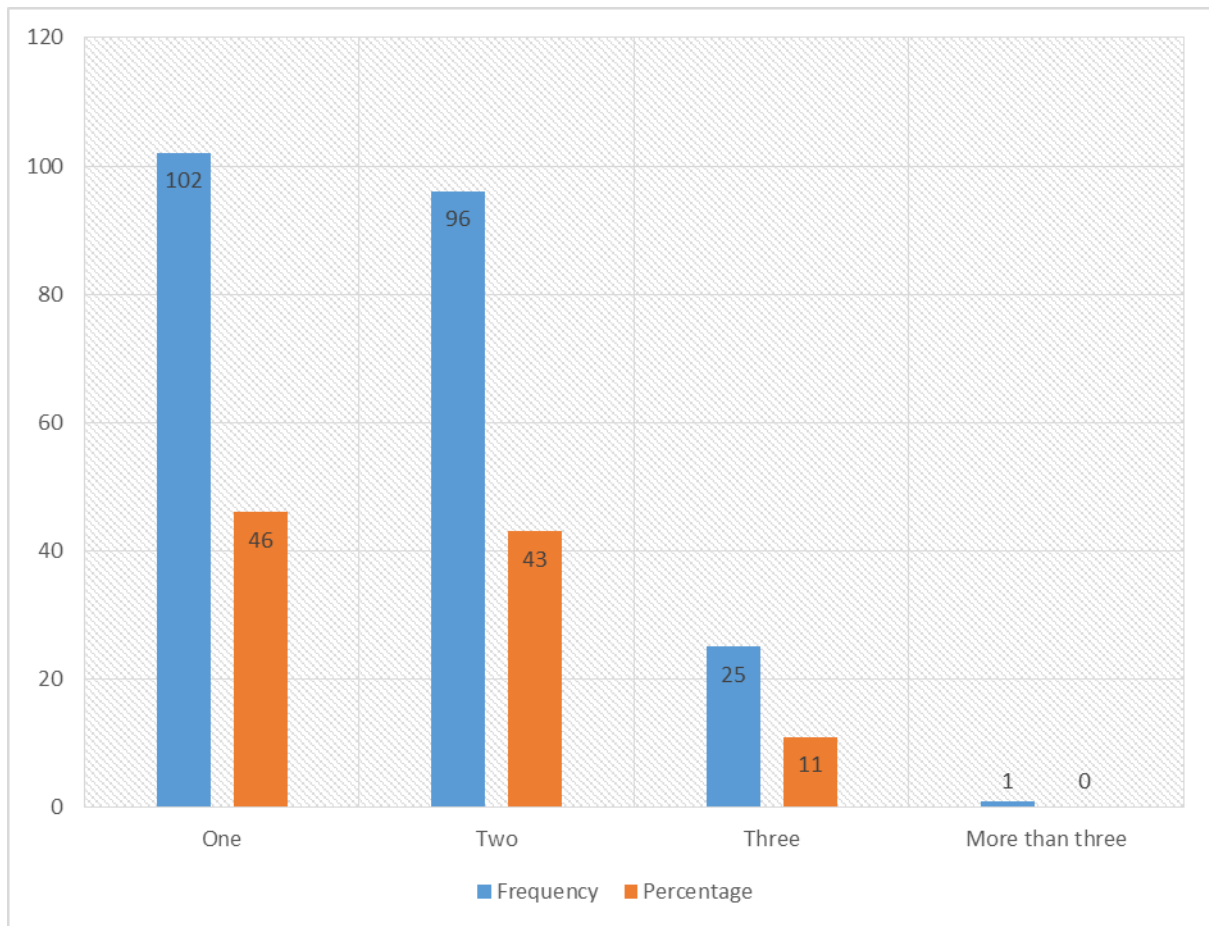


Figure 5. 4: Mobile Phone Ownership among Academic Staff (N=224)

Source: Survey data, 2016

Data captured in Table 5.5 indicate that 100 (24.6%) students owned Nokia mobile phone whilst 83 (20.4%) students owned Samsung mobile phone. This means that the two phones were the most pervasive mobile phones amongst students in public universities in Malawi as they accounted for 183 (45%) ownership rate amongst students which was close to half of entire mobile phone ownership amongst this group. However, ZTE 40 (9.8%) ownership rate, Huawei 33 (8.1%) ownership rate and Blackberry 31 (7.6%) ownership rate were the other pervasive mobile phones amongst students. On the contrary, Alcatel 7 (1.7%), HTC 6 (1.5) and TECNO 1 (0.2%) were not very pervasive.

Table 5. 5: Types of Mobile Phones that Students Owned (N=407)

Type of mobile phone	Frequency	Percentage
Nokia	100	24.6
Samsung	83	20.4
IPhone	8	2.0
Alcatel	7	1.7
HTC	6	1.5
Sony	11	2.7
LG	10	2.5
Huawei	33	8.1
Windows Phone	23	5.7
Blackberry	31	7.6
Itel	19	4.7
Motorola	13	3.2
ZTE	40	9.8
TECNO	1	.2
Other	22	5.4
Total	407	100.0

Source: Survey data, 2016

Findings on mobile phone ownership for academic staff have also indicated that Nokia 70 (20.1%) ownership rate and Samsung 92 (26.4%) ownership rate were the most pervasive mobile phones amongst academic staff in public universities in Malawi. The two phones accounted for 162 (46.5%) ownership rate amongst academic staff, which was close to half of entire mobile phone ownership. However, other phones not listed in Table 5.6, 38 (10.9%)

ownership rate, ZTE 24 (6.9%) ownership rate, Itel 23 (6.6%) ownership rate, Blackberry 20 (5.7%) ownership rate, and iPhone 19 (5.5%) ownership rate were the other pervasive mobile phones amongst academic staff. Similar to students, Alcatel 2 (0.6%) and TECNO 1 (0.3%) phones were discovered not to be very pervasive amongst academic staff. On the contrary, HTC phones 12 (3.4%) had slightly higher ownership rate amongst academic staff than students.

Table 5. 6: Types of Mobile Phones that Academic Staff Owned (N=348)

Type of mobile phone	Frequency	Percentage
Nokia	70	20.1
Samsung	92	26.4
IPhone	19	5.5
Alcatel	2	0.6
HTC	12	3.4
Sony	5	1.4
LG	6	1.7
Huawei	14	4.0
Windows Phone	14	4.0
Blackberry	20	5.7
Itel	23	6.6
Motorola	8	2.3
ZTE	24	6.9
TECNO	1	0.3
Other	38	10.9
Total	348	100.0

Source: Survey data, 2016

This study has further revealed that 299 (94.9%) students owned mobile phones with Internet capabilities whilst 16 (5.1%) owned mobile phones without this capability. Similarly, 216 (96.4%) academic staff indicated that their mobile phones had Internet capabilities, and only 8 (3.6%) indicated that their mobile phones did not have this capability.

Students who owned more than one mobile phone were asked to indicate how many of them had Internet capabilities. Forty-eight 48 (49%) students stated that two of their mobile phones had this capability whilst 46 (46.9%) indicated that only one of their phones had Internet capabilities. Only 4 (4.1%) had three or more mobile phones that had Internet capabilities. These findings are shown in Figure 5.5.

Majority of academic staff who owned more than one mobile phone 69 (59%) indicated that they owned two phones that had Internet capabilities. Additionally, 36 (30.8%) owned only one Internet-capable mobile phone whereas 12 (10.3%) owned three Internet-capable mobile phones. These findings that are captured in Figure 5.5 suggest that academic staff owned more phones with Internet capabilities than students.

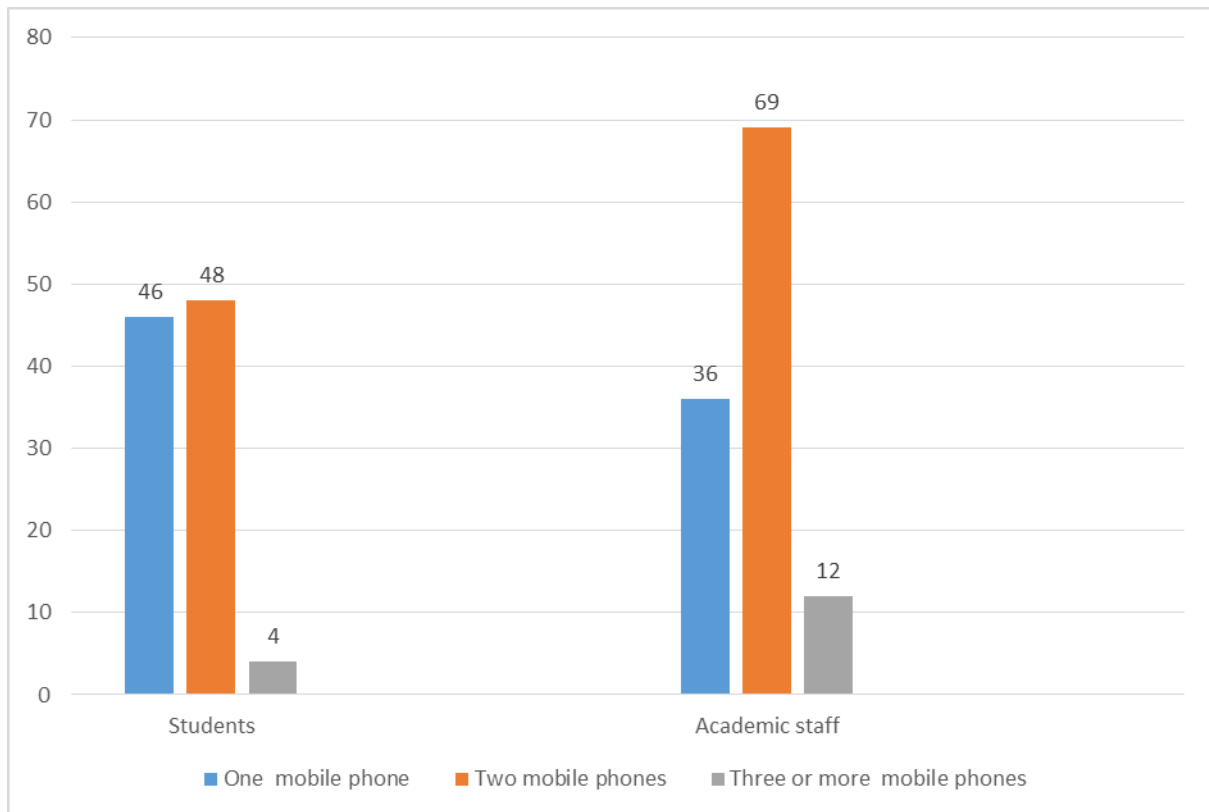


Figure 5. 5: Number of Internet-capable Mobile Phones for Respondents Who Owned More than One Mobile Phone (Students, n=98; Academic staff, n=117)

Source: Survey data, 2016

Internet capability is one of the important features of a smartphone, others being Wi-Fi capabilities, QWERTY keyboard (either physical or virtual), and touch screen (Song and Lee, 2012; Yu, 2012; Lippincott, 2010). Much as the study did not specifically find out whether the phones respondents owned were either smartphones or feature phones, this finding could point to a high prevalence rate of smartphones amongst the students and academic staff.

The technological context of the TOE Framework identifies technologies available both to the firm and the market place as critical to technological adoption. The fact that students and academic staff owned mobile phones, most of which had Internet capabilities, implies that libraries in this study could easily adopt the use of mobile phones in providing library and information services.

The researcher carried out a Chi – square (χ^2) cross-tabulation to determine whether age had an effect on mobile phone ownership. This was only conducted on data collected from academic staff because they had a wider age range (20 – Over 60) when compared to students. Findings presented in Table 5.7 indicate that although most of the academic staff 102 (45.5%) owned one mobile phone, single ownership was prevalent mainly amongst the 20 – 30 year olds 19 (61.3%) followed by those over the age of 60, 6 (50.0%) and least among those aged between 51-60, 6 (21.4%). Whilst dual mobile phone ownership was the norm amongst the 20-30 year olds and those over the age of 60, multiple mobile phone ownership was common amongst the rest of the age groups. Most of the academic staff in the 51-60 age bracket 19 (67.9%) owned two mobile phones but others reported owning three 2 (7.1%) or more than three 1 (3.6%) which was the highest number owned by any of the groups. Within the 41-50 year olds, those who owned two or three mobile phones 39 (53.4%) slightly outnumbered those who owned one mobile phone 34 (46.6%). Similarly, those who owned more than one mobile phone 43 (53.8%) outnumbered those who owned only one 37 (46.3%) within the 31 – 40 year old bracket. Despite the findings in Table 5.7 showing some noticeable differences in terms of mobile phone ownership amongst the various age groups, the findings were not backed by the Chi – square (χ^2) correlation test that showed no statistically significant correlation between age and number of mobile phones owned, $\chi^2 = 24.939$, df 12, $p = 0.015$. This finding is at variance with the UTAUT model which identifies age to have a moderating effect on technology adoption and use.

Table 5. 7: Cross-tabulation of age and number of mobile phones owned by academic staff (N=224)

Age range	How many mobile phones do you own?				Total
	One	Two	Three	More than three	
20-30	19	12	0	0	31
	61.3%	38.7%	0.0%	0.0%	100.0%
31-40	37	32	11	0	80
	46.3%	40.0%	13.8%	0.0%	100.0%
41-50	34	27	12	0	73
	46.6%	37.0%	16.4%	0.0%	100.0%
51-60	6	19	2	1	28
	21.4%	67.9%	7.1%	3.6%	100.0%
Over 60	6	6	0	0	12
	50.0%	50.0%	0.0%	0.0%	100.0%
Total	102	96	25	1	224
	45.5%	42.9%	11.2%	0.4%	100.0%

Source: Survey data, 2016

A cross-tabulation of gender and number of mobile phones owned amongst the students revealed that there was a slightly higher percentage of males 140 (68.6%) that owned one mobile phone than females 75 (68.2%). On the contrary, more females 35 (31.8%) owned two mobile phones compared to males 55 (27.0%) but there were more males 9 (4.4%) that owned three or more mobile phones and no female in this category. These findings are further shown in Table 5.8. However, the Chi-square (χ^2) test showed that there was no statistically significant correlation between gender and the number of mobile phone ownership, $\chi^2 = 5.443$, $df=3$, $p=0.142$.

Table 5. 8: Cross-tabulation of Gender and Mobile Phone Ownership among Students (N=314)

Gender	How many mobile phones do you own?				Total
	One	Two	Three	More than three	
Male	140	55	7	2	204
	68.6%	27.0%	3.4%	1.0%	100.0%
Female	75	35	0	0	110
	68.2%	31.8%	0.0%	0.0%	100.0%
Total	215	90	7	2	314
	68.5%	28.7%	2.2%	0.6%	100.0%

Source: Survey data, 2016

Another Chi-square (χ^2) cross tabulation of gender and number of mobile phones owned was conducted on data collected from academic staff. The findings showed that there were some percentage differences in terms of the number of mobile ownership between males and females. For instance, more males 80 (47.7%) owned only one mobile phone compared to females 22 (40.7%). However, a bigger percentage of females reported owning two 25 (46.3%) and three 7 (13.0%) mobile phones than males whereby findings indicated that 71 (41.8%) owned two mobile phones and 18 (10.6%) owned three mobile phones. Detailed findings are displayed in Table 5.9. The Chi-square test again showed that there was no statistically significant correlation between gender and the number of mobile phone ownership, $\chi^2 = 1.080$, $df = 3$, $p = 0.782$. Findings made in relation to mobile phone ownership and gender are contrary to the UTAUT model which indicates that gender has a moderating effect on technological adoption and usage.

Table 5. 9: Cross-tabulation of Gender and Mobile Phone Ownership among Academic Staff (N=224)

Gender	How many mobile phones do you own?				Total
	One	Two	Three	More than three	
Male	80	71	18	1	170
	47.1%	41.8%	10.6%	0.6%	100.0%
Female	22	25	7	0	54
	40.7%	46.3%	13.0%	0.0%	100.0%
Total	102	96	25	1	224
	45.5%	42.9%	11.2%	0.4%	100.0%

Source: Survey data, 2016

The respondents were asked to indicate if at all they owned other mobile devices such as iPad or Galaxy tab besides mobile phone. Findings obtained from the student respondents show that 65 (21%) answered in the affirmative while 245 (79%) stated that they did not own such devices. Similarly, only a few academic staff 94 (42.7%) indicated that they owned such devices while the majority 126 (57.3%) pointed out that they did not own them. Notwithstanding this, the level of ownership among academic staff, as was the case with mobile phones, was higher when compared to students.

5.5.1.2 Mobile Phone Use

Students were asked to rate the frequency of their mobile phone use on a five-point Likert Scale. The findings were cross-tabulated with their gender to see if this variable had an effect on their mobile phone usage. The findings are presented in Table 5.10.

Table 5. 10: Cross-tabulation of Frequency of Mobile Phone Use and Gender of the Students (N=311)

Gender	How often do you use your mobile phone?					Total
	Very frequently	Frequently	Moderately	Rarely	Very rarely	
Male	110	57	30	3	0	200
	55.0%	28.5%	15.0%	1.5%	0.0%	100.0%
Female	64	35	10	1	1	111
	57.7%	31.5%	9.0%	0.9%	0.9%	100.0%
Total	174	92	40	4	1	311
	55.9%	29.6%	12.9%	1.3%	0.3%	100.0%

Source: Survey data, 2016

Findings in Table 5.10 show that over half of the students 174 (55.9%) used their mobile phones very frequently. Another 92 (29.6%) students stated that they used their mobile phones frequently and 40 (12.9%) used them moderately. Only 5 (1.6%) used their phones either rarely or very rarely. The findings have also shown minor disparities in terms of mobile phone usage in relation to gender. In this regard, female students seemed to use mobile phones a lot more when compared to male students (See differences in percentage ratings in Table 5.10). The Chi-square (χ^2) cross-tabulation test indicated that there was no statistically significant correlation between gender and frequency of mobile phone usage among students, $\chi^2 = 4.305$, $df = 4$, $p = 0.366$.

Another Chi – square (χ^2) cross-tabulation test was conducted to determine if gender had an effect on the frequency of mobile phone usage among academic staff. Findings showed no statistically significant correlation between gender and mobile phone usage amongst academic staff, $\chi^2 = 3.070$, $df = 2$, $p = 0.215$. Findings shown in Table 5.11, however, indicate that majority of academic staff 167 (76.3%) used their mobile phones very frequently with female academic staff 45 (84.9%) using them more than their male counterparts 122

(73.5%). Another 35 (16.0%) academic staff used their mobile phones frequently whilst only 17 (7.8%) used them moderately. Slightly more male academic staff than females indicated that they used their mobile phones either frequently 29 (17.5%) or moderately 15 (9.0%) (See findings in Table 5.11). Findings made in relation to mobile phone usage and gender are at variance to the UTAUT model which asserts that gender has a moderating effect on usage of technology.

Table 5. 11: Cross-tabulation of Frequency of Mobile Phone Use and Gender for Academic Staff (N=219)

Gender	How often do you use your mobile phone?			Total
	Very frequently	Frequently	Moderately	
Male	122	29	15	166
	73.5%	17.5%	9.0%	100.0%
Female	45	6	2	53
	84.9%	11.3%	3.8%	100.0%
Total	167	35	17	219
	76.3%	16.0%	7.8%	100.0%

Source: Survey data, 2016

Findings of the cross-tabulation of the frequency of mobile phone usage in relation to age among academic staff show a relatively high usage of mobile phone across all the age groups, with over 50% of the respondents in the different age groups indicating that they used their mobile phones very frequently. However, academic staff in the 50 – 60 age group registered a remarkably high percentage of usage 24 (85.7%). The findings in Table 5.7 showed that mobile phone ownership in this age group was highest amongst the academic staff with 19 (67.9%) of the respondents owning two mobile phones whilst another 3 (10.7%) stated that they owned three or more mobile phones. These findings indicate that there could be a relationship between the number of mobile phone ownership and frequency of use. Academic staff within the 20-30 age group 23 (76.7%), 31-40 age group 58 (75.3%) and 41-50 age

group 56 (77.8%) also registered very high frequencies of use. Relatively lower rates of usage were registered among academic staff over 60 years of age whereby only 6 (50.0%) of them indicated that they used their mobile phones very frequently, 2 (16.7%) indicated that they used them frequently whilst 4 (33.3%) indicated that they used them moderately (See detailed findings in Table 5.12).

Table 5. 12: Cross-tabulation of Age Range and Frequency of Mobile Phone Use among Academic Staff (N=219)

Age range	How often do you use your mobile phone?			Total
	Very frequently	Frequently	Moderately	
20-30	23	6	1	30
	76.7%	20.0%	3.3%	100.0%
31-40	58	14	5	77
	75.3%	18.2%	6.5%	100.0%
41-50	56	11	5	72
	77.8%	15.3%	6.9%	100.0%
51-60	24	2	2	28
	85.7%	7.1%	7.1%	100.0%
Over 60	6	2	4	12
	50.0%	16.7%	33.3%	100.0%
Total	167	35	17	219
	76.3%	16.0%	7.8%	100.0%

Source: Survey data, 2016

Students were asked to indicate their main uses of mobile phones. The average Cronbach's Alpha values of the items to this question was 0.740 which suggested a high internal validity of the test items. Findings showed that calling was the main use of mobile phone for students

with 299 (94.9%) of them indicating that they strongly agree 212 (67.3%) or agree 87 (27.6%) with the statement. The rest of the students 16 (5.1%) either expressed no opinion 12 (3.8%), disagreed 2 (0.6%) or strongly disagreed 2 (0.6%) with the statement that calling was their main use of mobile phone. Students also used their mobile phones heavily for sending SMSs, connecting to social media sites such as Facebook, Twitter, and WhatsApp, and to check time as over 260 (80%) of them indicated that they strongly agree or agree with the statement that these were their main uses of mobile phones. Less than 54 (20%) students either expressed no opinion or disagreed that SMS or connecting to social media sites was their main use of mobile phones. Moreover, students also indicated that they used their mobile phones for surfing Internet, checking emails, to listen to music and radio, taking pictures and to set alarms and other reminder. Nevertheless, the torch, games and multi-media service (MMS) applications were used less (Details in Table 5.13).

Table 5. 13: Uses of mobile Phones among Students (N=315)

Use of mobile phone	Strongly agree	Agree	No opinion	Disagree	Strongly disagree	Total
Calling	212	87	12	2	2	315
	67.3%	27.6%	3.8%	0.6%	0.6%	100.0%
SMS	123	139	31	14	8	315
	39.0%	44.1%	9.8%	4.4%	2.5%	100.0%
MMS	19	56	138	53	49	315
	6.0%	17.8%	43.8%	16.8%	15.6%	100.0%
Surfing Internet	134	106	54	6	15	315
	42.5%	33.7%	17.1%	1.9%	4.8%	100.0%
Checking emails	103	134	46	20	12	315
	32.7%	42.5%	14.6%	6.3%	3.8%	100.0%
Connecting to	210	70	20	5	10	315

Social media (Facebook, twitter, WhatsApp, among others)	66.7%	22.2%	6.3%	1.6%	3.2%	100.0%
To take pictures	100	143	42	23	7	315
	31.7%	45.4%	13.3%	7.3%	2.2%	100.0%
Used as a torch	39	100	65	61	50	315
	12.4%	31.7%	20.6%	19.4%	15.9%	100.0%
To set alarms and other reminder	83	158	43	21	10	315
	26.3%	50.2%	13.7%	6.7%	3.2%	100.0%
To check time	131	132	34	13	5	315
	41.6%	41.9%	10.8%	4.1%	1.6%	100.0%
To play games	39	92	70	67	47	315
	12.4%	29.2%	22.2%	21.3%	14.9%	100.0%
To listen to music and radio	104	145	45	11	10	315
	33.0%	46.0%	14.3%	3.5%	3.2%	100.0%

Average Cronbach's Alpha value of the items in Table 5.13 was 0.740

Source: Survey data, 2016

Academic staff's uses of mobile phones were largely similar to those of students save for a few. As was the case with students, academic staff used their mobile phones the most for calling with 222 (99.1%) of them indicating that they strongly agree 200 (89.3%) or agree 22 (9.8%) with the statement that this was their main use of mobile phones. One academic staff (1, 0.4%) expressed no opinion and yet another (1, 0.4%) disagreed that with the statement that calling was his/her main use of mobile phone. Just like students, academic staff used their mobile phones heavily for sending SMSs, connecting to social media sites such as Facebook, Twitter, and WhatsApp, and to check time, with over 180 (80%) of them

indicating that they strongly agree or agree with the statement that these were their main uses of mobile phones. On the contrary, 39 (17.4%) academic staff or even less either expressed no opinion, or disagreed that sending SMS, connecting to social media tools and checking time was their main use of mobile phones. Other commonly used functions of mobile phones for academic staff were surfing Internet, taking pictures, and setting alarms and other reminder. Despite the similarities, academic staff also differed in their use of mobile phones with students in that they used their mobile phones more for checking emails than students. Conversely, students used their mobile phones to listen to music and radio more than academic staff. (Full details are presented in Table 5.14).

Table 5. 14: Uses of Mobile Phones among Academic Staff (N=224)

Use of mobile phone	Strongly agree	Agree	No opinion	Disagree	Strongly disagree	Total
Calling	200	22	1	1	0	224
	89.3%	9.8%	0.4%	0.4%	0.0%	100.0%
SMS	93	101	26	3	1	224
	41.5%	45.1%	11.6%	1.3%	0.4%	100.0%
MMS	18	29	122	25	30	224
	8.0%	12.9%	54.5%	11.2%	13.4%	100.0%
Surfing Internet	109	64	31	10	10	224
	48.7%	28.6%	13.8%	4.5%	4.5%	100.0%
Checking emails	131	59	23	4	7	224
	58.5%	26.3%	10.3%	1.8%	3.1%	100.0%
Connecting to Social media (Facebook, twitter, and WhatsApp)	126	59	22	8	9	224
	56.3%	26.3%	9.8%	3.6%	4.0%	100.0%
To take pictures	52	108	38	20	6	224
	23.2%	48.2%	17.0%	8.9%	2.7%	100.0%
Used as a torch	19	84	63	32	26	224
	8.5%	37.5%	28.1%	14.3%	11.6%	100.0%
To set alarms and other reminder	44	110	38	21	11	224
	19.6%	49.1%	17.0%	9.4%	4.9%	100.0%
To check time	89	100	26	5	4	224
	39.7%	44.6%	11.6%	2.2%	1.8%	100.0%
To play games	4	32	62	56	70	224
	1.8%	14.3%	27.7%	25.0%	31.3%	100.0%
To listen to music and radio	12	92	51	29	40	224
	5.4%	41.1%	22.8%	12.9%	17.9%	100.0%

Average Cronbach's Alpha value of the items in Table 5.14 was 0.723

Source: Survey data, 2016

5.5.1.3 ICT Infrastructure Necessary for Adoption and Use of Library and Information Services offered through Mobile Phones

This section presents findings on the availability of ICT infrastructure necessary for the adoption and use of library services offered through mobile phones. These findings were obtained from the analysis of data gained from interviews conducted with the university/college librarians and ICT directors. To ensure clarity of the findings, results of each of the five institutions (Mzuzu University, Kamuzu College of Nursing, The Polytechnic, College of Medicine, and Lilongwe University of Agriculture and Natural Resources) are presented separately.

5.5.1.3.1 Mzuzu University

When asked to say whether the institution had the requisite equipment and infrastructure necessary to facilitate the roll out of library and information services delivered through mobile phones, the University Librarian (UL) answered in the affirmative. He indicated that the fire which gutted down the library building in December 2015 (two months prior to the interview conducted in February 2016) had destroyed most of the ICT equipment. However, he indicated that most of the servers had been salvaged. Besides, a company the University had contracted to lay down the fibre-optic backbone for the University (projected funded by the African Development Bank) had just finished the work. The UL further indicated that the institution was hoping to get another consignment of desktop computers, and more importantly tablets which would be preloaded with prescribed textbooks to be used mainly by students. Preloading of information in the tablets was aimed at overcoming the high cost of accessing information over the mobile telecommunications networks as data charges were very high.

Responding to the question of what sort of equipment was at their disposal which he thought was critical for the project, the UL cited servers, tablet computers, desktop computers, and

fibre-optic backbone to facilitate access to both wired and Wi-Fi internet access. Much as this were the case, the UL stated that the library needed more desktop and tablet computers and servers with bigger capacity to provide better services. He further identified the country's mobile telecommunications infrastructure as an area of concern which needed to be addressed if the institution was to successfully provide library and information services through mobile phones to its clients. He cited mobile Internet, SMS and voice calls as ineffective.

The ICT Director further highlighted the institution's readiness to offer library and information services through mobile phones. He indicated that his department was in a position to provide the technical expertise necessary to support the provision of library and information services through mobile phones whenever the library decides to offer such type of services. With regard to the available infrastructure that may support the provision of such services, he hailed the ICT infrastructure upgrade project that was being undertaken with financial support of the African Development Bank (AFDB) as giving hope to such a project. Among others, he indicated that the wired component of the Local Area Network (LAN) had just been completed at the time of the interview (February 2016), and the wireless component was scheduled to be completed within two weeks whilst servers had already been installed. The ICT Director further indicated that the Directorate wanted to take over management of the library servers (under the management of library ICT staff at the time of interview) to provide what he described as a "seamless service to students". The ICT Director further indicated that his organisation was in a position to acquire all equipment that may be necessary for the roll out of library and information services delivered through mobile phones mainly with resources provided by the African Development Bank project.

With regard to the country's mobile telecommunications infrastructure, the ICT Director indicated that the University Campus had 100% network coverage by all telecommunications operators. In terms of network performance, the ICT Director had a more positive view about the performance of the mobile telecommunications networks when compared to the UL, rating their performance at 90%. According to him, challenges that the mobile telecommunications operators were facing were emanating from vandalism of the national fibre-optic backbone, indicating that "when the National backbone goes down, the [data services of the] other networks are also affected". However, the ICT Director indicated that the service charges (SMS, voice call, data, and more) of the mobile telecommunications operators were very expensive, reflecting studies conducted by the British Broadcasting

Corporation (BBC) and Research ICT solutions. Nevertheless, he was hopeful of the smooth operations of library services delivered through mobile phones that may be introduced as the Wi-Fi could give respite to students and academic staff from the high costs of accessing the services through the mobile networks. He also hinted that the data capacity of the University that was at 15MB was to be upgraded to 25MB to enhance the performance of the Wi-Fi.

The technological context of the TOE framework identifies all of the technologies that are relevant to the firm (both at firm level and outside the firm) as critical to technological adoption (Baker, 2012). Furthermore, facilitating conditions of the UTAUT model state that existence of the technical infrastructure to support use of a particular system aids in technology adoption and use (Venkatesh et al., 2003). The fact that the ICT infrastructure was available at MZUNI and mobile telecommunications infrastructure was also available suggests that the institution was in a position to provide library and information services through mobile phones.

5.5.1.3. 2 Kamuzu College of Nursing

The College Librarian (CL) for Kamuzu College of Nursing (KCN) indicated that the institution had the necessary infrastructure and equipment to facilitate the roll out of library and information services through mobile phones. He specifically mentioned the Library Management System (LMS) the library used as capable of accommodating such a service. He also pointed out that students had mobile phones which implies that they would be able to access library and information services delivered through mobile phones which the library would offer. The CL, however, bemoaned the absence of robust servers to support such a service.

The institution's ICT Director also hinted that his department was in a position to support the provision of library and information services through mobile phones should the library decide to embark on such a project. He spoke of the existence of mobile friendly systems and services, something that was interpreted as referring to the LMS the CL had spoken about, Wi-Fi network, and good Internet bandwidth connection as part of the ICT infrastructure that was available which could in turn be used for the offering of library and information services through mobile phones. The ICT Director identified the institution's capacity to develop own systems as another prospect in the roll out of library and information services delivered

through mobile phones. Much as this is the case, drawbacks also existed that needed to be overcome. One of such drawbacks was that the institution was only able to pay for bandwidth to a certain extent due to limited finances. The ICT Director also remarked that his department opted to acquire cheaper equipment due to cost considerations. On this point he said:

“CISCO equipment is expensive but better. Unfortunately, the college is not able to acquire it in sufficient quantities, and sometimes not able to buy at all”.

In terms of mobile telecommunications network coverage, both the CL and the ICT Director agreed that the area surrounding the institution had good network coverage. On this aspect, the CL indicated that mobile network coverage was generally good because the institution was in an urban set-up where network coverage was generally good. With regard to performance, the ICT Director described the performance of the mobile telecommunications network as being fair. He was, however, critical of the service cost which he described as very expensive. Much as he acknowledged that all mobile phone service costs were expensive, he particularly singled out mobile Internet data charges as an area of great concern. This being the case, the ICT Director suggested providing more Wi-Fi hotspots on campus to enable students connect their devices to the campus network. This, he said, would ensure that library and information services delivered through mobile phones that may be introduced are optimally utilised.

5.5.1.3.3 The Polytechnic

The College Librarian for the Polytechnic also indicated that her institution had the requisite infrastructure to facilitate the offering of library and information services through mobile phones. She stated that the institution had powerful servers with high capacity to handle the offering of such services; some users had smartphones to facilitate access to library and information services through mobile phones that may be offered; and existence of tablets provided by Airtel that were being used by postgraduate students to demonstrate how they could access e-resources off-campus as resources which could be used to kick-start such a project.

The ICT Director for the Polytechnic also indicated that his department was ready to support the provision of library and information services through mobile phones if the library

demanded such services. In a bid to highlight the ability of his department, the ICT Director stated that his department had presided over the implementation of the E2 Proxy Server that enabled library patrons to access e-journals from wherever they may be. In terms of the equipment that may be required to implement library and information services delivered through mobile phones, the ICT Director stated that the existing Internet infrastructure was what they needed. However, he indicated that they may have to work with one of the mobile service providers in the installation of the Unstructured Supplementary Service Data (USSD) SMS gateway, that is if the library decides to include the SMS reference service as one of the services it wishes to offer through use of mobile phone. Asked to say whether his department was able to acquire the required equipment, the ICT Director answered in the affirmative. He indicated that most of the ICT equipment they needed was available on the local market, and would work to procure equipment that may not be available on the local market such as the USSD with the service providers.

The Environmental Context of the TOE framework says that the presence or absence of technology service providers plays a critical role in technology adoption as the kind of technologies firms or organisations adopt are dictated by what is currently available on the market. Besides, organisations want to be assured of technical support to the technologies they adopt. The presence of technologies that could facilitate roll out of library and information services through mobile phones on the local market could hence facilitate speedy adoption of library services on the mobile phone platform not only at the Polytechnic but also in the other institutions.

Asked to describe overall network coverage in the local area, the ICT Director indicated that there was 100% coverage within Blantyre where the campus was located by the major operators. The network performance was described as equally good hence satisfactory. However, he bemoaned the rates charged by the mobile telecommunications network operators as prohibitive, particularly for students. He described both SMS and Internet charges as being expensive. He pointed out the need to negotiate for better service charges with the service providers for academic-related activities such as the delivery of library and information services through mobile phones.

The CL, however, differed with the ICT Director in her assessment of the performance of the mobile telecommunications networks. She summed up her assessment as follows:

“Connectivity not reliable; Internet service erratic; Voice calls get cut in the middle of the conversation; and SMS not delivered on time”. This implies that the network and service offering was deemed as poor.

5.5.1.3.4 College of Medicine

The CL for the College of Medicine (COM) indicated that his institution had most of the equipment and infrastructure that was required to facilitate the offering of library and information services through mobile phones. Some of it included the Wi-Fi hotspots, tablets that were loaned out to students, desktop computers, and servers. The only shortcoming which the CL pointed out was the bandwidth which he indicated needed to be increased.

The ICT Director also indicated that his department was capable of supporting the offering of library services through mobile phones, and confirmed the existence of Internet, servers and tablets as critical for the implementation of this service. Nonetheless, he identified aging servers and low Internet bandwidth as challenges which could negatively impact the offering of library and information services through mobile phones, if the library opted to offer them. He indicated that the ICT department was at the time not in a position to increase the bandwidth nor buy new servers because of budgetary constraints. Their only hope was on donor support from projects. Asked to say whether the resources they needed were easily accessible on the local market, he answered in the affirmative. He observed that much as most of the ICT equipment they needed was manufactured abroad, it was easily available on the local market owing to the presence of local suppliers. Internet service providers were also available on the local market.

Both the CL and the ICT Director agreed that the country had the necessary telecommunications infrastructure to support the delivery of library and information services through mobile phones. Specifically, the ICT Director pointed out that both of their campuses in Blantyre and Lilongwe had good network coverage save for a few buildings that experienced poor network coverage. With regard to performance, the ICT Director rated it to be 80% good. As was the case in previous instances, the ICT Director observed that mobile phone service charges, particularly Internet, were very expensive when compared to other countries. He indicated that this development could negatively impact the delivery of library

and information services through mobile phones that may be offered because many of them were offered on the Internet platform.

5.5.1.3.5 Lilongwe University of Agriculture and Natural Resources (LUANAR)

LUANAR had the infrastructure needed to support the provision of library and information services through mobile phones. This included mobile phones, computers and Internet. This is what transpired from the interview that was conducted with the University Librarian. However, the UL indicated that the institution still needed more servers to successfully operate the service.

The ICT Manager for LUANAR stated that his department was able to support implementation of library and information services through mobile phones based on request. He mentioned Library Solutions (LMS), DSpace (institutional repository), e-journals, servers, and Internet as some of the resources which the institution had to kick-start such a project. He also pointed out that the department was exploring the possibility of using cloud infrastructure for projects such as providing library and information services through mobile phones. The ICT Manager further indicated that the institution was able to acquire the resources stated above through own resources and project funds. He stated that the ICT department was working to acquire bigger bandwidth through Ubuntu Net Alliance and the Malawi Research and Education Network (MAREN). In terms of availability of the equipment on the local market, the ICT Manager indicated that Internet providers were available on the local market whereas cloud infrastructure could only be accessed outside the country.

The UL and ICT Director indicated that the country had the mobile telecommunications network infrastructure that could support the offering of library services through mobile phones. In terms of network performance, the ICT manager indicated that the data service fluctuated from good to bad. However, he rated voice calls and SMS as reasonably good. With regard to mobile phone service charges, the ICT Manager was of the view that the charges were largely affordable, contrary to the views expressed by most of the ICT Directors and librarians in this study.

5.5.2 Existence of Relevant Policy Framework for the Adoption and Use of Mobile Phones in Providing Library and Information Services

Evans et al. (2000) observe that policy guides and channels staff thinking in making decisions. Moreover, policies may also be looked at as rules or instructions that are intended to facilitate decision making. National policies as overarching policies have a bigger impact as they shape the way other minor policies should be formulated. Therefore, policies at both national and institutional level would either facilitate or impede the offering of library and information services through mobile phones depending on whether they are favourable or not. In light of this, the researcher posed questions to the university/college librarians and ICT Directors that sought to find out if there were any external and internal policies within the institutions that could impact the implementation of library services through mobile phone. An analysis of these findings are presented in the sections that follow.

5.5.2.1 Mzuzu University

When asked to indicate whether or not they had the necessary policy regime to drive the implementation of library and information services through mobile phones, the UL stated that institutional ICT policy and repository policy (policy that regulates the use of materials deposited in the institutional repository) were in draft form awaiting finalisation for adoption. Asked to say if he was aware of any national policies that may hamper the provision of library services through mobile phone, the ICT Director indicated that he was not aware of any. He pointed out that MACRA had been quite supportive of ICT development projects that the institution had carried out over the years citing the licensing of the VSAT equipment which the institution had relied on for a long time in the provision of Internet services. The ICT Director also concurred with the UL on the status of the institutional ICT Policy but was optimistic that the policy would be adopted soon.

5.5.2.2 Kamuzu College of Nursing

The CL for KCN stated that the College did not have an operational ICT policy at the time of the interview. He said that the institutional ICT policy was in draft form, and was hoping that it would govern the operations of library and information services delivered through mobile phones once adopted and implemented. The CL further indicated that

“...library regulations prohibiting use of mobile phones in libraries (often pasted on the walls of many libraries in Malawi) were removed. Patrons are allowed to use mobile phones in libraries as long as they are on silent mode to avoid disturbing other patrons”.

When asked how they would implement library and information services through mobile phones in the absence of the policy, the CL said they were hoping that the ICT policy would be adopted soon, and assist them to regulate the use of mobile phones in libraries.

The ICT Director also observed that he was not aware of any regulations from external regulatory bodies that could hamper the roll out of library services using mobile phones at KCN. The only obstacle to the implementation of such services was the institutional ICT policy which he agreed with the CL was still in draft form. He expressed concern that the absence of the institutional policy could affect the implementation of library and information services through mobile phones.

5.5.2.3 The Polytechnic

The CL for the Polytechnic also indicated that the institutional ICT policy existed only in draft form, but was being refined before adoption and implementation. She indicated that the ICT policy would aid the roll out and operations of library and information services through mobile phones once it is finalised and adopted.

The ICT Director indicated that he was not aware of any regulations from external regulatory bodies that could affect the implementation of library and information services delivered through mobile phones at the institution. He also agreed with the CL that the ICT policy was still in draft form. He expressed concern that the absence of the policy could negatively impact the implementation of library services using mobile phones. He pointed out that he was working together with his counterparts from constituent colleges of the University of Malawi to expedite the adoption of the ICT policy.

5.5.2.4 College of Medicine

The CL for COM while acknowledging that the overall ICT policy for all University of Malawi colleges was in draft form, indicated that the absence of the policy had little impact on what they did as a library. This was because library projects were guided by the strategic plan.

With regard to the existence of national policies that could affect the roll out and operations of library and information services delivered through mobile phones, the ICT Director for COM stated that he was not aware of any. He also agreed with the CL that the ICT policy was in draft form. The ICT Director, however, disagreed with the CL on the impact the absence of the ICT policy would have on the operations of library and information services delivered through mobile phones saying its absence would affect such services because there would be no document to regulate such services.

5.5.2.5 Lilongwe University of Agriculture and Natural Resources (LUANAR)

The UL for LUANAR stated that an institutional ICT policy to govern the implementation of library and information services delivered through mobile phones did not exist. He expressed the concern that lack of the policy affected provision of services. For instance, there were some materials that could not be circulated on a particular platform because of restrictions emanating from intellectual property rights. He was, therefore, hoping for the speedy implementation of the policy to address such type of issues. The UL further indicated that the library did not have policies/regulations that prohibited clients' use of mobile phones in the library but rather promoted responsible use of the same.

When asked whether he knew of any external policies that could affect the roll out and operations of library and information services delivered through mobile phones, the ICT Manager for LUANAR indicated that he was not aware of any. He also stated that the institutional ICT policy only existed in draft form. He added that within the draft ICT policy there were no provisions for implementation of library and information services delivered through mobile phones. The ICT Manager differed with the UL on the role of the policy in the implementation of a project such as that of library and information services delivered through mobile phones saying that the lack of the ICT policy should not affect use of mobile

technologies in the delivery of library services. He, however, acknowledged that whilst some challenges may be encountered, they could not seriously affect implementation of such services.

The environmental context of the TOE framework identifies the regulatory environment as one of the factors that impacts technology adoption both negatively or positively (Baker, 2012). Therefore, absence of ICT policies in public universities in Malawi could negatively impact implementation of library and information services through mobile phones.

5.5.3. Availability of Relevant Human Capacity for the Adoption and Use of Mobile Phones in Providing Library and Information Services

Human resources play a very important role in the offering of library and information services through mobile phones. Lessons learnt from a project undertaken at Oregon State University Library (Bridges et al., 2010) aimed at offering both user and reference library services through the mobile web (website accessible through mobile phone) shows that both professional library and technical staff collaborated in the planning, design, implementation, operationalisation and assessment of the services. It was based on this background that the researcher wanted to find out if the institutions in this study had the staff who possessed the required skills to offer library and information services through mobile phone.

5.5.3.1 Mzuzu University

The ICT Director stated that his department had a staff complement of 8 people that included both administrative and technical personnel. He indicated that the staff complement was not adequate but was quick to add that this had not adversely affected their operations because the available staff was able to move across, and hence service all departments. With regard to skills, the ICT Director was of the opinion that the staff he had, had the right skills and competencies to support a project aimed at offering library and information services using mobile phones.

The Librarian, on the other hand, stated that the library was adequately staffed. However, he indicated that the available staff needed further training to equip them with practical knowledge and skills to properly manage the use of mobile phones to offer library services.

5.5.3.2 Kamuzu College of Nursing

The CL for KCN indicated that the library was adequately staffed to handle the added work that may arise from using mobile phone to offer library services. He also boasted that most of the staff in the department, particularly those in the senior ranks, have computer science background hence were capable of managing library and information services offered through mobile phones. He further indicated that all libraries in the University of Malawi (KCN inclusive) had an ICT Directorate with personnel who could support the provision of library and information services using mobile phone.

Whilst acknowledging that the staff complement was adequate, the ICT Director for KCN stated that some of the staff was away on training. He indicated that three (3) fresh graduates had been recruited to enhance the staff complement. He pointed out that existing staff had the required skills to support the provision of library and information services using mobile phones.

5.5.3.3 The Polytechnic

When asked to say whether the institution had staff with requisite skills to help launch and manage library and information services offered through mobile phones, the CL for the Polytechnic answered “yes and no”. She indicated that staff with required skills were available in the library but not in the ICT department. She said that the ICT department sometimes took a long time to undertake some tasks such as updating the library website. This made her suspect that the department was understaffed. On how they could overcome this challenge if they were to roll out library and information services using mobile phones, the CL indicated that they planned to train Library Assistants (non-professional library staff) in ICT to close the skill gaps.

Although the CL doubted the adequacy of staffing in the ICT department, the ICT Director indicated that his department was adequately staffed. He also indicated that the staff had the knowledge and skills to oversee the implementation and management of library and information services offered through mobile phones. According to him, what was required is to send the staff for further training to perfect their skills.

5.5.3.4 College of Medicine

The CL for COM indicated that the library was adequately staffed with personnel that were conversant with the use of mobile phones to offer library and information services. He observed that skill gaps may only exist with newly recruited staff.

The ICT Director, however, indicated that his department was not adequately staffed. He stated that “most of the staff is senior but junior staff who do the donkey work are few. This scenario forces senior staff to do jobs that are meant for junior staff”. He also indicated that the library had its own ICT support personnel who could handle library-related issues but had since left.

5.5.3.5 Lilongwe University of Agriculture and Natural Resources (LUANAR)

With regard to availability of human resources in the library, the UL for LUANAR stated that the Library was adequately staffed. He indicated that all what was required was to train and equip more staff with the necessary skills to ensure that they were able to provide quality library and information services using mobile phones.

The ICT Director stated that his department was 80% adequately staffed. He indicated that the department had shifted priorities to many areas hence the staff seemed inadequate at times but they were managing with the staff they had. He also indicated that the available staff had all the necessary skills to manage the provision of library and information services using mobile phones. The ICT Director pointed out that the department faced the shortage of office space to accommodate newly recruited staff a development that was contributing to the staff shortage.

The organisational component of the TOE framework which addresses traits and characteristics of the organisation that influence IT adoption decisions such as financial slack and organisational size (Hsu et al., 2014) also recognises human resources as crucial for IT adoption. Similarly, the successful implementation of a project aimed at offering library and information services through mobile phones is dependent on the availability of human resources with the right skills and in adequate numbers. Findings of this study indicated that although libraries seemed to be adequately staffed, the staff lacked skills and experience in

the delivery of library and information services through mobile phones. On the contrary, technical staff had the skills required to support offering of library and information services through mobile phones but were not adequately staffed. This suggests that public university libraries in Malawi need to address human resource challenges to successfully offer library and information services on the mobile phone platform.

5.6 Electronic Information Resources and Services that are Currently Available in Public University Libraries in Malawi that can potentially be Provided Using Mobile Phones

The researcher asked university/college librarians in the case study sites to indicate electronic information resources and services they could offer using mobile phones. Findings obtained from each one of the five institutions are presented in the sections that follow.

5.6.1 Mzuzu University

The Mzuzu University Librarian stated that the institution, among others, provided the Online Public Access Catalogue (OPAC), institutional digital repository of Malawiana materials (e-resources authored by Malawians or about Malawi), e-journals and e-books which could be hosted on the mobile phone library platform. He also indicated that the library was hoping to acquire an e-granary (digital library of educational resources provided on the local area network) in the near future. With regard to the long-term availability of these resources, the UL was more positive about the institutional repository and OPAC than the other resources saying:

“We own the institutional repository and database for the OPAC hence their long-term availability is assured. However, the long-term availability of e-resources is dependent on the availability of funding to maintain the subscription”.

In terms of usage of the e-resources by both academic staff and students, the UL indicated that the e-resources were under-utilised. He attributed this problem to poor Internet connectivity on campus. Nonetheless, he indicated that he was hoping for increased usage upon completion of the campus-wide network project (that was being implemented at the

time of the interview) which was expected to improve Internet access. On another note, the UL indicated that the e-resources the institution was subscribing to were only accessible on-campus because the institution had not taken steps to make them accessible off-campus. This made it difficult for students and academic staff to access them using their mobile phones. However, he said that the library was making efforts to subscribe to an EZ proxy software that would make it possible for remote users, including those using mobile phones, to access the e-resources.

5.6.2 Kamuzu College of Nursing

The College Librarian for KCN also highlighted the presence of e-journals and e-books (provided under HINARI project of the World Health Organisation) as the resources which could be deployed through use of mobile phones in future. The CL further indicated that subscription to e-resources was done annually whilst e-books provided by HINARI were freely accessible. This implied that the long-term accessibility of these resources was assured.

The CL also observed that the e-resources were used more by both academic staff and students. Asked whether he saw the possibility that the e-resources could be accessed by students and academic staff through the use of mobile phones, the CL answered in the affirmative. However, he hinted that challenges relating to affordability of data charges and Internet connectivity needed to be addressed first if this project was to succeed, saying:

“Tablets donated by Airtel Malawi have not been rolled out yet because of challenges with the cost of purchasing data. Wi-Fi is again not easily accessible throughout the campus and other parts of the library, and this poses challenges in the use of the tablets”.

5.6.3 The Polytechnic

According to the CL for the Polytechnic, the library had e-resources (e-journals and e-books), OPAC, and institutional repository. A digital library was scheduled to be launched in the next financial year (commencing July, 2016). These are resources which were identified as accessible to patrons through the use of mobile phones. The CL further explained that there was potential for the long-term availability of these resources as the library planned to use library fees charged to postgraduate students for paying e-resources. In addition, the library

would use its share of resources generated from the Continuing Education Centre (CEC) to also pay for e-resources.

The CL was, however, not impressed with the current level of usage of the available e-resources. She indicated that the level of usage did not correspond with the level of investment made. Much as this were the case, the CL was still optimistic that prospects of the e-resources being accessed by students and academic staff using mobile phones were high. She indicated that the off-campus access to e-journals project that had just been implemented was well-received by students and academic staff, and hoped library and information services offered through mobile phones would equally be positively received.

5.6.4 College of Medicine

The COM, according to the CL, possessed the following resources which could potentially be accessed through use of mobile phones: OPAC, e-resource databases, and digital library for local content. The CL further indicated that the library had collaborations with other institutions such as the World Health Organisation (WHO) and the American Medical Journal that ensured long-term availability of some of these resources. However, he bemoaned the high library staff turnover which he indicated was hampering the growth of the digital library.

With regard to use of the e-resources by academic staff and students, the CL stated that usage was good. He attributed this to the popularisation of the Wi-Fi hotspots on campus. Asked to say if there was a possibility that the e-resources that the institution possessed could be accessed by students and academic staff through the use of mobile phones, the CL stated that this was already happening as these resources had already been made accessible through use of mobile phone.

5.6.5 Lilongwe University of Agriculture and Natural Resources (LUANAR)

E-journals, The Essential Electronic Agriculture Library (TEEAL) database, and digital repository of Malawiana materials are some of the electronic resources which the UL indicated that LUANAR Library had which could be offered through the use of mobile phones. He further indicated that the long-term accessibility of these resources was assured as long as the subscription was paid for and more documents were added to the local

repositories. The UL also stated that students and academic staff used the e-resources quite often. On the potential of deploying the available resources through the use of mobile phones, the UL stated that prospects were high.

5.7 The Current Status of Providing and Accessing Library and Information Services through Mobile Phones in Public University Libraries in Malawi

The researcher triangulated information obtained from the interviews conducted with the university/college librarians and data obtained from the questionnaires administered to the students and academic staff to arrive at findings that illuminated this theme. Findings obtained from the interviews are presented first followed by those obtained from the questionnaires.

5.7.1 The Use of Mobile Phones to Provide and Access Library and Information Services

Findings obtained from university/college librarians are presented in this section. The findings give an insight of how public university libraries in Malawi were using mobile phones to provide library services. Findings of each of the five institutions are presented separately.

5.7.1.1 Mzuzu University

Questioned if he was familiar with the potential uses of mobile phones in libraries, the UL for Mzuzu University indicated that he was. He pointed out SMS text messaging, and the downloading of information from databases as some of the examples. Asked if the library was planning to start using mobile phones in providing services in the near future, the UL answered in the affirmative. He indicated Facebook, digital library, and OPAC as some of the services they were planning to start with. He further indicated that the library was planning to prioritise electronic access to information as the library did not have enough books following the fire incident that happened in December 2015 that gutted down the library, and the use of mobile phones to provide and access information was one of the areas they were planning to exploit.

When queried to find out if he was familiar with academic uses of mobile phones by students and academic staff, the UL said yes. He identified downloading of library handbooks and rules, and reference queries as some of them. In terms of facilitating access to any of these services, the UL stated that the library's reference desk had made efforts to reach out to clients through Facebook. He indicated that this initiative might have encouraged library users to access the services they were accessing through mobile phones. As to whether students and academic staff were asking for the use of mobile phones in the delivery of library services, the UL stated that he was not aware of any of such requests.

5.7.1.2 Kamuzu College of Nursing

The CL for KCN also indicated that he was familiar with the potential uses of mobile phones in libraries, and that the library was planning to launch such type of services in the near future. In terms of service offering, he indicated that the library was planning to start with SMS service before extending it to OPAC. WhatsApp and Facebook were likely to be adopted at a much later stage. The CL further indicated that the SMS and OPAC services have their roots in the library management system they were using hence easier to adopt. He elaborated that trials for the SMS service were done in 2014 but was not pursued further because it faced implementation challenges as both students and academic staff seemed not ready to use their mobile phones to access library services when the service was piloted. He indicated that usage costs might have contributed to low usage.

Asked to shed more light on the academic uses of mobile phones by students and academic staff, the CL stated that students used their phones to access academic-related information on the college intranet such as news, time tabling, social events plus e-journals and e-books mainly for those who had iPads. Academic staff, on the other hand, used their mobile phones to communicate to students about class time tables and schedules, and also to log onto the college ICT facilities to access student records and emails. In spite of this, the CL conceded that the library had not played a big role in facilitating access to these services but only piloted the SMS service. With regard to students and academic staff asking about the use of mobile phones in service delivery, the CL indicated that both academic staff and students had never asked for such services. However, the CL believed that the library had the potential to offer library and information services using mobile phones.

5.7.1.3 The Polytechnic

The CL for the Polytechnic also stated that she was familiar with potential uses of mobile phones in libraries. She further indicated that the library was planning to implement such services in the near future. With regard to service offering, the CL pointed out that the library was planning to start with Facebook and mobile apps of publishers such as Ebscohost because many of them were already mobile-optimised. OPAC was likely to be brought in at a much later stage because it would require consultation and collaboration with the ICT Department.

On academic uses of mobile phones by students and academic staff, the CL indicated that most academic staff were using the phones for downloading academic-related articles whilst students used them mainly for googling articles for assignments. She also stated that the library provided information literacy courses that were aimed at promoting the use of e-resources. The CL further acknowledged that students and academic staff had asked for the library to implement the use of mobile phones in information service delivery. She added that many students and academic staff indicated that they were interested in accessing e-resources through the use of mobile phones.

5.7.1.4 College of Medicine

The CL for COM stated that he was familiar with the use of mobile phones in library services delivery, and that his institution was implementing them. He indicated Facebook, SMS and e-mails as the services that were being implemented on the mobile phone platform.

The CL identified accessing e-resources as the main academic uses of mobile phones by students and academic staff at COM. In terms of facilitating access to the e-resources, the CL stated that the library stopped subscribing to print journals way back in 2007 and started to promote the use of the e-resources.

5.7.1.5 Lilongwe University of Agriculture and Natural Resources (LUANAR)

The UL for LUANAR stated that he was familiar with the potential uses of mobile phones in libraries. Moreover, he indicated that the library started using phones (ground and mobile)

mainly to respond to queries from farmers, extension workers, students, teachers and policy makers as far back as 2004. However, the library had not extended these services to LUANAR students and academic staff who were the main client base of the library. The UL further indicated that the library was planning to deliver some of its services via WhatsApp and Facebook because they were commonly used by their clients.

Asked if he was familiar with academic uses of mobile phones by students and academic staff at the institution, the UL stated that no survey was done but assumed students and academic staff used them to access academic-related information. He further indicated that he was not aware of academic staff and students asking the library to provide library and information services using mobile phones.

5.7.2 Access to Information Resources Using Mobile Phones

Students were asked to indicate if they ever accessed e-books, e-journals, library website or OPAC using their mobile phone. Findings of their responses are presented in Figure 5.6, and they show that majority of the students 165 (52.9%) had ever used their mobile phone to access e-books whilst an equally bigger percentage of them 149 (47.8%) had ever used their mobile phone to access e-journals. A significant number of the students 110 (35.3%) also reported using their mobile phones to access the library website whilst only a few 37 (11.9%) used their mobile phone to access the OPAC. However, some of the respondents did not seem to understand what OPAC was, and perhaps its actual use could be much higher than what was reported.

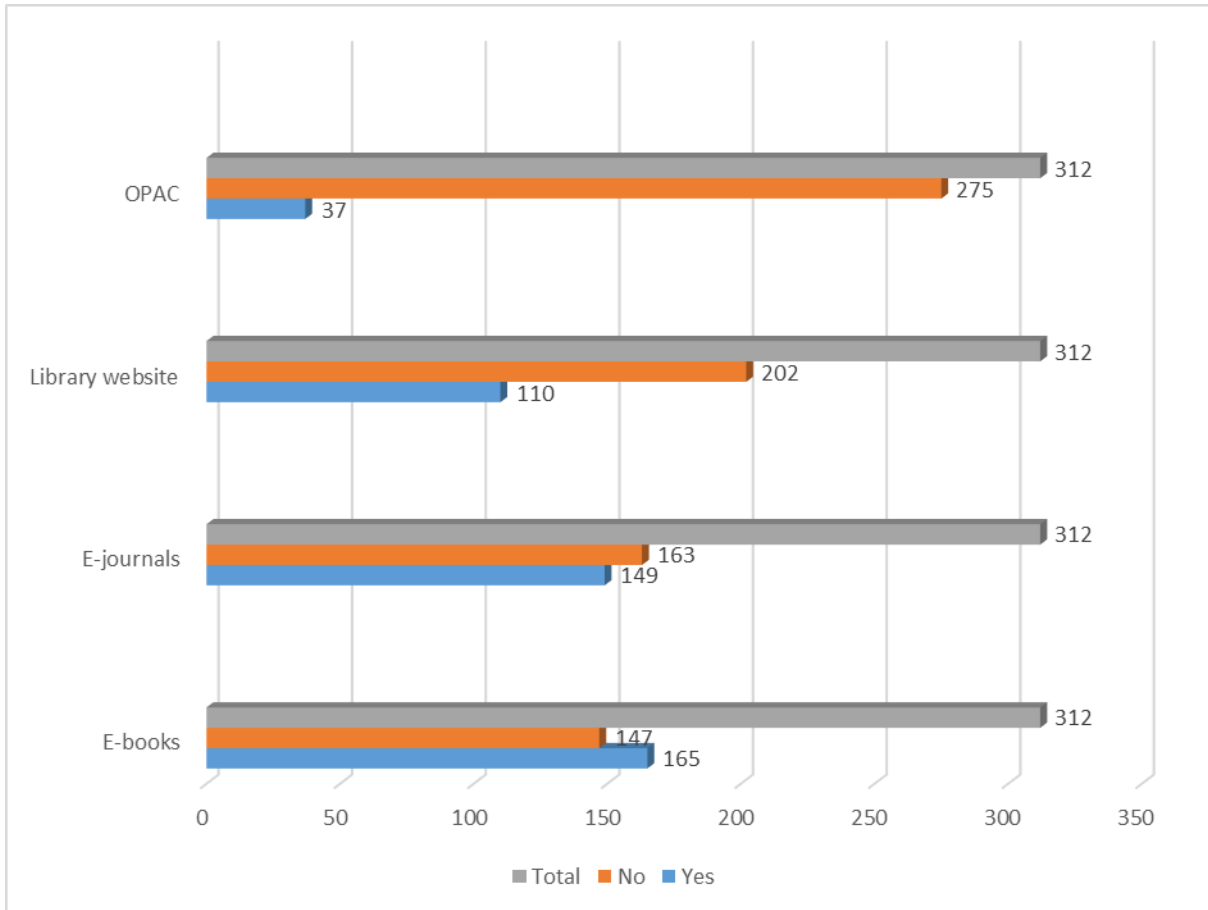


Figure 5. 6: Access to Information Resources Using Mobile Phone by Students (N=312)

Source: Survey data, 2016

Findings presented in Figure 5.7 show that majority of the academic staff 108 (49%) used their mobile phones to access e-journals, 90 (42%) used their mobile phones to access e-books and 69 (33%) used their mobile phones to access the library website. Only a few 18 (8%) academic staff used their mobile phones to access the OPAC. Moreover, academic staff reported using their mobile phones to access e-journals more than e-books whilst students used their mobile phones to access e-books more than e-journals.

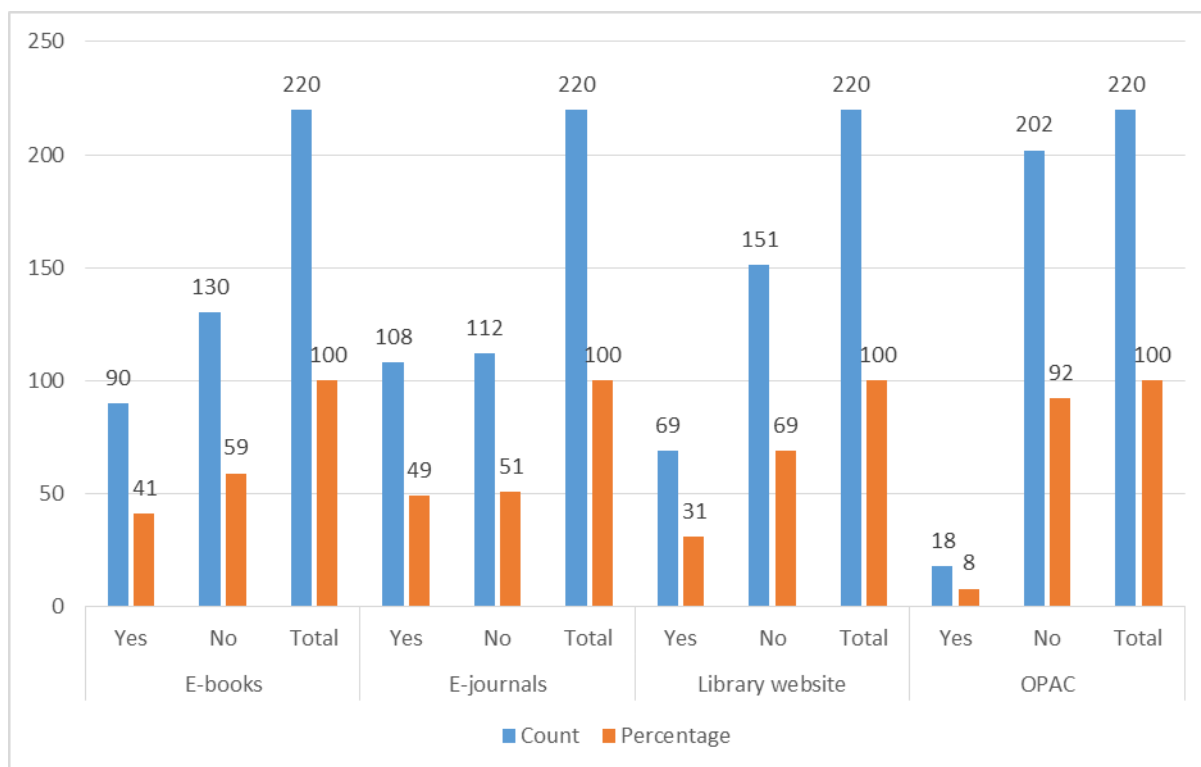


Figure 5. 7: Access to information resources using mobile phone by academic staff (N=220)

Source: Survey data, 2016

Findings presented in Table 5.15 indicate that majority of students either strongly agreed 143 (63.0%) or agreed 57 (25.1%) that they used mobile phone to access information resources over other available means such as laptops because mobile Internet was available from anywhere, anytime hence more convenient to use. The rest of the students either expressed no opinion 14 (6.2%), disagreed 11 (4.8%) or strongly disagreed 2 (0.9%) with this statement. Some of the reasons that made students to use mobile phones over other available resources were that it was easier to access services using mobile phone; because of PC shortage in the computer labs; mobile Internet was more reliable; and mobile Internet was cheaper to use. On the other hand, most of the students disagreed with the statement that they used mobile phone over other available means because they were influenced by a friend or because of frequent power outages in computer labs.

Table 5. 15: Why Students Used Mobile Phones over other Available Means i.e. Laptop Computers (N=227)

Reason for using mobile phone over other means i.e. laptops	Strongly agree	Agree	No opinion	Disagree	Strongly disagree	Total
Mobile internet is available from anywhere, anytime hence more convenient to use	143	57	14	11	2	227
	63.0%	25.1%	6.2%	4.8%	0.9%	100.0%
Mobile internet is more reliable	66	82	47	29	3	227
	29.1%	36.1%	20.7%	12.8%	1.3%	100.0%
PC shortage in computer labs	75	63	47	32	10	227
	33.0%	27.8%	20.7%	14.1%	4.4%	100.0%
Frequent power outages in computer labs	35	44	53	68	27	227
	15.4%	19.4%	23.3%	30.0%	11.9%	100.0%
Mobile internet is cheaper to use	96	48	31	36	16	227
	42.3%	21.1%	13.7%	15.9%	7.0%	100.0%
Book shortage in the library	82	71	37	27	10	227
	36.1%	31.3%	16.3%	11.9%	4.4%	100.0%
It is easier to access services using mobile phone	96	89	27	12	3	227
	42.3%	39.2%	11.9%	5.3%	1.3%	100.0%
Influenced (copied) from a friend	17	24	59	74	53	227
	7.5%	10.6%	26.0%	32.6%	23.3%	100.0%

Average Cronbach's Alpha value of the items in Table 5.15 was 0.665

Source: Survey data, 2016

Findings displayed in Table 5.16 indicate that academic staff used mobile phones over alternative means mainly because mobile Internet was available from anywhere, anytime hence more convenient to use; it was easier to access services using mobile phone; and mobile Internet was more reliable. A few academic staff used mobile phones because of frequent power outages; they found mobile Internet cheaper to use; and also because of book shortage in the library. However, shortage of PCs or laptops and influence of a friend were rejected as reasons for opting to use mobile phones over other alternative means.

Table 5. 16: Why Academic Staff Used Mobile Phones over other Available Resources such as Laptop Computers (N=137)

Reason for using mobile phone over other means i.e. laptops	Strongly agree	Agree	No opinion	Disagree	Strongly disagree	Total
Mobile internet is available from anywhere, anytime hence more convenient to use	91	38	2	3	3	137
	66.4%	27.7%	1.5%	2.2%	2.2%	100.0%
Mobile internet is more reliable	34	45	42	13	3	137
	24.8%	32.8%	30.7%	9.5%	2.2%	100.0%
PC shortage	5	20	65	27	20	137
	3.6%	14.6%	47.4%	19.7%	14.6%	100.0%
Frequent power outages in computer labs	14	23	59	28	13	137
	10.2%	16.8%	43.1%	20.4%	9.5%	100.0%
Mobile internet is cheaper to use	24	24	42	27	20	137
	17.5%	17.5%	30.7%	19.7%	14.6%	100.0%
Book shortage in the library	21	32	51	26	7	137
	15.3%	23.4%	37.2%	19.0%	5.1%	100.0%
It is easier to access services using mobile phone	50	41	35	7	4	137
	36.5%	29.9%	25.5%	5.1%	2.9%	100.0%
Influenced (copied) from a friend	4	8	56	27	42	137
	2.9%	5.8%	40.9%	19.7%	30.7%	100.0%

Average Cronbach's Alpha value of the items in Table 5.16 was 0.674

Source: Survey data, 2016

Findings presented in Figure 5.8 and 5.9 show that both students and academic staff indicated that the small screen size of mobile phone that made reading difficult, high cost of mobile Internet, and library websites that were not mobile friendly were the reasons that made some of them not to access some information resources using mobile phone.

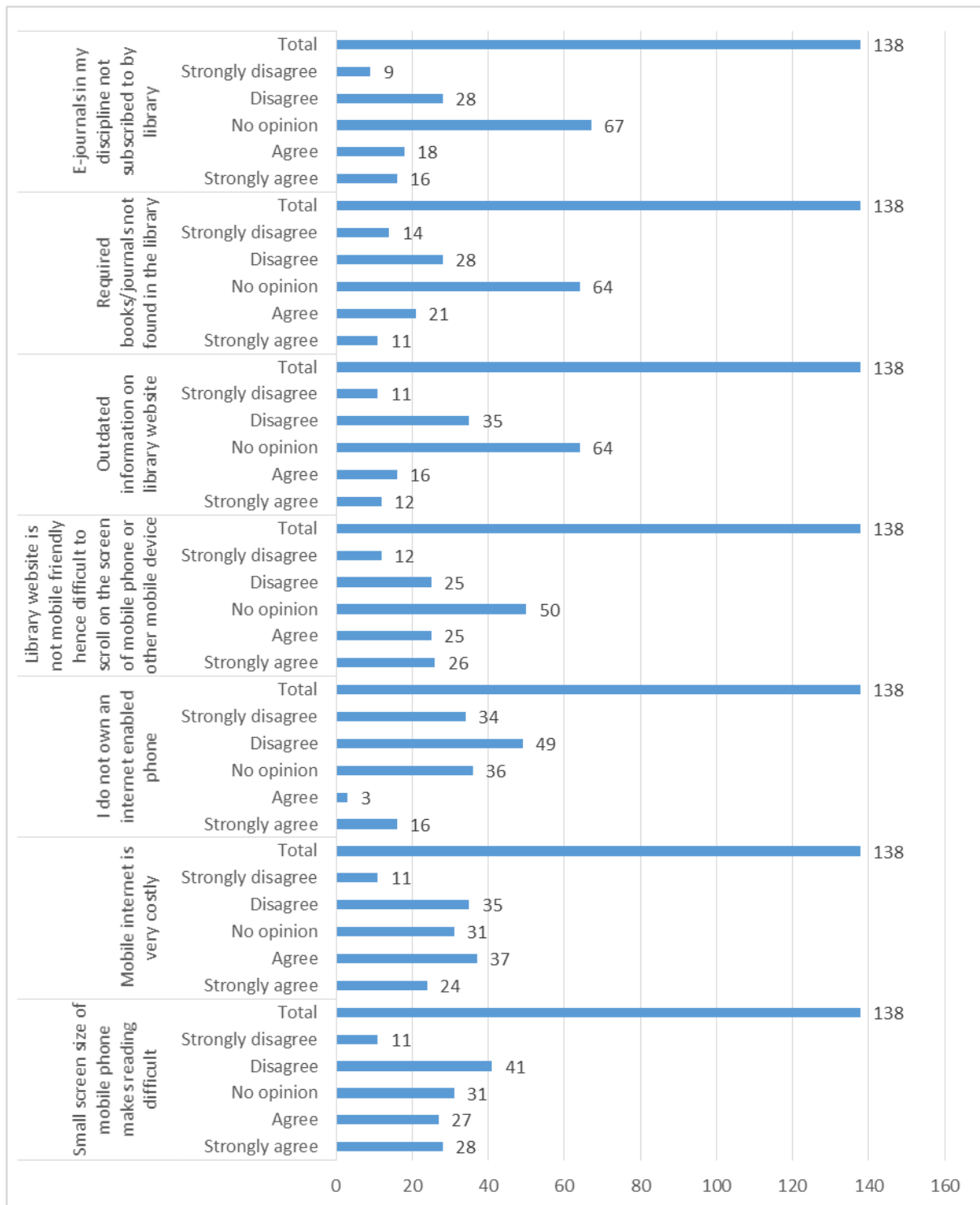


Figure 5. 8: Reasons for not Using Mobile Phones to Access Information Resources by Students (N=138)

Source: Survey data, 2016

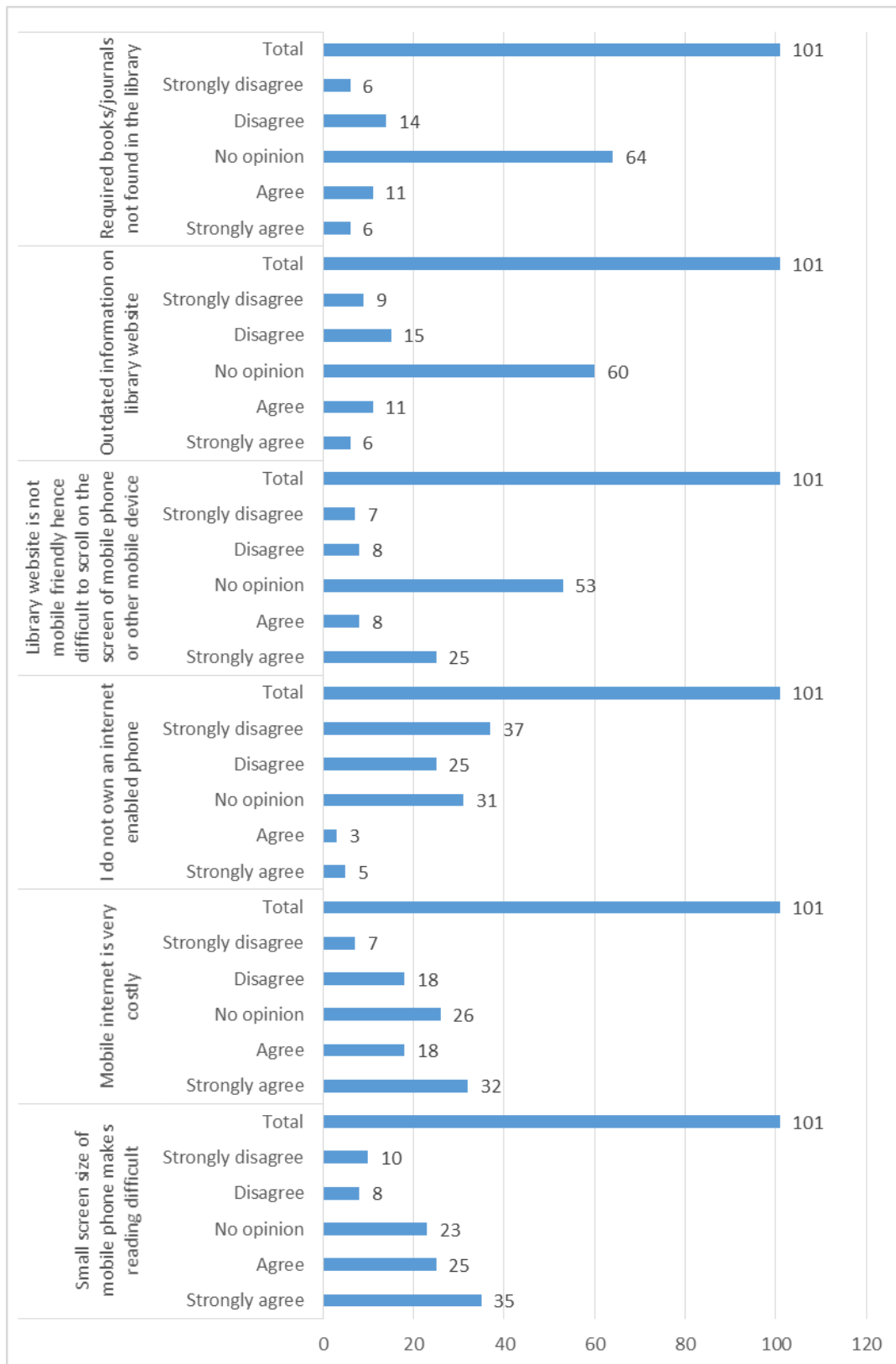


Figure 5. 9: Reasons for not Using Mobile Phone to Access Information Resources by Academic Staff (N=101)

Source: Survey data, 2016

The UTAUT model states that behavioural intention to use technology is driven by among others performance expectancy and effort expectancy. Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in a job whilst effort expectancy is defined as the degree of ease associated with the use of the system (Venkatesh et al., 2003). Findings of this study show that students and academic staff chose to access e-books and e-journals using mobile phones over other resources such as laptops because they expected higher performance (mobile internet is more reliable) with minimal effort (mobile internet is available from anywhere, anytime hence more convenient to use; it is easier to access services using mobile phone). Findings of this study further indicated that most of the students did not access e-books and e-journals using mobile phone as a result of influence of a friend. This shows that the construct of social influence did not have an impact on technology use which is similar to what Venkatesh et al. (2003) found out in validating the UTAUT model when he found that this construct is only significant in mandatory contexts and becomes nonsignificant in voluntary settings.

Students and academic staff who did not use mobile phone to access information services such as e-books and e-journals were asked to indicate if they were willing to use them in future if the challenges they faced (as indicated in Figures 5.8 & 5.9 respectively) were addressed. Their responses as computed and presented in Figure 5.10 show that both students and academic staff were willing to use their mobile phones to access information services such as e-books and e-journals if the challenges that stopped them from doing this were addressed. However, statistics show that students were showing greater willingness to use their mobile phones to access information services such as e-books and e-journals than academic staff as 88 (52%) of them said most definitely as opposed to 41 (40%) academic staff who did the same.

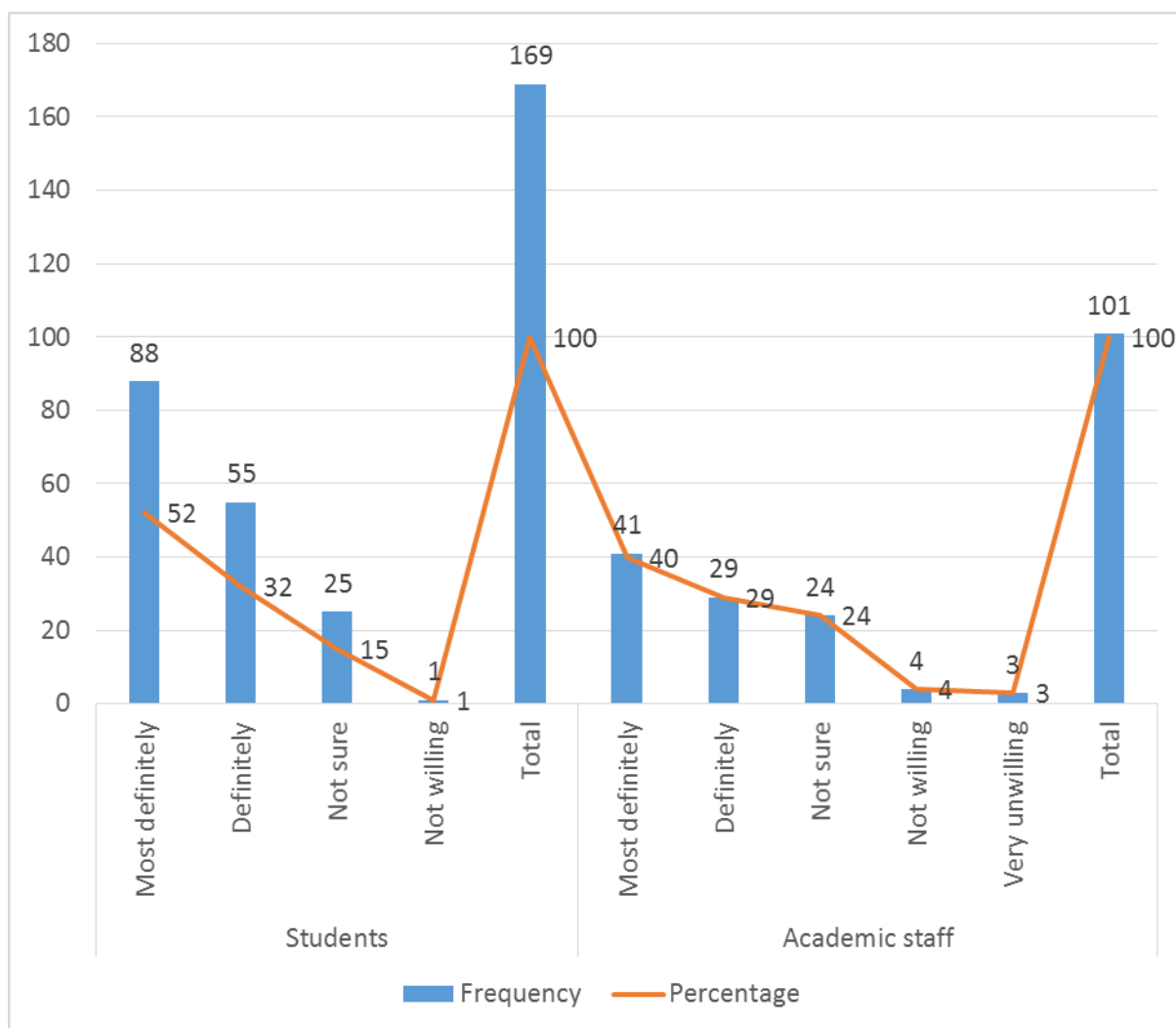


Figure 5. 10: Students and Academic Staff's Willingness to Use Mobile Phones to Access E-Books and E-Journals if Problems Identified in Figures 5.8 & 5.9 were Addressed (Students, N=169; Academic staff, N=101)

Source: Survey data, 2016

Students were further asked to indicate if they had ever used their mobile phone to call, email or text the library to seek help or access any reference service. An analysis of their findings as presented in Table 5.17 show that cumulatively only 60 (20%) students had ever used their mobile phones to call, email or text the library to seek help or access any reference service either rarely or frequently whilst the rest 240 (80%) were either not sure or had never used it.

Further analysis of the findings revealed that students at LUANAR 14 (34.1%) used their mobile phones to access reference services more than their colleagues in the other institutions, followed by their colleagues at KCN 4 (20%), The Polytechnic 23 (19.7%) and

MZUNI 15 (19.5%). Students from COM used their mobile phones the least 4 (8.9%) to call, email or text the library to seek help or access any reference service.

Table 5. 17: Students’ Responses to Use of Mobile Phone to Call, E-mail or Text the Library to Seek Help or Access any Reference Service (N=300)

Name of institution	Have you ever used your mobile phone to call, email or text the library to seek help or access any reference service?					Total
	Yes, frequently	Yes, but rarely	Not sure	Hardly use	Never used	
MZUNI	5	10	5	17	40	77
	6.5%	13.0%	6.5%	22.1%	51.9%	100.0%
KCN	0	4	0	9	7	20
	0.0%	20.0%	0.0%	45.0%	35.0%	100.0%
Polytechnic	9	14	8	38	48	117
	7.7%	12.0%	6.8%	32.5%	41.0%	100.0%
COM	1	3	2	15	24	45
	2.2%	6.7%	4.4%	33.3%	53.3%	100.0%
LUANAR	6	8	1	11	15	41
	14.6%	19.5%	2.4%	26.8%	36.6%	100.0%
Total	21	39	16	90	134	300
	7.0%	13.0%	5.3%	30.0%	44.7%	100.0%

Source: Survey data, 2016

Academic staff were asked to indicate if they had ever used their mobile phone to call, email or text the library to seek help or access any reference service. An analysis of their findings as presented in Table 5.18 show that cumulatively only 71 (32.4%) academic staff had ever used their mobile phones to call, email or text the library to seek help or access any reference

service either rarely or frequently whilst the majority 148 (67.6%) were either not sure or had never used it.

Additional analysis of the findings obtained from academic staff revealed that academic staff from KCN 11 (57.9%) used their mobile phones the most to access reference services from the library. Their colleagues from LUANAR 20 (40%) followed in a distant second. Academic staff from COM 9 (31%), MZUNI 17 (29.3%) and the Polytechnic 14 (22.3%) followed in that order.

Overall, usage of mobile phones by both students and academic staff to access reference services from the library was high at LUANAR and KCN. Surprisingly, students and academic staff at COM were observed not to use their mobile phones more to call, email or text the library to seek help or access any reference service despite the library reporting to have adopted the use of mobile phones in service delivery (see findings in section 5.7.1.4). Furthermore, academic staff used mobile phones slightly more than students to call, email or text the library to seek help or access any reference service.

Table 5. 18: Academic Staff’s Responses to Use of Mobile Phone to Call, Email or Text the Library to Seek Help or Access any Reference Service (N=219)

Name of your institution	Have you ever used your mobile phone to call, email or text the library to seek help or access any reference service?					Total
	Yes, frequently	Yes, but rarely	Not sure	Hardly use	Never used	
MZUNI	1	16	3	23	15	58
	1.7%	27.6%	5.2%	39.7%	25.9%	100.0%
KCN	3	8	2	3	3	19
	15.8%	42.1%	10.5%	15.8%	15.8%	100.0%
Polytechnic	3	11	2	20	27	63
	4.8%	17.5%	3.2%	31.7%	42.9%	100.0%
COM	2	7	1	13	6	29
	6.9%	24.1%	3.4%	44.8%	20.7%	100.0%
LUANAR	4	16	1	11	18	50
	8.0%	32.0%	2.0%	22.0%	36.0%	100.0%
Total	13	58	9	70	69	219
	5.9%	26.5%	4.1%	32.0%	31.5%	100.0%

Source: Survey data, 2016

Students who indicated that they have ever used their mobile phone to contact the library to access reference services were asked to indicate the mobile phone applications they used. An analysis of their findings as presented in Figure 5.11 revealed that students frequently used Instant messenger 31 (47%), e-mail 31 (47%), SMS 29 (43.9%) and also called 19 (28.8%) to contact the library. However, students did not frequently use social media tools such as Facebook, Twitter or WhatsApp 5 (7.8%) to contact the library to access reference services despite using them heavily for other purposes (see Table 5.13).

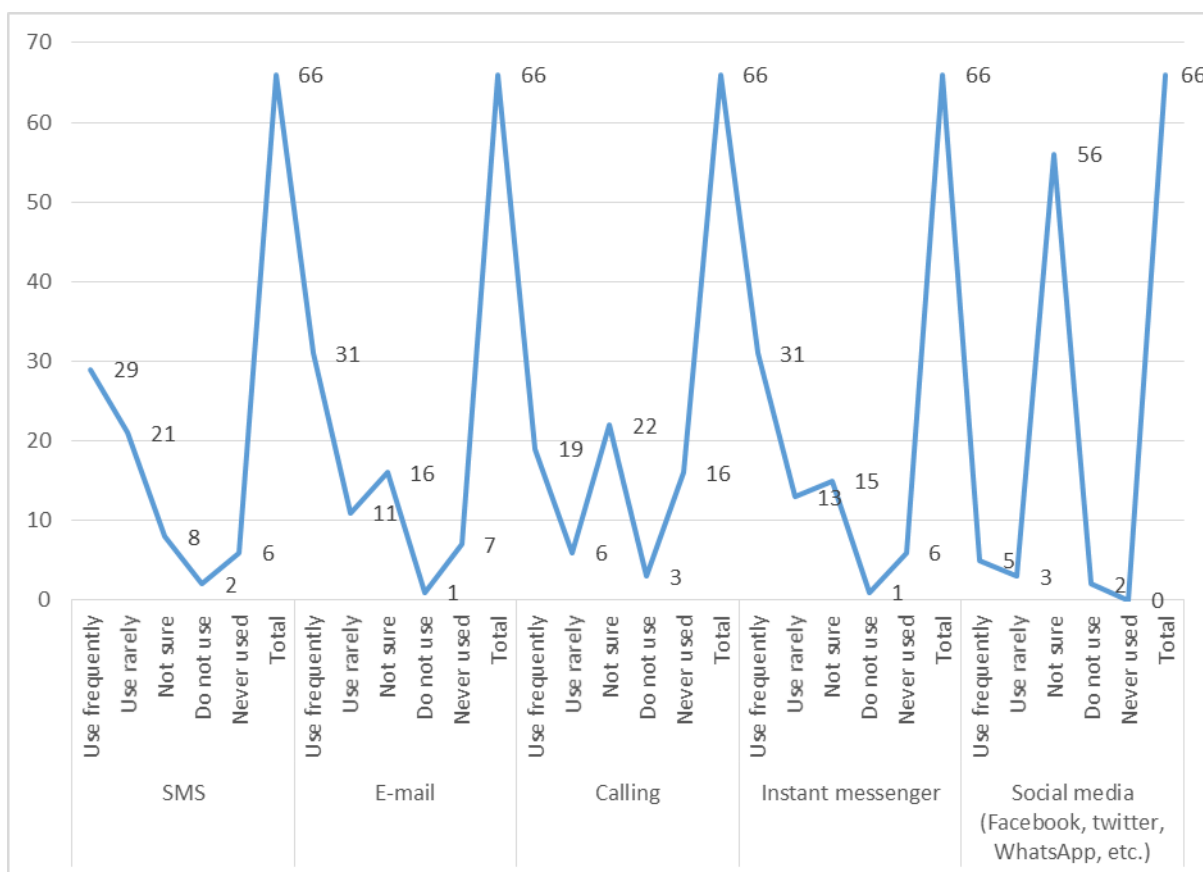


Figure 5. 11: Mobile Applications Students Used to Access Reference Services from the Library (N=66)

Source: Survey data, 2016

Similarly, academic staff who indicated that they have ever used their mobile phone to contact the library to access reference services were asked to indicate the mobile phone applications they used. Findings presented in Table 5.19 indicate that academic staff frequently called 34 (47.2%) or sent e-mail 27 (37.5%) to access reference services from the library. SMS 14 (19.4%) was largely of secondary function to them. Conversely, academic Staff did not use social media tools such as Facebook, Twitter or WhatsApp 8 (11.1%) and Instant messenger 6 (8.3%) much to access reference services from the library.

Table 5. 19: Mobile Applications Academic Staff Use To Access Reference Services from the Library (N=72)

Mobile phone application	Use frequently	Use rarely	Not sure	Do not use	Never used	Total
SMS	14	11	26	5	16	72
	19.4%	15.3%	36.1%	6.9%	22.2%	100.0%
E-mail	27	23	17	0	5	72
	37.5%	31.9%	23.6%	0.0%	6.9%	100.0%
Calling	34	18	10	2	8	72
	47.2%	25.0%	13.9%	2.8%	11.1%	100.0%
Instant messenger	6	3	34	6	23	72
	8.3%	4.2%	47.2%	8.3%	31.9%	100.0%
Social media (Facebook, twitter, and WhatsApp)	8	10	27	6	21	72
	11.1%	13.9%	37.5%	8.3%	29.2%	100.0%

Average Cronbach's Alpha of the items in Table 5.19 was 0.671

Source: Survey data, 2016

5.8 Attitudes of Library Staff, Academic Staff and Students towards the Potential Use of Mobile Phones in Providing and Accessing Library and Information Services

This section presents findings of the attitudes of library staff, students and academic towards the potential use of mobile phones in the delivery and access to library and information services. The findings are based on the data obtained from interviews conducted with the university/college librarians and questionnaires that were administered to the students and academic staff. Findings obtained from the interviews are presented first followed by those obtained from the questionnaires.

5.8.1 Mzuzu University

Asked to say what he knows about the attitudes of students, academic staff and library staff towards the use of mobile phones in the delivery and access to library services, the UL for MZUNI indicated that enthusiasm was there but only that others were discouraged by problems that affected the Wi-Fi network. However, he indicated that the library would proceed with its plans to offer library and information services through mobile phones. Nevertheless, he stated that cost considerations would affect the way the library would offer its services through mobile phones in that some of the content would be preloaded in tablets. This would ensure that users who may not afford the cost of accessing library and information services offered on the mobile phone platform through the mobile telecommunications networks have access to such resources.

5.8.2 Kamuzu College of Nursing

The CL for KCN stated that students, academic staff and library staff were initially not ready to use their mobile phones to access library services when the SMS project was piloted. He further indicated that the library had not seen students and academic staff use their mobile phones to access library services in large numbers. He suspected that data usage costs could have contributed to the low usage of mobile phones for library-related activities. In spite of this, he indicated that plans to roll out library and information services through mobile phones had not been affected.

5.8.3 The Polytechnic

The CL for the Polytechnic stated that attitudes of students, academic staff and library staff towards the delivery and access to library and information services offered through mobile phones were positive. Consequently, she indicated that the library planned to respond to the needs of users by introducing library and information services offered through mobile phones.

5.8.4 College of Medicine

The CL for COM had earlier on indicated that the institution was offering library and information services through mobile phones. On this particular aspect, he stated that the

attitudes of students, academic staff and library staff towards offering information services through mobile phones were positive. Therefore, the library was planning to work with the ICT department to increase the number of Wi-Fi hotspots with the aim of enhancing usage.

5.8.5 Lilongwe University of Agriculture and Natural Resources (LUANAR)

The UL for LUANAR noted that attitudes of students, academic staff and library staff towards the use of mobile phone to access to library services through mobile phones were positive. This had made the library to consider extending library and information services offered through mobile phones which were modestly offered to farmers, extension workers and other researchers to LUANAR students and academic staff.

Findings presented in Figure 5.12 indicate that majority of the academic staff 181 (82%) either strongly agreed 99 (45%) or agreed 82 (37%) with the statement that the use of mobile phones is good for offering library and information services. The rest of the academic staff 42 (18%) neither agreed nor disagreed 34 (15%), disagreed 5 (2%) or strongly disagreed 3 (1%) with the statement that the use of mobile phones is good for offering library and information services. This result suggests that the greater majority of the academic staff 181 (82%) held positive views about the use of mobile phones in the delivery of library services. Similarly, the majority of the students 274 (87%) held positive views about the use of mobile phones in the delivery of library services whilst 42 (13%) either expressed no opinion or held negative views about the use of mobile phones in service delivery. Findings presented in Figure 5.12 show that 128 (41%) students strongly agreed and 146 (46%) agreed that use of mobile phones is good for the delivery of library services. Conversely, 24 (8%) students neither agreed nor disagreed, 10 (3%) disagreed, and 8 (2%) strongly disagreed with the statement that use of mobile phones is good for the delivery of library services.

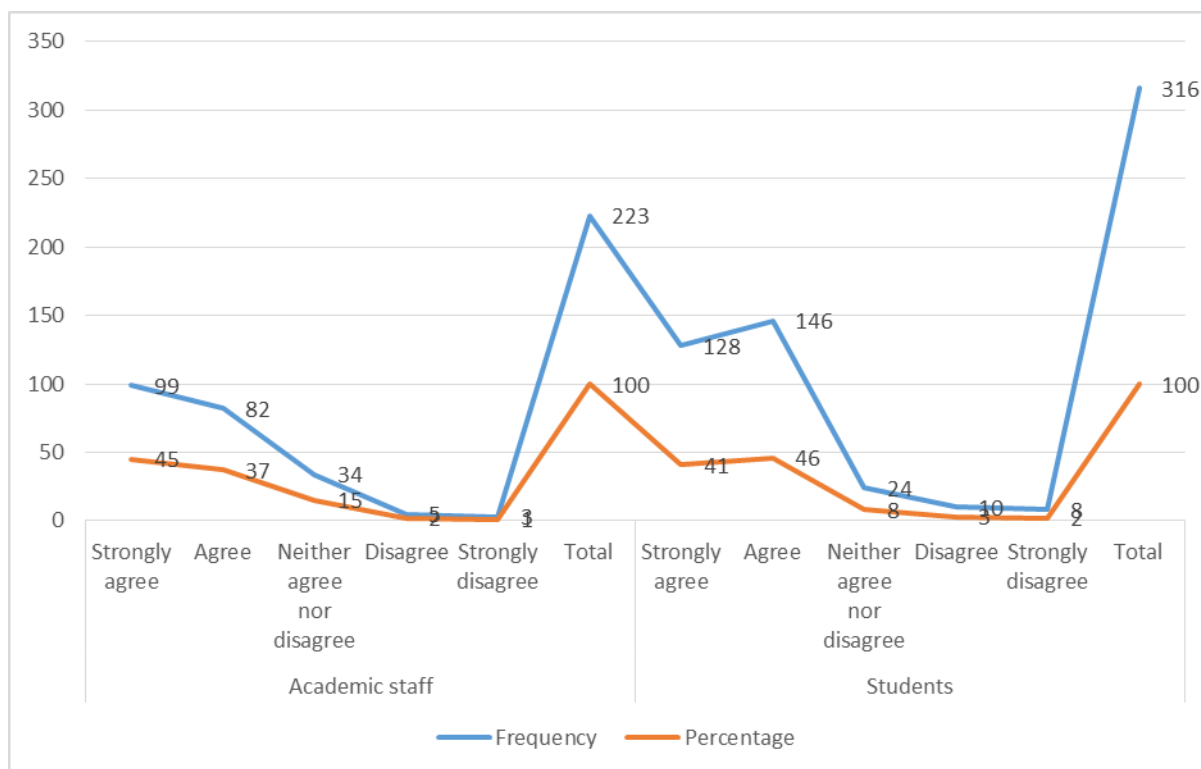


Figure 5. 12: Views Expressed by Students and Academic Staff Pertaining to Whether the Use of Mobile Phones is Good for Offering Library and Information Services (Academic staff, N=223; Students, N=316)

Source: Survey data, 2016

The majority of the students who stated that the use of mobile phone is good for offering library and information services strongly agreed with this statement mainly because mobile phones promote 24/7 access to library resources and services 152 (55.3%); and also because mobile phone facilitates anywhere access to library services hence it was viewed as convenient to use 150 (54.5%). Moreover, others strongly agreed with the statement that mobile phone is good for offering library services because it limits the scramble for PCs in the computer laboratories 127 (46.2%); and mobile phone promotes speedy access to information resources and services 124 (45.1%). However, only few 93 (33.8%) strongly agreed that use of mobile phone in the delivery of library services overcomes the challenge of power blackouts prevalent in the country. These findings are presented in Table 5.20.

Table 5. 20: Why Use of Mobile Phone is Good for Offering Library Services According to Students (N=275)

Why use of mobile phone is good for offering of library services	Strongly agree	Agree	No opinion	Disagree	Strongly disagree	Total
Promotes 24/7 access to library resources and services	152	95	25	3	0	275
	55.3%	34.5%	9.1%	1.1%	0.0%	100.0%
Facilitates anywhere access to library services hence convenient to use	150	98	24	2	1	275
	54.5%	35.6%	8.7%	0.7%	0.4%	100.0%
Promotes speedy access to information resources and services	124	121	24	4	2	275
	45.1%	44.0%	8.7%	1.5%	0.7%	100.0%
Limits the scramble for PCs in the computer laboratories	127	102	31	13	2	275
	46.2%	37.1%	11.3%	4.7%	0.7%	100.0%
Overcomes the challenge of power blackouts prevalent in the country	93	85	57	31	9	275
	33.8%	30.9%	20.7%	11.3%	3.3%	100.0%

Average Cronbach's Alpha value of the items in Table 5.20 was 0.763

Source: Survey data, 2016

Findings obtained from the academic staff presented in Table 5.21 followed a similar pattern to the students. The only difference was that findings obtained from academic staff had a higher rating when compared to that of students. For instance, the majority of academic staff 117 (65.4%) indicated that they strongly agreed with the notion that use of mobile phones in offering library services promotes 24/7 access to library resources and services. Others 113 (63.1%) indicated that use of mobile phones facilitates anywhere access to library services hence convenient to use. In each of these cases, the weighting was almost 10% higher when compared to that obtained from the students. Academic staff also strongly agreed that use of

mobile phone promotes speedy access to information resources and services 89 (49.7%), limits the scramble for PCs in the computer laboratories [for students] 75 (41.9%), and overcomes the challenge of power blackouts prevalent in the country 72 (40.2%).

Table 5. 21: Why Use of Mobile Phone is Good for Offering Library Services According to Academic Staff (N=179)

Why use of mobile phone is good for offering library services	Weight of measurement	Count	Percentage
Promotes 24/7 access to library resources and services	Strongly agree	117	65.4%
	Agree	46	25.7%
	No opinion	14	7.8%
	Disagree	2	1.1%
	Strongly disagree	0	0.0%
	Total	179	100.0%
Facilitates anywhere access to library services hence convenient to use	Strongly agree	113	63.1%
	Agree	54	30.2%
	No opinion	12	6.7%
	Disagree	0	0.0%
	Strongly disagree	0	0.0%
	Total	179	100.0%
Promotes speedy access to information resources and services	Strongly agree	89	49.7%
	Agree	59	33.0%
	No opinion	27	15.1%
	Disagree	4	2.2%
	Strongly disagree	0	0.0%
	Total	179	100.0%
Limits the scramble for PCs in the computer laboratories	Strongly agree	75	41.9%
	Agree	51	28.5%

	No opinion	40	22.3%
	Disagree	9	5.0%
	Strongly disagree	4	2.2%
	Total	179	100.0%
Overcomes the challenge of power blackouts prevalent in the country	Strongly agree	72	40.2%
	Agree	38	21.2%
	No opinion	40	22.3%
	Disagree	24	13.4%
	Strongly disagree	5	2.8%
	Total	179	100.0%

Average Cronbach's Alpha value of the items in Table 5.21 was 0.730

Source: Survey data, 2016

The findings presented in Figure 5.13 show that the majority of the students either strongly agreed 143 (45%) or agreed 144 (46%) that the library should formalise the provision of services through the use of mobile phones. On the contrary, 20 (6%) students neither agreed nor disagreed, 5 (2%) disagreed whilst 3 (1%) strongly disagreed that the library should formalise the provision of services through the use of mobile phones. This shows that majority of the students 287 (91%) were in favour of the library formalising the provision of services through mobile phones. Majority of academic staff 199 (90%) were also in favour of the library formalising the use of mobile phones in the delivery of library services. Findings show that 109 (49.1%) academic staff strongly agreed whilst 90 (40.5%) agreed that the library should formalise the use of mobile phones in the delivery of library services. Conversely, 18 (8.1%) academic staff neither agreed nor disagreed and 5 (2.3%) disagreed that the library should formalise the use of mobile phones in the delivery of library services.

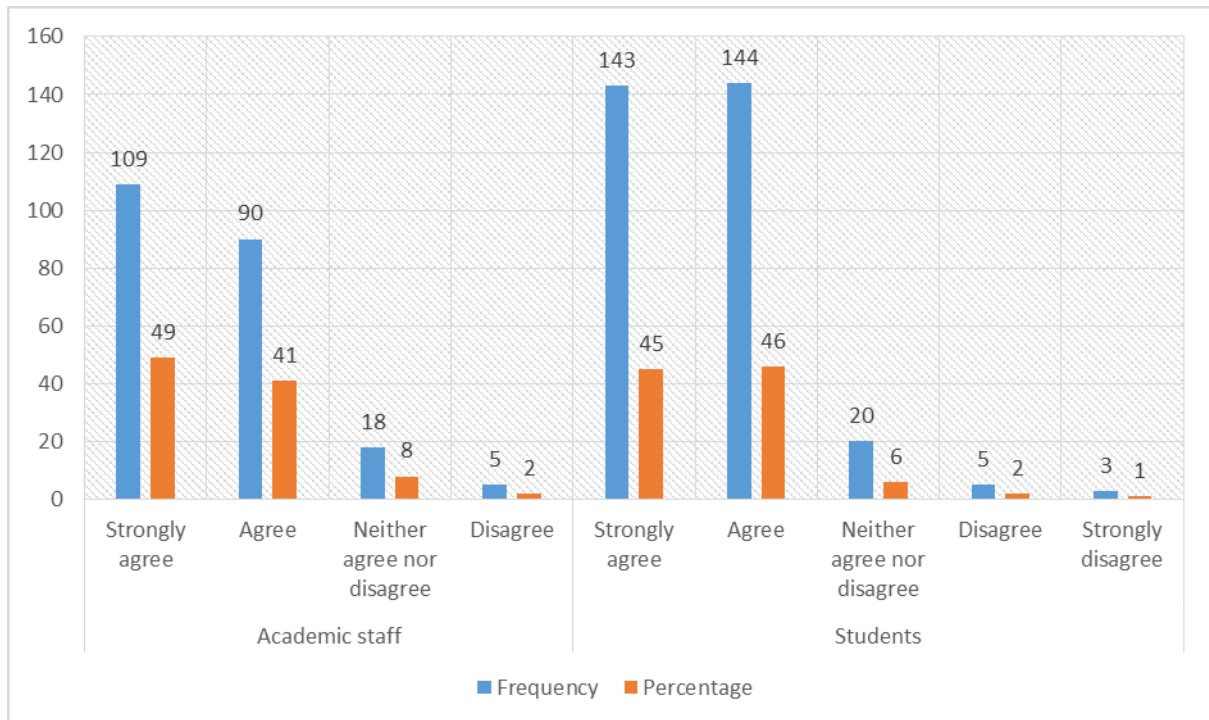


Figure 5. 13: Responses of Students and Academic Staff on Whether the Library Should Formalise Provision of Services through the Use of Mobile Phones (Students N=315; Academic staff N=222)

Source: Survey data, 2016

Student respondents who were in favour of the library formalising the provision of library and information services through mobile phones were asked to indicate the services they wished to be prioritised. An analysis of their responses shown in Table 5.22 indicate that 175 (57.9%) students strongly wanted to access e-books, 172 (57.0%) e-journals, 151 (50.0%) OPAC, 139 (46.0%) reference services, 124 (41.1%) lending services (Overdue reminders, book renewals, among others), 121 (40.1%) information services (Notification of recent acquisitions, change of opening hours, and news). Slightly fewer students 119 (39.4%) wanted to be able to check availability of short loan items and make reservations/bookings and 105 (34.8%) wanted user awareness or information literacy offerings. Very few 65 (21.5%) wanted to be able to carry out inter-library loan transactions.

Table 5. 22: Services Students wanted Libraries to Prioritise after Adopting the Use of Library and Information Services through the Use of Mobile Phones (N=302)

Service offering	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Online Public Access Catalogue (OPAC)	151	100	47	4	0	302
	50.0%	33.1%	15.6%	1.3%	0.0%	100.0%
E-journals	172	91	37	1	1	302
	57.0%	30.1%	12.3%	0.3%	0.3%	100.0%
E-books	175	89	37	1	0	302
	57.9%	29.5%	12.3%	0.3%	0.0%	100.0%
Reference services	139	100	57	6	0	302
	46.0%	33.1%	18.9%	2.0%	0.0%	100.0%
Lending services (Overdue reminders, book renewals, among others)	124	105	56	16	1	302
	41.1%	34.8%	18.5%	5.3%	0.3%	100.0%
Information services (Notification of recent acquisitions, change of opening hours, and news)	121	116	57	8	0	302
	40.1%	38.4%	18.9%	2.6%	0.0%	100.0%
Inter-library loans	65	96	120	18	3	302
	21.5%	31.8%	39.7%	6.0%	1.0%	100.0%
Checking availability of short loan items and making reservations/bookings	119	113	59	10	1	302
	39.4%	37.4%	19.5%	3.3%	0.3%	100.0%
User awareness or information literacy offerings	105	115	77	5	0	302
	34.8%	38.1%	25.5%	1.7%	0.0%	100.0%

Average Cronbach's Alpha value of the items in Table 5.22 was 0.859

Source: Survey data, 2016

Academic staff who were in favour of the library formalising the provision of library and information services through mobile phones mainly wanted to access to e-journals 144 (72.7%), e-books 135 (68.2%), Online Public Access Catalogue 124 (62.6%), lending services (Overdue reminders, book renewals, among others) 109 (55.1%), and information services (Notification of recent acquisitions, change of opening hours, and news) 108 (54.5%). Not many academic staff wanted the following services prioritised when libraries adopted the use of mobile phones in providing library and information services: Checking availability of short loan items and making reservations/bookings 96 (48.5%); reference services 83 (41.9%); and user awareness or information literacy offerings 69 (34.8%) (These findings are shown in Table 5.23).

Table 5. 23: Services Academic Staff Wanted Libraries to Prioritise After Adopting the Use of Library and Information Services through the Use of Mobile Phones (N=198)

Service offering	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
Online Public Access Catalogue (OPAC)	124	46	28	0	0	198
	62.6%	23.2%	14.1%	0%	0%	100%
E-journals	144	42	11	1	0	198
	72.7%	21.2%	5.6%	0.5%	0.0%	100.0%
E-books	135	44	16	3	0	198
	68.2%	22.2%	8.1%	1.5%	0.0%	100.0%
Reference services	83	60	55	0	0	198
	41.9%	30.3%	27.8%	0.0%	0.0%	100.0%
Lending services (Overdue reminders, book renewals, among others)	109	55	29	4	1	198
	55.1%	27.8%	14.6%	2.0%	0.5%	100.0%

Information services (Notification of recent acquisitions, change of opening hours, and news)	108	58	31	1	0	198
	54.5%	29.3%	15.7%	0.5%	0.0%	100.0%
Inter-library loans	61	60	69	7	1	198
	30.8%	30.3%	34.8%	3.5%	0.5%	100.0%
Checking availability of short loan items and making reservations/bookings	96	71	29	1	1	198
	48.5%	35.9%	14.6%	0.5%	0.5%	100.0%
User awareness or information literacy offerings	69	78	48	1	2	198
	34.8%	39.4%	24.2%	0.5%	1.0%	100.0%

Average Cronbach's Alpha value of the items in Table 5.23 was 0.827

Source: Survey data, 2016

5.9 Factors that influence the adoption and use of mobile phones by library staff, students and academic staff in providing or accessing library and information services

The researcher integrated findings from interviews conducted with university/college librarians and ICT directors together with findings obtained from questionnaires administered to students and academic staff in a bid to unearth factors that may influence the adoption and use of mobile phones by library staff, students and academic staff in providing or accessing library and information services. Findings obtained from interviews with university/college librarians and ICT directors are presented first followed by findings obtained from questionnaires administered to students and academic staff.

5.9.1 Mzuzu University

The UL for Mzuzu University pointed out factors that would influence the use of mobile phones in the provision of library services. These include shortage of staff with the right skills to provide library and information services through mobile phones; high cost of providing the service (for the library) and accessing the service (for students and academic staff); and availability of staff at all times to respond to users' queries (in case of reference services). With regard to staff shortage, the UL indicated that the library would have to deploy more staff to the reference desk to ensure timely response to clients' queries, something that may overstretch the available staff.

The researcher asked the ICT Director if his department was adequately funded in an attempt to find out how the budget would affect the support they may render in the provision of library and information services using mobile phones. The ICT Director indicated that he was getting the necessary support for funds needed to undertake ICT projects and activities. He, however, acknowledged that inadequate funding could hamper efforts to offer library services using mobile phones. He hoped that the prevailing goodwill from management would continue, and that more resources would be allocated for the provision of library and information services using mobile phones.

5.9.2 Kamuzu College of Nursing

The CL for KCN stated that there were some factors that would influence the use of mobile phones in providing library and information services. Availability of Wi-Fi would be the main factor in the provision of library and information services through mobile phones as it was not accessible in many areas on campus. The CL indicated further that the Wi-Fi network could be overwhelmed due to increased usage brought about by the introduction of library and information services through mobile phones. With regard to how the institution planned to overcome this factor, the CL indicated that the bandwidth needed to be increased.

The ICT Director for KCN hinted that the department was not adequately funded to carry out its activities. Asked whether inadequacy of funding could hamper the department's efforts to support the offering of library and information services through mobile phones, he indicated "not much". The main limitation in the offering of library and information services through

mobile phones, according to the ICT Director, was affordability of services to students in terms of Internet access away from campus. The ICT Director also indicated that management was very supportive of ICT development projects. In this regard, bandwidth had been increased in all the campuses of the college in 2015. For instance, the Lilongwe Campus had seen its bandwidth increase fourfold from 2MB to 8MB. The newly opened Kameza Campus in Blantyre had seen its bandwidth also increased substantially from 512Kb to 2 MB whilst the old Blantyre Campus had doubled bandwidth from 2MB to 4MB.

5.9.3 The Polytechnic

The CL for the Polytechnic identified the increased workload that may come about due to the added service range and nature of the library and information services offered through mobile phones as a factor which they may have to contend with. The CL also pointed out that Wi-Fi hotspots on campus were few. She indicated that this could force users, especially students, to use their own data bundles to access the services offered which may prove very costly.

The ICT Director stated that funding had been a problem for the department. This had made it difficult to implement all the projects that were desired. He indicated that inadequacy of funding had made the department to compromise on service delivery, particularly in the area of Internet connectivity, because of low bandwidth.

Asked if inadequacy of funding could hamper the department's efforts to support the provision of library services offered through the use of mobile phones, the ICT Director said "definitely". He indicated that bandwidth was very important in the provision of library and information services through mobile phones as it acts as the gateway in the provision and access to such services. However, the network was heavily congested during peak hours due to low bandwidth. He said this could affect the provision and usage of mobile phones to provide library and information services that may be introduced. The ICT Director further indicated that the provision of the library SMS service would require provision of funds for the purchase of relevant hardware and software such as the Unstructured Supplementary Service Data (USSD) SMS gateway, and hiring experts to install, commission and train staff on how to use it. The ICT Director, however, indicated that management was supportive of ICT development projects but their efforts were being hampered by inadequate funding.

5.9.4 College of Medicine

The CL for the COM indicated that there were a number of factors that were affecting the provision of library and information services through mobile phones. These included slow Internet speed due to limited bandwidth, periodic disruption of Internet services due to vandalism of fibre-optic cables, limited number of Wi-Fi hotspots, few tablets, and limited skills to provide and access library and information services using mobile phones.

The ICT director for COM indicated that his department was not adequately funded, a development that was negatively impacting service delivery. As already indicated, the department was facing challenges in increasing bandwidth and replacing aging servers. However, the ICT Director said that inadequate funding could not affect the department's efforts to support the offering of library and information services using mobile phones. This was so because the college was subscribing to e-journals which could be accessed on the mobile phone platform. However, he indicated that other services such as digitisation of resources could be affected. The ICT Director further indicated that management was supportive of ICT development projects as more projects such as the newly introduced project of offering library and information services through mobile phones were being undertaken.

5.9.5 Lilongwe University of Agriculture and Natural Resources (LUANAR)

The UL for the LUANAR identified the task of registering students' mobile phone numbers into the database as the major factor the library would likely face when they decide to embark on the project of providing library services through mobile phone. The library, therefore, hoped to carry out this exercise gradually starting with newly registered students and finishing with continuing students.

Responding to the question of whether his department was adequately funded or not, the ICT Manager for LUANAR indicated that his department was adequately funded. He further indicated that management was supportive of ICT development projects evident by the good funding they were getting.

The organisational context of the TOE framework has equally identified human resources, management support and financial resources as being important drivers of technology adoption in an organisation. Ramdani et al. (2013) indicated that the decision maker in technology adoption is likely to be in the top management team. This means that the decision maker's support is vital for technology adoption to take place as his/her role includes facilitating technology adoption and implementation through, among others, financial resource allocation for the project. The role of skilled human resources includes setting up and also running systems that make an organisation to realise its technology goals.

Students were asked to indicate factors that would impact their access to library and information services delivered through mobile phones. Findings presented in Table 5.24 show that 255 (80.9%) students either strongly agreed 128 (40.6%) or agreed 127 (40.3%) that poor network quality was a factor they would face in using mobile phones in accessing library services. The rest of the students 60 (19%) neither agreed nor disagreed 35 (11.1%), disagreed 23 (7.3%) or strongly disagreed 2 (0.6%) that poor network quality was a factor they would face in using mobile phones to access library and information services delivered through mobile phone. High service costs, delayed response, and query not adequately addressed are some of the notable factors which students identified as likely to impact their use of mobile phones in accessing library services with over 170 (50%) of the respondents indicating that they either strongly agree or agree with the statement. A good number of the students (over 130, 40%) also indicated that library policies that prohibited the use of mobile phones in the library, and messages not delivered on time were some of the factors that could negatively impact usage of the mobile phones to access library and information services offered through mobile phones. On the other hand, not many students indicated that mobile phones (mobile devices) quickly getting outdated, and lack of knowledge on usage were factors that could negatively impact usage of library and information services offered through mobile phones.

Table 5. 24: Factors that Would Impact Students’ Access to Library and Information Services Offered through Mobile Phones (N=315)

Factors	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
High service costs	118	97	62	34	4	315
	37.5%	30.8%	19.7%	10.8%	1.3%	100.0%
Poor network quality	128	127	35	23	2	315
	40.6%	40.3%	11.1%	7.3%	0.6%	100.0%
Mobile phones (mobile devices) quickly get outdated	35	51	129	88	12	315
	11.1%	16.2%	41.0%	27.9%	3.8%	100.0%
Lack of knowledge on usage	30	91	81	92	21	315
	9.5%	28.9%	25.7%	29.2%	6.7%	100.0%
Received no response to queries	33	81	148	49	4	315
	10.5%	25.7%	47.0%	15.6%	1.3%	100.0%
Library policies that prohibit use of mobile phones in the library	70	77	96	56	16	315
	22.2%	24.4%	30.5%	17.8%	5.1%	100.0%
Delayed response	60	117	102	32	4	315
	19.0%	37.1%	32.4%	10.2%	1.3%	100.0%
Reference query not adequately addressed	52	121	104	36	2	315
	16.5%	38.4%	33.0%	11.4%	0.6%	100.0%
Messages not delivered	45	91	123	50	6	315
	14.3%	28.9%	39.0%	15.9%	1.9%	100.0%

Average Cronbach’s Alpha value of the items in Table 5.24 was 0.762

Source: Survey data, 2016

Whilst students indicated poor network quality as the single biggest factor that could negatively impact the delivery of library services through mobile phones, academic staff identified high service costs and poor network quality as joint factors that could have a similar impact with over 140 (60%) of the respondents indicating that they either strongly

agree or agree to this statement. Reference query not adequately addressed, and library policies that prohibited the use of mobile phones in the library were some of the factors academic staff identified as likely to affect their access to library and information services offered through mobile phones with over 80 (30%) of them either strongly agreeing or agreeing to this statement. Conversely, messages not delivered, lack of knowledge on usage, and failure to receive a response to a reference query posed were some of the factors that few academic staff (less than 60 (30%)) indicated that they could affect access to library and information services offered through mobile phones. These findings are presented in Table 5.25.

Table 5. 25: Factors that Would Impact Academic Staff’s Access to Library and Information Services Offered through Mobile Phones (N=223)

Factors	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
High service costs	94	48	49	26	6	223
	42.2%	21.5%	22.0%	11.7%	2.7%	100.0%
Poor network quality	78	74	38	29	4	223
	35.0%	33.2%	17.0%	13.0%	1.8%	100.0%
Mobile phones (mobile devices) quickly get outdated	16	30	90	68	19	223
	7.2%	13.5%	40.4%	30.5%	8.5%	100.0%
Lack of knowledge on usage	26	40	74	48	35	223
	11.7%	17.9%	33.2%	21.5%	15.7%	100.0%
Received no response to queries	19	35	130	28	11	223
	8.5%	15.7%	58.3%	12.6%	4.9%	100.0%
Library policies that prohibit the use of mobile phones in the library	34	49	92	35	13	223
	15.2%	22.0%	41.3%	15.7%	5.8%	100.0%
Delayed response	21	56	109	28	9	223
	9.4%	25.1%	48.9%	12.6%	4.0%	100.0%
Reference query not adequately addressed	27	56	108	24	8	223
	12.1%	25.1%	48.4%	10.8%	3.6%	100.0%
Messages not delivered	15	43	121	34	10	223
	6.7%	19.3%	54.3%	15.2%	4.5%	100.0%

Average Cronbach’s Alpha value of the items in Table 5.25 was 0.788

Source: Survey data, 2016

5.10 Summary

The findings show that all the institutions covered by this study possessed the requisite ICT infrastructure for the roll out of library and information services using mobile phone. The ICT infrastructure available included servers, Internet connection, tablets, computers, and more. Although most of the requisite ICT infrastructure for the roll out of library and information services offered through mobile phones was available, the institutions did not have adequate bandwidth to ensure reliable Internet connection. The institutions as well as the country at large also seemed to have good mobile telecommunications network coverage whose performance was largely good. However, the service charges were described as exorbitant something which could affect both the offering and access to library and information services offered through mobile phones. The study also indicated that most of the students and all academic staff had mobile phones. Most of the mobile phones owned had Internet capabilities. This suggests that students and academic staff were capable of accessing library and information services offered through mobile phones.

Findings further show that all the five institutions covered by this study did not have operational policies to guide the implementation of library services through mobile phones as all their policies were in draft form. The absence of the policies had left some librarians and ICT Directors worried that this could affect the implementation of library and information services on the mobile phone platform. The study further found that no national policies existed that could have a negative impact on the operations of library and information services offered through mobile phones in the study sites.

Findings also revealed a mixed picture in relation to the human resources to manage the provision of library services that are delivered through mobile phones. Most of the libraries seemed to be adequately staffed but much of the staff lacked knowledge, skills and even experience in the delivery of library services on the mobile phone platform, something that could affect the quality of service delivery.

The study has also shown that libraries in this study possessed diversity of information resources which could potentially be accessed through the use of mobile phones. Topping the list were e-journals, e-books, OPAC, and institutional repositories of local content. These are resources that were common to all the institutions. Besides these, some of the libraries had or were hoping to acquire digital libraries and e-granary services which could potentially be

accessed on the mobile phone platform. Usage of the e-resources varied from institution to institution whereby usage was good in others and not so good in others.

Findings of the study indicate that some libraries had made efforts to introduce library and information services offered through mobile phones whilst the rest were planning to introduce these services. For instance, LUANAR pioneered introduction of library and information services offered through mobile phones though at a very modest level whilst KCN Library had experimented with the use of SMS in 2014 but the initiative did not succeed because students and academic staff were not willing to access the services that time. COM is the only institution which indicated that it had rolled out library and information services offered through mobile phones on a larger scale. Both students and academic staff had also reported using their mobile phones to seek reference services from their libraries. This presented an opportunity for the roll out of library and information services offered through mobile phones.

The findings have further shown that library staff, students and academic staff had positive attitudes towards the use of mobile phones in the provision and access to library and information services. The perceived positive attitudes of library staff, students and academic staff had convinced libraries already offering library and information services through mobile phones to scale up their operations. Libraries not offering the services had also made the decision to introduce such services in the near future to respond to the needs of their clients who demanded such services.

University/college librarians and ICT Directors identified skills of staff, ICT infrastructure (limited bandwidth, limited tablets, shortage of appropriate servers, among others) and cost of offering and accessing the services as factors that could hamper the offering of library services on the mobile phone platform. Students and academic staff also identified other factors that could have a bearing on access to library and information services delivered through mobile phones offered. Key among them were service costs and network quality. However, response times, query not adequately addressed, library policies on the use of mobile phones in the library, and delivery times of messages are some of the factors that could affect impact usage of library services offered on the mobile phone platform.

CHAPTER 6

DISCUSSION OF FINDINGS

6.1 Introduction

This chapter discusses and interprets the research findings presented in Chapter 5. According to Lincoln and Guba (1985), interpretation involves making sense of the data. At this stage, researchers link their interpretations to the larger research literature developed by others (Creswell, 2013). In doing so, the researcher is able to develop the story found in the data, making connections between the findings of the current study and existing theory and research (Fink, 2002). From the foregoing discussion, it is clear that interpretation and discussion of data are related concepts as their objective is to examine, interpret, and qualify the findings as well as draw inferences from them (Oso and Onen, 2008).

The aim of this study was to ascertain the level of eReadiness of public university libraries in Malawi in using mobile phones in the provision of library and information services. Specifically, the study addressed the following research questions:

1. What is the level of preparedness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services?
2. What electronic information resources and services are currently available in public university libraries in Malawi that can potentially be adopted and used through mobile phones?
3. What is the current status of providing and accessing library and accessing information services through mobile phones in public university libraries in Malawi?
4. What are the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services?
5. What factors influence the adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services?

The chapter is structured around themes and broader issues emanating from the research questions of the study. The chapter is organised logically in the order of the research questions. The research findings pertaining to each theme under discussion are briefly summarised followed by a discussion that compares current findings with those drawn from other studies and theoretical frameworks that underpinned this study.

6.2 Response Rates

All the ten interviews that were scheduled for the university/college librarians and ICT directors were done representing a 100% response rate. The study also achieved a good response rate from the questionnaires that were administered to students and academic staff. In total, 316 students out of the sampled 370 responded to the questionnaire representing an 85.4% response rate. However, the response rate was slightly higher for academic staff as 224 out of the 255 sampled responded to the questionnaire representing an 87.8% response rate. The average response rates achieved in similar survey studies have been varied. For example, Baruch (1999) cites 55.6% while Baruch and Holtom (2008) cite 52.7% average response rates in similar studies respectively. Gow and Liew (2009) in an investigation of potential users' cognitive beliefs and intention to use a proposed short message service (SMS)-based library catalogue system at the University of Wellington in New Zealand using survey questionnaires achieved a response rate of 92% which is slightly higher to the one attained in this study. Nonetheless, two other related studies have yielded lower response rates. In the first study, Ruppel and Vecchione (2012) conducted two surveys at Boise State University in the USA using a survey questionnaire as a data collection instrument. The first study was conducted in the Fall of 2010, and it examined the perceptions of respondents to chat reference service. The second study was done in Spring of 2011, and it surveyed respondents' perceptions of SMS reference service. The chat reference survey achieved a 23% response rate while the SMS reference survey attained a 20% response rate. In the second study, Parsons (2010) used a combination of email and web-based questionnaires to investigate the current habits of distance learners in higher education (HE) regarding information access and mobile device use, and their attitudes for future changes to their habits. This study which was carried out at The Robert Gordon University (RGU) in Aberdeen (UK), attained a 4.1% response rate.

6.3 E-readiness of Public University Libraries in Malawi in Terms of ICT Infrastructure, Policy Framework and Human Capacity for the Adoption and Use of Mobile Phones in Providing Library and Information Services

E-readiness covers so many aspects but the tools developed to measure the concept on average assess “the level of infrastructure development; connectivity; internet access; applications and services; network speed; quality of network access; ICT policy; ICT training programs; human resources; computer literacy; and relevant content” (Toufani and Montazer, 2011, p.472). However, in studying the e-readiness status of public university libraries in Malawi to offer library and information services through mobile phones, the present researcher mainly focussed on three main aspects. These included ICT infrastructure, policy framework and human capacity. Findings obtained in relation to these aspects are discussed subsequently.

6.3.1 E-readiness of Public University Libraries in Malawi in Terms of ICT Infrastructure for the Adoption and Use of Mobile Phones in Providing Library and Information Services

ICT infrastructure plays a very important role both in the delivery and access to library and information services through mobile phones. Therefore, the study sought to find out the availability of ICT infrastructure at institutional level which is critical for the offering of library and information services through mobile phones by the libraries, and access to library and information services through mobile phones by students and academic staff. Findings indicated that all the libraries studied had most of the requisite ICT infrastructure to facilitate the offering of library and information services through mobile phones save for bandwidth which was inadequate in all the institutions. The available ICT infrastructural resources available were mainly Internet infrastructure and ICT systems such as Library Management System (LMS), servers, tablet computers, desktop computers, and fibre-optic backbone that facilitated access to both wired and Wi-Fi Internet access. Furthermore, the Polytechnic had an E2 Proxy Server which could facilitate remote access to e-resources.

Besides the ICT infrastructure, institutions studied had plans to acquire and install other ICT-related infrastructure to facilitate the offering of library and information services through mobile phones. The Polytechnic, for instance, was planning installing the Unstructured Supplementary Service Data (USSD) SMS gateway to assist in the offering of the SMS

reference service. Conversely, MZUNI was hoping to acquire an electronic library and e-granary which could potentially be offered on the mobile phone platform. LUANAR was also exploring the possibility of using cloud infrastructure to support ICT projects including the offering of library and information services through mobile phone. Moreover, most of the ICT equipment which the institutions needed, save for cloud infrastructure, was available on the local market. This implies that the institutions in the current study could easily acquire such type of infrastructure if they had financial resources.

Findings further revealed that although much of the required ICT infrastructure was available, libraries in the institutions surveyed faced some challenges which could negatively affect the offering of library and information services through mobile phones. Most notably, MZUNI indicated that it needed more desktop and tablet computers, and servers with bigger capacity. KCN acknowledged using cheaper ICT equipment due to cost considerations whilst COM conceded that some of the servers in use were old hence needed to be replaced with more modern servers. Besides, all the institutions faced the challenge of limited Internet bandwidth in spite of various initiatives undertaken aimed at increasing their bandwidth.

A number of case studies undertaken to probe projects aimed at delivering library and information services through mobile phones (Li, 2013; Jetty and Anbu, 2013; Wang et al., 2012; Bridges et al., 2010) have shown that libraries that were making use of mobile internet, SMS and MMS among others in the delivery of both user and reference services needed a robust network infrastructure, desktop and laptop computers, tablet PCs, and more. Similarly, the technological context of the TOE framework identifies all of the technologies that are relevant to the firm (both at firm level and outside the firm) as critical to technological adoption (Baker, 2012). Furthermore, facilitating conditions of the UTAUT model state that existence of the technical infrastructure to support the use of a particular system aids in technology adoption and use (Venkatesh et al., 2003). The fact that most of the required ICT infrastructure was available in the study institutions suggests that they had built the capacity necessary to support the offering of library and information services using the mobile phone platform.

As already noted, the institutions covered by this study faced chronic challenges related to the Wi-Fi network infrastructure and limited bandwidth. The ECAR (2015) study of undergraduate students' ownership and use of mobile devices in the USA indicated that

students living on campus rated their network experiences considerably lower than students living off-campus whereby only three in five students stated that they had reliable access to Wi-Fi throughout their campus (58%) or in classrooms/instructional spaces (63%) (Dahlstrom et al., 2015). This challenge came about mainly because of the huge number of mobile devices which students connected to the campus network. The US study revealed that 61% of students connected at least two devices to the campus network at the same time.

With regard to ownership, findings of the current study showed that mobile phone ownership amongst students and academic staff was very high. Whilst mobile phone ownership amongst academic staff was 100% (224), that of students was 99.7% (315). Another worthwhile finding of the current study was that multiple mobile phone ownership was prevalent. Whereas 215 (68.5%) students indicated that they only owned one mobile phone, a good part of the student body 90 (28.7%) indicated that they owned two mobile phones. In addition, 7 (2.2%) students indicated that they owned three mobile phones and only 2 (0.6%) students pointed out that they owned more than three mobile phones. Further analysis of findings obtained from academic staff indicated that only a few 102 (45.5%) owned one mobile phone whilst the majority 122 (54.5%) owned two or more mobile phones. These findings show that besides having a higher ownership rate, academic staff also owned more mobile phones than students.

Findings of the current study bear some resemblance but also differ in some aspects to those made in the MACRA (2014) survey on access and usage of ICT services in Malawi. Findings of the MACRA (2014) survey indicated that mobile phone ownership in the national population was highest (88.1%) amongst respondents with tertiary and post tertiary education qualification and lowest (22.5%) for those with primary education or lower. The results resonate with the current study where mobile phone ownership was high amongst respondents with high levels of education attainment. However, mobile phone ownership reported in the current study (315, 99.7% for students and 224, 100% for academic staff) was higher than those reported in the MACRA (2014) survey (88.1%).

The high ownership rates of mobile phones observed in the current study resemble findings made in a number of other studies obtained in various parts of the world. Becker et al. (2013), using an open survey method that involved 613 students, investigated mobile phone ownership of students at Hunter College in New York. They found that 98.7% of the students

owned mobile phones. The mobile phone ownership rate reported in this study is slightly lower compared to that obtained in the current study but this could be a result of the three year time difference in which the two studies were done. In a longitudinal study of first-year Business School students at London Metropolitan University, Bradley and Holley (2010) tracked mobile phone ownership among students between the years 2005 - 2009. Their findings indicated that mobile phone ownership among students was always high for most of the years as it ranged from 98.6% in 2005 to 100% in 2009 which is similar to what was observed in the current study.

A number of related studies carried out in Africa have also shown mobile phones to be pervasive amongst students. Akeriwa et al. (2015) did a study focusing on the use of mobile technologies for social media-based library services at the University of Development Studies Library in Ghana. This study, which involved 155 graduate students found out that 117 of the 119 respondents owned a mobile phone, representing a 98.3% penetration rate. Another study conducted by Thinyane (2010) involving 270 students at Rhodes and Fort Hare Universities revealed that 98.1% of the students owned a mobile phone, with some students owning more than one mobile phone as was the case in the current study. Furthermore, Dewah and Mutula (2013) conducted a study on mobile phone access and use among students at the National University of Technology (NUST) in Zimbabwe, targeting fourth year undergraduates and master's students. The study found that all the students surveyed owned a mobile phone representing 100% ownership rate.

The findings obtained in the current study also differ with those arrived at in other related studies. Ruleman (2012), for instance, carried out a web-based survey at the University of Central Missouri between May and September 2010 with the aim of determining the technology user characteristics of students and faculty (academic staff). Findings revealed that students (59%) owned more smartphones than faculty (43%). Similarly, findings of an ECAR (2015) study of ICT ownership and use amongst faculty (academic staff) covering 139 colleges and universities and 13,276 faculty members in the USA indicated that smartphone ownership amongst academic staff was 89% (Brooks, 2015). However, a study conducted by Dahlstrom et al. (2015) covering 161 institutions and 50,274 students revealed that smartphone ownership amongst students was 92%. This suggests that mobile phone ownership in the USA was higher amongst students than academic staff as opposed to the present study where ownership was higher for academic staff than students.

Findings of the current study also indicated that Nokia and Samsung were the most pervasive mobile phones amongst students and academic staff in public university libraries in Malawi. The two phones accounted for 183 (45%) ownership rate amongst students and 162 (46.5%) ownership rate amongst academic staff, which was close to half of entire mobile phone ownership amongst both groups. ZTE and Blackberry phones were equally pervasive amongst students and academic staff but their ownership rate was less than 20% for both groups. However, Huawei mobile phones were only pervasive among students. Similarly, the iPhone, HTC, ITEL and other phones were pervasive only amongst academic staff. On the contrary, Alcatel and TECNO mobile phones were discovered not to be pervasive amongst students and academic staff.

These findings partly reflect the findings obtained in studies conducted by Dewah and Mutula (2013) in Zimbabwe and Balakrishnan and Raj (2012) in Malaysia. The former found that Nokia with 57% ownership rate, were the most pervasive mobile phones among students at the National University of Science and Technology in Zimbabwe whilst the latter found that Nokia mobile phones were equally pervasive in Malaysia (Balakrishnan and Raj, 2012). These findings, however, are in sharp contrast to those made in studies conducted in Europe and the USA where Apple and other Android mobile phones were found to be dominant (Dahlstrom and Bichsel, 2014; Nowlan, 2013). A study conducted by Dahlstrom and Bichsel (2014) revealed that 54% of USA undergraduate smartphone owners owned an iPhone and only 43% of the respondents owned an Android phone. Another study conducted by Nowlan (2013) at the University of Regina in Canada showed that a large portion of the students surveyed possessed the iPhone, Blackberry, and Android devices.

Findings of the current study further show that most of the phones which students and academic staff owned were Internet-enabled (299, 94.9% for students and 216, 96.4% for academic staff). Although the study did not investigate whether the mobile phones owned by the respondents were either feature phones or smartphones, the high percentage of Internet-enabled phones could point to the high prevalence of smartphones as this is the main characteristic of smartphones (Song and Lee, 2012; Yu, 2012). The implication of this finding is that most of the respondents were capable of accessing most of the services that libraries may offer on the mobile phone platform as many of the services libraries are offering through mobile phone are web-based. The seemingly high pervasiveness of

smartphones in this study reflects findings of a study by Palumbo (2015) who observed that smartphones were making inroads in Africa. Moreover, it is a reflection of current global trends whereby a number of studies have recorded high ownership of smartphones amongst both students and academic staff. For instance, the ECAR (2015) study of faculty ownership of mobile ICT devices had shown that smartphone ownership was at 89% whilst the ECAR (2015) study of student ownership of mobile ICT devices had shown that ownership of smartphones was at 92% (Brooks, 2015; Dahlstrom et al., 2015). Dewah and Mutula (2013) also found out that 73% of the respondents in their study owned smartphones.

Findings of the current study showed that age and gender had no significant effect on mobile phone ownership. This is in sharp contrast to what is contained in the UTAUT model which underpinned this study that identifies gender and age as some of the moderators of the key drivers of behavioural intention to use technology. The model states that gender moderates performance expectancy, effort expectancy and social influence. Age, on the other hand, has a moderating effect on all the three drivers of behavioural intention already indicated plus facilitating conditions that has a direct effect on usage of technology (Venkatesh et al., 2003).

Findings obtained in the current study indicated that other mobile devices such as iPads, Galaxy tabs (also referred to as tablet PCs) had a smaller penetration rate. Statistics show that 65 (21%) students and 94 (42.7%) academic staff owned such devices. However, academic staff ownership of such devices was twice that of students. Some of these mobile devices, as is the case with Samsung's Galaxy tab, embrace the functionalities of mobile phones that include the call function. Much as the main focus of this study was on mobile phones (smartphones and feature phones), the researcher briefly tackled this aspect as it was seen as alternative way of providing and accessing library and information services on the mobile phone platform. Based on the findings made in the current study, it can be stated that academic staff were in a much better position to exploit the potential of these devices in accessing library and information services offered or to be potentially offered on the mobile phone platform as a good number of them owned them.

These findings bear some resemblance to those in other studies but are also in variance with others. The ECAR (2015) studies focusing on students and faculty had shown tablet PC ownership among academic staff (80%) to be higher when compared to that of students (56%) (Brooks, 2015; Dahlstrom et al., 2015) which is similar to what was observed in the

current study. However, findings of the present study differ with those obtained in the two studies cited in that tablet PC ownership was observed to be far much lower. In fact, tablet PC ownership of academic staff in the present study 94 (42.7%) was almost half of what their American counterparts owned (80%) whilst that of students 65 (21%) was almost a third of what fellow American students owned (56%). Similarly, the Pearson (2015) study focusing on mobile ICT device ownership by undergraduate students in the USA showed that tablet PC ownership was booming, rising from 38% in 2013 to 45 % in 2014 before hitting the 52% mark in 2015 (Poll, 2015). This clearly shows that ownership levels of tablet PCs amongst students and academic staff in the institutions in this study was low.

Findings of the current study exhibited very high levels of mobile phone use amongst students and academic staff. Cumulatively, 264 (85.4%) students or roughly 4 out of 5 students indicated that they used their mobile phones either very frequently 174 (55.9%) or frequently 92 (29.6%). Additionally, 40 (12.9%) students used their mobile phones moderately whilst only 5 (1.6%) used their phones either rarely 4 (1.3%) or very rarely 1 (0.3%). Likewise, 202 (92.3%) academic staff stated that they used their mobile phones either very frequently 167 (76.3%) or frequently 35 (16.0%). Only 17 (7.8%) academic staff indicated that they used their mobile phones moderately. Although usage was evidently high amongst students and academic staff, it is also clear that it was higher amongst academic staff. Findings further show that females used their mobile phones more frequently than males with female academic staff having an even higher frequency of use than female students (See Tables 5.10 & 5.11). Findings based on age range and frequency of mobile phone use among academic staff showed high rates of usage across all the age groups, with over 50% of the respondents in the different age groups indicating that they used their mobile phones very frequently but the 50-60 age group registered a remarkably higher percentage of usage 56 (85.7%). In spite of the notable differences in usage between the two sexes and age ranges, findings of the Chi-square tests did not show any statistically significant correlation of mobile phone use in relation to gender on one hand and age on the other. This finding could be attributed of the higher educational status of the respondents coupled with the mobile phone's ability to perform a number of functionalities that included communication, educational and social functions. This implies that the overall needs of the respondents were largely uniform hence the respondents used their mobile phones to fulfil those needs. However, the differences observed in mobile phone use in relation to age and gender are contrary to the UTAUT model that posits that age and gender have a moderating effect on IT

usage. Age, for instance, impacts all the four constructs of the UTAUT model namely performance expectancy, effort expectancy, social influence and facilitating conditions. Gender, conversely, impacts performance expectancy, effort expectancy and social influence.

The study findings pertaining to uses of mobile phones indicated that students and academic staff had a more or less similar pattern of use. In either case, calling was discovered to be the main use of mobile phones for both students and academic staff with over 90% of the respondents (over 290 students and 220 academic staff) indicating that they used their mobile phones for this function. However, the two groups (over 260, 80% students and over 180, 80% academic staff) also used their mobile phones heavily for sending SMSs, connecting to social media sites such as Facebook, Twitter, and WhatsApp, and to check time. Findings of this study further indicated that students (less than 260, 80%) and academic staff (less than 180, 80%) used mobile phones for surfing Internet, taking pictures and setting alarms and other reminder. On the other hand, the torch, games and multi-media service (MMS) applications were not used much by students and academic staff with less than 50% of the respondents in each category using them. Despite the similarities, academic staff differed in their use of mobile phones with students in that they used their mobile phones more for checking emails than students. Conversely, students used their mobile phones to listen to music and radio more than academic staff.

The findings of this study are largely similar to those seen in other related studies. For instance, a study conducted by Song and Lee (2012) involving international students enrolled at the College of Business at the University of Illinois indicated that students' uses of mobile phones fell into five broad categories. These were (1) communication (e.g. e-mail, video communications, text messaging); (2) social networking (e.g. Facebook, Twitter, blogs); (3) information search (e.g. news, online libraries, databases, current events); (4) entertainment (e.g. videos, music, games); and (5) other (e.g. scheduling, shopping, banking). Students in the current study used their mobile phones to perform similar broader functions. Another study conducted by Bradley and Holley (2010) reported findings of first-year students' uses of mobile phones at London Metropolitan University from 2005 to 2009. Findings of the study noted heavy use of the communicative function of mobile phone (calls and SMS text messaging) by students which is similar to what was observed in the current study. Similarly, use of the Internet search function for research purposes was equally on the increase. In yet another study, Balakrishnan and Raj (2012) carried out a mixed methods study that used both

questionnaires and 24 hour diaries to study, among others, usage patterns of mobile phones among Malaysian University Students. Findings of the study indicated that most of the students (97.7%) used their mobile phones 5 to 10 times daily regardless of application (call, internet search, and text messaging). This study signified heavy usage of mobile phones by students which was similarly observed in the current study. A study of mobile phone usage among Finish undergraduate students conducted by Haverila (2013) found that the call and SMS functions were the most heavily used applications as they were used on a daily basis which is again similar to what was observed in the current study. The two studies, however, differ in that the Finish study does not talk of social media use which was heavily used by students and academic staff in the current study. Another point of departure between the study conducted by Haverila (2013) and the present study is that the latter discovered that the calendar accounted for the second heaviest use something that did not feature at all in the current study. Other findings obtained from the study by Haverila (2013) were that music, notes and calculator were moderately used with most of the respondents using them 2-3 times a week. The present study did not examine usage of notes and calculator but found that students used their mobile phones to listen to music and radio moderately which was similar to what was obtained in the study by Haverila (2013).

Other studies focusing on students and academic staff have shown contrasting findings. A study conducted by Ruleman (2012) at the University of Central Missouri found that academic staff and students differed sharply in their use of mobile phones contrary to the findings of the current study. The study by Ruleman (2012) further indicated that almost half of the students (46%) used their mobile phones to access the Internet on a daily basis, and almost a third (30%) spent three hours or more per week online on their mobile phone. Contrary to what was obtained in the present study, faculty used the Internet less than students as almost one-third (32%) went online on a daily basis and 22% spent three hours or more per week accessing the Internet with their mobile phone. Karim et al (2010) carried out a survey on mobile phone appropriation of students and staff at the International Islamic University of Malaysia (IIUM) involving 201 participants. The study indicated that SMS, alarm clock, voice call, calendar, address book, camera and music were the most common features that were used. The Karim et al study and the current study both identified SMS and voice calls to be heavily used. However, the current study also identified alarm clock, camera and music to be moderately used features. Contrary to the findings of the current study, the study conducted by Karim et al (2010) found that age and gender had a moderating effect on

usage whereby women were found to use SMS, alarm clock, camera, and music more than males.

In this current study the availability, quality and affordability of the mobile telecommunications infrastructure was investigated. This was deemed necessary because mobile telecommunications network acts as a conduit for the offering of library and information services on the mobile phone platform by public university libraries on one hand, and access to the service offering by students and academic staff on the other. Findings showed that places where the study institutions were located, had overall good mobile telecommunications network coverage. There were reported incidents of erratic coverage for some buildings in certain institutions but most reported having good coverage. Some of the respondents attributed this to the setting indicating that urban areas where most of the study institutions were located normally had good network coverage. However, LUANAR which was situated in a rural area also reported having good mobile telecommunications network coverage which means that most of the areas in the country could have good network coverage. These findings reflect those of a study conducted by Nyirenda (2012) who found that Malawi had achieved a 99.55% land coverage of mobile cellular network by 2012. The implications of these findings are that students and academic staff in public universities in Malawi could use their mobile phones from almost any part of the country. Facilitating conditions of the UTAUT model states that existence of the technical infrastructure to support the use of a particular system facilitates technology adoption and use (Venkatesh et al., 2003). Availability of the mobile telecommunications infrastructure in the country implies that public university libraries in Malawi were in a position to provide library and information services through mobile phones as users (students and academic staff) could easily access such services using the mobile telecommunications network.

Although mobile telecommunications network coverage was good, findings of this study found that the network performance was far from being efficient. Most of the university/college librarians and ICT directors rated the network performance between 80-90%. Students and academic staff also identified poor network quality as one of the factors that would impact their access to library and information services offered through mobile phones (See Tables 5.24 & 5.25). Some of the areas of concern to the respondents were mobile Internet, SMS and even voice calls. The technological context of the TOE framework states that technology or an innovation is easily adopted if it is perceived to be better than the

idea that it supersedes (Rogers, 2003). Therefore, issues affecting the performance of the mobile telecommunications network could negatively impact the offering of library and information services through mobile phones if they are not adequately addressed. Moreover, the findings made in relation to the mobile telecommunications network reflect those obtained in the MACRA quality of service report for the fourth quarter covering October to December 2015. The report, whilst applauding operators for making progress in achieving network quality, pointed out that challenges in relation to call setup success rate, call drop rate, SMS success rate, GPRS content activation success rate, and others still remained (MACRA, 2015).

Findings of the current study have shown that high cost of mobile phone services is another threat to the potential for provision of library and information services through mobile phones. Students and academic staff identified cost as a major factor they would likely face in accessing library and information services offered through mobile phones (See Tables 5.24 & 5.25). Out of the ten university/college librarians and ICT directors interviewed, only one indicated that mobile phone service costs were affordable whilst the rest were of the opinion that the cost was very high. Although many highlighted mobile Internet service as being the most costly, others also indicated that mobile voice calls and even SMS were very costly. The high cost of access was forcing most of the institutions to focus on investing in Wi-Fi infrastructure to enable students connect their mobile phones to the campus network so that they can access library and information services through mobile phones. MZUNI was also planning to preload information in tablets that it was planning to acquire as a means of overcoming the high cost of accessing the planned library and information services through mobile phones.

Related studies conducted in Malawi have shown that the cost of making a voice call in between networks that was US\$0.35/minute in 1998 reduced to US\$0.25 in 2002 (Clarke et al., 2003), and declined further to US\$0.19 (MK90)/minute in 2014 (Research ICT Solutions, 2015). Although overall voice call tariffs in Malawi have reduced over time, a study conducted by Research ICT Solutions (2015) found that call tariffs were still higher in the country compared to neighbouring countries. This means that the country still has a long way to go before it achieves a level of competitiveness in terms of pricing and making services affordable to users. The technological context of the TOE framework also identifies cost as a factor in technology adoption and use. The high cost of mobile phone services in Malawi

could impact negatively on the efforts to offer library and information services through mobile phones.

6.3.2 E-readiness of Public University Libraries in Malawi in Terms of Policy Framework for the Adoption and Use of Mobile Phones in Providing Library and Information Services

The findings of the present study indicated that all the five institutions surveyed did not have operational ICT policies to govern the operations of library and information services currently on offer and those to be potentially offered through mobile phones. However, all the institutions had draft ICT policies that were being refined in readiness for adoption and implementation. As already pointed out in Chapter 1 of this thesis, KCN, COM and The Polytechnic are part of the federal system of the University of Malawi. Consequently, the process of developing and implementing this policy was done centrally with the involvement of stakeholders from all these institutions. Surprisingly, MZUNI and LUANAR seemed to have been moving at a correspondingly slow pace in the development of the ICT policy in spite of them being autonomous public institutions. The environmental context of the TOE framework identifies the regulatory environment as one of the factors that could impact technology adoption both negatively or positively (Baker, 2012). The absence of the institutional ICT policies would likely have a detrimental effect on the offering of library and information services through mobile phones as there would be no unified approach to decision making in this regard.

The slow pace observed in the development of the ICT policies in the institutions in this study are not isolated cases but symptomatic of the challenges that exist at national level. Malawi adopted the National ICT Policy in the last quarter of 2013. The researcher from experience working in university library environment in Malawi observed that most of the public university libraries operate without other relevant policy documents such as selection and collection development policies which are necessary for providing an effective library and information service.

Besides ICT policy, respondents indicated that their institutions were planning or had developed other policies to promote access to library and information services. For example,

the UL for MZUNI indicated that the library had already developed an institutional repository policy which they were hoping to implement alongside the ICT policy. The ICT Manager for LUANAR noted that though their draft ICT policy had some statements that guided provision of library services, there was none to guide implementation of library and information service offering through mobile phone platforms. The findings of the current study also revealed that the majority of the respondents feared that the absence of the ICT policy could have an adverse impact on the implementation of library and information services offered through mobile phones. However, the CL for COM and ICT Director for LUANAR, were of the opinion that absence of the policy would not have much impact on the provision of library and information services offered through mobile phone platform as this would be guided by their strategic plans.

Stueart and Moran (2002) point out that the advantage of a policy is that it helps in ensuring consistency in decision making, particularly in an environment whereby several decision makers exist. Considering that libraries have become complex organisational structures with several layers of decision making at both managerial and operational levels, as revealed in the libraries studied, it is important that policies be formulated to provide a unified approach to decision making. The absence of ICT policies in the institutions may lead to lack of consistency in decision making that may affect the overall quality of library and information services delivered through mobile phones. However, the availability of draft ICT policies in all the institutions surveyed gives hope that the final policy framework would be completed in the near future to facilitate the implementation of library and information services through mobile phones.

The study has also found that regulations or policies from external regulatory bodies that may hamper the provision of library services through mobile phones did not exist. Policies or legislation existing at national level tend to have greater effect as it affects other policies at institutional level. The fact that policies did not exist at national level that could negatively impact the implementation of library and information services through mobile phones means that the policy regime in the country was favourable to the offering of library and information services through mobile phones. Findings of the study also indicated that libraries did not have policies/regulations that prohibited clients' use of mobile phones in the library but instead encouraged responsible use of the mobile phones in the library. This augurs well for the offering library and information services through mobile phones.

6.3.3 E-readiness of Public University Libraries in Malawi in Terms of Human Capacity for the Adoption and Use of Mobile Phones in Providing Library and Information Services

Library and ICT staff collaborate in the offering of library and information services through mobile phone. However, findings obtained in the present study revealed a mixed picture in relation to the human resource base available in public universities in Malawi to manage the provision of library and information services through mobile phones. Most of the libraries were adequately staffed but much of the staff lacked knowledge, skills and even experience in the delivery of library and information services on the mobile phone platform. The organisational component of the TOE framework recognises human resources as being crucial for IT doption. Therefore, absence of skilled human resources could affect the quality of library and information services offered through mobile phones if not addressed. However, most of the ICT departments were not adequately staffed. Although some of the ICT directors openly acknowledged the existence of the staff shortages, others downplayed the issues of staffing. The problem of staff shortages meant that the ICT departments were struggling to service departments that required their services including the library. The implementation of library and information services through mobile phones might pile more pressure on the ICT existing staff. Nonetheless, most of the ICT staff had the requisite skills to enable them support the provision of library and information services through mobile phones as only minor cases of skill gaps were reported.

Human resource capacity is an important element for determining the preparedness of a library with respect to the delivery of services through mobile phones. Projects undertaken at the Kimbel Library of the Coastal Carolina University (CCU) (Felts Jr. 2014) Ryerson University Library (Wilson and McCarthy, 2010) and Oregon State University Library (Bridges et al., 2010) on offering library services through mobile phone show that joint teams of experts that include professional librarians and ICT personnel are needed to work together in overseeing the successful implementation of such projects. As overall managers of the whole project, the role of librarians was to determine the services and content to be displayed on the mobile websites after soliciting views of users, and assess the use of the project after implementation. The role of the ICT team was to offer technical support in terms of building the website and managing it. Likewise, the presence of librarians and technical staff in the study institutions, many of whom were conversant with the offering of library and

information services on the mobile phone platform, denotes that the various institutions in the current study had the necessary human resources to enable them offer library and information services through mobile phones. Barnhart and Pierce (2012) in their thematic paper titled “Becoming Mobile: Reference in the Ubiquitous Library” identifies staffing for offering services 24–7 as one of the challenges libraries face in their bid to offer library services through mobile phone. Institutions in this study would similarly face this challenge as they offer library and information services on the mobile phone platform hence more staff need to be recruited both in the library and ICT departments to ensure that they cope with the added workload that may come with the introduction of these services.

6.4 Electronic Information Resources and Services Available in Public University Libraries in Malawi that can Potentially be Adopted and Used Through Mobile Phones

The findings have shown that libraries in this study possessed a diversity of information resources which could potentially be accessed through mobile phones. Topping the list were e-journals, e-books, OPAC, and institutional repositories of local content. These are resources that were common to all the institutions. The institutions also planned to acquire other information resources. The Polytechnic, for instance, was planning to acquire a digital library and MZUNI was planning to get an e-granary whilst LUANAR had the Essential Electronic Agriculture Library (TEEAL) database, all of which could potentially be accessed on the mobile phone platform. The organisational context of the TOE framework posits that the availability of the needed organisational resources defines an organisation’s readiness to adopt technology (Iacovou et al., 1995). Likewise, the availability of e-resources which could potentially be hosted on the mobile phone platforms of the libraries in the current study could speed up the adoption and use of mobile phones in offering library and information services.

A recent study conducted by Bomhold (2014) which focused on 73 public research universities under the Carnegie Corporation found that most of the libraries offering library and information services through mobile phones based their services on the electronic resources similar to those that were available in the institutions that were surveyed in the current study. For instance, OPAC or catalogue access was available in 98.1% of the libraries whilst e-journals or database access was available in 69.2% of the libraries. However, the libraries did not offer local institutional repositories content. Besides catalogue and databases, libraries in the Bomhold (2014) study were also offering library hours (80.8%), maps

(78.8%), ask-a-librarian (76.9%), contact information (73.1%), and library account access (51.9%) on their mobile platform.

A UK-based online survey conducted by Paterson and Low (2011) that attracted 1,716 participants found that Edinburgh University did not offer library services through mobile phones at that time. However, students indicated that they found search of the library catalogue (60%) and databases (52%) useful, and were ready to access them if they were provided on a mobile-optimised website. As was the case in the study conducted by Bomhold (2014), students in the current study did not indicate the institutional repository as an important resource which they could access if it were put on the library mobile-optimised website. The other content which students wanted to access on the library mobile-optimised website was checking PC availability in the library (55%), view own library record (60%), reserve items on loan (54%), request an item through interlibrary loan (38%), locate a shelf mark (49%), and more.

Yee (2012) conducted a survey in November 2010 that revealed that Australian academic libraries were making efforts to optimise their websites for mobile phones but at a very slow pace, with only 10 out of 23 universities (43.5%) providing mobile friendly services by then. As revealed in other related studies already reviewed, checking of the catalogue was the most popular service available in those libraries. Booking of library classes, study rooms and PCs are some of the services that were least offered on the mobile phone platform. Another study done by Wei et al. (2013) revealed that top Chinese universities that included the Beijing Institute of Technology, South China University of Technology, Chongqing University, and Peking University had some mobile presence. The main service offering in these libraries included SMS, WAP (Mobile Internet), and APP (Mobile phone application such as Global Positioning System [GPS]).

Other studies focusing on mobile phone use in libraries on the African continent indicate that mobile phone usage has mainly concentrated on SMS text messaging on new acquisitions, overdue reminders, and more (Baro et al., 2014; Anbu and Mavuso, 2012). However, there are indications that other libraries are going beyond this by embracing a wider service range (Mbambo-Thata, 2010). A recent study conducted by Baro et al. (2014) involving 36 university libraries in Nigeria revealed that the majority of the libraries received reference services through mobile phones. Likewise, a pilot SMS project conducted by Anbu and

Mavuso (2012) at the University of Swaziland revealed that SMS could be used successfully to market library services. Yet another study conducted by Mbambo-Thata (2010) indicated that AirPac library management system was successfully used by the University of South Africa (UNISA) Library to enable students and academic staff with web-enabled mobile phones to search the library website, manage their records, request learning materials, and search some databases.

The fact that libraries in this study possessed OPAC, e-journals, e-books and other electronic resources implies that they had the core content which could be accessed through the mobile phone platform. However, as the other studies have shown (Baro et al., 2014; Bomhold, 2014; Wei et al., 2013; Anbu and Mavuso, 2012; Paterson and Low, 2011; Mbambo-Thata, 2010), library users expect much more than just this content. It is, therefore, imperative that a proper needs assessment be done before deciding on what type of content to upload to the mobile library webpage. Libraries that have done a proper needs assessment on the type of content to upload to the mobile webpage have witnessed increased usage (Ballard and Blaine, 2013; Wang et al., 2012). However, those that did not do this experienced low usage (Felts Jr., 2014).

Findings of the current study revealed that libraries covered by this study were in a position to provide the available electronic information resources in the short to long-term. Firstly, it was noted that the institutions owned the databases for OPAC and institutional repositories. Mzuzu University which was planning to acquire an e-granary (database of full-text educational resources provided on the local area network to overcome Internet connectivity costs and challenges) will be able to offer the content on a long-term basis. Secondly, the institutions in this study were able to allocate financial resources on a yearly basis to cater for subscription to some of the e-resources such as e-journals and e-books they had. Moreover, subscription to the e-journals was done through the Malawi Library Consortium (MALICO), a local consortium of academic and research institutions. This means that the cost of subscribing to these resources was slightly lower than it would have been if the institutions were subscribing to these resources on their own. Thirdly, the institutions under study had forged partnerships with international academic and non-governmental organisations that were assisting them access some of the e-resources. This implies that access to those resources was assured throughout the duration of the existing partnership agreements.

Findings have further revealed that majority (three) of the five librarians indicated that usage of the e-resources was generally good. Slow Internet speed and limited coverage of Wi-Fi was largely blamed for the low usage of the e-resources in some institutions. However, the university/college librarians expressed the hope that usage would improve in cases where usage was low. Since the institutional Internet infrastructure was seen to be holding back usage, making the e-resources accessible through mobile phones could help boost usage as patrons who can afford the cost of data charges may use the mobile telecommunications network to access these resources when the Wi-Fi network does not perform well. Similarly, findings of studies conducted by Bomhold (2014) and Paterson and Low (2011) revealed that databases were in great demand by students who accessed or wanted to access the library webpage through mobile phone. Since the available e-resources were already widely used by students and academic staff through other means such as laptop and personal computers, there is a possibility that patrons may transfer usage of these resources to the mobile phone platform whenever such services are implemented as patrons seek to take advantage of the convenience that comes with the use of such resources (Ballard and Blaine, 2013).

6.5 The Current Status of Providing and Accessing Library and Information Services Through Mobile Phones in Public University Libraries in Malawi

Findings of the study showed that all the university/college librarians were familiar with the offering of library and information services through mobile phones. The findings further revealed that all the libraries in this study were moving towards the implementation of library and information services through mobile phones but varied greatly on the progress made from one institution to another. Whilst three out of the five libraries (COM, LUANAR and KCN) had taken steps towards realising their aspirations of offering library services through mobile phones, the remaining two (MZUNI and The Polytechnic) only expressed interest to do so but were yet to take concrete steps towards achieving this goal. The COM Library was the only institution that indicated that it had fully embraced the offering of library and information services through mobile phones. LUANAR was the other institution which had partially adopted the use of mobile phones in the delivery of library and information services as it started using phones (ground and mobile) to respond to queries from farmers, extension workers, students, teachers and policy makers as far back as 2004. However, the library had not extended these services to LUANAR students and academic staff who are the main client

base of the library. Nevertheless, the library was planning to extend these services to students and academic staff. KCN, on the other hand, indicated that it had experimented with the SMS module of its Library Management System (LMS) in 2004 but the project did not proceed following poor response from students and academic staff who were not willing to use their mobile phones to access library services. Findings of the current study further show that most of the library services which institutions were either offering or planning to offer through mobile phones were based on social media tools such as Facebook and WhatsApp, OPAC, e-resources (e-journals and e-books), SMS, emails and digital library.

Findings of this study resemble those obtained in studies conducted in other parts of the world. A study by Li (2013), for instance, reported that as of September 2011, only 14 of the 39 Chinese Universities (35.9%) that were part of the 985 Project provided library and information services on the mobile phone platform. However, the number of libraries with some mobile presence had increased to 36 (92.3%) by August 2014 (Wei et al, 2015). This result suggested that Chinese libraries were making remarkable progress in their movement to the mobile web.

A number of other studies done in the USA have shown that libraries in that country have gradually embraced the provision of library and information services through mobile phone. Aldrich (2010) used a mixed-method study to evaluate progress made within the Association of Research Libraries (ARL) in the move to the mobile web at 111 English-speaking ARL libraries. Findings revealed that only 39 of the 111 libraries had mobile web sites for either the university or library, and 24 (21%) had mobile web pages for the library. The study further indicated that library hours (75%), staff directories (67%), and library catalogs (67%) were the common services offered on the mobile websites. A follow-up study conducted by Jackson (2013) involving 99 ARL libraries revealed that great progress had been made from the previous study. Findings of this study indicated that the total number of libraries that had mobile web sites jumped from 21.6% in 2009/2010 to 80% in 2012. A more recent study conducted by Bomhold (2014) which focused on 73 public research universities under the Carnegie Corporation found that 52 (71.2%) of the libraries had some sort of mobile accessibility to library services. Bomhold, however, noted that the type of access provided was mixed. In total, 39 (53.4%) had university apps with access to the library; 7 (9.6%) had university websites that were optimised for mobile use; 4 (5.5%) had university apps that provided a link to an optimised library website; and 2 (2.7%) had no university app or mobile

website, but the library area of the web site was optimised. With regard to content, most of the libraries provided catalogue access (98.1%), hours (80.8%), maps (78.8%), ask-a-librarian (76.9%), contact information (73.1%), database access (69.2%) and library account access (51.9%). Overall, these USA-based studies show that libraries had made a lot of progress in gaining some mobile presence within a short period of time. The service offering too was much broader and largely different to what was offered or proposed to be offered by libraries in the present study.

Despite the fact that the proliferation of library and information services offering through mobile phones has been increasing remarkably in many developed countries, public university libraries in Africa in general, and Malawi in particular, seem to be moving at a significantly slower pace. For example, a study undertaken by Sekyere (2010) that investigated virtual reference services offered by 79 academic libraries in ten West African countries found that none of the libraries surveyed made use of mobile phones in service delivery. Ever since, there has been a number of case studies that appeared in the West Africa and Southern Africa Region that document projects aimed at offering library and information services through mobile phones in countries such as Nigeria (Baro et al., 2014), South Africa (Mbambo-Thata, 2010), and Swaziland (Anbu and Mavuso, 2012).

Findings from the current study have shown that both students and academic staff used mobile phones for a number of academic-related activities. These included accessing reference services from the library, reading news items, time-tabling schedules, social events plus e-journals and e-books mainly for those who had iPads, and other mobile devices. The study further noted that save for a few, the majority of the libraries were encouraging the student and academic staff use of mobile phones. Most notably, the CL for the Polytechnic indicated that the library conducted information literacy sessions which helped students and academic staff in their information searches. UL for MZUNI indicated that the library's reference desk had made efforts to reach out to clients through Facebook which facilitated use of mobile phone to access such type of services. COM Librarian further stated that the library had taken a decision to stop subscribing to print journals way back in 2007 thereby promoting the use of the e-resources.

As already pointed out, academic libraries subscribed to e-resources through a local consortium called MALICO. Mobile phones were often used to access these e-resources.

Moreover, information literacy sessions offered mainly to first year students in all the institutions covered by this study played a role in facilitating academic uses of mobile phones.

The findings of the current study further revealed that most of the university/college librarians were not aware if students or academic staff were interested in the implementation of library and information services through mobile phones. However, as the CL for the KCN put it, libraries saw the potential of offering library and information services using mobile phones. Given that mobile phone ownership was very high (315, 99.7% for students and 224, 100% for academic staff), libraries were right to consider leveraging this ownership to provide library and information services through mobile phones.

Findings revealed that students and academic staff used their mobile phones a lot to access different information resources. With regard to students, majority 165 (52.9%) used their mobile phones to access e-books and 149 (47.8%) used their mobile phones to access e-journals. A significant number 110 (35.3%) also reported using their mobile phones to access the library website and only a few 37 (11.9%) used them to access the OPAC. On the contrary, academic staff used their mobile phones more to access e-journals 108 (49%) followed by e-books 90 (42%) and library website 69 (33%). Just like students, academic staff used their mobile phones minimally 18 (8%) to access the OPAC. Comparatively, academic staff used their mobile phones more to access e-journals than e-books whilst students used e-books more than e-journals. The possible reason could be that most of the students used the e-books for their coursework because the majority of them 299 (94.6%) were undergraduate students (See Table 5.3). Conversely, academic staff may have used the e-journals more for research purposes. The findings further show that academic staff's access to e-journals, e-books, library website and OPAC was lower when compared to that of students. Moreover, access to the OPAC was generally low for both students and academic staff. However, some of the respondents did not seem to understand what OPAC was about, and perhaps its actual use could be much higher than what was reported if they knew what information services it provides.

Higher access to e-journals, e-books, and library website through mobile phones revealed in this study gives a strong impetus for the inclusion of these services on the mobile phone platform for libraries in this study. Fortunately, COM library which was the only institution

that had fully adopted the use of mobile phones at the time of this study indicated that these resources were already included in its service range. The other libraries that were planning to adopt the use of mobile phones indicated they would include them in their service provision. This suggests that access to these services through mobile phones was bound to increase as they constitute a range of services which patrons were already accessing. Provision of library and information services which patrons are willing to access through mobile phones lead to high usage rates (Caniano and Catalano, 2014; Ballard and Blaine, 2013; Bridges et al., 2010). The high levels of access to e-journals, e-books, and library website reported in this study were further aided by the high ownership levels of Internet-enabled mobile phones for both students 299 (94.9%) and academic staff 216 (96.4%). This reinforces the importance of the ICT infrastructure at various levels for the smooth implementation of library and information services through mobile phones.

Findings of the current study indicated that students and academic staff opted to use mobile phone to access services such as e-journals, e-books, and library website mainly because it required very little effort to do so. In this regard, most of the students indicated that they accessed these resources using their mobile phones for two main reasons: Mobile Internet was available from anywhere, anytime hence more convenient to use; and it was easier to access services using mobile phone. The UTAUT model postulates that effort expectancy, which is the degree of ease associated with the use of the system (Venkatesh et al., 2003), has an effect on behavioural intention to use technology. Whilst there was consensus on the two reasons given for accessing e-journals, e-books, and library website, students and academic staff differed sharply on the other reasons they gave for using mobile phones to access e-journals, e-books, and library website. Students stated that they used mobile phone for this purpose because mobile Internet was more reliable; PC shortage in computer labs; mobile Internet was cheaper to use; and book shortage in the library. Frequent power outages and influence of a friend were not indicated by many as motivating factors for using mobile phones to access e-journals, e-books, and library website. As for academic staff, the motivating factor for using mobile phones to access e-journals, e-books, and library website was that mobile Internet was more reliable. On the other hand, PC shortage, frequent power outages, mobile Internet being cheaper to use, book shortage in the library and influence of a friend were not viewed as motivating factors for the use of mobile phones to access as e-journals, e-books, and library website by academic staff. The fact that respondents did not access e-books and e-journals using mobile phone as a result of influence of a friend shows

that the construct of social influence did not have an impact on technology use in this case. This result resonates with Venkatesh et al. (2003) who found that the construct of social influence in the UTAUT model is only significant in mandatory contexts and becomes nonsignificant in voluntary settings.

It is surprising to note that students indicated mobile Internet as cheaper to use as both university/college librarians and ICT directors had indicated that it was the most expensive service offered by the mobile telecommunications operators. Similarly, a study conducted by Research ICT Solutions (2015) found that call tariffs were higher in Malawi compared to neighbouring countries. The study findings also indicated that students and academic staff found mobile Internet to be more reliable. This could be attributed to the fact that WI-FI connection in all the institutions covered by this study was unreliable due to limited bandwidth. It is, therefore, possible that most of the respondents might have resorted to using mobile Internet in place of WI-FI Internet.

The findings of the current study revealed that students and academic staff that did not access e-journals, e-books, and library website using mobile phone were discouraged from doing so because of the small screen size of mobile phone, high cost of mobile Internet, and library websites that were not mobile friendly. Besides high cost of mobile Internet, it is clear that some of the users opted not to use their mobile phones to access e-books and e-journals because of the technical limitations associated with mobile phones. The technological context of the TOE framework indicates that compatibility and ease of use are determining factors to adoption and use of any technology. That may possibly explain why students and academic staff that did not use their mobile phones to access e-journals, e-books, and library website indicated that they were willing to use their mobile phones to access these resources if the issues that prevented them from doing so, as indicated above, were addressed. The findings further showed that a higher percentage of students 88 (52%) demonstrated greater willingness to use their mobile phones to access e-journals, e-books, and library website than academic staff 41 (40%).

Studies by Lee and Song (2015) and Luo (2011) have also identified the small screen size of the mobile phone as a challenge to the offering of library and information service. Luo (2011), states that it is difficult for a library to use a mobile phone as a dedicated device for receiving and responding to reference services. This is so because the small screen size of

mobile phone makes the handling of a huge number of SMS reference queries difficult. She, therefore, recommends the use of a desktop computer.

Lee and Song (2015), used an emailed survey to conduct a comparative study of mobile information-seeking behaviour of students at the University of Illinois at Urbana-Champaign (UIUC) in the United States and Kyungsoong University (KU) in South Korea. The study yielded a total of 115 valid responses at UIUC and 125 at KU. Findings indicated that 84 (73%) students at UIUC and 70 (56%) students at KU felt that the small screen size of the mobile phone was the main limitation of smartphones as an information-searching tool. A number of other studies have also shown cost to be a big factor in access to library and information services offered on the mobile phone platform. For instance, a study conducted by Song and Lee (2012) of international students enrolled at the College of Business at the University of Illinois found that the high total cost of ownership (costs for handsets and monthly data plans) was the main reason why 39% of the respondents did not own a tablet PC. In yet another study, Walsh (2010) conducted a series of focus groups in 2009 at the University of Huddersfield in the UK to investigate student attitudes towards the use of mobile phones in libraries. Although this study found student attitudes towards text messaging from the library to be positive, students had reservations about using the mobile web because of cost considerations.

Findings of the current study showed that not many students and academic staff have used their mobile phones before to call, email or text the library to seek help or access any reference service. An analysis of the study findings show that cumulatively only 60 (19.7%) students and 71 (32%) academic staff have used their mobile phone to call, email or text the library to seek help or access any reference service either rarely or frequently whilst the majority have never used it or have hardly ever used it. Although usage was low for both groups, academic staff used the mobile phones slightly more than students to call, email or text the library to seek help or access any reference service. Further analysis of the findings revealed that students at LUANAR 14 (34.1%) used their mobile phones to access reference services from the library more than their colleagues in the other institutions, followed by their colleagues at KCN 4 (20%), The Polytechnic 23 (19.7%) and MZUNI 15 (19.5%). Students from COM used their mobile phones the least 3 (8.9%) for this purpose. Additional analysis of the findings obtained from academic staff revealed that academic staff from KCN 11 (57.9%) used their mobile phones the most to access reference services from the library.

Their colleagues from LUANAR 20 (40%) followed in a distant second. Academic staff from COM 9 (31%), MZUNI 17 (29.3%) and the Polytechnic 14 (22.3%) followed in that order. Overall, usage of mobile phones by both students and academic staff to access reference services from the library was high at LUANAR and KCN. Surprisingly, students and academic staff at COM were observed to use their mobile phones the least to access reference services despite the library reporting to have adopted the use of mobile phones in service delivery.

Findings revealed that there was a difference in terms of mobile phone applications students and academic staff used to access reference services from the library. Whilst students frequently used Instant messenger 31 (47.7%), e-mail 31 (47.7%) and SMS 29 (43.9%) to contact the library, academic staff frequently called 34 (47.2%) or sent e-mail 27 (37.5%). SMS 14 (19.4%) was largely of secondary function to the academic staff. Surprisingly, social media tools such as Facebook, Twitter or WhatsApp were largely not used for this purpose by both students and academic staff despite being used heavily by both groups for other purposes (See Tables 5.13 & 5.14). Findings obtained in relation to use of mobile phones to access reference services from the library by students and academic staff do not reflect mobile phone usage trends of the two groups which were found to be largely uniform. It is even more surprising to note that students were not using mobile phones much to call the library to seek reference help as the findings had shown that calling was their main use of mobile phone.

Findings from the current study are in line with prevailing trends globally whereby library users in many academic libraries have been reported to use a number of mobile phone applications, particularly, SMS to access library services. A recent study conducted by Baro et al. (2014) involving 36 university libraries in Nigeria revealed that the majority of the libraries received reference services through mobile phones. Another study conducted by Wang et al. (2012) at the Oriental Institute of Technology Library in China indicated that the library provided a number of mobile web services that included library SMS reference service which proved popular to its clients. Another study of SMS reference service conducted by Luo (2011) undertaken at San Jose State University in the USA revealed that the majority of the respondents used the service. The study further indicated that majority of the users of the service were highly satisfied, and predictably, most of the respondents (88.9%) indicated that they would be willing to use the service again.

6.6 Attitudes of Library Staff, Academic Staff and Students towards the Potential Use of Mobile Phones in Providing and Accessing Library and Information Services

The study findings based on the interviews conducted with university/college librarians show that the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services were largely positive. The only exception was the KCN whereby findings showed that students and academic staff did not show greater willingness to use their mobile phones to access library services when the library piloted the SMS project in 2014. However, even non-use of the service is not enough to interpret their attitudes as being negative as no studies were done to ascertain reasons for the failure of the students and academic staff to use the service. Nevertheless, lessons learnt from similar projects have shown that projects undertaken without taking on board the needs of users through a proper needs assessment end up in failure. For instance, a mobile website that was created at the Coastal Carolina University Library in the USA did not initially attract much usage. It was only after introducing some value-added services such as discovery services, chat and SMS capabilities, and computer availability maps that the library witnessed remarkable increase in usage (Felts Jr., 2014). It is possible that students and academic staff at KCN did not respond favourably to the pilot SMS project because it did not address their needs or other factors such as poor marketing may have played a part.

The findings of this study indicated that the poor response of students and academic staff to the pilot SMS project had not deterred the KCN Library from proceeding with its plans of offering library services through mobile phones. Similarly, the other libraries were planning to introduce the provision of library and information services through mobile phones due to the perceived positive attitudes of library staff, students and academic staff to the offering and access to these services. COM Library, which was already offering library and information services through mobile phones at the time of the study, was equally encouraged by the perceived positive attitude of library staff, students and academic staff. Consequently, it was planning to work with the ICT department to increase the number of Wi-Fi hotspots at the campus with the aim of increasing usage of the services offered. Likewise, LUANAR which was offering such services only to farmers, extension workers, students, teachers and policy makers was also planning to extend the service offering to its students and academic staff.

Research findings showing positive students' and academic staff attitudes towards access to library and information services through mobile phones discussed above were corroborated by findings obtained from questionnaires administered to students and academic staff. The findings showed that the majority of the academic staff 181 (82%) held positive views about the use of mobile phones in the delivery of library services as they either strongly agreed 99 (45%) or agreed 82 (37%) with the statement that the use of mobile phones is good for offering library and information services. The rest of the academic staff 42 (18%) neither agreed nor disagreed 34 (15%), disagreed 5 (2%) or strongly disagreed 3 (1%) with the statement that the use of mobile phones is good for offering library and information services. This implied that they were either neutral or held negative attitudes about the use of mobile phones in the delivery of library services.

Similarly, the majority of the students 274 (87%) held positive views about the use of mobile phones in the delivery of library services whilst 42 (13%) either expressed no opinion or held negative views about the use of mobile phones in service delivery. Findings presented in Figure 5.12 show that 128 (41%) students strongly agreed and 146 (46%) agreed that the use of mobile phones is good for the delivery of library services. Conversely, 24 (8%) students neither agreed nor disagreed, 10 (3%) disagreed, and 8 (2%) strongly disagreed with the statement that use of mobile phones is good for the delivery of library services.

Findings of a number of other studies have similarly shown students to exhibit positive attitudes about the use of mobile phones in the delivery and access to library and information services through mobile phones. Kumar (2014), for instance, conducted a study that involved 180 students at Jawaharlal Nehru University (JNU) in India. Findings of the study revealed that 89.44% of the respondents did not have problems if the library reached out to them through mobile phone. This figure was slightly higher than that recorded in the current study (87%). Paterson and Low (2011) also examined student attitudes towards the use of mobile phones in the delivery of library services at Edinburgh University in 2010. The study which initially comprised of an online survey that attracted 1,716 participants, was followed up with two focus-groups of six undergraduate and five postgraduate students. Edinburgh University Library was not offering library and information services through mobile phones at the time of this study. However, findings drawn from both the survey and the focus-groups revealed that students had positive attitudes to the use of mobile phones in the delivery of library

services. In yet another study, Walsh (2010) conducted a series of focus groups in 2009 at the University of Huddersfield to study student attitudes about the use of mobile phones in libraries. Findings indicated that student attitudes towards text messaging from the library were overwhelmingly positive.

The study findings further showed that the majority of the students and academic staff strongly agreed with the statement that the use of mobile phone is good for offering library and information services mainly because it promotes 24/7 access to library resources and services; it facilitates anywhere access to library services hence it was viewed as convenient to use; it limits the scramble for PCs in the computer laboratories (for students); and promotes speedy access to information resources and services. However, only few students and academic staff strongly agreed that use of mobile phone in the delivery of library services overcomes the challenge of power blackouts prevalent in the country. This is possibly because mobile phones require frequent charging too, more especially when they are used frequently. Though students and academic staff responded to these questions in a similar pattern, the difference was that findings obtained from academic staff had a 10% higher rating when compared to those of students (See findings in Tables 5.20 & 5.21).

The findings presented above indicate that the positive attitudes of students and academic staff towards the potential use of mobile phones in the delivery of library and information services were partly influenced by the perceived ease of accessing library services and resources using mobile phones. The UTAUT model identifies effort expectancy, which is defined as the degree of ease associated with the use of the system (Venkatesh et al., 2003), as a determining factor in technology adoption and use. Similarly, the technological context of the TOE framework indicates that ease of use influences adoption of an innovation.

Findings obtained in the current study have further shown that the majority of the students wanted libraries to formalise or adopt the provision of services through use of mobile phones. In total 287 (91%) students and 199 (90%) academic staff, which is almost an equal percentage, were in favour of formalising the use of mobile phones in the delivery of library and information services. Only, 28 (9%) students and 18 (8.1%) academic staff were either neutral or held negative attitudes about the use of mobile phones in the delivery of library services. The research findings further show that there was a four percentage gap between the attitudes of students about the use of mobile phones in the delivery of library and information

services 274 (87%) and those who wanted actual implementation of those services 287 (91%). However, the percentage gap between attitudes about use 181 (82%) and those wanting actual implementation 199 (90%), was slightly bigger (8) for academic staff. A possible explanation to these disparities is that some of the respondents may not have understood the question properly in the first instance or some may have changed their opinions slightly in the course of answering the questions.

Findings further revealed that students and academic staff differed sharply in their opinions of what they wanted libraries to offer on the mobile phone platforms of their institutions. Most students wanted reference services 139 (46.0%), lending services (overdue reminders, book renewals, among others) 124 (41.1%), and information services (notification of recent acquisitions, change of opening hours, and news) 121 (40.1%). Some wanted to be able to check availability of short loan items and make reservations/bookings 119 (39.4%) whilst user awareness or information literacy offerings 105 (34.8%) were also on higher demand. Very few 65 (21.5%) wanted to be able to carry out inter-library loan transactions. Conversely, access to e-journals 144 (72.7%), e-books 135 (68.2%), Online Public Access Catalogue 124 (62.6%), lending services (overdue reminders, book renewals, among others) 109 (55.1%), and information services (notification of recent acquisitions, change of opening hours, and news) 108 (54.5%) are the services that were in great demand by academic staff. Checking availability of short loan items and making reservations/bookings 96 (48.5%), reference services 83 (41.9%), and user awareness or information literacy offerings 69 (34.8%) were not in great demand by academic staff.

Differences in terms of service portfolio which academic staff and students wanted included on the mobile phone platform observed in the current study is a reflection of the different responsibilities undertaken by the two groups. Most of the students that participated in this study were undergraduates hence wanted mainly monographs and services that would enable them access such type of resources to enable them accomplish their course commitments. On the other hand, academic staff have a diversity of commitments and obligations. One of the obligations which academic staff need to fulfil to earn promotion in many universities including those in the current study is publishing and consultancies. To undertake meaningful research, academic staff require recent journal articles hence many of them expressed the need for e-journals to be included on the mobile phone platform. Academic staff also have the commitment of teaching. This is why many of them expressed the need for e-books and

library user services to ensure that they access information resources from the library that would enable them accomplish the task of teaching.

Studies focusing on students' and academic staff's attitudes about the services they wished their libraries to include on the mobile phone platform have shown mixed findings. Pažur (2014) conducted an online survey whose aim was to determine the attitudes of scientists to the use of mobile devices in library services. The study attracted 240 responses from scientists of Rudjer Boškovic Institute in Croatia including students and faculty of other Croatian universities. Respondents to this study identified online databases (35%), Croatian Scientific Bibliography (30%), e-journals (35%), and library catalogue (34%) as important hence wanted them included on the mobile library platform. Many of the resources that were demanded by respondents in the Croatian study were research-based because most of the respondents were researchers. The same trend was observed in the current study whereby academic staff wanted e-journals to be included in the mobile phone platform to help them conduct their research projects.

A study conducted by Kumar (2014) at Jawaharlal Nehru University (JNU) in India involving 180 students indicated that most of the respondents wanted to access library catalogue (76.84%), book reservations (74.74%), programmes, events, new additions, library news (72.63%), reminders (66.32%), downloadable e-books and e-journal articles (68.42%) and booking library training sessions (64.21%). Similar to what was observed in the current study, students in the Indian study prioritised monographs and reference sources and services that would enable them access these resources. E-journals though demanded by students featured lower down the ladder of the resources students wanted to access on the mobile phone platform. Another study conducted by Bridges and Rempel (2013) at Oregon State University Library comprising of 115 respondents found that most users were interested in viewing the library's hours (47%), finding a book (25%), locating resources on a topic (21%), reserving study rooms (13%) and checking computer availability (10%). Yet another study conducted by Caniano and Catalano (2014) comprising of 130 students, many of whom were seniors and graduates at Hofstra University, revealed that most of those using mobile devices to access the library accessed research databases (44%), Google Scholar (26%), Journal Finder (24%), the catalogue (24%), course reserves (18%), and interlibrary loan (15%). The findings of this study were evidently different from those obtained in the current study in relation to students and those obtained in the other related studies. The explanation behind the

differences is that most of the respondents in the Hofstra University study were seniors and graduate students hence needed the databases more than any other resource for their research activities.

6.7 Factors that Influence the Adoption and Use of Mobile Phones by Library Staff, Students and Academic Staff Respectively in Providing and Accessing Library and Information Services

Findings resulting from data collected from university/college librarians and ICT directors indicated that there were some factors that could have a bearing on the offering of library and information services on the mobile phone platform. These include: Periodic disruption of Internet services due to vandalism of fibre-optic cables experienced by the service providers; the network may get congested due to increased usage brought about by the introduction of library and information services through mobile phones; the hustle of registering clients' mobile phone numbers into the database; and high cost of accessing services through mobile phone for students and academic staff accessing the services through the mobile telecommunication service providers.

Findings of the current study further indicated that the majority of the students 255 (80.9%) either strongly agreed 128 (40.6%) or agreed 127 (40.3%) that poor network quality is a factor they would face in using mobile phones in accessing library and information services through the use of mobile phones. The rest of the students 60 (19%) neither agreed nor disagreed 35 (11.1%), disagreed 23 (7.3%) or strongly disagreed 2 (0.6%) that poor network quality was a factor they would face in using mobile phones to access library and information services through mobile phone. High service costs, delayed response, and query not adequately addressed are some of the notable factors which students identified as likely to impact their use of mobile phones in accessing library services with over 170 (50%) of the respondents indicating that they either strongly agree or agree with the statement. A good number of the students (over 130, 40%) also indicated that library policies that prohibited use of mobile phones in the library, and messages not delivered on time were some of the factors that could negatively impact usage of mobile phones to access library and information services offered through mobile phones.

Findings further showed that whilst students indicated poor network quality as the single biggest factor that could negatively impact the delivery of library services using mobile phones, academic staff identified high service costs and poor network quality as joint factors that could have a similar impact with over 140 (60%) of the respondents indicating that they either strongly agree or agree to this statement. Reference query not adequately addressed, and library policies that prohibited use of mobile phones in the library were some of the factors academic staff identified as likely to affect their access to library and information services offered through mobile phones with over 80 (30%) of them either strongly agreeing or agreeing to this statement. Conversely, messages not delivered, lack of knowledge on usage, and failure to receive a response to a reference query posed were some of the factors that few academic staff (less than 60, 30%) indicated that they could affect access to library and information services offered through mobile phones.

The fact that poor network quality was identified as a challenge to the offering of library and information services through mobile phones is not surprising. This is because serious concerns were raised about the institutional Wi-Fi infrastructure and the mobile telecommunications network. Nevertheless, as already discussed, students and academic staff rated the mobile telecommunication network more favourably than the Wi-Fi network as they described mobile Internet as more reliable (See Tables 5.15 & 5.16). This implies that although a robust network is desirable, it is not easy to provide such a network especially in an environment where multiple mobile device ownership has become a norm. This study further found that high service costs could negatively impact library and information services offered through mobile phones. This reflects studies conducted by Clarke et al. (2003) and Research ICT Solutions (2015) that revealed that mobile phone services in Malawi were more expensive than those of neighbouring countries although tariffs had gone down over the years.

Delayed response, and query not adequately addressed were the other notable factors which students and academic staff identified as likely to impact their use of mobile phones in accessing library services. These would likely come about due to the anticipated pick up in service usage that could overwhelm the available staff. Similarly, a study conducted by Pearce et al. (2010) indicated that the average response time of SMS reference was more than two hours even during hours of operation. This shows that reference services received through mobile phones are often affected by this challenge.

Library policies that prohibit the use of mobile phones in the library was another factor which the study identified as capable of negatively impacting the use of mobile phones in delivery of library services. Mobile phones have for a long time been viewed as a distraction to library users because of the noise that is associated with the caller tunes. This has resulted in many libraries putting up notices that calls on patrons to switch off phones whilst in the library something that the researcher also observed in the libraries in this study. Whilst it is true that mobile phones could be a source of noise, it is also good to acknowledge that mobile phones have become a valuable information resource tool that complements other library resources such as computers. It is, therefore, necessary that library policies that restrict use of mobile phones, as identified in this study, are reviewed to ensure that they are in tandem with the current trends. If anything, libraries should work towards promoting responsible use of mobile phones in the library other than condemning their use outright in the library as this will be self-defeating.

6.8 Summary

The aim of this chapter was to provide a discussion of the findings presented in chapter five. This exercise was guided by the research questions and constructs of the theories that underpinned this study.

Findings of the study revealed that much of the ICT infrastructure necessary for the offering and access to library and information services on the mobile phone platform was available. The available ICT infrastructural resources were mainly Internet infrastructure and ICT systems, and Library Management System (LMS) consisting of, servers, tablet computers, desktop computers, and fibre-optic backbone, and Wi-Fi Internet access. Availability of these resources means that libraries were in a position to offer library and information services through mobile phones to their clients.

The study findings further indicated that mobile phone ownership was very high amongst both students 315 (99.7%) and academic staff 224 (100%). Moreover, over 100 (30%) of the students indicated that they had two or more mobile phones. Likewise, the majority of the academic staff 122 (54.5%) owned two or more mobile phones. Findings of the current study indicate that 299 (94.9%) students and 216 (96.4%) academic staff owned mobile phones that

had Internet capabilities. Besides these devices, 65 (21%) students and 94 (42.7%) academic staff owned other mobile devices such as Galaxy tabs and iPads. These findings resonate with those of ECAR (2015) that indicated that ownership of smartphones and tablets among students and academic staff in the USA was very high. The implications of these findings are that students and academic staff had the ICT tools with which they could use to access library and information services offered through mobile phones.

The findings also indicated that places where the study institutions were located, had overall good mobile telecommunications network coverage. This signifies that students and academic staff could easily access library and information services through mobile phones using Wi-Fi network or mobile telecommunications network. Nevertheless, mobile phone services such as Internet, SMS and voice calls were rated poor by some respondents, a development that could negatively impact library and information service delivery through mobile phones. The MACRA quality of service report for the fourth quarter covering October to December 2015 had also noted challenges in relation to call setup success rate, call drop rate, SMS success rate, and GPRS content activation success rate (MACRA, 2015).

The findings of the current study indicated that all the five institutions covered by this study did not have operational ICT policies to govern the offering of library and information services through mobile phone. However, all the institutions had draft ICT policies that were being refined in readiness for adoption and implementation. The construct of facilitating conditions of the UTAUT model posits that both the organisational and technical infrastructure assist in technological adoption.

Research findings revealed a mixed picture in relation to the human resource base available to manage the provision of library services that are delivered through mobile phones. Whilst the libraries were adequately staffed, the ICT departments were not. Furthermore, though most of the libraries seemed to be adequately staffed the staff lacked knowledge, skills and experience to deliver library and information services through mobile phones. The organisational context of the TOE framework identifies human resources as critical to technological adoption. Lack of adequate and skilled human resources could affect the quality of library and information services offered through mobile phones if not addressed.

The findings disclosed that libraries in this study possessed a diversity of information resources which could potentially be accessed through mobile phones. Topping the list were e-journals, e-books, OPAC, and institutional repositories of local content. Besides this, some other libraries were planning hoping to acquire digital libraries and e-granary. Similarly, studies by various scholars (Bomhold, 2014; Yee, 2012; Paterson and Low, 2011) revealed that much as libraries offered or were planning to offer a wider and diversified range of services, e-books, e-journals and OPAC were integral parts of those services.

The findings further revealed that all the libraries in the current study were moving towards the implementation of library and information services on the mobile phone platform but were at varied levels in realising this objective. COM Library had fully implemented library and information services offered through mobile phones whilst LUANAR had only done that modestly by offering such services to farmers, extension workers, policy makers and students but was yet to offer such type of services to its own students and academic staff. Conversely, KCN had piloted the SMS project in 2014 that did not attract much usage. LUANAR, KCN, MZUNI and The Polytechnic all indicated that they would fully implement library and information services offered through mobile phones in the near future using Facebook, WhatsApp, OPAC and SMS. Findings further show that many students and academic staff were using mobile phones to access e-books, e-journals, and library website whilst only a few were using mobile phones to access the OPAC.

Findings of the current study show that the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services through mobile phones were largely positive. Moreover, majority of students 287 (91%) and academic staff 199 (90%) were in favour of formalising the use of mobile phones in the delivery of library and information services.

Findings further revealed a number of factors that could influence the offering of library and information services through mobile phones. The major ones included network quality, service costs, and availability, funding, staffing particularly in the ICT and library departments, and skills.

CHAPTER SEVEN

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This chapter presents a summary of the findings, draws conclusions from the findings, and makes necessary recommendations. According to Denscombe (2007), the summarising and concluding chapter of a thesis is aimed at drawing together the threads of the research to arrive at some general conclusion, and to suggest some way forward in addressing the research problem. The aim of this study was to investigate the level of e-Readiness of public university libraries in Malawi in using mobile phones in the provision of library and information services. The study addressed the following specific research questions:

1. What is the level of preparedness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services?
2. What electronic information resources and services are currently available in public university libraries in Malawi that can potentially be adopted and used through mobile phones?
3. What is the current status of providing and accessing library and information services through mobile phones in public university libraries in Malawi?
4. What are the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services?
5. What factors influence the adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services?

The study was underpinned by two theories: Unified Theory of Acceptance and Use of Technology (UTAUT), and Technology, Organization, and Environment (TOE) Framework. With regard to methodology, the study used the pragmatic paradigm which emphasises the importance of conducting research in a way that best addresses the research problem. The

mixed method approach was used with case study design. The total population of the study was 6216, and it included 5465 students, 741 academic staff, 5 university/college librarians and 5 ICT directors. A sampling table provided by Israel (2013) was used to sample the student and academic staff populations. University/college librarians and ICT directors were purposively sampled for the study. The final sample was, therefore, 370 students, 255 academic staff, 5 university/college librarians and 5 ICT directors. Qualitative data was collected through interviews with university/college librarians and ICT directors using interview schedules. Conversely, quantitative data was collected from students and academic staff using questionnaires. These instruments were pretested and refined before they were used to collect data. The researcher collected data with the assistance of five research assistants, and the UKZN ethics protocol was adhered to before and during data collection. Qualitative data collected was analysed using Nvivo whilst quantitative data was analysed using IBM SPSS Software version 23.

Summary of findings and conclusions presented in this chapter are organised around the research questions and broader issues around research problem. The chapter also provides recommendations based on the findings of the study. Furthermore, originality of the study and its implications for theory, policy and practice are proffered. Areas for further research are also provided.

7.2 Summary of findings

Summary of findings fall under the following themes: E-readiness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services; electronic information resources and services currently available in public university libraries in Malawi that can be adopted and used through mobile phones; the current status of providing and accessing library and information services through mobile phones in public university libraries in Malawi; attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services; and possible factors that influence the adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services.

7.2.1 E-readiness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services

This section provides a summary on e-readiness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services.

7.2.1.1 E-readiness of Public University Libraries in Malawi in Terms of ICT Infrastructure for the Adoption and Use of Mobile Phones in Providing Library and Information Services

Findings of the current study revealed that much of the ICT infrastructure necessary for the offering and access to library and information services on the mobile phone platform was available. The available ICT infrastructure available was mainly Internet infrastructure and ICT systems such as Library Management System (LMS), servers, tablet computers, desktop computers, and fibre-optic backbone that facilitated access to both wired and Wi-Fi Internet access. Availability of these resources meant that libraries were in a position to offer library and information services through mobile phones to their clients. Likewise, students and academic staff could also use the Wi-Fi network to access the library and information services offered.

Findings further revealed that mobile phone ownership was very high amongst both students and academic staff. Moreover, most of the students and academic staff owned mobile phones that had Internet capabilities. Besides, a fifth of the students and close to half of the academic staff owned other mobile devices such as Galaxy tabs and iPads. Based on these findings, it is concluded that students and academic staff in public university libraries in Malawi had the ICT tools which they could use to access library and information services offered through mobile phones.

The findings also indicated that places where the study institutions were located, had overall good mobile telecommunications network coverage. Nevertheless, mobile phone services such as Internet, SMS and even voice calls were rated poor by some respondents, a

development that could negatively impact the delivery of library and information services through mobile phones.

Findings revealed that high cost of mobile phone services was another threat to the overall success of library and information services offered through mobile phones. Students and academic staff identified cost as a major factor they would likely face in accessing library and information services offered through mobile phones. Most of the university/college librarians and ICT directors also indicated that mobile service costs were very expensive in Malawi.

7.2.1.2 E-readiness of public university libraries in Malawi in terms of policy framework for the adoption and use of mobile phones in providing library and information services

The findings of the study indicated that all the five institutions covered in this study did not have operational ICT policies to govern the offering of library and information services through mobile phones. However, all the institutions had draft ICT policies that were being refined in readiness for adoption and implementation.

7.2.1.3 E-readiness of public university libraries in Malawi in terms of human capacity for the adoption and use of mobile phones in providing library and information services

Research findings revealed a mixed picture in relation to the human resource base available to manage the provision of library and information services through mobile phones. Whilst the libraries were adequately staffed, the ICT departments were not. Moreover, the library staff lacked knowledge, skills and experience in the delivery of library and information services through mobile phones. Lack of adequate staff in the ICT departments and skilled human resources in the libraries could affect the quality of library and information services offered through mobile phones if not addressed.

7.2.2 Electronic information resources and services currently available in public university libraries in Malawi that can potentially be adopted and used through mobile phones

The findings disclosed that public university libraries in Malawi possessed a diversity of electronic information resources which could potentially be accessed through mobile phones. Topping the list were e-journals, e-books, OPAC, and institutional repositories of local content. Besides, some libraries were planning to acquire digital libraries and e-granary. More importantly, these resources were widely used by students and academic staff in the institutions surveyed.

The study findings further showed that public university libraries in Malawi were in a position to offer the available electronic information resources (e-journals, e-books, OPAC, and institutional repositories of local content) in the short to long term using mobile phones. The libraries studied also owned OPACs and institutional repositories that could be offered through mobile phones in the short to long term.

7.2.3 Current Status of Providing and Accessing Library and Information Services through Mobile Phones in Public University Libraries in Malawi

The findings further revealed that all the libraries in this study were moving towards the implementation of library and information services on the mobile phone platform but were at different levels in realising this objective. COM Library had fully implemented library and information services offered through mobile phones whilst LUANAR was at modest stage of offering such services to farmers, extension workers, policy makers and students from other institutions but was yet to offer such type of services to its own students and academic staff. However, the KCN library had piloted the SMS project in 2014 but did not attract much usage. LUANAR, KCN, MZUNI and The Polytechnic libraries all indicated that they would fully implement library and information services offered through mobile phones in the near future. The service offering would initially focus on Facebook, WhatsApp, OPAC and SMS whereas the other services would be added later.

Findings further showed that many students and academic staff were using mobile phones to access e-books, e-journals, and library website whilst only a few were using mobile phones to access the OPAC. This raises the possibility that usage of these resources could be boosted even further if they are put on mobile phone platform.

7.2.4 Attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services

Findings show that the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services were largely positive. Moreover, majority of students and academic staff were in favour of formalising the use of mobile phones in the delivery of library and information services. The perceived positive attitudes of library staff, students and academic staff to the use of mobile phones in the delivery and access to library and information services had made the COM Library to consider introducing more Wi-Fi hotspots to ensure that students and academic staff easily access its services. MZUNI, KCN, COM and The Polytechnic, all of which had not adopted or fully adopted the use of mobile phones in the delivery of library and information services, felt encouraged to adopt the services in the short to medium term.

7.2.5 Possible factors that influence the adoption and use of mobile phones by library staff, students and academic staff respectively in providing and accessing library and information services

Findings showed a number of factors that could influence the offering of library and information services through mobile phones. The major ones included network quality (both Wi-Fi and mobile telecommunications network), service costs, and response rate. Other factors are library policies on the use of mobile phones in the library, and non delivery or delayed messages. Futhermore, funding, and staffing particularly in the ICT departments were the other factors.

7.3 Conclusions

The conclusions of this study are informed by findings and the interpretations attached to them by the researcher. The conclusions are drawn in the order of the research questions and themes.

7.3.1 E-readiness of public university libraries in Malawi in terms of ICT infrastructure, policy framework and human capacity for the adoption and use of mobile phones in providing library and information services

The study findings revealed that institutions studied had the ICT infrastructure necessary for offering and accessing library and information services on the mobile phone platform. This included the Library Management System (LMS), servers, tablet computers, desktop computers, and Wi-Fi. Findings further indicated that most of the infrastructural ICT resources that the institutions were using or needed were accessible either on the local market or abroad. Since the institutions studied had the required ICT infrastructure to offer library and information services through mobile phones and other required ICT resources were available on the market, it is concluded that libraries studied were e-ready to offer library and information services through mobile phones.

Findings further revealed that mobile phone ownership was very high amongst both students and academic staff. Moreover, most of the students and academic staff owned mobile phones that had Internet capabilities. Besides, a fifth of the students and close to half of the academic staff owned other mobile devices such as Galaxy tabs and iPads. Based on these findings, it is concluded that students and academic staff in public university libraries in Malawi had the ICT tools which they could use to access library and information services offered through mobile phones.

Findings have also shown that places where the study institutions were located, had overall good mobile telecommunications network coverage. Nevertheless, mobile phone services such as Internet, SMS and voice calls were rated as poor by some respondents. Findings further indicated that mobile phone services in Malawi were very expensive. A number of conclusions can be drawn from these findings. Firstly, the pervasiveness of the mobile telecommunications network has the potential to enhance the delivery of library and

information services through mobile phones to students and academic staff as they would be able to access services offered from almost any point in the country. Secondly, the availability of the mobile telecommunications network provides an alternative means to academic staff and students of accessing library and information services using the mobile phone platform besides the campus Wi-Fi network. Thirdly, high cost of accessing the services may slow down the uptake of library and information services through mobile phones.

The findings indicated that all the five institutions covered by this study did not have operational ICT policies to govern the operations of library and information services offered via the mobile phone platform. However, all the institutions had draft ICT policies that were being refined in readiness for adoption and implementation. Findings further indicated that national regulatory framework and policies that could hamper the provision of library services through mobile phones did not exist.

The absence of ICT policies in the institutions in this study may affect the overall quality of library and information services delivered through mobile phones. Moreover, the absence of national regulations or policies that may limit the provision of library services through mobile phones implies that the regulatory environment in Malawi was favourable to the adoption and use of mobile phones in the provision of library services.

The study findings revealed a mixed picture in relation to the human resources available to manage the provision of library and information services through mobile phones in the institutions in this study. Whilst the libraries were adequately staffed, the ICT departments were not. Additionally, most of the library staff lacked knowledge, skills and even experience in the delivery of library and information services through mobile phones. In light of these findings, it is concluded that though the human resource required to manage the provision of library and information services through mobile phones in the institutions studied was available, they did not have the necessary skills and numbers to provide quality library and information services through mobile phones.

7.3.2 Electronic information resources and services currently available in public university libraries in Malawi that can potentially be adopted and used through mobile phones

Findings disclosed that libraries in the current study were providing a diversity of electronic information resources which could potentially be accessed through mobile phones. These resources included e-journals, e-books, OPAC, and institutional repositories content. Besides these resources, some other libraries were planning to acquire digital libraries and e-granary. The available electronic resources were already widely used by students and academic staff. Findings further showed that public university libraries in Malawi were in a position to provide the available electronic information resources in the short to long-term. Long term availability of the e-journals and e-books was guaranteed through budgetary allocations for yearly subscriptions and existence of partnerships with academic and non-governmental organisations that provided access to such type of resources.

Two main conclusions are drawn from these findings. Firstly, existence of e-journals, e-books and OPAC suggest that institutions possessed core content of electronic resources to be offered through the mobile phone platform. Secondly, the long-term accessibility of the available electronic resources makes provision of library and information services sustainable.

7.3.3 Current Status of Providing and Accessing Library and Information Services through Mobile Phones in Public University Libraries in Malawi

The findings revealed that some libraries had implemented library and information services on the mobile phone platform whilst others were intending to do the same. COM Library had fully implemented library and information services offered through mobile phones whilst LUANAR had only done that modestly by offering such services to farmers, extension workers, policy makers and students of other institutions but was yet to offer such type of services to its own students and academic staff. LUANAR, KCN, MZUNI and The Polytechnic libraries all indicated that they would fully implement library and information services through mobile phones in the near future.

Based on these findings, it is concluded that public university libraries in Malawi were very enthusiastic about adopting the use of mobile phones in providing library and information services. However, the enthusiasm had not translated into meaningful action as only one of the five libraries studied had fully adopted the use of mobile phones in the provision of library and information services. Considering that the needed ICT infrastructure, human resources and electronic information resources, which are critical to the implementation of such services were available the prospects for the institutions adopting mobile phone in providing library and information services looks good.

Findings further show that many students and academic staff were already using mobile phones to access e-books, e-journals, and library website and a few others were using mobile phones to access the OPAC. There is, therefore, possibility that access to e-books, e-journals, the library website and OPAC would go up if more public university libraries in Malawi introduced library and information services offered through mobile phones.

7.3.4 Attitudes of Library Staff, Academic Staff and Students towards the Potential Use of Mobile Phones in Providing and Accessing Library and Information Services

Findings from the interviews with university/college librarians revealed that the attitudes of library staff, academic staff and students towards the potential use of mobile phones in providing and accessing library and information services were largely positive. The perceived positive attitudes of library staff, students and academic staff towards the use of mobile phones in the delivery of library and information services had two notable effects. Firstly, COM Library which had adopted the use of mobile phones in the delivery of library and information services was considering introducing more Wi-Fi hotspots to ensure students and academic staff easily access its services. MZUNI, KCN, LUANAR and The Polytechnic, which had not adopted or fully adopted the use of mobile phones in the delivery of library and information services, felt encouraged to adopt their use.

7.3.5 Factors Influencing the Adoption and Use of Mobile Phones by Library Staff, Students and Academic Staff in Providing and Accessing Library and Information Services

The findings revealed a number of factors that influence the offering of library and information services through mobile phones. The major ones included network quality (both Wi-Fi and mobile telecommunications network), service costs, and response times. Other factors are library policies on use of mobile phones in the library, delivery times of messages, and funding. Based on these findings, this study concludes that factors from both within and outside the public university libraries in Malawi had/could have an influence on the successful implementation of library and information services through mobile phones.

7.3.6 Overall Conclusion of the Study

The aim of this study was to ascertain the level of e-Readiness of public university libraries in Malawi in using mobile phones in the provision of library and information services. The study concluded that institutions surveyed have the ICT infrastructure necessary for offering library and information services on the mobile phone platform. Likewise, students and academic staff have mobile phones, most of which have Internet capabilities, to enable them access services offered on the mobile phone platform. The pervasiveness of the ICT infrastructure suggests that library and information services in the institutions surveyed can be provided and accessed using mobile phones. Furthermore, the lack of ICT policies in all the institutions in the institutions surveyed could negatively impact the offering of library and information services through mobile phones. The study further concluded that the human resources required to provide library and information services through mobile phones was available but not in sufficient numbers to successfully sustain such services. The available staff, particularly those in the libraries, also needed to be equipped with requisite knowledge, skills and experience in the delivery of library and information services through mobile phones to enable them deliver quality services.

This study further concluded that public universities libraries in Malawi possessed a diversity of electronic information resources which could potentially be offered through mobile phones. Besides, public university libraries in Malawi were very enthusiastic about adopting the use of mobile phones in providing library and information services because COM had

fully adopted the use of mobile phones in the delivery of library and information services while MZUNI, KCN, LUANAR and The Polytechnic were all planning to adopt the use of mobile phones in service delivery. This was prompted by perceived positive attitudes of library staff, students and academic staff to the offering and access to such type of services. Finally, the study concluded that several factors impacted the offering and access to library and information services through mobile phones. The factors included network quality, services costs, funding, and staffing. The overall conclusion from this study, therefore, is that public university libraries in Malawi were generally e-ready to offer library and information services through mobile phones notwithstanding certain infrastructure and skills issues that must be addressed.

7.4 Recommendations

This study concluded that public university libraries in Malawi were generally e-ready to offer library and information services through mobile phones, but certain challenges must be addressed.

Recommendation 1: Improve ICT Infrastructure in Public Universities in Malawi

University/college librarians and ICT directors of the study institutions should work together to improve ICT infrastructure such as upgrading Internet bandwidth, increase the number of tablets, and purchase more robust servers necessary for the delivery of library and information services through mobile phones.

Recommendation 2: Engage in Fundraising Activities

Most of the challenges of ICT infrastructure to facilitate offering of library and information services through mobile phones could be addressed if funding was made available. It is, therefore, recommended that university/college librarians should work together with ICT directors to source for sustainable funding sources beyond donors in order to invest in the improvement of the ICT infrastructure.

Recommendation 3: Lobby for Increased Budgetary Allocations

The study findings further indicated that management of the institutions were despite funding constraints making attempts to implement ICT projects in public university libraries in Malawi that could support provision of library and information services through mobile phones. However, budgetary allocations for such projects were still low. It is recommended that university/college librarians and ICT directors should work closely with their institutional management to increase funding to ICT infrastructure development.

Recommendation 4: Improve Mobile Telecommunications Network and Reduce Cost of Services

The study findings revealed that the quality of mobile telecommunications network performance is low. This has resulted in poor service offering by the mobile telecommunications services operators. Furthermore, the prices charged for the services are high, and this will negatively impact the provision of library and information services through mobile phones.

Based on these findings, it is recommended that the Malawi Communications Regulatory Authority should scale up its oversight role to ensure that mobile telecommunications operators adhere to set standards. This would ensure that mobile telecommunications services provided are of high quality which might ensure smooth operations of library and information services delivered through mobile phones. It is further recommended that university/college librarians and ICT directors should work with other stakeholders such as the Ministry of Information and Communications Technology, ICT Association of Malawi, Malawi Library Association, and other stakeholders to lobby for the lowering of tariffs that are charged by the mobile telecommunications service operators to ensure that the services become affordable. University/college librarians and ICT directors should also work with the stakeholders outlined above to lobby the Minister of Finance to reduce or even eliminate some of the taxes that are levied on mobile phone services such as SMS, data, and voice calls to ensure that the cost of using these services becomes affordable.

Recommendation 5: Adopt ICT Policy and Library Friendly Policies

Findings of the study indicated that all the institutions surveyed did not have operational ICT policies to guide the implementation of library and information services on the mobile phone platform. The absence of the ICT policies would likely affect the offering of library and information services through mobile phones as things would be done in a haphazard way. The ICT directors should work with relevant stakeholders to refine and implement draft policies that are available in all the five institutions to ensure the operationalisation of library and information services through mobile phones. Similarly, university/college librarians should ensure that policies implemented in the library promote responsible use of mobile phones by academic staff and students to ensure smooth operations of library and information services through mobile phones.

Recommendation 6: Employ and Train More Staff

Findings of the study indicated that the staff complement in the ICT departments was not adequate. This resulted in the ICT staff failing to properly service all units within their institutions. Findings further suggested that library staff lacked knowledge, skills, and experience in the offering of library and information services on the mobile phone platform.

Based on these findings, it is recommended that university/college librarians and ICT directors push for the recruitment of more staff both in the library and ICT departments to ensure that existing staff cope with the pressure that may come with the implementation of library and information services through mobile phones. University/college librarians should also facilitate staff training in the delivery of library and information services using mobile phones to ensure that the staff acquire the requisite knowledge and skills needed to offer such type of services.

Recommendation 7: Maintain Electronic Information Resources and Services

Findings of this study revealed that institutions in this study were offering a number of electronic resources. These included e-journals, e-books, OPAC, and institutional repositories of local content. It is, therefore, recommended that university/college librarians should work not only to sustain subscriptions of the current electronic resources but also to expand on the

existing collections. University/college librarians should also ensure that adequate financial resources are provided to all the time to ensure continued accessibility of the electronic resources. In addition, university/college librarians should ensure that collections of repositories of local content which were being offered to patrons should be expanded, and widely marketed for wider use.

Recommendation 8: Speed up implementation of library and information services through mobile phones

Notwithstanding that students and academic staff were using mobile phones to access e-books, e-journals, library website and OPAC, only COM Library had fully implemented the delivery of library and information services through mobile phones. MZUNI, KCN, LUANAR and The Polytechnic are encouraged to fast track the offering of library and information through use of mobile phones.

7.5 Originality of the Study

Originality of the present study is construed from three main perspectives: Context, theory and methodology. Contextually, this study is original in that it is the first of its kind to be done in Malawi. The literature reviewed revealed that most of the studies that have been done on the subject are concentrated in the developed world and transitional economies such as the USA, Malaysia, China, and Japan (Li, 2013; Sabaratnam and Ong, 2013; Cummings et al., 2010). In contrast, studies focusing on developing countries, and Africa in particular, were found to be few, and were mainly done in countries like South Africa, Swaziland and Nigeria (Baro et al., 2014; Mohamed, 2014; Anbu and Mavuso, 2012). No studies were found covering the subject on public university libraries in Malawi.

This study was also theoretically original. The study jointly used the UTAUT model and the TOE framework as anchoring theoretical models. Both the UTAUT model and the TOE framework have been used extensively in a number of fields (see chapters 1 and 2). However, the literature reviewed did not disclose any studies that used the UTAUT model and TOE framework either individually or jointly with regard to mobile phone use in the delivery of library and information services in university libraries. Use of the UTAUT model and TOE

framework in this study have helped illuminate the research phenomenon from a developing country context such as Malawi.

The study has also demonstrated methodological originality. Most of the studies undertaken in both developed and developing countries on the use of mobile phone in providing library and information services have used case studies (Felts Jr., 2014; Johns-Masten and Mann, 2013; Schultz, 2013; Bridges et al., 2010; Wilson and McCarthy, 2010), desktop research (Keating, 2011; Walsh, 2009), and surveys (Salisbury et al., 2015; Bomhold, 2014; Luo, 2014; Aharony, 2013; Cummings et al., 2010). Multi-case studies are limited. The present study was a multi-case study that investigated use of mobile phones in the provision of information services in public university libraries in Malawi. With regard to approach, the majority of the studies undertaken investigated mobile phones use either from the user (clients) (Lin and Lan, 2014; Hsiao, 2014) or from the information provider (libraries) perspectives (Hoivik, 2013; Sabaratnam and Ong, 2013), and only a few from both perspectives (Wang et al., 2012; Chu and Meulemans, 2008). The current study investigated the use of mobile phones in the provision of library services from the users' and service providers' perspectives.

7.6 Contributions of the Study

The contributions of this study are to theory, policy, and practice. As already discussed, most of the researchers in the field of information systems have extensively used either the UTAUT model or the TOE framework, adaptations of either of the two models, or either the UTAUT model or the TOE framework in conjunction with other models or theories (see chapter 2). However, the literature reviewed did not reveal articles that indicate the two models being used to underpin studies on the delivery of library and information services through mobile phones either independently or jointly. The study has generated knowledge on the applicability of the two models to the study of the use of mobile phones in the delivery of library and information services hence assist in greater understanding of these theories. Such information could prove useful to current and future researchers in this field who may wish to use the two models in a similar way.

Findings revealed that all the five institutions covered by this study did not have operational ICT policies. The study concluded that the absence of such policies could negatively impact

the implementation of library and information services through mobile phones. The study findings also indicated that some of the libraries surveyed by this study had in place library policies that prohibited the use of mobile phones in libraries. This aspect too could negatively impact access to library and information services through mobile phones mainly by students who spend much of their time in the library as they would be unable to optimally use their mobile phones to access library and information services on offer. The study, therefore, provides the basis for the promulgation of relevant policies for university libraries to offer library and information services using mobile phones.

The findings revealed that only COM had fully adopted the use of mobile phones in the delivery of library and information services whilst the other institutions were intending to do so in the near future. Notwithstanding this, the findings revealed that most public university libraries in Malawi were generally e-ready to offer library and information services through mobile phones because they had, among others, relevant ICT infrastructure, human capacity and e-resources which could be offered on the mobile phone platform. Consequently, the findings of this study will act as an advocacy tool for the adoption and use of mobile phones in the delivery of library and information services not only in public university libraries in Malawi but also by other types of libraries in the country and across the borders.

7.7 Areas for Further Research

This study investigated the eReadiness of public university libraries in Malawi in using mobile phones in the provision of library and information services. Due to the limitation of time and resources, the study only covered students in years 3-5 and postgraduates including academic staff of MZUNI, KCN, The Polytechnic, COM and LUANAR. Being a case study, the findings are limited to the institutions and the populations studied (Creswell, 2013). The public university sector in Malawi includes the Malawi University of Science and Technology and Chancellor College, which is a constituent college of the University of Malawi. The researcher, therefore, recommends a much broader study covering all students in the four public universities in order to provide a holistic picture of the eReadiness of public university libraries in Malawi to offer library and information services through mobile phones.

Findings of this study revealed that some public university libraries have policies that prohibit use of mobile phones in libraries. It is, therefore, necessary to establish how these policies impact library users (students and academic staff)'s use of mobile phones whilst in the library. In addition, high service costs and poor network quality have been singled out as some of the factors that are negatively impacting the provision of library and information services through mobile phones. It is, therefore, necessary to investigate the extent to which these factors are impacting the provision of library and information services through mobile phones at College of Medicine which had already adopted the use of mobile phones in the provision of library and information services.

The study findings further indicated that the ICT departments were inadequately staffed whilst the library did not have staff that had the requisite knowledge, skills and experience in the offering of library and information services through mobile phones. Based on these findings, it might be necessary to carry out a study to establish the extent to which shortage of staff in the ICT departments and limited knowledge, skills and experience affected the offering of library and information services through mobile phones.

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APPENDICES

Appendix 1: Informed Consent Form for Interviewees



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11 June, 2015

Dear Respondent

INFORMED CONSENT LETTER FOR INTERVIEWS

Researcher: Aubrey Chaputula

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I, Aubrey Chaputula, of Mzuzu University, kindly invite you to participate in the research project entitled **‘eReadiness of Public University Libraries in Malawi with Special Reference to Use of Mobile Phones in the Provision of Library and Information Services’**.

This study is undertaken as part of the requirements of the PhD, which is undertaken through the University of KwaZulu-Natal, Information Studies Department.

The aim of this study is to investigate the **‘eReadiness of Public University Libraries in Malawi with Special Reference to Use of Mobile Phones in the Provision of Library and Information Services’**.

Participation in this study is voluntary. You may refuse to participate or withdraw from the research project at any stage and for any reason without any form of disadvantage. There will be no monetary gain from participating in this study. Confidentiality and anonymity of records identifying you as a participant will be maintained by the Department of Information Studies, at the University of KwaZulu-Natal.

If you have any questions or concerns about participating in this study, please feel free to contact myself or my supervisor at the numbers indicated above.

The interview would take approximately 15 minutes to complete. If you are willing to be interviewed, please indicate (by ticking as applicable) whether or not you are willing to allow the interview to be recorded by the following equipment:

	willing	Not willing
Audio equipment		

Thank you for participating in this study.



11th June 2015

Signature

Date

I hereby consent to participate in the above study.

Name: Date: Signature:

Appendix 2: Informed Consent Form for Respondents Completing Questionnaires



University of KwaZulu-Natal

School of Social Sciences

Private Bag X01

Scottsville

3209

Pietermaritzburg

Republic of South Africa

Telephone: 031 -260-4373

Fax: 031- 260- 4426

Email: 212550229@stu.ukzn.ac.za

11 June, 2015

Dear Respondent

INFORMED CONSENT LETTER FOR QUESTIONNAIRES

Researcher: Aubrey Chaputula

Institution; University of KwaZulu-Natal

Telephone number: +27 31 260 4373

Email address: 212550229@stu.ukzn.ac.za

Supervisor: Prof S.M. Mutula

Institution: University of KwaZulu-Natal

Telephone number: +27 33 260 5571

Email address: mutulas@ukzn.ac.za

Humanities Research Ethics Officer: Phumelele Ximba

Institution: University of KwaZulu-Natal

Telephone number: +27 31 260 3587

Email address: ximbap@ukzn.ac.za

I, Aubrey Chaputula, of Mzuzu University, kindly invite you to participate in the research project entitled '**eReadiness of Public University Libraries in Malawi with Special Reference to Use of Mobile Phones in the Provision of Library and Information Services**'.

This study is undertaken as part of the requirements of the PhD, which is undertaken through the University of KwaZulu-Natal, Information Studies Department.

The aim of this study is to investigate the '**eReadiness of Public University Libraries in Malawi with Special Reference to Use of Mobile Phones in the Provision of Library and Information Services**'.

Participation in this study is voluntary. You may refuse to participate or withdraw from the research project at any stage and for any reason without any form of disadvantage. There will be no monetary gain from participating in this study. Confidentiality and anonymity of records identifying you as a participant will be maintained by the Department of Information Studies, at the University of KwaZulu-Natal.

If you have any questions or concerns about participating in this study, please feel free to contact myself or my supervisor at the numbers indicated above.

The questionnaire would take approximately 15 minutes to complete.

Thank you for participating in this study.



11th June 2015

Signature

Date

I hereby consent to participate in the above study.

Name: Date: Signature:

Appendix 3: Interview guide for University/College ICT Directors



School of Social Sciences

Department of Information Science

Questions

ICT INFRASTRUCTURE

INTERNAL ENVIRONMENT

1. Are you familiar with the use of mobile phones in the provision of library and information services?
2. Is your organisation in a position to support the provision of library and information services through the use of mobile phones?
3. What sort of infrastructural resources would you require to accomplish this task?
4. Which of these resources are currently available and which ones do you lack?
5. Is your organisation in a position to acquire these resources? If yes, how? (Through own resources or through donor support?)
6. Are these resources easily accessible on the local market?

EXTERNAL ENVIRONMENT (successful implementation of library and information services would also depend on the network infrastructure provided by the telecommunication providers)

7. How would you describe the overall network coverage within your area and surrounding areas?
8. How do you rate the performance of your network?
9. Are the services (SMS, Internet charges, among others) affordable to enable the library to offer services to its clients, and for the clients (students and academic staff) access those services through their mobile phones with ease?
10. If not, which services are not affordable, and what can be done to remedy the situation?

CHARACTERISTICS AND RESOURCES OF THE FIRM

11. Is your department adequately funded to carry out its tasks?
12. If not, how has inadequacy of funding affected your operations?

13. Could inadequacy of funding in any way hamper your efforts to support the offering of library and information services through use of mobile phones?
14. Is management supportive of IT development projects?
15. If not, how does this affect the implementation of a project such as this?

HUMAN RESOURCES

16. Is your department adequately staffed
17. If not, how critical is the issue of staffing, and how has this affected your operations?
18. Does the staff have requisite skills to support the offering of library and information services through the use of mobile phones?
19. If not, what skill gaps exist, and how can those gaps be closed?

REGULATORY ENVIRONMENT

20. Are there regulations from such bodies as the Malawi Communications Regulatory Authority (MACRA) or indeed the parent organisation that may hamper the provision of library and information services through the use of mobile phones?
21. If yes, what are these regulations, and how do they affect you?
22. How can these challenges be overcome?

POLICY FRAMEWORK

23. Do you have relevant policy (ies) to guide implementation of projects such as that of offering library and information services through the use of mobile phones?
24. In what way does the policy (ies) aid the management of a programme such as this?
25. If the policy doesn't exist, what impact will this have on a programme such as this one?
26. If policy doesn't exist, are there any immediate plans to develop one?

END OF INTERVIEW AND THANK YOU FOR YOUR TIME

Appendix 4: Interview guide for University/College Librarians



School of Social Sciences

Department of Information Science

Questions

The Use of Mobile Phones in the Management and Provision of Library and Information Services

1. Are you familiar with the potential uses of mobile phones in libraries?
2. If yes, are you planning to start using mobile phones in the near future?
3. Which services (SMS, OPAC, WhatsApp or Facebook) are you likely going to adopt?
4. If not, why is this the case?

Availability of equipment, infrastructure, skills and human resources and policy

5. Do you have the requisite equipment and infrastructure to facilitate the roll out of mobile library services
6. What sort of infrastructure do you have at your disposal which you think is critical for this project?
7. What sort of equipment do you lack which you may need to roll out this project?
8. Do you think the country has the necessary telecommunications infrastructure to support delivery of library services using mobile phones?
9. If not, which areas are lacking?
10. Do you have staff that has the necessary skills both from the service provider side and the technical side to help you launch and manage mobile library services?
11. If not, which skill gaps exist in this regard in your organisation?
12. If you still want to roll out these services, how do you hope to close these skill gaps?
13. Do you have the necessary policy regime to drive forward this project?
14. If not, how do you hope to overcome this challenge?

Electronic information resources and services currently available in university libraries in Malawi that can be deployed through mobile phones

15. What electronic information resources and services are currently available in your library that can be deployed through mobile phones?
16. What is the potential for the long-term availability of these resources?
17. What is your assessment of the use of these resources by academic staff and students?

18. Is there potential that these resources could be utilised by academic staff and students through mobile phones as well if they were made accessible via that platform? In either case say why this may be the case.

Extent of the use of mobile phones to access services by students and academic staff

19. Are you familiar with academic uses of mobile phones by students and academic staff at your institution? If yes, name them.
20. As a library, have you played a role in facilitating the use of any of them?
21. Have students and academic staff ever asked about the use of mobile phones in the delivery of library services?
22. If yes, which services are they more interested in?

Attitudes of library staff, academic staff and students towards the use of mobile phones for managing and accessing library and information services

23. Do you know the attitudes (positive or negative) of students, academic staff and library staff to the use of mobile phones in the management and access of library services?
24. In either case (positive or negative), have these affected your future plans in regard to the introduction of these services?
25. If yes, how?

Challenges faced by public university libraries and students in using mobile phones for managing and accessing information services

26. If you were to start using mobile phones, which challenges would you likely face?
27. How do you plan to overcome these challenges?

END OF INTERVIEW AND THANK YOU FOR YOUR TIME

Appendix 5: Questionnaire for students



School of Social Sciences

Department of Information Science

Instructions

Answer questions by ticking in appropriate boxes or filling in the blank spaces. Where applicable, multiple responses are allowed.

Section A: Demographic Information

1. Tick in the box that represents your gender

Male Female

2. Fill in details in the table below

Name of your institution (i.e. Mzuni or Polytechnic)	
Year of study	
Faculty	

3. Tick box that represents your age range

Below 20	
20 – 25	
26 – 30	
31 – 35	
36 - 40	
Over 40	

Section B: Mobile Phone Ownership

4. Do you own a mobile phone?

Yes No

5. How many mobile phones do you own?

One Two Three More than three

6. If yes, what type (s) of mobile phone do you own?

Nokia	
Samsung	
IPhone	
Alcatel	
HTC	
Sony Ericson	
LG	
Huawei	
Windows phone	
Blackberry	
TECNO Phone	
ZTE	
Itel	
Motorola	
Other	

7. Does your mobile phone have internet capabilities?

Yes No

8. If you own more than one mobile phone, indicate how many of them have Internet capabilities.

One

Two

Three

More than three

9. Besides mobile phone, do you also own other mobile devices such as iPad or Galaxy tab?

Yes

No

Section C: Uses of Mobile Phones

10. How often do you use your mobile phone?

Very frequently

Frequently

Moderately

Rarely

Very rarely

11. Which of the following could be termed as your main uses of mobile phones?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Calling					
SMS					
Multi-Media Service (MMS)					
Surfing internet					
Checking emails					
Connecting to Social media (Facebook, twitter, or WhatsApp)					
To take pictures					
Used as a torch					
To set alarms and other reminder					
To check time					
To play games					
To listen to music and radio					
Other (specify)					

Section D: Uses of Mobile Phone to access Library and information services

12. Have you ever accessed each of the following information resources using your mobile phone?

Information resource	Yes	No
E-books		
E-journals		
Library website		
OPAC		
Other		

13. If the answer to **question 12** is yes, what prompted you to choose the mobile phone over other available means such as personal computers (PCs) in the computer laboratories or laptop computers, among others?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Mobile internet is available from anywhere, anytime hence more convenient to use					
Mobile internet is more reliable					
PC shortage in computer labs					
Frequent power outages in computer labs					
Mobile internet is cheaper to use					
Book shortage in the library					
It is easier to access services using mobile phone					
Influenced (copied) from a friend					

If you have tackled question number 13 then proceed to question number 16.

14. If you have NOT accessed any of these services, what are the reasons?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Small screen size of mobile phone makes reading difficult					
Mobile internet is very costly					
I do not own an internet enabled phone					
Library website is not mobile friendly hence difficult to scroll on the screen of mobile phone or other mobile device					
Outdated information on library website					
Required books/journals not found in the library					
E-journals in my discipline not subscribed to by library					
Other					

15. Assuming the challenges listed above have been sorted out, are you willing to use your mobile phone to access the services stated in (12) in future?

Most definitely

Definitely

Not sure

Not willing

Very unwilling

16. Have you ever used your mobile phone to call, email or text the library to seek help or access any reference service?

Yes, frequently

Yes, but rarely

Not sure

Hardly use

Never used

17. If the answer to **question 16** is yes, which one of the following do you frequently use to access the reference service?

SMS	Use frequently	use rarely	Not sure	Do not use	Never used
E-mail					
Calling					
Instant messenger					
Social media (Facebook, twitter, or WhatsApp)					
Other (specify)					

Section E:

Attitudes of students towards the use of mobile phones to access library services

18. Is the use of mobile phones good for offering library and information services?

Strongly agree

Agree

Neither agree nor disagree

Disagree

Strongly disagree

19. If you agree or strongly agree to notion in **question 18**, why have you taken this stand?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Promotes 24/7 access to library resources and services					
Facilitates anywhere access to library services hence convenient to use					
Promotes speedy access to information resources and services					
Limits the scramble for PCs in the computer laboratories					
Overcomes the challenge of power blackouts prevalent in the country					
Other (Specify)					

20. If you neither agree nor disagree to notion in **question 18**, why have you taken this stand?

21. If you disagree or strongly disagree to notion in **question 18**, why have you taken this stand?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Small screen size of mobile phone makes reading difficult					
Mobile internet is very costly					
Delayed response					
It is difficult to type on mobile phone as opposed to a PC					
Other (Specify)					

22. Should the library formalise provision of services through use of mobile phones?

Strongly agree

Agree

Neither agree nor disagree

Disagree

Strongly disagree

23. If you agree or strongly agree to the formalisation of mobile library services, which services would you recommend to be prioritised?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Online Public Access Catalogue (OPAC)					
E-journals					
E-books					
Reference services					
Lending services (Overdue reminders, and book renewals, among others)					
Information services (Notification of recent acquisitions, change of opening hours, and news)					
Inter-library loans					
Checking availability of short loan items and making reservations/bookings					
User awareness or information literacy offerings					
Other (Specify)					

Section F:

Challenges encountered by students in using mobile phones to access library services

24. What challenges do you face/would you likely face in using mobile phones to access library services?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
High service costs					
Poor network quality					
Mobile phones (mobile devices) quickly get outdated					
Lack of knowledge on usage					
Received no response to queries					
Library policies that prohibit use of mobile phones in the library					
Delayed response					
Reference query not adequately addressed					
Messages not delivered					
Other (specify)					

Appendix 6: Questionnaire for Academic Staff



School of Social Sciences

Department of Information Science

Instructions

Answer questions by ticking in appropriate boxes or filling in the blank spaces. Where applicable, multiple responses are allowed.

Section A: Demographic Information

1. Tick in the box that represents your gender

Male Female

2. Fill in details in the table below

Name of your institution (i.e. Mzuni or Polytechnic)	
Position .i.e. Lecturer	
Faculty	

3. Tick box that represents your age range

20 – 30	
30 – 40	
40 – 50	
50 – 60	
Over 60	

Section B: Mobile Phone Ownership by academic staff

4. Do you own a mobile phone?

Yes No

5. How many mobile phones do you own?

One Two Three More than three

6. What type (s) of mobile phone do you own?

Nokia	
Samsung	
IPhone	
Alcatel	
HTC	
Sony Ericson	
LG	
Huawei	
Windows phone	
Blackberry	
TECNO Phone	
ZTE	
Itel	
Motorola	
Other	

7. Does your mobile phone have internet capabilities?

Yes No

8. If you own more than one mobile phone, indicate how many of them have Internet capabilities.

One

Two

Three

More than three

9. Besides mobile phone, do you also own other mobile devices such as iPad or Galaxy tab?

Yes No

Section C: Uses of Mobile Phones by academic staff

10. How often do you use your mobile phone?

Very frequently

Frequently

Moderately

Rarely

Very rarely

11. Which of the following could be termed as your main uses of mobile phones?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Calling					
SMS					
Multi-Media Service (MMS)					
Surfing internet					
Checking emails					
Connecting to Social media (Facebook, twitter or WhatsApp)					
To take pictures					
Used as a torch					
To set alarms and other reminder					
To check time					
To play games					
To listen to music and radio					
Other (specify)					

Section D: Uses of Mobile Phone to access Library and information services

12. Have you ever accessed each of the following information resources using your mobile phone?

Information resource	Yes	No
E-books		
E-journals		
Library website		
OPAC		

13. If the answer to **question 12** is yes, what prompted you to choose the mobile phone over other available means such as personal computers (PCs) in the computer laboratories or laptop computers?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Mobile internet is available from anywhere, anytime hence more convenient to use					
Mobile internet is more reliable					
PC shortage in computer labs					
Frequent power outages in computer labs					
Mobile internet is cheaper to use					
Book shortage in the library					
It is easier to access services using mobile phone					
Influenced (copied) from a friend					

If you have tackled question number 13 then proceed to question number 16.

14. If you have NOT accessed any of these services, what are the reasons?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Small screen size of mobile phone makes reading difficult					
Mobile internet is very costly					
I do not own an internet enabled phone					
Library website is not mobile friendly hence difficult to scroll on the screen of mobile phone or other mobile device					
Outdated information on library website					
Required books/journals not found in the library					
E-journals in my discipline not subscribed to by library					
Other					

15. Assuming the challenges listed above have been sorted out, are you willing to use your mobile phone to access the services stated in (12) in future?

Most definitely

Definitely

Not sure

Not willing

Very unwilling

16. Have you ever used your mobile phone to call, email or text the library to seek help or access any reference service?

Yes, frequently

Yes, but rarely

Not sure

Hardly use

Never used

17. If the answer to **question 16** is yes, which one of the following do you frequently use to access the reference service?

Response	Use frequently	use rarely	Not sure	Do not use	Never used
SMS					
E-mail					
Calling					
Instant messenger					
Social media (Facebook, twitter or WhatsApp)					
Other (specify)					

Section E:

Attitudes of academic staff towards the use of mobile phones to access library services

18. Is the use of mobile phones good for offering library and information services?

Strongly agree

Agree

Neither agree nor disagree

Disagree

Strongly disagree

19. If you agree or strongly agree to notion in **question 18**, why have you taken this stand?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Promotes 24/7 access to library resources and services					
Facilitates anywhere access to library services hence convenient to use					
Promotes speedy access to information resources and services					
Limits the scramble for PCs in the computer laboratories					
Overcomes the challenge of power blackouts prevalent in the country					
Other (Specify)					

20. If you neither agree nor disagree to notion in **question 18**, why have you taken this stand?

21. If you disagree or strongly disagree to notion in **question 18**, why have you taken this stand?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Small screen size of mobile phone makes reading difficult					
Mobile internet is very costly					
Delayed response					
It is difficult to type on mobile phone as opposed to a PC					
Other (Specify)					

22. Should the library formalise the provision of services through the use of mobile phones?

Strongly agree

Agree

Neither agree nor disagree

Disagree

Strongly disagree

23. If you agree or strongly agree to the formalisation of mobile library services, which services would you recommend to be prioritised?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Online Public Access Catalogue (OPAC)					
E-journals					
E-books					
Reference services					
Lending services (Overdue reminders, book renewals, among others)					
Information services (Notification of recent acquisitions, change of opening hours, and news)					
Inter-library loans					
Checking availability of short loan items and making reservations/bookings					
User awareness or information literacy offerings					
Other (Specify)					

Section F:

Challenges encountered by academic staff in using mobile phones to access library services

24. What challenges do you face/would you likely face in using mobile phones to access library services?

Response	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
High service costs					
Poor network quality					
Mobile phones (mobile devices) quickly get outdated					
Lack of knowledge on usage					
Received no response to queries					
Library policies that prohibit the use of mobile phones in the library					
Delayed response					
Reference query not adequately addressed					
Messages not delivered					
Other (specify)					

Appendix 7: Introductory letter to the research institutions

Registrar, Kamuzu College of Nursing, P/Bag 1, Lilongwe.

Registrar, College of Medicine, P/Bag 312, Blantyre.

Registrar, The Polytechnic, P/Bag 303, Blantyre

Registrar, Lilongwe University of Agriculture and Natural Resources

Registrar, Mzuzu University, P/Bag 201, Mzuzu

11 March 2015

RE: Introducing Mr Aubrey Chaputula – PhD Student at University of KwaZulu Natal

This letter serves to introduce and confirm that Mr Aubrey Chaputula is a duly registered PhD (Information Studies) candidate at the University of KwaZulu-Natal. The title of his PhD research is **‘eReadiness of University Libraries in Malawi with special reference to use of mobile phones in the provision of library and information services’**.

The outcome from the study is expected to improve practice, inform policy and extend theory in this field of study. As part of the requirements for the award of a PhD degree he is expected to undertake original research in an environment and place of his choice. **The UKZN ethical compliance regulations require him to provide proof that the relevant authority where the research is to be undertaken has given approval.**

We appreciate your support and understanding to grant Mr Aubrey Chaputula permission to carry out research in your organisation(s). Should you need any further clarification, do not hesitate to contact me.

Thank you in advance for your understanding

Prof Stephen Mutula



Dean & Head: School of Social Sciences
University of KwaZulu-Natal
Private Bag X01 Scottsville 3209
Pietermaritzburg
Republic of South Africa
Email: mutulas@ukzn.ac.za
Tel: +27 33 260 5571; +27 712 750 109

Appendix 8: Permission to conduct research at Mzuzu University



MZUZU UNIVERSITY
Office of the Director of Research

Private Bag 201, Luwingu,
Mzuzu 2, Malawi
Tel: 01-320-722
Fax: 01-320-6648
E-mail: kasulov@gmail.com

27th April, 2015

Aubrey Harvey Chaputula
College of Humanities
School of Social Sciences
University of KwaZulu – Natal
Pietermaritzburg
Private Bag X01
Scottsville 3209
REPUBLIC OF SOUTH AFRICA

Dear Mr Chaputula,

PERMISSION TO CONDUCT RESEARCH AT MZUZU UNIVERSITY

Please refer to Prof Stephen Mutula's letter dated 11th March 2015 in which permission was requested for you to conduct research at this University. I am pleased to inform you that permission has been granted for you to carry out your research in '**eReadiness of University Libraries in Malawi with special reference to use of mobile in the provision of library and information services**'. This permission is granted on the understanding that the information that will be collected will be used strictly for academic purposes and that where necessary informant consent will be sought before interviews and that respondents' confidentiality will be maintained.

The Directorate of Research will help you to facilitate your study at the University. Wishing you all the best in your research and overall studies.

Yours sincerely,

Dr Victor Kasulo
DIRECTOR OF RESEARCH

CC: Prof. Stephen Mutula
E-mail: mutulas@ukzn.ac.za

Appendix 9: Permission to conduct research at Kamuzu College of Nursing

**UNIVERSITY OF MALAWI
KAMUZU COLLEGE OF NURSING**

PRINCIPAL

A. MALATA, DipNurs, MRM,
B.Sc., MN, PhD



P/BAG 1, LILONGWE, MALAWI

TELEPHONE: 265 (0)1 751 622/200

TELEGRAMS: NURSING

FAX: 265 (0) 1 756 424

EMAIL:

principal@kcn.unima.mw

Website: www.kcn.unima.mw

5th May, 2015

Ref. No. KCN/P

Dean and Head: School of Social Sciences
University of KwaZulu Natal
Private Bag X01 Scottsville 3209
Pietermaritzburg
Republic of South Africa

Dear Prof. Matula

**PERMISSION TO CARRY OUT A RESEARCH AT KAMUZU COLLEGE OF NURSING
LIBRARY**

Permission has been granted to Mr Aubrey Chaputula to carry out a research titled 'eReadiness of University Libraries in Malawi with special reference to use mobile phones in the provision of Library and Information Services'.

Warm regards

pp. HLP

Prof A. Malata, FAAN
Principal

Cc: Registrar
: Acting College Librarian



Appendix 10: Permission to Conduct Research at the Polytechnic



All correspondence to be addressed to the Principal

University of Malawi – The Polytechnic
Private Bag 303
Chichiri
Blantyre 3, Malawi
Tel: (+265) 1 870 411
Fax: (+265) 1 870 578
E-Mail: principal@poly.ac.mw

PRINCIPAL
Prof Grant Kululanga, PhD. Eng., MSc. Eng., BSc. Eng., MASCE

Our Ref.: R1/23
Your Ref:
Date: 1st July 2015

Mr Aubrey Chaputula
University of KwaZulu-Natal

Dear Mr Chaputula

RE: PERMISSION TO CARRY OUT RESEARCH

Reference is made to the letter from the Dean and Head of School of Social Sciences at University of KwaZulu-Natal.

We are pleased to inform you that permission has been granted for you to carry out the research at our institution, the Polytechnic.

Best wishes.

Yours sincerely

M J T LONGWE (MRS)
REGISTRAR

cc: Principal
College Librarian

MJTL/atm

Appendix 11: Permission to conduct research at College of Medicine

COLLEGE OF MEDICINE

P/BAG 360

CHICHIRI

BLANTYRE 3

MALAWI

E-mail : mmatululu@medcol.mw

Cell : +265999877505

PROF STEPHEN MUTULA
DEAN & HEAD: SCHOOL OF SOCIAL SCIENCES
UNIVERSITY OF KWAZULU-NATAL
PRIVATE BAG X01 SCOTTSVILLE 3209
PIETERMARITZBURG
REPUBLIC OF SOUTH AFRICA
EMAIL: mutulas@ukzn.ac.za
TEL: +27 33 260 5571; +27 712 750 109

Dear Sir,

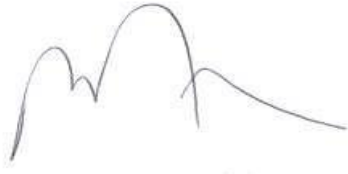
CONDUCTING RESEARCH AT COLLEGE OF MEDICINE

Your letter dated 11th March 2015 regarding the above captioned matter refers.

Please note that Mr. A. Chaputula has been granted permission to carry out his research activities at the College of Medicine.

Should you wish to seek some clarification on the matter please contact me anytime

Yours faithfully,

A handwritten signature in black ink, consisting of several loops and a long horizontal stroke extending to the right.

MARTIN M. MATULULU

FOR REGISTRAR

Appendix 12: Permission to conduct research at Lilongwe University of Agriculture and Natural Resources

VICE CHANCELLOR

Prof. G Y Kanyama-Phiri, Dip, BSc, MSc, Ph.D.



BUNDA COLLEGE CAMPUS

P.O. BOX 219, LILONGWE, MALAWI.

Telephone: (265) 277 222
Fax : (265) 277 364
Telex : 43622 BUNDA MI
Telegrams: "BUNDAGRIC"

Our Ref.: BC/ PF
Your Ref.:

2 July 2015

Mr Aubrey Chaputula
University of KwaZulu Natal
Private Bag X01 Scottsville 3209
Pietermaritzburg
REPUBLIC OF SOUTH AFRICA

Dear Mr Chaputula

RE: PhD RESEARCH

We refer to your letter on the above subject and write to accept that the University can allow you to do your PhD research entitled "eReadiness of University Libraries in Malawi with special reference to use of mobile phones in the provision of library and information services".

By copy of this letter, the University Librarian is informed about the development and is requested to assist you during your research period.

Yours sincerely

D S BANDA

For: **UNIVERSITY REGISTRAR**

Cc: University Librarian

Appendix 13: University of KwaZulu-Natal Ethics approval



04 November 2015

Mr Aubrey H Chaputula 2125500229
School of Social Sciences
Pietermaritzburg Campus

Dear Mr Chaputula

Protocol reference number: HSS/1526/015D

Project title: eReadiness of Public Policy University Libraries in Malawi with Special reference to use of mobile phones in the provision of Library and Information Services.

Expedited Approval

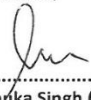
In response to your application dated 19 October 2015, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. Please note: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully



.....
Dr Shenuka Singh (Chair)

/px

cc Supervisor: Prof Stephen Mutula
cc Academic Leader Research: Professor Sabine Marschall
cc School Administrators: Ms Nonhlanhla Radebe & Ms Nozipho Ndlovu

Humanities & Social Sciences Research Ethics Committee

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