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Assessment of e-Readiness of Zambia's Copperbelt University

By

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SUPERVISOR

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DECLARATION

I hereby declare that this study, ***"Assessment of e-Readiness of Zambia's Copperbelt University"*** is entirely the scholarly work of the author. It is original work except where due reference is made to other people's works. This work has not been submitted, either in whole or part, to any other institution for a similar or any other degree.

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DEDICATION

I dedicate this work to all my family members for their sacrifice, support and encouragement for me to continue working hard while pursuing my studies. God Bless you all.

It is true that;

The price of success is hard work to the job at hand, and the determination that whether I win or lose, I would have applied the best of myself to the task at hand.

Vince Lombardi

ABSTRACT

Given the influential role that ICTs play in socio-economic development, emphasis is being placed on universities becoming repositories of valuable innovation and human capital to sustain the knowledge economy. Drawing on several sources, including studies from different scholars, theories and emerging literature on the growing role of ICTs in different business processes, it is argued that universities must become e-Ready in order to create service efficiency and ultimately place themselves at a competitive edge. In the same vein, Copperbelt University (CBU) embarked on a number of ICT initiatives in a bid to advancing its core business of teaching and learning, research and community outreach. This study therefore assessed the e-Readiness of Zambia's CBU. Specifically, the study assessed the extent to which CBU stakeholders; students, academic staff and managers were utilizing and integrating ICTs into its core mandate of teaching and learning, research and community outreach.

This study essentially employed a positivist approach and adopted a case study design coupled with methodological triangulation at the data collection stage where a self-administered questionnaire, interviews and document analysis were used as data collection instruments to understand the e-Readiness of CBU from multiple vantage points. Furthermore, stratified quota and purposive sampling were used to maximise presentation of the study sample comprising third to fifth year students including graduate students and academic staff. Quantitative data collected using questionnaires were entered into SPSS software to generate frequencies and percentages for the research data while qualitative data from interviews was analysed using content analysis techniques. The Network Readiness Index (NRI) model and the Socio-technical theory which underpin the extended Technological Enactment Framework were used as the theoretical lens. The NRI model was used in both developed and developing world to assess e-Readiness of Higher Education Institutions (HEIs). The study investigated to what extent the three main constructs of the NRI model; network usage, environment readiness and readiness to access ICTs influenced e-Readiness indicators and corresponding on the level of e-Readiness at CBU.

The study anticipates contributing to theory through proposing a context-based theoretical framework for appropriate measurement of e-Readiness in the developing world context. Practically, the study highlights the salient factors behind implementation of ICT initiatives in universities in Africa. Lastly, the study recommends that a further study be done that would include students from other academic years and all university staff may be included to achieve statistical significance and representativeness.

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Operational Definition of Terms

Yusof and Chell (1998) state that defining terms in a research is very important to dispel confusion and to improve the understanding of those who are new to the subject area together with those who are familiar with the subject. Therefore, some of the terms utilised in this study are defined as follows:

Digital Divide: The disparities among students, academic members of staff and the general community of the Copperbelt University (CBU), regarding their opportunities to access Information Communication Technologies (ICT) and their use of the Internet and different electronic resources for educational purposes (see also Adams, 2005; Moolman & Blignaut, 2008; De Moraes et al., 2010).

e-Learning: Refers to the learning programs that CBU is developing that make use of information network or electronic means such as the Internet, intranet (LAN) or extranet (WAN) whether wholly or in part for course delivery, interaction and /or facilitation (see also Antonelli, 2003; OECD, 2006; Kumpulainen, 2007; Youssef & Dahmani, 2008).

e-Readiness: The ability and the capacity of CBU institutional stakeholders (students, ICT personnel, lecturers and managers) to use communication devices and Internet services to create efficient services that would advance their core mandate of teaching, collaborative research and development (see also Bridges Organization, 2005; Iluyeni, 2008 UN, 2008).

ICTs: Any electronic communication-related technology including conventional communication media such as telephone or telex and computer-supported technologies such as electronic data transfer, electronic mail systems, the Internet and Local Area Network (see also Plowman et al., 2010; Lepicnik-Vodopivec & Samec, 2012).

ICT Infrastructures: The computer and communications hardware and software available at CBU to support ICTs integration in its core business of teaching and learning, research and community outreach (see also Plowman et al., 2010).

University Library: Refers to the support unit of CBU mandated to provide information needs of the teaching and learning process of the university including both applied and basic research (see also Aina, 2004).

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List of Abbreviations and Acronyms

APEC	Asia Pacific Economic Corporation
ASPA	American Society for Public Administration
AUCC	Association of Universities and Colleges of Canada
CBU	Copperbelt University
CBUAO	Copperbelt University Academic Office
CBUAR	Copperbelt University Annual Report
CBULAR	Copperbelt University Library Annual Report
CID	Centre for International Development
CSPP	Computer Systems Policy Project
DICT	Directorate of Information Communication Technology
DOI	Digital Opportunity Index
EIU	Economist Intelligence Unit
EU	European Union
EFA	Education for All
GDI	Global Diffusion of Internet
GK	Government of Kenya
GTI	Global Technology Index
HD	High Definition
HEIs	Higher Education Institutions
ICTs	Information Communication Technologies
ITU	International Telecommunication Union
KAM	Knowledge Assessment Matrix

KENET	Kenya Education Network
LIS	Library and Information Studies
MDGs	Millennium Development Goals
MI	McConnell International
NEPAD	The New Partnership for Africa's Development
NOSM	Northern Ontario School of Medicine
NRI	Networked Readiness Index
NTIA	National Telecommunication and Information Agency (NTIA)
OECD	Organisation for Economic Co-operation and Development
PDA	Personal Digital Assessment
PPPs	Public Private Partnerships
SIDA	Swedish International Development Agency
SWOT	Strength, Weaknesses, Opportunities and Threats
UK	United Kingdom
UNESCO	United Nations Educational Scientific and Cultural Organisation
UNISA	University of South Africa
UNZA	University of Zambia
WDI	World Development Indicators
WTO	World Trade Organisation

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Introduction

This study focusses on assessment of e-Readiness of Zambia's Copperbelt University (CBU). It assessed the ability and capacity of the University students, ICT personnel, lecturers and managers to use communication devices and Internet services to create efficient services that would advance their core mandate of teaching, collaborative research and development. In order to establish CBU's readiness or preparedness, the study assessed different factors which may contribute to achieving a higher level of e-Readiness and recommended remedial measures to improve implementation of ICT initiatives at the University. This chapter begins with a background on the emerging trends in ICTs used in different High Education Institutions (HEIs) worldwide. It proceeds with a discussion on literature on e-Readiness and outlines various ICT initiatives that CBU has embarked on to improve its e-Readiness. Therefore, the purpose of the study and the expected outcomes follow.

1.2 Background to the Study

Advancements in Information and Communication Technologies (ICTs) and the rapid mainstreaming of Internet-based applications in global socio-economic value chains have culminated into new global economies driven by knowledge (Manyika et al., 2013). The world over as access to information using ICTs continues to grow exponentially, various governments, businesses and educational institutions are starting to adopt new techniques to keep abreast with technological developments and achieve their competitive advantage (Adams, 2005; Moolman & Blignaut, 2008; De Moraes et al., 2010).

Further, various scholars (Derek & Dahlman, 2005; Chen et al., 2006; Teo, 2009) note that ICT use has made world economies more competitive and interdependent, knowledge creation and its use have become focal points for long-term development strategies. Additionally, emerging literature on different ICT technology applications suggests that effective use of ICTs enhances the standard of living, modernizes societies, promotes equity in education and improves the quality of teaching and learning and, with other technologies, is a force for change (Adams, 2005; Chen et al., 2006; Moolman & Blignaut, 2008). Derek and Dahlman (2005) further point out that countries transitioning to knowledge economies must build more diversified and flexible types of Higher Education Sectors in which research, teaching, and social engagement remain rich, relevant and accessible through the use of ICTs. Therefore, it is increasingly evident that ICTs play critical role in improving research,

education, university administration and community outreach.

1.2.1 ICTs in Research

The application of ICTs in academic research has grown steadily in the past 10 to 15 years in both developing and developed countries, although there are wide variations in usage both within and between countries and regions (Balasubramanian et al., 2009). These variations are a reflection of the vision and commitment of the leadership of HEIs to deploy ICTs in research; the funds and people available to sustain investments in ICT infrastructure and support systems; and the existence of helpful national and institutional ICT policies. It must be pointed out that the most straightforward use of ICTs in research is in data processing where computing power provide opportunities for analyzing huge amounts of data and performing complex computations on them in a manner that is extremely fast, accurate and reliable (Mutagahywa, 2012).

Additionally, ICTs support research through providing online full text databases and online research libraries which are the direct outcome of the growth in telecommunications networks and technology. Hence, its becomes possible for researchers to constantly have online access to the contents of hundreds of thousands of books from major publishing houses, research reports and peer- reviewed articles in electronic journals. Examples include: the Questia online library providing access to e-books and journals in the humanities and social sciences; EBSCO Publishing's EBSCOhost online Research databases and the online Books Page hosted by the University of Pennsylvania libraries which provides free online access to e-books (Balasubramanian et al., 2009). ICTs are also being used to transform research from something done by individuals or teams in particular HEIs to an activity involving the instantaneous sharing and collaborative generation of new knowledge by networks of researchers located around the world. This is facilitated by speedy telecommunications and the emergence of social networking sites, wikis, communication tools and folksonomies (the practice and method of collaboratively creating and managing tags to annotate and categorize content) that catalyze online collaboration and sharing among users.

1.2.2 ICTs in Education

Pajo and Wallace (2001) argue that ICTs for education have become more critical today than ever before since its growing power and capabilities are triggering a change in the delivery means of education. Hence, during the past two decades, countries around the globe have invested heavily in their higher education institutions to develop capacity in using ICTs as tools for teaching, curriculum development, staff development, and student learning (Antonelli, 2003; OECD, 2006; Kumpulainen, 2007; Youssef & Dahmani, 2008).

One such example is Hong Kong that embarked on various initiatives to promote the application of ICTs across the school curriculum with the introduction of Information Technology for learning in the New Era: Five-Year Strategy (Bhattacharya & Sharma, 2007). Similarly, in a study based on a survey of more than 200 European universities to assess the pace of integration of ICTs in universities, it was concluded that the general extent of integration of ICTs in teaching has risen greatly since 2000 with three out of four universities in the European Union experiencing high or very high rates of increase and only 3% low or very low increase (OECD, 2006). To conform to global trends, countries in Africa are increasingly starting to adopt ICTs to address various issues including those related to higher education (Kirkup & Kirkwood, 2005; James & Hopkinson, 2009).

Additionally, South Africa has commenced a number of e-Learning projects by implementing ICTs in the country's HEIs. For instance, the UNISA, through its e-Learning project, has about 4500 courses on distance education (Ngugi et al., 2007). UNISA uses a customised delivery system for e-Learning which comprises two areas: a Web environment used to provide general information on programmes and courses, and a secure environment that provides access for staff and students (Kinuthia & Dagada, 2008). The lectures for these courses are done online and lecturers can access online course resources, details of learners, student feedback and teaching tools (Kinuthia & Dagada, 2008). Consequently, the integration of ICTs in education is positively impacting on the teaching and learning environments. Research has shown that the effectiveness in the use of ICTs to support learning is a function of the curriculum content and the instructional strategy, such that when appropriate content is taught using appropriate strategies, students and teachers will benefit (Cardler & Brown, 2010).

In an effort to remain competitive and maintain their market share, a number of conventional HEIs have widened their educational offerings to incorporate e-Learning programmes in order to compete with the escalating number of virtual HEIs (Huynh & Schneider, 2005; Sun Microsystems, 2003). Hence, HEIs can use their brand names to expand their target market internationally in order to capitalizing on excess demand that exists in the education systems of other countries.

1.2.3 ICTs in University Administration

Universities are now using ICTs in managing students' admission and records, tests/examination results and transcripts, managing various assets human and financial resources. The positive impact of ICTs on university governance is being felt in this area of administration where institutions are increasingly using ICTs for better planning, setting standards, effecting change and monitoring results of core functions of the university (Mutagahywa, 2012). Many ICT applications in HEIs are directed at improving the quality and capacity of management information systems to support strategic decision-making and policy implementation, stimulate and facilitate free flow of information through

the university and to respond to the needs and demands of students for better and increased access to university services and information through the web.

Additionally, to improve consultations and accountability in administration of HEIs, ICTs may provide online discussion forums and mailing/sms lists with staff and students. Extensive use of the Intranet also enhances collegiality by giving access to minutes/records of decision making organs to all staff affected by those decisions; and at the same time allowing senior managers to have access to background information and the thinking behind issues they are requested to make a decision on. It can also be pointed out that various Management Information Systems are deployed in universities. The key challenge however is to integrate these systems and enhance their capacity to support strategic decision-making. The voluminous amount of data generated by these systems would be a wasted opportunity if not used, through data warehousing technologies, to discover trends and provide hidden information that eases managers' decisions. Data warehouse acts as a hub to facilitate the exchange of information between systems and therefore serves as the institutions' information infrastructure (Balasubranian, 2009).

1.2.4 ICTs in Community Engagement

Balasubramanian (2009) points out that it is important to place higher education in the context of development and to recognize the scope of ICTs in reinforcing the role of higher education in development. Hence, there is a growing belief in emerging societies that universities should create forward and backward linkages with the communities surrounding them. The developmental role of HEIs is being seen from their initiatives and impacts in addressing social issues such as poverty, inequality, gender, environment and empowering the poor and marginalized sections of the society to play a major role in the developmental process (Mutagahywa, 2012). Besides contributing to social and economic policies and planning through theoretical perspectives, policy research and evaluation studies, HEIs are also playing a role in directly reaching communities and society.

For instance, medical colleges and universities, through their community health programmes, reach large numbers of people in the communities. In many countries programmes like National Social Service (NSS) and youth programmes are raising students' awareness of the social dimensions of development. Unlike University-Industry linkages and technology transfer which are continuously monitored, the linkages between HEIs and community have yet to be tracked in a systematic manner (Balasubramanian, 2009). In order to engage the communities; universities are building closer community engagement at various levels from project conceptualization, planning, execution and project monitoring and evaluation. In this aspect ICTs have not only provided the tools for universities but has also extended the scope of such engagement and reinforced the direct role of

universities in community development. When properly deployed, ICTs enable universities to facilitate and be part of developmental effort and do so without over extending their human, time and financial resources (Kumpulainen, 2007; Youssef & Dahmani, 2008). This has led to what is termed a "triple-helix model' of development where university-industry/village-government linkages lead to technology transfer and economic growth. Through ICT networks, universities can now engage more with government and industry in the development of technology parks and both production and consumer cooperatives.

The realization of the critical role of ICTs has led to a vision of a future in which universities are using ICTs to achieve their competitive advantage. The focus on a more strategic use of ICTs in planning and management of universities has become important as the environment in which HEIs are operating is constantly changing. Further, the increasing use of ICTs to improve HEIs core business processes is emphasizing on the need for HEIs to become repositories of valuable innovation and human capital, and their central role in the success and sustainability of the knowledge economy (Kozma, 2008; Abu-Shanab, 2012). HEIs are therefore compelled to become innovative and leaders in the use of cutting-edge technology to meet the aforementioned expectations. But it must be pointed out that in order for HEIs to exploit the diverse opportunities which arise from effectively using ICTs, they must be e-Ready so that lecturers, students and society at large can benefit from this phenomenon.

However, for HEIs to become e-Ready, they must attain or maintain a low digital divide. This means that HEIs must invest intensively in developing or creating environments that can promote the adoption and use of ICTs in its core business activities (Ozdemir & Abrevaya, 2007). For instance, to maintain a low digital divide, HEIs must ensure that they develop enabling environments with relevant polices to support key stakeholders' (employees, students, lecturers and managers) accessibility and effective use of ICTs to develop or restore its competitiveness. Among other things, maintaining a low digital divide is a function of a combination of factors such as; the presence of requisite skills to use ICTs within individuals, accessibility to ICTs, affordability of ICTs and ICT leadership (Dutta & Jain, 2004; Shin & Harman, 2009). Also, HEIs must develop appropriate ICT infrastructures, ICT policies and enabling environments that support ICTs use. Dutta and Jain (2004) point out that those societies which count on better prepared key stakeholders and enabling environments are more likely to benefit from higher rates of ICT use and impact. It is therefore imperative that institutions align their business strategies with e-Readiness strategies (UNESCO, 2002; Hare, 2007; Mikre, 2011).

Furthermore, it must be pointed out that the opportunity cost for HEIs not becoming e-Ready is multifaceted. If HEIs are not e-Ready they are likely to miss from the potential benefits that come with ICTs. Some of these benefits are:

- ICTs provide for the expansion of any given HEIs across traditional business zones and national boundaries to become part of the commercial global village. This is done by using ICTs as enablers or means through which HEIs can respond to their patrons' demands and create user-centric services to satisfy customers' expectations (Bowles, 2004).

- ICTs can be used to support teaching and learning as well as research activities including collaborative learning and inquiring. Therefore, a number of HEIs are adopting the application of ICTs in teaching and learning based on these new technologies (Ezziane, 2007).

- ICTs can be used to respond to the needs and demands of the younger generation (especially the digital natives) for better and increased access to university services and information through the web.

- ICTs can support the improvement of the quality and capacity of management information systems to support strategic decision-making and policy implementation.

Hargittai (2003) further argues that:

> "As more people start using the Web for communication and information retrieval, it becomes less useful to merely look at binary classifications of who is online when discussing questions of inequality in relation to the Internet. Rather, we need to start looking at differences in how those who are online access and use the medium." (p. 45)

Hence, contemporary efforts to integrate ICTs at different levels of an education system must articulate well-informed strategies to act as guidelines. Such guidelines would help in building policies that would effectively implement ICT initiatives in different HEIs and improve ICT access and use among its users.

Therefore, this study was carried out to ascertain CBU's capabilities to benefit manage and maintain its ICT initiatives with a view to planning for the future and supporting specific changes. The study has contributed to theory by proposing a context-aware theoretical framework for appropriate

measurement of e-Readiness in a developing world context. Further, the study highlighted the salient factors behind implementation of ICT initiatives in universities in an African context (Bridges Organisation, 2005; Naidoo & Klopper, 2005).

1.3 The Copperbelt University

The Copperbelt University (CBU) is one of the three public universities in Zambia, located in Kitwe Copperbelt Province and was established as a full-fledged university in 1987. The university started with two (2) schools, namely the School of Business and Industrial Studies and the School of Environmental Studies with a student population of 514. However, it has enjoyed significant growth since its inception in terms of expansion in the number of programmes and student enrolment (Copperbelt University Annual Report, 2011).

According to the 2011 Copperbelt University Annual Report (CBUAR) the university now has eight schools namely: School of Built Studies, School of Business, School of Engineering, School of Graduate Studies, School of Mathematics and Natural Science, School of Medicine, School of Mines and Minerals and the School of Natural Resources and two Institutes, the Dag Hammarskjold Institute for Peace Studies and The Directorate of Distance Education and Open Learning.

Additionally, the 2008 report from the Copperbelt University Academic Office (CBUAO) points out that the university student population has increased over the years. For instance, in 2007/2008, the student enrolments rose from 4155 to 5355 (CBUAO, 2008). In 2009 the student enrolments grew from 6045 and are now well over 13000. The need to manage increasing numbers of students and monitor their development through the education system has put pressure on the university to turn to ICT solutions. This has therefore accelerated the need for harnessing technology for better planning and setting standards of the core function of the university.

1.4 The University's ICT Initiatives

Through the Directorate of Information and Communication Technology (DICT), CBU has embarked on a number of ICT initiatives as a way of creating a robust research infrastructure, an attractive and flexible learning environment, optimise administration and make the university as visible as possible all over the world.

Investments made so far include expansion of the local area networking and Internet connectivity. This initiative started in 2009 and over 100 computers have since been added and installed on the university network so that students can access Internet from their hostels (CBUAR, 2009). Another initiative was the procurement of the XVD Espresso HD video conferencing system that was given to

the university by the Alliance Forum Foundation of Japan through the government of Zambia in 2010. The system makes it possible for CBU to create linkages with UNZA and other universities to enable knowledge transfer and sharing (CBUAR, 2011). Furthermore, in 2012, the library procured two software's namely Dspace and Moodle to improve the services of the library. Using Dspace, the library now has a digital institutional repository and intends to use Moodle in the e-Learning environment at the university (CBULAR, 2012).

From the aforementioned initiatives, it is evident that CBU is committed to be an e-Ready institution as a requirement to amass the diverse benefits that come with the information and knowledge society.

1.5 Statement of the Problem

Advancements in ICTs and rapid diffusion of Internet-based applications have globally transformed every aspect of human life and are generally positively impacting on socio-economic development (Gurstein, 2003; ITU, 2013). It is believed that institutions or organisations with increased capacity to generate Internet based functions using computer-based technologies are likely to benefit from opportunities that come with effective utilization of ICTs (Bridge Organisation, 2005; Mutula, 2010). In conformity with the global trends, CBU has embarked on a number of ICT initiatives as a strategy tailored to meet the demands of a modern university and expectations of its stakeholders. However, there is a lack of empirical evidence to determine the potential challenges that might arise when implementing such initiatives within the current institutional context. Studies by Ahmed (2006) and Mutula (2010) have shown that inadequate attention paid to institutional, social and economic factors may impede the overall success of ICT integration and use

Though a number of studies (Mutula & Van Brakel, 2006; Kashorda, et al., 2007; Bwalya, 2009; Mutula, 2010) have been carried out to determine e-Readiness assessments of different institutions elsewhere in the world, including Zambia, none of them focussed on CBU. Therefore, conducting this study in order to understand the state of e-Readiness at CBU given the institutional context cannot be overemphasized. The successful implementation of the various ICT initiatives at CBU would require an assessment of complex social, organisational and infrastructural factors to ascertain the position of the institution in terms of ICT availability, deployment and use. It is hoped that this research will provide information for the development of a coherent and achievable strategy tailored to meet specific local needs of the university. The study anticipated contributing to theory by proposing a context based theoretical framework for appropriate measurement of e-Readiness in a developing world and to practice by contributing to the understanding of the salient factors behind implementation of ICT initiatives in universities in Africa (Bridges Organisation, 2005, Naidoo & Klopper, 2005).

1.6 Research Objectives

The major objective of this study is to assess e-Readiness of CBU in harnessing the opportunities offered by the e-Society and the emerging knowledge economy in advancing its core mandate of teaching and learning, research and community outreach.

The specific objectives are to:

I. Identify the available ICT hardware and software facilities at CBU.
II. Identify the requisite ICT infrastructures that contribute to accessibility of different ICT technology applications that correspond to e-Readiness at CBU.
III. Identify the requisite ICT skills that stakeholders have to use different ICTs technology applications that correspond to e-Readiness at CBU.
IV. Identify if the ICT policy supports the use of ICTs at CBU.
V. Assess if the University's work environment affects effective use of ICTs at CBU.

In order to achieve these objectives this study has the following research questions:

1.7 Research Questions

I. What are the available ICT hardware and software facilities at CBU?
II. What are the requisite ICT infrastructures that contribute to accessibility of different ICTs technology applications that correspond to e-Readiness at CBU?
III. What are the requisite ICT skills that stakeholders have to use different ICT technology applications that correspond to e-Readiness at CBU?
IV. How does the ICT policy support the use of ICTs at CBU?
V. How does the University's work environment affect effective use of ICTs at CBU?

1.8 Significance of the Study

The significance of this study lies in its potential contribution to theory and practice on the integration and use of ICTs in African universities in general and Zambia in particular. The study anticipated contributing to theory through proposing a context-based theoretical framework for appropriate measurement of e-Readiness in African context and practice by enhancing the understanding of the salient factors behind implementation of ICT initiatives in universities in an African context (Bridges Organisation, 2005; Naidoo & Klopper, 2005). More specifically, this study offered a holistic understanding of the factors that would enable CBU to harness and benefit from opportunities created by ICTs. Further, the study provided a model (Modified NRI model) drawn from the local context.

1.9 Scope of the Study

According to Collins and Hussey (2003) the scope defines the ambit of the study. This refers to the parameters covered by the study.

1.9.1 Study Focus

To understand and assess e-Readiness of CBU, this study mainly focused on collecting empirical data on the ICT infrastructure, accessibility of ICT facilities, requisite ICT skills to use ICTs, the policy in place to support accessibility and use of ICTs and establish if the working environment at CBU supports ICT use. The data was collected from third to fifth year undergraduate students, graduate students, and academic members of staff, IT staff and Deans of schools. The study then recommends strategies needed for the successful integration of ICTs in the business processes of CBU.

1.10 Limitations of the Study

This study did not employ hypothesis testing because of its descriptive nature. Another limitation was attributed to the inclusion of only third to fifth year undergraduate students, graduate students and academic members of staff and excluding the rest of the University community such as first and second year students including other non-academic staff. There is need for another research where more staff and students from other academic years can be included to achieve statistical significance and representativeness.

1.11 Summary

This chapter presented the study background and outlined the research objectives and the research questions. It discussed the function of the study and outlined major ICT initiatives which CBU embarked on in an effort to become e-Ready. Further, it stated the main and specific objectives of the study, research questions, significance and limitations. The chapter also pointed out why it is necessary for CBU to become e-Ready and through reviewing literature, it showed that while there have been attempts to understand the depth of e-Readiness in different organisations in Zambia, none of them focused on CBU. The study therefore justified the need for an in-depth understanding of e-Readiness assessment at CBU.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

According to Hart (1998), literature review is the collection of available documents both published and unpublished on the subject of study that contain information, ideas, data and evidence from a specific perspective to fulfil certain aims or express certain views on the nature of the topic and how it will be investigated. Randolph (2009) also posits that literature review is a means of demonstrating the author's knowledge about a particular field of study. Even Rowley and Slack (2004) explained that literature review is a process of distilling the existing literature on a subject with the objective of summarizing the state of that particular subject. The two authors' further pointed out that literature review is important and useful in supporting the identification of a research question or hypothesis. Reviewing of past literature makes it possible to create a theoretical basis on which to carry out a research. It also helps one to determine the nature of his/her own research and to gain methodological insights, evaluation of major theories, arguments, methodologies, approaches and controversies in the scholarly literature on a subject (Reuber, 2010).

Boote and Beile (2005) and Kirby et al. (2006) pointed out that literature review goes beyond the search for information and include the identification and articulation of relationships between the literature and one's field of research. They argued that the literature review is important because it provides the context of the research; justifies the research; ensures that the study being done is not a replication; illustrates how the subject has been studied previously; highlights flaws in the previous research; outlines gaps in the previous research and helps refine, refocus or even change the topic. Therefore, the review of related literature to the study area makes it possible for the researcher to compare what has been done and narrow the gaps that are identified (Blaxter, Hughes & Tight, 1998). Doing a careful and thorough literature review was essential for this study as it outlined what different scholars have done in order to understand the critical factors considered in carrying out a specific study.

The chapter is divided into five (5) sections: the introduction and outline of the importance of reviewing literature and its benefits to this study, a definition of terms according to different studies, concepts and theoretical framework, a discussion of the literature on the relationship between e-Readiness and digital divide is discussed, an examination of the literature on e-Readiness from developed and developing countries and a review of previous studies including models with regard to their relevance to this study.

2.3 Definition of Terms

2.3.1 Information Communication Technologies (ICTs)

Information-Communication Technologies (ICT) is a common expression for a variety of different computer, information and communication devices (hardware), applications (software), networks (Internet), and services (Lepicnik-Vodopivec & Samec, 2012). It is a general concept which includes all communication devices of the modern society and their usage. Its primary purpose is mediating information and enabling the communication process. Plowman et al. (2010) argue that looking at ICTs, the Internet and mobile technology and their applications are most often considered. However, it must be stressed that ICTs do not only include computers and mobile phones, but are also present in many other types of technology. The broad ICT definition also includes a variety of everyday technologies like: electronic toys, interactive whiteboards, playing consoles, various players and digital cameras.

It is important to argue that there is no universally accepted meaning of ICTs as it denotes a number of concepts, methods and applications which are rooted on technology that constantly changes. Zuppo (2011) acknowledges that:

> "The challenge of defining ICTs in a universal sense becomes apparent when one considers that diverse application of the term ICT exists within several contexts and treatments of the term. The continuum of definition and applications of ICTs one may encounter are further divided as the span of differences is represented in kinds than merely by degrees." (p.13)

However, Perron et al. (2010) and Lepicnik-Vodopivec and Samec (2012) argue that ICT signifies a common expression for a variety of different computer information and communication devices, application, network and services. This includes e-mail, SMS text messaging, video chats, mobile technology and online social media among others. Consequently, ICT is a compound term that implies a combination of devices and infrastructure that removes the physical or geographical barriers in order to facilitate the transfer of information through digital media in a more efficient and effective manner.

Punie (2007) observes that because of their nature, ICTs already have numerous advantages. Besides using it for pleasure and entertainment, ICTs can be used for study and work purposes. ICTs encourage learning; motivate the individual and at the same time give an individual the capability to do certain activities. However, Markovac and Rogulja (2009) claim that ICTs are not only an educational tool, but also a support strategy, as they can help one develop the digital and technical

competences needed for employment, education, self-development and general activeness in the modern society.

The general consensus here therefore is that ICTs are a critical resource in every aspect of the modern world as a potential powerful tool that could be used for development. ICTs are the means and not an end to human development. Hence, if implemented effectively and efficiently, ICTs can lead to enhancement of livelihood for the majority and act as a catalyst for developing countries to integrate into the global economy.

2.3.2 e-Readiness

The concept of e-Readiness can mean diverse things to different people, in different contexts, and for different purposes. Hence, large gaps exist between ideas and concepts on one hand, and practical applications and implications on the other (Bridges Organization, 2005; UN, 2008). Therefore, in order to provide a holistic understanding of the concept of e-Readiness, it is imperative to outline its various definitions. EIU (2007) defines e-Readiness as the state of a country or institution's ICTs infrastructure and the abilities of the consumers, businesses and governments to utilise ICTs for their benefit. EIU further recognises that e-Readiness derives from more than just computers, broadband connections and other ICT technologies. It also includes user's ability to utilise technologies skilfully, the transparency of the business and legal systems and the extent to which such a business entity encourages the use of digital technologies (DIT, 2003; EIU, 2007; Lou & Goulding, 2010). However, EIU (2007) argue that requisite ICT skills are one of the critical components of e-Readiness as a result of the growing emphasis being placed on the socio-economic dimensions of technologies today.

Additionally, APEC (2000) describes an e-Ready country as one that is 'Ready' for e-Commerce, has free trade, industry self-regulation, ease of exports, and compliance with international standards and trade agreements. Following these themes, it follows that e-Readiness can also be defined as an economy or institution's disposition to use Internet based computers and other ICT facilities to shift traditional businesses into the contemporary economy. The contemporary economy is characterized by the abilities to create and perform business transactions in real time, in any form and at any time (Bui et al., 2003).

The World Bank Information for Development Programme argues that at the state level, e-Readiness entails awareness of states to offer governance equitably and cost effectively and the ability to reproduce in the degree of integration the deprived segments of society to use ICTs as an e-Governance tool (*info*Dev, 2003). Similarly, Bridges Organisation (2005) and Ifinedo and Davidrajuh (2005) define e-Readiness as a measure of a country or institution's e-Business environment, a

collection of factors that indicate how amenable a market is to Internet-based opportunities. However, CID (2000) stresses that e-Readiness must develop or create the potential of a community to participate in ICT development. Thus, e-Readiness is not only indicative of the number of computer servers, websites and mobile phones in the country but also entails enhancing abilities of citizens of a particular country in utilising technology skilfully, enhancing transparency in businesses and legal systems, and the extent to which a country encourages the use of digital technologies. This realisation is making various scholars and researchers to shift their thought and perspective of looking at e-Readiness from a macro level to a micro level where e-Readiness indices are constructed primarily for creating rankings of countries to a micro level that promotes community participation in ICT development.

Diverted from global perspectives, a second wave of e-Readiness studies have been introduced to specific ICT-related areas. The realisation that what appears at the macro level assessment of e-Readiness can hide wide heterogeneity among organisations, government department's local areas and among individuals in terms of digital access is promoting e-Readiness studies at micro level (Losh, 2004). Thus, in the context of electronic banking, e-Readiness is perceived as the function of the capability to pursue value creation opportunities (Maugis et al., 2003). In the property world, in order to attain e-Readiness, there are five actions that need to be acquired and these are: innovation, flexibility and service, connectivity, brand and location (Feenan & LaSalle, 2001). However, Özmen (2003) argues that within the electronic trade, e-Readiness is presented as a resource to be implemented in any enterprise.

Furthermore, within the context of HEIs, the concept of e-Readiness is built on the rubrics between people, processes and technology (Siemieniuch & Sinclair 2004; CID, 2007). In this respect, HEIs are not different from any other sector specific organization. Hence, the relationship among the three elements mentioned above is that developing competence in one element must be accompanied by improvement in the others for the organization to succeed. For instance, in order to invest in promoting e-Learning activities, one of the many competence issues that HEIs require are people with the necessary ICT skills and knowledge to implement such e-Learning processes. However, to achieve e-Readiness also requires creating an enabling environment that can support these proposed changes. Therefore, for an institution to achieve e-Readiness, it must embrace such levers as motivation, empowerment and the change management. Thus, it is important to encourage and support the integration between people and process through a flexible and advanced technology infrastructure.

The major lesson that can be drawn from the above discussion can be seen from two perspectives. Firstly, e-Readiness is a multidimensional concept and thus at any given point, it is a function of

various elements and consequently its use and relevance lie in the user or researcher's study goals. The second lesson is that variations in the definition of e-Readiness bring the question as to what the most accurate for the concept constitutes. Maugis et al. (2003) and Özmen (2003) and EIU (2007) and Lou and Goulding (2010) argue that there is no complete definition on the concept of e-Readiness. However, in the context of CBU, e-Readiness is viewed as the ability and capacity of the CBU institutional stakeholders (ICTs personnel, lecturers, students and managers) to use communication devices and Internet services to create efficient services that would advance their core mandate of teaching, collaborative research and development.

Therefore, the convergence in the heterogeneous assessment frameworks above is that e-Readiness measures the degree to which an economy, institution, society or individuals is ready to harness the opportunities of an e-Society as a way of participating in the digital economy. For the purposes of this study, as such e-Readiness is defined as the degree of ability of CBU and the capacity of the institutional stakeholders (students, IT personnel, lecturers and managers) to use communication devices and Internet services to create efficient services that would advance their core mandate of teaching, collaborative research and community development.

2.3.3 Digital Divide

The phrase digital divide is used to refer to such differing standards or imbalances between countries fully poised to realize the benefits of the information age and those that are unable (Bridge Organization, 2001). It is gradually becoming common to see more and more countries across the globe shifting from the earlier agrarian and industrial economies to becoming knowledge-based in which information resource utilization thrives (Adams, 2005; Moolman & Blignaut, 2008; De Moraes et al., 2010). Such economies go by various names: network economy, knowledge economy, and e-Economy and information economy (Hart, 2003; Turner and Dart, 2008), amongst others.

Additionally, it is worth pointing out that digital divide may also exist within the confines of a single country (World Development Indicators, 2001; American Society for Public Administration, 2003; Knowledge Assessment Matrix, 2002). Warschauer (2003) and Jaeger (2005) argue that in nearly every country, it is primarily a certain percentage of people who have the best ICTs that is available to society. These people have access to computers and information sources, telephone and facsimile services, Internet services, as well as a wealth of content and training relevant to their lives. Jaeger (2005) further laments that there is another group of people whom, for social or economic reasons, do not have access to computers or even relatively valuable information sources, reliable telephone services, let alone the wealth of information and convenience afforded to one via Internet services. The difference between these two groups of people is what is known as the digital divide. Hence,

being on the less fortunate side of the divide means that there is less opportunity for an individual to take part in the new information-based economy, in which more and more jobs are related to computers.

However, Planting (2000) places emphasis on the possible devastating implications of the digital divide by pointing out that, on the one hand, developed markets could lose the opportunity to develop new markets to trade with and, on the other, the developing world would lose the opportunity to grow. Even worse, there is a risk of an increase in social and economic turmoil that could result from the exclusion of the majority of the world's population from the New Economy. These consequences could harm local, regional and international stability. Therefore, raising the level of digital inclusion, that is, increasing the number of people who have access to and use the technology tools of the digital age, is of vital importance. Therefore, the imperative and overwhelming task facing both the global and the development community, is finding ways to bridge this divide and wire the poor, whose livelihoods could be enhanced through access to technology. It is evident that these very technologies that are causing this colossal rift are perhaps the very tools that can be used to bridge this ever-growing and urgent divide.

Debates from various schools of thoughts have emerged on the cause and nature of digital divide. Earlier discussions on digital divide employed an element of technological determinism to explain the phenomenon. Technological determinism posits that technology is the sole or precursory cause of changes in society, while human and social factors are seen as secondary (Smith & Marx, 1996). Epstein et al. (2011) claim that the debate about the technological determinist view concerning digital divide have preoccupied ICT policy makers' minds at national and global level for a long time. Epstein et al. further argue that in the United States, the Clinton administration directed the National Telecommunication and Information Agency (NTIA) to examine ICTs and Internet adoption. This investigation led to a series of reports with the first one being released in 1995. These reports documented systematic gaps in the use of computer networks by socio-economic status, educational background, race, gender and geographic location.

Numerous studies previously conducted (Chowdary, 2002; Meng & Li, 2002; James, 2003; Srinuan & Bohlin, 2011) have emphasised the equalization of access to ICTs in relation to physical access, using technological determinism in their hypotheses and conclusions. But variances in terms of access could also be seen from three specific facets comprising the global divide, social divide and democratic divide (Norris, 2001). Therefore, even though researches utilized technological determinism to equalise access to ICTs in terms of physical access, they also supported the theory of social

determinism by including socio-economic factors in their analysis. Hence, the approach of equalising access to ICTs suggests that technological determinism is not an appropriate framework on which to explain the situation concerning the digital divide.

Norris (2001) and Jaeger (2005) equally disagree with technological determinism but emphasizing that social stratification still exists and there is a significant divide with regard to access to the Internet based on differences in income, education, race, ethnic groups, age, handicaps, and family structure. According to Norris (2001), the social stratification in society is the reason for the digital divide. The scientist concludes that the social structures, which already exist in the society, will continue in the information society where the lack of access to digital resources will lead to an additional stigmatization of the weakest part of the population. More factors than just social structures determine a person's belonging to the group of either IT-weak or IT-strong. The phenomenon of the digital divide is complex. Jæger (2005) expands on Norris' definition and adds that social stratification, cultural differences and personal and political positions affect the probability of being a part of the digital divide. Hence, Norris concludes by pointing out that digital divide means more than just having Internet access.

Warschauer (2003) goes further to introduce some requisite ICTs skills that citizens ought to have to be part of the information society:

- Physical resources: access to computer and Internet connection.
- Digital resources: skills to search the Internet and understand the contents.
- Human resources: education and ICTs-literacy, including knowledge and understanding about how to behave on the Internet.
- Social resources: include the local community, institutions and societal structures, all which underpin the use of ICTs.

In Warschauer's view, all these types of resources are needed to construct IT-skills and overcome the digital divide. If a person obtains these four resources, that person will be empowered with the necessary ICTs skills and competences to access and effectively use new technologies. Waschauer further argue that if some people are unable to find information online while an increasing number of services relevant to daily life become easier to access on the web (e.g. financial services, product

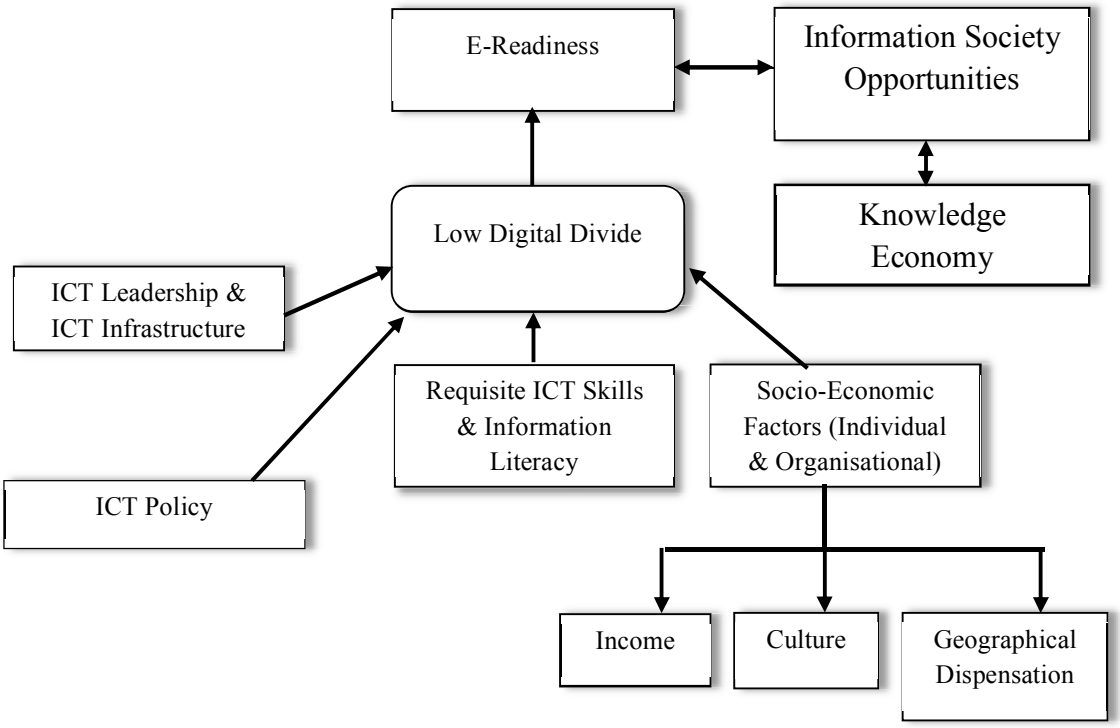
information, government forms), then the segment of the population with low digital literacy levels become increasingly disadvantaged. Therefore, it is evident that the theory of technological determinism is not an appropriate framework on which to explain the situation concerning the digital divide.

It can be seen from the discussion above that digital divide is a function of technical and socio-economic factors. It must also be argued that the process of maintaining a low digital divide is dependent on a number of other factors which are a representation of the contextual characteristics of the country, institution or the localities in which the study is being done. Therefore, for an economy, organization or institution to achieve a low digital divide, they need to have supportive structures and policies which recognize the multifaceted nature of attaining e-Readiness.

2.4 e-Readiness and the Digital Divide

The difference between e-Readiness and digital divide is essentially a function of varying definitions and understandings of what constitutes e-Readiness (Bridges Organisation, 2005). It can be pointed out that e-Readiness assessments emerged as a measurement of specific aspects of ICTs such as ICT infrastructures and the use of ICTs in the economy, while others concentrated on establishing the use of ICTs in government and education. However, very few e-Readiness tools focus on those whose marginalization for whatever reason (socio-economic status, gender, age, geographic location, level of education) renders them unlikely to have access to ICTs. It follows then that for a country's economy or institution to effectively measure its e-Readiness, there is need to consider various factors including socio-economic factors (Digital Divide) that are a representation of the context in which the research is being conducted (Floride, 2001; James, 2009).

Therefore, in order to become e-Ready, an institution must create an enabling environment to mitigate or maintain a low digital divide. This may be done through the provision of accessibility to ICTs and development of the requisite ICT skills amongst institution stakeholders in an effort to equip them with necessary abilities to be able to access and effectively use ICTs across social, economic and geographical platforms (Dutta & Jain, 2004). The linkage of e-Readiness, digital divide and competitiveness is illustrated in Figure 1 below:



Source: (Dutta & Jain, 2004; Bridges Organisation, 2005)

Figure 1: e-Readiness Attributes

As can be seen from Figure 1, the process or strategy for an institution to become e-Ready is dependent on how well the different factors within the institution's ICT ecosystem interact and impact on the level of digital divide. According to Figure 1, for an institution or organisation to realise or maintain a low digital divide and corresponding on the level of e-Readiness, it must develop a comprehensive strategy that would ensure that a number of factors (independent variables): ICT policy, ICT leadership and infrastructure, requisite ICT skills and information literacy and socio-economic factors are continually developed and positively utilised in its business processes (Norris, 2001; Chowdary, 2002; EIU, 2007; James, 2009; Lou & Goulding, 2010; Srinuan & Bohlin, 2011). Creating a comprehensive strategy would also ensure that an institution develops an enabling environment to promote accessibility and the rapid and wider use of its ICT facilities by all key stakeholders (individuals, businesses and governments). Additionally, as more key stakeholders' access and use ICT facilities effectively, they would likely contribute to the greater impact on competiveness and development on an institution (Dutta & Jain, 2004). Similarly, Meg and Li (2002),

James (2003) and Srinuan and Bohlin (2011) agree that an institution that can count on better prepared actors and an enabling environment for ICT use are likely to benefit from higher rates of ICT use and impacts (e-Ready). However, it must also be pointed out that developing a successful strategy in achieving a low digital divide is dependent on the contextual characteristics of a particular country, organisation or institution.

Figure 1 further shows that another critical aspect in achieving a low digital divide or becoming e-Ready is that there exist a forward and backward linkage between an institution's e-Readiness and an information society's opportunities and the surrounding knowledge economy. This suggests that implementing ICTs initiatives or innovations in an institution or organisation is a dynamic and continuous process that co-evolves and is driven by changes in technology (Molla & Licker, 2005; Lalic & Marjanovic, 2011). Therefore, the process of becoming e-Ready is not a one-time strategy but a continuous process. It is seldom either a discrete or one-time event; it is an overlapping activity that occurs throughout the life cycle of the organization (Molla & Licker, 2005; Lalic & Marjanovic, 2011).

2.5 Value of e-Readiness for Universities towards their Competitiveness

In the emerging networked environment comprising rapid growth of the knowledge economy, an e-Ready university is being seen as a proactive engine for national growth and development especially in developing countries. Also the possibilities for academic institutions becoming e-Ready are great especially that they are charged with equipping graduates to compete in today's knowledge economy (EIU, 2010). However, it must be pointed out that for a university to benefit from being e-Ready, it must build the necessary abilities and capabilities to use ICTs and Internet services to create efficiency.

2.6 Factors Determining e-Readiness of Universities

According to Adams (2005) Balasubramanian (2009) and Kettani (2013) there are so many factors that influence e-Readiness. This can be confirmed by considering the multi-dimensional nature of e-Readiness (Maugis et al., 2003; Özmen, 2003; EIU, 2007; Lou & Goulding, 2010). In this study, the following factors were considered given the context and nature of the study questions.

2.6.1 ICT Policies in Universities

With so much development in ICTs, it is becoming prudent that a modern university must have comprehensive ICT policies in place. According to Addom (2004) and Afolabi and Abidoye (2011) argues that the lack of systematic ICT polices in most universities in developing countries impedes the deployment of ICTs in these institutions. However, some universities are putting in place robust ICTs policies to support and improve use of ICTs in their core business activities. For instance, Cornell

University in the United States has a comprehensive information technology policy framework that provides a coherent picture of both the university responsibilities and user obligations for the maintenance, security, legal and appropriate use of the Cornell University network in keeping with the university's educational research missions (Mitrano, 2004).

2.6.2 Human Resource Development in Universities

The successful development of requisite ICT skills requires that an institution becomes more than just the consumer of technology and ensure that it builds capacity in its local expertise to adequately fashion the technology to meet the specific needs. It is argued that developing requisite ICT skill creates a platform on which an institution can further build and develop capabilities in its personnel to leverage the potential of ICTs (Colle, 2005; Rizk, 2004). However, Addom (2004) argues that the ICT human resources situation is not the best in most African countries. He points out that more than 70% of the highly qualified ICT professionals of African origin leave and work in the developed countries and of these more than 80% had their graduate training in these countries (Baryamureeba, 2003). Consequently, most of the mainstream HEIs in Africa are severely under sourced in comparison to their counterparts in the developed world (Gauci, 2001). Baryamureeba (2003) also argues that the type of academic programs which universities offer determine its levels of building its ICT human resource capabilities. He further points out that there is a need for HEIs to create deliberate steps in ensuring that they produce ICT graduates and retained some as building blocks for its ICT human resource base.

2.6.3 An Enabling Environment to Support ICT Use

An enabling environment to support ICT use determines the capacity of an institution to benefit from the use of ICTs. The success of an economy or institution in leveraging ICTs and achieving the desired economic and social benefits depend on its overall environment including market conditions, the regulatory framework, and to boost innovation and entrepreneurship. Hence, creating a supportive environment is necessary to maximize the potential impacts of ICTs in boosting competitiveness and well-being (Dutta & Jain, 2004). Integration of ICTs in the functions of any organization is a complex process that needs to be fully conceptualized and defined from the beginning. However, this is not the case in many higher learning institutions in developing countries as most of them have embraced the ICT integration process without creating an enabling environment to act as a platform for developing clear plans to guide the way. Sife et al. (2007) argue that the institutional ICT policy and strategic plan should be defined to provide a framework for the development and implementation of specific ICT projects. The diversity and competing interests of different stakeholders in the institution should be recognized when developing ICT policy and a strategic plan.

2.6.4 Awareness and Attitude towards ICTs

It is important for key stakeholders in the institution to recognize the existing ICT facilities and services and their significance in relation to their specific tasks. However, Tusubira and Mulira (2004) argue that there tends to be some unclear knowledge about ICTs, with some interpreting them as purely advanced technologies that require a lot of money and very advanced skills. They are not appreciated as a means of creating efficiency and cost effectiveness. Lack of awareness goes along with attitude. Positive attitude towards ICTs is widely recognized as an essential condition for their effective implementation (Woodrow 1992). Full involvement of all stakeholders in the implementation process is a key to addressing awareness and attitudinal problem. Formally organized awareness programs, visits to similar institutions where success has occurred, and short trainings can contribute to raise the awareness and change the attitude of key stakeholders towards facilities and services.

2.6.5 Bandwidth Constraints

In order to be able to encourage universal accessibility and effective use of ICTs it is critical for universities to invest in acquiring the necessary bandwidth (Adams, 2005). Most developed countries have invested rapidly in acquiring necessary bandwidth in achieving greater capabilities to utilize and benefit from ICTs. However, adequate or necessary bandwidth is the scarcest ICT resource in African universities mainly due to prohibitions on academic institutions' accessing international circuits and high licensing fees for connecting to advanced circuits or for obtaining authorization. Most countries do not have adequate international bandwidth. A survey by Jensen (2002) showed that almost 60% of African countries have bandwidth that is less than that of a typical institution in the developed world. Only six African countries have a reasonable outgoing bandwidth. As a result of insufficient bandwidth, most universities with larger student and employee numbers are left with limited connectivity capabilities. Studies on how such a low bandwidth is actually used are absent in African higher education, but experience elsewhere shows that low levels of access could be far more frustrating than having no bandwidth. Adams (2005) points out that experience also shows that whatever bandwidth is available to academic institutions it is often quickly filled up, suggesting a need for investigation into how available bandwidth is actually used in African universities. Such information would allow institutions to develop strategies for conserving their available bandwidth by looking at options like hosting local caches, implementing good traffic management techniques such as dynamically assigning existing bandwidth to web and email traffic, and creating digital libraries. A serious barrier to acquiring bandwidth in Africa is its high cost. A survey carried out by Partnership for Higher Education in Africa (2003) showed that a typical 128 Kbps uplink and 512 kbps downlink cost between US$4,500 to $12,000 per month, ten times the cost of similar capacity in the developed

world. In Africa it is clear that government policies and regulatory frameworks make up the major bottleneck in the availability of adequate bandwidth. Current policies not only restrict access to satellite technologies but also impose higher license charges on installation of networks.

There are many challenges that come with the attainment of lever levels of e-Readiness in an institution. It can also be pointed out that with the large investments put in increasing their education's capacity of utilizing ICTs, developed countries have been able to leverage the potential of ICTs and use HEIs as a conduit for creating competiveness and development. Conversely, universities across Africa are at a cross-road of making ICTs useful to their academic enterprise and at the same time understanding their implications to learning, teaching, research and institutional development. Despite enormous potential benefits, it is still unclear what impacts ICTs may have on teaching and learning and research particularly at resource-poor, low quality, peripheral universities in Africa.

2.7 e-Readiness in Developed Countries

In order to present the objective review on e-Readiness assessments and be able to clearly articulate a diverse view on the study area, it is important to show the level or degree of preparedness in using ICTs (e-Readiness) from different countries around the world. Therefore, the successive section presents a detailed account of the status of e-Readiness from a developed and developing world perspective.

2.7.1 e-Readiness in North America

The United States' effort to participate in and benefit from ICTs goes back to the mid-1990s when access to the Internet was liberalised and the World Wide Web became ubiquitous. With such a historical background, the United States has since developed technology leading to extensive use of the Internet into people's everyday activity. Additionally, the United States has developed reliable, convenient and affordable access to voice and data services that continue to underpin a digital economy (Saekow & Samson, 2011). Even most of the United States universities have long adopted Internet based applications to create efficient ways of providing services and finding new opportunities for teaching and learning remotely and developing competitive and collaborative research networks.

2.7.2 e-Readiness in Canada

Canada has a long and proud past of innovation and has been the spot of many world firsts, the long distance telephone call, the transatlantic wireless message, the geostationary satellite communications network and the world's longest fibre optic communication (Industry Canada, 2008). As a country

Canada appears well positioned to benefit from the application of new technologies to learning and teaching, including research. The fast growth and infiltration of ICTs in Canada especially the use of personal computers and Internet for educational purposes is expanding access to an ever-widening range of learning opportunities and options. According to the EIU (2008) report for ranking e-Readiness of different countries, Canada was ranked 12th out of 70 countries assessed. Given the strong ICT sector, Canada seems well positioned to use technology to improve education and learning. In terms of universities and their ability to utilize technology, the Canadian government is host to a number of efforts to align new technologies with innovative HEIs. For instance, Athabasca University has initiated a number of ICT projects dedicated to the removal of barriers that restrict access to modern education. The University uses a variety of ICTs to enhance teaching and learning like the use of audio/video conferencing systems (AUCC, 2008). Also, at the Northern Ontario School of Medicine (NOSM) there are a number of current technologies in use. These includes the Personal Digital Assistant (PDA) and web-based logbook system for undergraduates to record their clinical experiences and online database system that manage information about the school's clinical tutors (NOSM, 2008).

2.7.3 e-Readiness in the United Kingdom

To a wider front, the UK government has adopted objectives that ensure that access to the Internet for everyone who wants it is made possible. In the European Union (EU), universities are seen as playing a key role in achieving the strategic goal set at the Lisbon European Council to make the EU the most competitive and dynamic knowledge based economy in the world. Abertay University is one of the leading universities for its use of ICTs in the support of learning, teaching and research. For instance, in 2014 Abertay University invested almost £3 million in its ICT infrastructure, systems and services (Beyth-Maron et al., 2003; EC, 2003). The ICT Transformation Programme 2014 now under way is a far reaching programme of transformation in classroom technology, end user computing, network infrastructure and security and storage back up servers, which will enhance the learning and working environment for everyone at Abertay. Also the university subscribes to the Janet Roaming Service (Eduroam) which is a free wireless Internet service that allows users from any participating institution mostly in UK HEIs to log on at any other participating institution using their credentials (Lundgren & Nantz, 2003).

It is evident that with the realization of the potential benefits of leveraging the potential of ICTs most economies and HEIs in developed countries have invested massively in various ICT programs. Developed economies and their HEIs are rapidly transforming and increasing their abilities to use ICTs as a catalyst to become inclusive global information societies in which all persons are empowered to create, receive, share and utilize information for their economic, social, cultural and

political development. By harnessing the potential of ICTs, developed countries can now provide new and better responses to critical long standing issues such as poverty reduction, wealth creation, education, equity and social justice.

2.8 e-Readiness in Developing Countries

2.8.1 e-Readiness in Africa

Advancements in the adoption of ICTs in Africa have continued to be uneven. There are some universities that have embraced ICTs actively by creating their own corporate IT departments. Additionally, the uptake of ICTs in African universities have either worked badly or become an island of low bandwidth connections with frequent breakdowns. However, African countries have embarked on various e-Readiness initiatives driven by the World Economic Forum and the e-Africa Commission's ICT Task Team which is responsible for developing NEPAD's ICT programmes and implementing its projects (Iluyemi, 2008; Mutula, 2010). Also, NEPAD is collaborating jointly with the World Economic Forum to help African countries develop e-Readiness policies and reduce the policy obstacles that limit the use of ICTs throughout the region.

2.8.2 e-Readiness in Tanzania

As is the case with other African countries, the implementation of ICTs in Tanzanian universities is still very low despite immense opportunities that are provided by open source technology and enabling environment created by the government to support ICT use. In 2003, the Tanzanian government enacted the National ICT Policy and the Tanzania Communications Regulatory Authority Act (URT, 2003). These two major actions were deliberate steps in ensuring that by 2007 licenses for two basic telephone service providers, four land cellular mobile telephone operators, one global mobile personal communication service, eleven public data communication companies, nine private (dedicated) data services companies and 24 public Internet service providers were issued (TCRA, 2007).

In the case of higher education, among the ten universities (Ardhi University, Hubert Kairuki Memorial University, Muhimbili University, St. Johns University of Tanzania, St. Augustine University of Tanzania, Tumaini University, University of Dar es Salaam, University of Dodoma, State University of Zanzibar and Muhimbili University of Health and Allied Sciences), only the University of Dar es Salaam has managed to integrate ICTs in its business processes. The University of Dar es Salaam has implemented various ICTs activities, enabling it to, for instance, use WEBCT and Blackboard in building an e-Learning environment (Sife et al., 2007). While other universities such as Sokoine University of Agriculture, Mzumbe University and Open University of Tanzania

possess basic ICT infrastructure such as Local Area Network, Internet, computers, CDs and DVD facilities that form the basis for the establishment of e-Learning platforms.

2.8.3 e-Readiness in Kenya

In Kenya, the Ministry of Education has been given the mandate to lead the monitoring and evaluation of the strategy of implementing ICT initiatives. The Ministry's mandate is guided by overall government policies on education and ICTs, specific educational documents for implementing government mandate, the global goals such as Education for All (EFA) and the Millennium Development Goals (MDGs). In general, the objective is to facilitate public-private partnerships (PPPs) to eventually mobilise and provide ICT resources to Kenyan public schools and community resource and learning centres. It hopes to achieve the following goals over the next five years: 1). Mobilise resources for delivering ICT infrastructure to schools. 2). Establish e-Readiness assessment for secondary schools, tertiary institutions and primary schools. 3). Develop a portal for ICT information sharing. 4). Establish a national computer assembly centre.

Furthermore, through the Kenya Education Network (KENET), Kenya hopes to establish sustainable communication and networking among its educational institutions. Thus, it would become possible to facilitate the wide use of Internet technology in teaching, research and sharing of other information resources to the general populace at affordable cost (Waema & Kashorda, 2002). This initiative is spearheaded by Kenya's institutions of higher learning to establish a high-speed, reliable and sustainable network for the interconnectivity of all learning institutions. The objectives of KENET are to: 1). Establish an Internet infrastructure for educational institutions. 2). Develop human resources in information content development, information management and communication technology to support, operate and manage KENET. 3). Develop and improve local content so that KENET members benefit by receiving substantially lower connectivity costs, as well as having access to technical support and staff training. In November 2006, Kenya entered into partnership with a global telecommunications service provider, Etisalat, to lay the undersea fibre optic cable that will connect eastern and Horn of African countries to the rest of the world (GK, 2006).

2.8.4 e-Readiness in Thailand

In Thailand, the government has embarked on various initiatives to promote e-Readiness. This commitment is paying off as Thailand now stands in the third place after Singapore and Malaysia in ICT network readiness index during the period 2009 – 2010 (Dutta & Mia, 2011).

In Thailand various policies, strategies and steps have been put in place by government and higher education providers. Among others, government is re-examining its role in providing higher education

and reviewing the relationship between private and public providers by exploring mechanisms related to governance, accountability, research, teaching and learning, student enrolment and use of ICTs in higher education systems. Although the use of ICTs is not the remedy for all the challenges faced by HEIs in Thailand, ICTs are being used to leverage and extend traditional teaching and learning activities. Furthermore, ICTs are increasingly ubiquitous within HEIs and it is being used to include promoting research, scholar community engagement and administration. In addition the integration of ICTs in HEIs is also moving beyond getting personal computers into the hands of learners and towards mobile technology, virtual world and cloud computing. Thus HEIs in Thailand have to be innovative and leverage on the developments in ICTs to lead by example in using cutting edge technology to provide more accessible, effective and efficient higher education.

2.8.5 e-Readiness in Egypt

Learning is a major sector in the Egyptian industry. As a service provider, learning institutions have realised the importance of investing in technology to control cost, attract students and fulfil customer needs for convenience and technical innovation (Khaled, 2008). Literature is rich with studies regarding e-Learning potentials. It also provides a clear view on how e-Learning is adopted in developed countries. In Egypt, there is a growing interest in using ICTs to deliver educational instructions and facilitate the process of teaching and learning. For instance, e-learning is being more swiftly adopted by many universities and is destined to become a large part of the educational experience of the students in years to come. Some universities have made significant investments in its ICT infrastructure over the last two years and are undergoing change to introduce and develop e-Learning and using programmes of faculty development to support this process through the e-Learning centre in universities (Amit, 2005; Nermin, 2007).

From the discussion above it is evident that different developing countries are striving to attain some measure of e-Readiness to create competitive economies by investing in higher education systems at various levels. Predominantly, as economies, they wish to become inclusive global information societies in which all persons are empowered to create, receive, share and utilize information for their economic, social, cultural and political development (Martin, 1997). By harnessing the potential of ICTs, national and local governments can now provide new and better responses to critical and long standing issues such as poverty reduction, wealth creation, education, equity and social justice. Similarly, an understanding of the e-Readiness of a country or institution is indispensable for providing baseline information that can be used for planning and making comparisons across regions, countries, and institutions.

2.9 Review of Related Studies

Table 1 below shows the summary of studies that were previously been done to assess e-Readiness of different organisations. It focused on giving a concise summary of the methodological approach, models, findings and the philosophical framework used in prior research similar to the current study. It also highlighted possible attributes to use in the development of the conceptual framework that informed the study.

Table 1: Review of Related Studies

#	Title	Methodological Approach	Theoretical Model	Key Aspects Assessed	Philosophical Framework
1	e-Readiness survey of Higher Education Institutions in Kenya (Kashorda et al., 2007).	Methodological Triangulation	Modified NRI	Network Access, Networked Campus, Networked Learning, Networked Society, Institutional ICT Policy and Strategy were used to measure e-Readiness.	Positivist
2	e-Readiness of University Divisions in Online Education.	Qualitative Approach Interviews	Not specified	Learner, Management, Personnel, Content, Technical, Environmental, Cultural and Financial Readiness were assessed.	Positivist
3	An e-Readiness assessment of Nigeria's Premier University, (IJEDICT), 2008, 4(2), 16-46. (Olatokun, & Opesade, 2008).	Methodological Triangulation	NRI	ICT Infrastructure and Accessibility, ICT Human Resource Skills, Institutional ICT Policy and ICT Usage in University activities were used to measure e-Readiness.	Positivist
4	e-Readiness assessment of seven Higher education institutions in Ghana (Addom, 2004).	Methodological Triangulation	Not specified	ICT Human Resources Level, ICT Infrastructure and Access, Academic Programmes related to ICT, ICT Policy on Outreach, Posture of ICT	Positivist

#	Title	Methodological Approach	Theoretical Model	Key Aspects Assessed	Philosophical Framework
5	e-Readiness assessment at Tabriz University of Medical Sciences (Ranjbarzadeh et al.,2013)	Quantitative Approach (Questionnaires)	Not Specified	Human Resources, Skills, Institutional ICT Policy, and ICTs Usage were assessed	Positivist
6	An assessment of e-Learning readiness at Open University Malaysia	Two different sets of detailed Questionnaires were used	Not specified	Learner, Management, Personnel, Content, Technical, Environmental, Cultural and Financial Readiness were assessed	Positivist
7	e-Learning Readiness of Thailand's Universities comparing to the USA's Cases (Saekow &Samson, 2011).	Methodological Triangulation	Not specified	ICT Human Resource Skills, Infrastructure, policy and Financial Support to the university were assessed.	Positivist
8	Measuring E-Readiness assessment : the case of Laotian Organisations (Keoduangsine & Robert, 2009)	Qualitative Approach (Interviews)	Not specified	ICT Infrastructure, Internet Affordability, Literacy, Mobile Operator and Network Technology, Hardware and Software were assessed.	Positivist
9	A Study of e-Readiness assessment: the case of three Universities in Nigeria (Eweni et al., 2013).	Quantitative Approach (Questionnaires)	Not specified	State of ICT Infrastructure and Affordability of Internet, ICTs related services, ICTs Human Resource Skills, Key Barriers to faster Uptake of ICTs were assessed.	Positivist

Source (Addom, 2004; .Kashorda et al., 2007; Olatokun, & Opesade, 2008; .Keoduangsine & Robert, 2009; Saekow & Samson, 2011; Eweni et al., 2013; Ranjbarzadeh et al., 2013).

From Table 1, it can be seen that: Firstly, the NRI model was used for measuring e-Readiness of HEIs including universities and the corporate world. Secondly, looking at the methodological approach used in previous studies, it can be seen that in order to solicit a variety of information about different aspects of their studies, most researchers used methodological triangulation. Thirdly, it can be seen that the NRI model was frequently utilised among the sample studies reviewed in Table 1. Further, the

key aspects assessed in all studies in the table are holistic in nature (Learners, Staff, Managers, ICT Infrastructure, Human Resource, ICT Skills, Funding, ICTs Policies and Plans). These observations suggest that NRI is a strong model for conducting e-Readiness studies.

2.10 Models of e-Readiness and their Focus of Assessment

Table 2 below depict the underlining focus areas of different models on e-Readiness that have been developed by several organisations (the private sector, governments and academic institutions). In an effort to create a comprehensive assessment tool for measuring e-Readiness, various models have been developed as summarised by Table 2 below:

Table2: Models of e-Readiness and their Focus of Measurement

e-Readiness Model	Focus
APEC (Asian Pacific Economic Corporation)	Looks at e-Commerce Readiness (Bridges. Organisation, 2005)
CSPP (Computer Society Policy Project)	Self-assessment tool of existing infrastructure for Global e-Commerce (Bridges Organisation, 2001; 2005)
CID (Centre for International Development)	Society Readiness (CID, 2000)
EIU (Economic Intelligent Unit)	e-Business Readiness
KAM (World Bank Knowledge Assessment Matrix)	Knowledge Economy
MN (Metrix Net)	Economy
Mosaic's Global Diffusion of the Internet Project	e-Society
NRI (Networked Readiness Index)	Infrastructure, E-Society, Policies Digital Economy, Education and Government
MI (McConnell International)	Infrastructure, Digital Economy, Education and Government
SIDA (Swedish International Development Cooperation Agency)	SWOT Analysis of a Nation

Source: (CID, 2000; Bridges Organisation, 2001; 2005)

Looking at Table 2, this study adopted the NRI model as a theoretical lens for the following reasons:

- Firstly, the NRI has been used by different studies that focussed on assessing e-Readiness of higher education institutions as is shown in Table 1. It is also a modern model of assessing e-Readiness compared to the CSSP that may have become obsolete (Kashorda et al., 2007; Tarvid, 2008).

- Secondly, the strength of the NRI is in the use of both qualitative and quantitative variables that allows for better capture of the reality (Tarvid, 2008; Dutta & Mia, 2011). Such characteristics of the NRI model made it an ideal tool in assessing e-Readiness at the CBU in that it helped the study capture key factors related to the development, use and impact of the university ICT initiatives by empirically soliciting data on three aspects of the university: Environment (measuring how conducive CBU is to adopt ICTs); Readiness (establishing the capabilities of the university students, managers and lecturers in leveraging the potential of ICTs) and network use (determining the changes that the adoption of ICTs at the University has brought on the students, managers and lecturers behaviour in relation to teaching and learning).

- Thirdly, the model allowed for benchmarking of the performance of the university's ICT initiatives with respect to ICT use. This is unlike the MI, EIU and DOI which only use qualitative variables in measuring e-Readiness making their assessment subjective (Dutta & Jain, 2002; EIU, 2007). Such subjective assessment measures are usually useful in determining the possibility to use ICT services, not their actual usage.

However, in summary, there are two overarching lessons that were drawn from this comparison:

Firstly, when one is chooses or selects an e-Readiness assessment tool, it must be one that fits the user's goal. Each assessment tool or model has a different underlying goal and definition of e-Readiness. Hence, the user should choose carefully and with a clear understanding of the kind of results that any particular tool is likely to lead them toward. This report aims at providing a foundation for that choice.

Secondly, there is a wide range of e-Readiness assessment models available, but each has limitations. Every model evaluated would require re-designing to make it a comprehensive assessment tool. The tools that are ready-to-use are either limited in scope or lack detailed description on how to use the tool in practice. Of course, no tool will fit every user's needs. However, one could envision a tool that

gave the user control over what was measured, and provided the resources to measure the various aspects of e-Readiness.

2.10.1 Networked Readiness Index (Combination of CID and Harvard)

The NRI model defines e-Readiness as the degree of preparation of a nation or community to participate in and benefit from ICT developments (Dutta & Jain, 2004; Bridge Organisation, 2005). The NRI is a composite of three components:

- The Environment Readiness component: referring to assessing the conduciveness of an economy or organisation environment to benefit from the use of ICTs.

- The Readiness to Access ICT component: referring to measuring how ready key stakeholders, individuals, businesses and governments are to make good use of ICT infrastructure.

- The Network Usage component: that assesses the individuals, business, and government preparedness to increase their capacity to use ICTs as well as their actual use in their day-to-day activities with other agents.

The Index has been widely used in studies for assessing e-Readiness of different universities in developing countries (Addom, 2004; Kashorda et. al., 2007; Olatokun & Opesade, 2008). The strengths of the model lies in the fact that it takes a step forward by defining a fairly comprehensive and well-developed framework which is simple and well-structured compared to other similar models like CSPP and CID (Dutta & Jain, 2004). The model also allows for expansion or deduction of constructs in order to provide a contextual measure (e.g. a Country or Institution). Additionally, the model is a diagnostic tool useful for self-assessment and part of SWOT analysis in ICT strategy review (Kashorda et al., 2007). Therefore, the NRI was a useful model in assessment of e-Readiness of CBU. The NRI is shown in Figure 2 below:

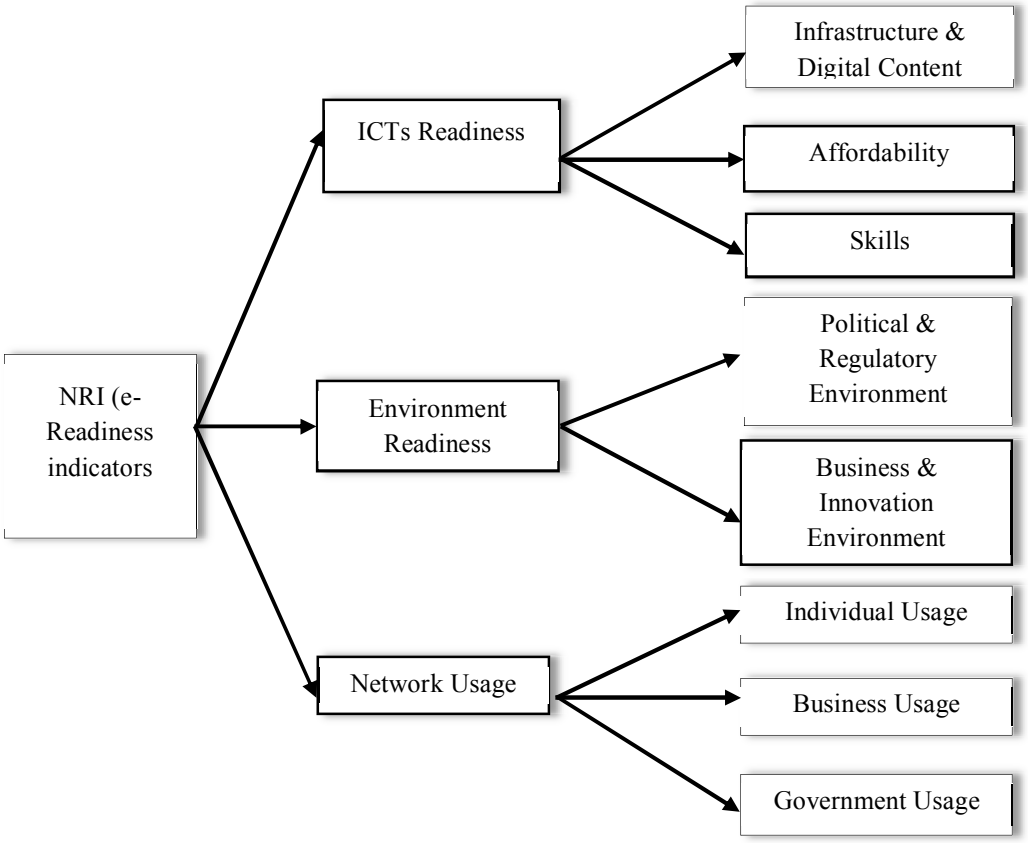


Figure 2: The Network Readiness Index Model

Figure 2 shows that the NRI model is a composite of three major components: the Environment Readiness, ICTs Readiness and Network usage which are key aspects in determining the integration of ICTs in any given business process. Therefore, it presents one of the modern and holistic models for measuring e-Readiness in an economy or institution.

2.10.2 Conceptual Model: The Modified Networked Readiness Index Model

In the recent past, a number of efforts have been done to develop a model or framework to holistically measure e-Readiness by the private sector, government and academic institutions (Dutta & Jain, 2004). However, it can be pointed out that, prior assessment measurement approaches vary significantly with the type of organization in which they were developed, aims and objectives, methodology and the results (Kirkman et al., 2002; Dutta & Jain, 2004). For instance, the GTI, McConnell's e-Ready? Net. Go! and the APEC e-Commerce Assessment Guide are rooted in the private and public sectors and are meant to be guides for businesses. On the other hand, the Mosaic's GDI stems from the academic world and presents a more balanced framework as it includes business related measures like organizational infrastructure and government related measures like connectivity infrastructure (Dutta & Jain, 2004).

However, the NRI by the CID at Harvard University extended the concept of readiness to include the potential of a community to participate in ICT developments (Grafton, 2003). In order to measure or assess e-Readiness of CBU, it was critical to consider all the factors (internal and external) that were constantly reshaping its business prospects. The internal factors of CBU constitute staff and students' (academic, IT specialists, managers and students) various attributes, cultural beliefs, barriers, skills and backgrounds. The external factors however include the institutional competiveness in providing education in the modern era, soliciting for funding perceived benefits, changes in technology and social conditions. Moreover, the ICT impact in any organization arises only if ICTs are widely used by key actors: individuals, businesses and governments (Dutta & Jain, 2004). Therefore, the holistic nature of the NRI model was seen as an appropriate theoretical lens to measure e-Readiness at CBU.

Furthermore, the methodology applied in each and every e-Readiness assessment model varies. However, this study used the NRI model specifically for the following reasons:

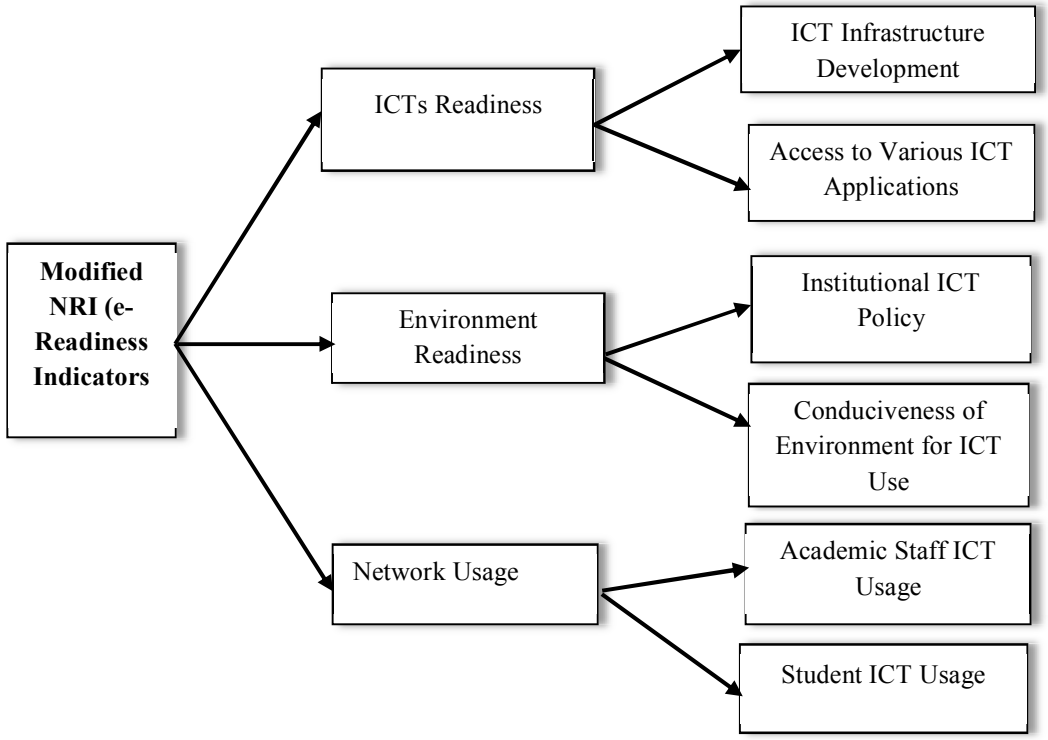
- Firstly, studies that have used models such as APEC, McConnell's e Ready? Net. Go!, e-Readiness ranking by EIU and the Global Diffusion of Internet only use questionnaire based data, while the NRI model is a hybrid of both qualitative and quantitative variables that help to better capture the reality (Dutta & Jain, 2004; Bridges Organization, 2005; Tarvid, 2008; Sharman, 2011). This allowed for data collection on e-Readiness from different stakeholders of CBU (students and academic staff) using questionnaires and Interviews.

- Secondly, the NRI model assesses the business environment to determine the capacity of an organization and its stakeholders to benefit from the use of ICTs (Dutta & Jain, 2004).

- Thirdly, the NRI model incorporates the impact metrics into its framework by including the network usage aspect as the modern approach to measuring e-Readiness (Dutta & Jain, 2004; Kashorda et al., 2007; Sharman, 2011). Hence, it becomes possible to assess the impact of ICTs at CBU from different vantage points.

- Fourthly, the network readiness of a nation or institution is a dynamic measure as it evolves overtime as a result of policy measures taken by a nation or institutional leaders (Dutta & Jain, 2004). The NRI model includes the policy aspect as a key attribute when measuring e-Readiness that APEC, EIU, McConnell's Ready? Net. Go! and GTI do not have.

Further, studies by Addom (2004) and Glen and Isaac (2007) and Kashorda et al. (2007) reported that requisite ICT skills, institutional ICT policies, accessibility to ICTs by key stakeholders and enabling environment to leverage ICTs are critical factors in determining e-Readiness especially for developing countries given their need to narrow the digital divide. As such and based on the premise that all theories may have limitations (Bridges Organisation, 2005), the NRI e-Readiness model was modified so that it measures e-Readiness holistically using the characteristics of CBU (Maugis et al., 2003; Bridges Organisation, 2005; Mutula, 2010; Sharman, 2011). The modified NRI is shown in Figure 3 below:



Source: ((Maugis et al., 2003; Bridges Organisation, 2005; Kashorda et al., 2007; Mutula, 2010; Sharman, 2011)

Figure 3: The Modified NRI Model

The modified model introduced four new attributes (academic staff ICT usage; student ICT usage, and institutional ICT policy), which were specific to CBU replacing (individual usage; business usage, government usage and political and regulatory environment) as attributes from the original NRI model. Modifying the NRI model was important in order to create or accommodate the contextual characteristics of CBU where the study was carried out. Also adding the contextual characteristics of

CBU in the model was necessary so as to measure the current e-Readiness level at the university to the potential future impact that the institution would make in the networked world. Although the modified model was similar to the original NRI, it could be used to develop, implement and monitor institutional ICT strategy in the core business of teaching and learning, research and community outreach.

2.11 Summary

This chapter presented a synthesis of studies found in literature on e-Readiness assessment from both the developed and developing countries. It was observed that previous research, reports and other scholarly literature depict integration of technologies by organizations and institutions as problematic despite the potential benefits that come with full utilization of technologies. Also, it was evident that ICT infrastructure, ICT human resource, accessibility to ICT facilities, working culture, an enabling environment that support effective use of ICTs and appropriate ICT policy are some of the important factors that influence technology adoption and use, especially in developing countries, given their need to narrow the digital divide. The chapter concluded by a discussion of various e-Readiness models, their strengths, weaknesses and suitability for this study. Hence, the observations, and discussions made in the literature suggested that a modified NRI is a strong model to use for conducting e-Readiness studies.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

Research methodology is a way of systematically solving the research problem. In conducting a research such as this one, various authors have argued that it is crucial to state the research design and methodology (Bless et al., 2006; Ngulube, 2003; Kemoni, 2007). Research methodology may be understood as a science of studying how a study is done scientifically. Ngulube (2003) argues that a methodology denotes a system of methods with underlying principles and rules of a system or procedures. Hence, with an established statement of the problem, a methodology is developed in order to provide a format to follow when researching on what, where, when, how much and by what means a study would be conducted along with the logic behind them.

Consequently, after providing the contextual and the motivation that the research anticipated to take, this chapter presents the research methodology. This chapter outlined the justification of research paradigm, research design, study population, sampling method, data collection instruments, ethical considerations and data analysis procedure to be used.

3.2 Research Paradigm

In order to design and conduct research, it is imperative to read and critique studies of others and join in the philosophical, theoretical and methodological discussion in the research community. However, in order to adopt a comprehensive philosophical perspective to guide a research, one needs to appreciate the existence of two major research paradigms which have been used to guide various previous research studies from time in memorial with their distinctive underlying philosophical assumptions (Mertens, 2010).

It must be pointed out that a paradigm is an approach of looking at the world and is composed of the philosophical and psychological assumptions that guide thinking and action. Similarly, Patton (1990) posits that a paradigm is a worldview, a general perspective and a way of breaking down the complexity of the real world. Further, a research paradigm is a composite of sets of assumptions, concepts, values and practices that are held by a community of researchers (Bless et al., 2006). It is these assumptions, concepts and practices which therefore guide a researcher to find specific literature to review, methodologies to follow, limitations and cautions to observe when interpreting the results and the ethical issues to consider during the entire study (Bless et al., 2006).

There are basically two major research paradigms in educational research: the positivist and interpretivist paradigms. For a long time adherents of positivist and interpretivist paradigms have

engaged in an enthusiastic dispute on the strength and weakness of these paradigms (Johnson & Onwuegbuzie, 2004). Quantitative research purists (Maxwell & Delaney, 2004; Mertens, 2010) articulate assumptions that are consistent with what is called a positivist philosophy while qualitative purists, also called constructivist or interpretivist oppose positivism but believe in the superiority of constructivism, idealism, relativism, humanism, hermeneutics and sometimes, postmodernism (Lincoln & Guba, 2000; Schwandt, 2000). According to Mertens (2010) the major differences of these two paradigms lies in the nature of ethical behaviour (Axiology), nature of reality (Ontology), nature of knowledge (Epistemology) and the approach to systematic inquiry (Methodology).

Therefore, according to positivist epistemology, science is seen as the way to get at truth, to comprehend the world well enough so that it might be projected and controlled (Krauss, 2005). Also, positivists argue that the world and the universe are deterministic because they operate by laws of cause and effect that are discernible if we apply the unique approach of the scientific method. Thus, science is largely a mechanical matter in positivism. Additionally, positivism propels a logical model or mode of inquiry (deductive reasoning) in which specific expectations of hypothesis testing are developed on the basis of general principles (Babbie, 2013). This entails that the truth of the premise guarantees the truth of the conclusion. In contrast, interpretivism assumes that people are active in research socially construct knowledge, and that researchers should try to understand the complex world of lived experiences from the point of view of those who live it. Hence, interpretivist researchers are expected to adhere to basic principles of ethics (William et al., 2000; Babblie, 2013). Further, interpretivism is associated with inductive reasoning were reasoning begins with actual instances and concludes with broad statements. Also, interpretivism is linked to induction that presents the logical model in which general principles are developed from specific observations (William, et al., 2000).

However, the most evident difference between positivism and interpretivism is that, the former is basically objectivist while the latter argues that the inquirer and the inquired are interlocked in such a way that the findings of the investigation are the literal creation of the inquiry process (Al Zeera, 2001). Therefore, interpretivism takes the position that the knower and the known are co-created during the inquiry (Cohen, 2008; Babbie, 2013).

In the recent past, there has been a growing consensus in mixing methods as a pragmatic approach to fit together the insights provided by both research methods into a workable solution (Creswell, 2003; Onwuegbuzie, 2004). Mixing research methods is quickly developing as an alternative research paradigm. Several scholars have contributed considerably in shaping and augmenting mixed method as an alternative and dependable paradigm in the Social Sciences (Johnson & Onwuegbuzie, 2004;

Creswell & Plano, 2007; Greene, 2007; Johnson & Christensen, 2008; Teddlie & Tashakkori, 2009) and in Library and Information Science (LIS) (Fidel, 2008; Ngulube et al., 2009; Ngulube, 2010).

Philosophically, it is the third research movement, a movement that moves past the paradigm wars by presenting a logical and practical alternative (Cohen et al., 2008). The mixed research method makes use of the pragmatic methods and system of philosophy. Its logic of inquiry includes the use of induction (or discovery of patterns), deduction (testing of theories and hypotheses), and abduction (uncovering and relying on the best of a set of explanations for understanding one's results) (De Waal, 2001; Mertens, 2010). Mixed methods research also attempts to legitimate the use of multiple approaches in answering research questions, rather than restricting or constraining researchers' choices (Babbie, 2013). It is an expansive and creative form of research and not a limiting one. It is inclusive, pluralistic, and complementary, and it suggests that researchers take an eclectic approach to method selection and the thinking about and conduct of research to fulfil their fundamental quest (Healy & Perry, 2000).

This study was informed by the positivist paradigm but complemented by a qualitative method of investigation through interviews and methodological triangulation during data collection. Triangulating questionnaires with qualitative data collected through interviews and document analysis was necessary so as to provide more insight on the phenomenon under study. The study used the quantitative approach through questionnaires to collect data on accessibility to ICTs and requisite ICT skills from CBU students and academic staff. The study also used qualitative approaches through interviews to collect data on how the institution's ICT policy and working environment affect ICT use at CBU. Such qualitative understanding required the use of semi-structured interviews and conducting a document review.

Even though the study used both quantitative and qualitative methods, it was not a mixed method research because mixing of methods was negligible and was only done at data collection. According to Creswell (2003), a mixed method approach must have three typical strategies:

- Sequential procedures where the researcher seeks to expand the outcome of one method with another method. This may include starting with a qualitative method for exploratory purposes and following up with a quantitative method with a large sample so that the researcher can generalize results to a population.

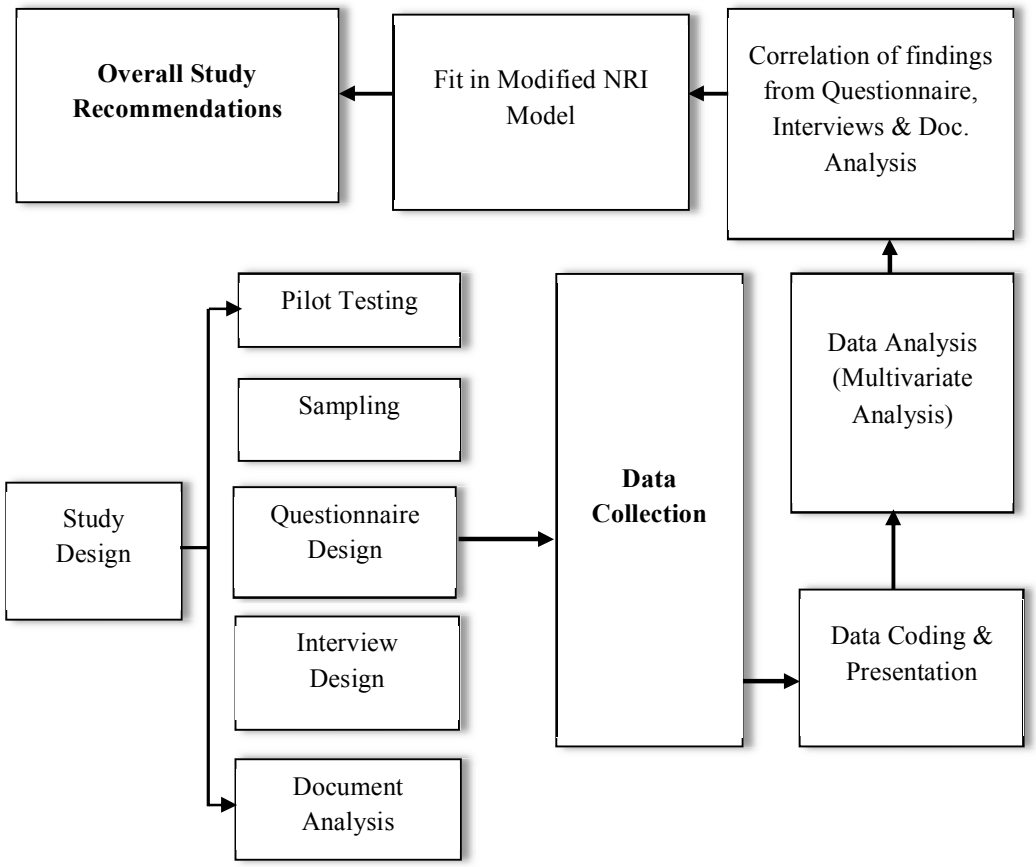
- Concurrent procedures where the investigator collects both forms of data at the same time during the study and then integrates the information in the interpretation of the overall results

and parallel technique where data is collected using both qualitative and quantitative procedures simultaneously.

- Transformative procedures in which the researcher uses a theoretical lens as an overarching perspective within a design that contains both quantitative and qualitative data.

3.3 Research Design

Research design is concerned with the broader perspective of the research project (Babbie & Mouton, 2001; Creswell 2009). Further, Yin (1994) points out that research designs outline the logical structure of the inquiry. It has a wider scope which is concerned with the broader perspective of the research project. It includes: the sampling criteria and sampling frame, time frame, data collection, data analysis, validity and reliability, among other things. Hence, the underpinned research cycle of this study is shown in Figure 4 below:



Source: (Yin, 1994; Babbie & Mouton, 2001; Creswell 2009)

Figure 4: Research Cycle

3.3.1 Methodological Triangulation

In order to address the research problem, the researcher employed methodological triangulation. Triangulation refers to the use of several different research methods (qualitative and/ or quantitative) to test the same finding (Babbie & Mouton, 2001). For this study, triangulation was used at the stage of data collection where data was collected from different participants and sources (see Figure 3.1). Methodological triangulation was also used at the stage of data analysis (data was to be analysed using more than one method) to the final interpretation of the findings (inferences were to be made from both approaches and methods). The nature of the problem under study (Case Study) made it necessary to collect quantitative and qualitative data. Other researchers also used triangulation in their assessment of e-Readiness of HEIs (Addom, 2004; Karshoda et al., 2007; Olatokun & Opesade, 2008; Saekow & Samson, 2011). It is also encouraged in Library and Information Studies (LIS) because of the complexity of the phenomena in that field (Liebscher, 1998). It was necessary to use triangulation to ensure that a complete, holistic and contextual portrayal of the units under study is captured from different vantage points hence enhancing the validity of the research findings (Ngulube et al., 2009).

3.3.2 Quantitative and Qualitative Research

Qualitative research is described as a systematic process by which objective facts can be obtained for purposes of a study that seeks to describe variables and discover relations amongst the variables of interest (Creswell, 2009:7). The quantitative approach emphasizes the principles of measurement, causality, reduction and determination and it uses structured tools to generate numerical data (Burns & Grove, 2001). Quantitative research is usually employed in studies seeking to measure variables and identifying the relationships between the various factors using statistics. The benefits of using this method are that it limits the incidence of bias as it is objective. It is accurate and the results can be generalized but it is difficult to analyze data and come up with answers to understand beliefs, values and experiences that are being tested. Being a positivist research, this study mostly employed quantitative research to understand e-Readiness assessment at CBU. A questionnaire with mostly close-ended questions was used to elicit data from students and academic staff. This allowed objective data to be collected. Many other studies (Addom, 2004; Kashorda et. al., 2007; Olatokun, & Opesade, 2008; Keoduangsine & Robert, 2009; Eweni et al., 2013; Ranjbarzadeh et al., 2013) have used quantitative research to assess e-Readiness at various HEIs. These studies also helped in developing a holistic understanding of factors that enable HEIs harness and benefit from opportunities created by ICTs and draw appropriate recommendations.

Qualitative research on the other hand, is broadly defined as any kind of research that produces findings not arrived at by means of statistical quantification (Cresswell, 2003; Denzin & Lincoln,

2003). Qualitative research is usually used where researchers want to understand meanings, experiences, ideas, beliefs and values as they focus on discovery and exploration. As a qualitative approach, interviews were employed in the study to elicit data from the IT staff and Deans of Schools concerning their experiences as facilitators of the system and their opinion on the attitude of ICT users' e-Readiness at CBU. The data from the interviews supplemented data that was obtained from the quantitative approach. The qualitative approach is subjective and this might encourage bias but it achieves a greater level of depth and detail especially as the questions are open-ended and the researcher is the main data gathering instrument. As mentioned earlier, many studies on e-Readiness assessment employed the quantitative approach and use interviews as a supplement. Table 3 shows the differences between the two approaches.

Table 3: Summarized Differences between Quantitative and Qualitative Approaches

	Quantitative	Qualitative
Approach	Objective. Predicts causal relationships	Subjective. Emphasizes understanding
Methods	Structured such as questionnaires, surveys	Semi- structured interviews, participant observation
Data format	Numerical	Textual
Questions Format	Close-ended	Open-ended

Quantitative research limits biasness as it is objective, accurate and the results can be generalised (Creswell, 2009). Qualitative research is however used where a researcher wants to have an in-depth understanding of phenomena (Denzin & Lincoln, 2003). This study employed quantitative approach using a questionnaire with mostly close-ended questions to elicit data from students and staff on ICT infrastructure, ICT access level, and manpower availability. The qualitative approach in the form of interviews was employed to elicit in-depth data from CBU Director of Directorate of ICT and the IT personnel including the Deans of Schools on the University policy framework, ICT use and opinion on the attitude of users towards e-Readiness of the University. By combining both methods, the study was able to collect more reliable information as qualitative research was substantiated with quantitative data (Creswell, 1994; Punch, 2000).

3.4 Case Study Method

This research used a case study approach to gather information from participants on assessing e-Readiness of CBU. A case study was used because it is an empirical inquiry that investigates a contemporary phenomenon within its real-life context especially when the boundaries between the phenomena are not clearly evident (Yin, 1994:13; Bell, 2005). Further, the research used a case study approach in order to have an in-depth understanding of a contemporary phenomenon by combining

data collection techniques such as interviews, observations, questionnaires and document analysis. Therefore, the choice of this method increased reliability and validity of the answers.

3.5 Population

Population refers to a complete set of all those elements like people and institutions which have at least one characteristic in common and which a researcher wishes to study (Williamson, 2002). In a research study, population has to be defined clearly before sampling is done. This is necessary in order to delimit the subjects of analysis and provide a clear boundary of those subjects which the study would focus on (Leedy & Ormrod, 2005).

3.5.1 Study Population

The total population of this study was 2992, constituting of 2,480 third to fifth year students from the 8 schools including, 200 postgraduate students and 300 academic staff and the units of analysis was CBU where every respondent belongs. In addition, 4 IT personnel, namely the Director of Information and Communication Technology and 3 other IT personnel at management level and 8 Deans from the Schools were included. The table below shows the targeted population for the study.

Table 4: Total Research Population

#	Schools	Total
1	Academic Staff	300
2	Built Environment	740
3	Business	560
4	Engineering	120
5	Graduate Students	200
6	IT Personnel and Deans of Schools	12
7	Mathematics and Natural Sciences	150

#	Schools	Total
8	Medicine	72
9	Mining and Mineral Sciences	370
10	Natural Resources	468
Total Research population		**2992**

Table 4 highlights the total of the study population with specific numbers of possible participants from different schools, and Units of CBU. Therefore, the study was targeted at assessing e-Readiness of the entire University.

3.5.2 Inclusion Criteria

In this study, the respondents were third to fifth year undergraduates, including postgraduate students. These students were included in the study because they were likely to participate in the research seriously by virtue of their many years at the University. Also, the academic staff, Deans of Schools, the Director of ICT and the IT personnel as University employees were added as part of the respondents because they are key stakeholders in implementing activities related to ICT.

3.6 Sampling

As mentioned earlier, sampling is part of the design study (see Figure 4) and it includes the sample procedures such as sample frame and sample size. Below is a description of the sample procedure.

3.6.1 Sampling Method

Sampling method involves selecting a portion of subjects in order to learn something about the entire population because the population can be large or infinite (Kalton, 1983; Cresswell, 1994). Sampling methods are classified as probability and non-probability (StatPac Survey Sampling, 2010). This study used probability sampling and adopted stratified sampling in order to maximise representation in the strata comprising each school. The study also used non-probability sampling, specifically purposive sampling and quota sampling to select respondents from the university's IT Department and the Deans of Schools as critical to the study.

a) Probability Sampling

Probability sampling is a process of selecting respondents into the study that ensures that every member of the population has an equal chance of being selected. Probability sampling does not allow

the researcher to purposely leave out any certain portion of the population. To achieve this, the sample should be selected randomly (Burns & Grove, 2001). This study used probability sampling whose advantage is that it prevents subjectivity, bias and the results can be generalised. There are several types of sampling within probability sampling and they include: simple random sampling, systematic sampling and stratified sampling where the sample frame is sub-divided into groups with similar characteristics such as age and gender. This study adopted stratified sampling approach in order to maximise representation in the strata comprising schools and different departments under which the male and female students and academic staff with diverse ages belong. The participants were chosen randomly within the stratum using MS Excels‟ Add-in Software, ToolPak. The system was used to perform a random sample of a stated size from the strata. The code numbers returned in the sample space were matched with individual students in the strata, and those students were requested to be respondents in the study.

b) Non-Probability Sampling

Non-probability sampling is a process of selecting respondents into the study with less chances of getting a representative sample (Burns & Grove, 2001). The different types of non-probability sampling include: convenience sampling, quota sampling, snowball sampling and purposive sampling, where a sample is chosen with specific purpose in mind targeting one pre-defined group (Burns & Grove, 2001). This study used quota sampling to select specific respondents to interview for questions dealing with establishing the conduciveness of CBU environment to use ICTs, to establish whether CBU has an ICT policy and if the work culture at CBU supports ICT use.

3.6.2 Sample Size of the Study

The respondents for the questionnaire were third and fifth year undergraduate students including graduate students and academic staff totalling 2980. In determining the sample size and the exact respondents, the study adopted a tested formula credited to Yamane (1967:886).

$$n = \frac{N}{1+N(e)^2}$$

Where, n is the sample size, N is the population size and, e is the level of precision (margin of error). The study will work with a 95% confidence level. When this formula is applied to find the sample size, it will be as follows:

$$n = \frac{N}{1+N(e)^2} = \frac{2980}{1+2980(.05)^2} = 353 \text{ Study respondents}$$

Table 5: Summary of Sample Population for the Study

(N= 353 + 12 (12 purposively sampled)

Sample Groups	Research Instrument	Sampling Method	Calculation of Sample size per Strata	Total
Academic Staff	Questionnaire	Stratified Sampling	300 × 0.1185	35
Business	Questionnaire	Stratified Sampling	560 × 0.1185	66
Built Environment	Questionnaire	Stratified Sampling	740 × 0.1185	88
Engineering	Questionnaire	Stratified Sampling	120 × 0.1185	14
Graduate Students	Questionnaire	Stratified Sampling	200 × 0.1185	24
Mathematics and Natural Science	Questionnaire	Stratified Sampling	150 × 0.1185	18
Medicine	Questionnaire	Stratified Sampling	72 × 0.1185	9
Mines and Mineral Science	Questionnaire	Stratified Sampling	370 × 0.1185	44
Natural Resources	Questionnaire	Stratified Sampling	468 × 0.1185	55
IT Personnel and Deans of Schools	Interview	Purposive	12	12
TOTAL POPULATION				**365**

3.7 Data Collection

Creswell (1994) defines data collection as the gathering of relevant information to address critical questions identified during evaluation. Typically, the research methodology influences the choice of techniques and instruments that are used. Also, the techniques employed for data collection should

ensure their validity and reliability. Usually the techniques and instruments used are questionnaires, interviews, observations and document analysis (Onyango, 2002; Aina, 2004).

3.7.1 Data Collection Instruments

This study used methodological triangulation to collect data. The questionnaire, complemented with the interviews and observations, were the main method of data collection considering the descriptive nature of the study. Methodological triangulation is based on the rationale that a single data collection method is not sufficient to provide adequate and accurate research results. Triangulation, therefore, strengthens the results as the weakness from one study is compensated for by the strength of the other. Triangulation improves validity and reliability as the research topic can be examined from multiple perspectives (Ngulube, et al., 2009). It also reduces biases. In this study, triangulation made it possible to make comparison of quantitative data received from a structured questionnaire answered by students with qualitative data received from interviews done by the IT personnel and also data received from observation of facilities and documents.

Through triangulation it was possible to use document analysis, questionnaires and interviews as the main methods of data collection because of the exploratory and descriptive nature of the study. Each of these tools is described in detail below:

a) Document Analysis

Document analysis was another method that the study used. It is mostly used as a supplement for other data collection instruments like observations, in-depth interviews and social surveys (Mogalakwe, 2006). It is a systematic procedure for reviewing or evaluating documents which can either be print or electronic and is usually used in combination with other research methods as means of triangulation to provide confluence of evidence that breed's credibility (Bowen, 2009). An analysis of primary and secondary sources that contain the phenomenon under study is the basis for using documentary sources (Bailey, 1994). Document analysis, e.g. using university annual reports and university strategic plans 2014 - 2018, was used in the study to create an inventory of ICTs infrastructure.

b) Questionnaires

The questionnaire was the principle instrument of data collection because it is a flexible data collection tool. A semi-structured questionnaire using open and closed ended questions was designed and distributed to students and academic members of staff. The choice of this instrument was prompted by its reliability and validity of the answers. This is so because the interaction between the

researcher and the respondents, which could bias the responses to the questions in the questionnaire, is minimal.

In addition, the advantages of using questionnaire in data collection include: encouraging frankness; no intimidation from researcher; data collection can be quicker; they are less costly and questions can be standardized (Oates, 2006; Collins & Hussey, 2003; MacNabb, 2002). However, Williamson (2002: 239) argues that the disadvantages of questionnaires include: difficulty in securing adequate responses; difficulty in obtaining responses from a representative cross section of the target population; lack of opportunity for respondents to qualify answers for the researcher to probe for further information. The use of interviews in this study compensated for the weaknesses inherent in the questionnaire.

Table 6: Summary of the Advantages and Disadvantages of Questionnaires

Advantages	Disadvantages
Questionnaires are relatively inexpensive and easy for a single researcher	The questionnaire may not be completed and may result in a poor response rate
Respondents can complete questionnaires at their convenience	There is no one to clarify the question especially if it is by mail
There is anonymity which makes respondents to express their views without fear	A questionnaire is limited to the kind of information it provides
	If a questionnaire is incomplete it is difficult to follow up

The data for this study was cross-sectional as collection of data was done at one point between December 2013 and March 2014. The questionnaire is based on the pre-existing NRI model developed by Dutta and Jain (2004) and Bridge Organisation (2005) with modifications to make it relevant to assess e-Readiness at CBU. The questions focused on demographic background and the three determinants of higher levels of e-Readiness in the NRI model, and these are; the environment readiness, ICT readiness and network usage (Bridges Organisation, 2005). The participants responded to questions with a five-point Likert scale where a five represents strongly agree and a one represents strongly disagree (cf. Appendix a & b). The questionnaires were personally distributed in hard copy format to the respondents and were collected by the researcher.

c) Interviews

This study also utilized interviews as the other method for data collection. Interviews are one of the most commonly used methods of data collection (DiCicco-Bloom & Crabtree, 2006). Specifically, interviews have also been used to study e-Readiness assessment of different organisations in developing countries (Totolo, 2007; Chigona et al., 2010; Benson, 2011). An interview is a "short-

term, secondary social interaction between people with the explicit purpose of one person obtaining specific information from the other" (Neumann, 2012: 197). They can be structured, semi-structured or unstructured (Burns & Grove, 2001; Fontana & Frey, 2005; Polit & Beck, 2006).

This study used semi-structured interviews to solicit for in-depth data from the purposively selected IT personnel and Dean of Schools (see Appendix c). In-depth semi-structured interviews provide much more detailed information than what is available through other data collection methods (Boyce & Neale, 2006). Also semi-structured questionnaires do not impose structure on interviews and can assess what the subject feels is important (Bless et al., 2006). However, semi-structured interviews are very difficult to standardise and analyse and are very time-consuming and expensive.

Table 7: Summary of the Advantages and Disadvantages of Interviews

Advantages	Disadvantages
Yields can be high if participants cooperate	Interviewee may be reluctant to share information with the interviewer
Interviews enable researchers to gain in-depth knowledge of the problem and clarify ambiguous questions and /or responses	Interviews are time consuming and may not be practical with large sample sizes
They are broad, flexible and more likely to yield information that the researcher had not planned for	Data are time consuming to analyze
It is possible to make a follow up	There is likely to be bias
	Interviews depend on memory which may not be reliable

For this study, interviews were necessary to gain further useful insight that could not be revealed from the questionnaire. Extra data on the e-Readiness levels of CBU were needed from the facilitators of the system. The interviews assisted the researcher in finding out what the facilitators knew and thought about the phenomenon under study. The research used face-to-face, semi-structured interviews with open-ended questions. The researcher had a list of questions or themes to be covered, but questions varied from interview to interview (Saunders, et al., 2011). The respondents were IT staff including the Director of DICT and the Deans of Schools (cf. Appendices 3). Interviews were conducted between 16th and 20th March, 2013.

3.8 Administration of Data Collection Instruments

The following procedures were observed during data collection

- Permission sought from the Vice Chancellor through Staff Development Office to conduct the study.

- Respondents were informed about the purpose of the study.

- Respondents were informed that they participated at own free will.

3.9 Reliability and Validity

Reliability is the degree to which the indicator or test is a consistent measure over time or simply, will the respondent give the same response if asked to give an answer at separate times (Kline, 1998; David & Sutton, 2004). It can be pointed out that reliability is about dependability and consistency (Norland, 1990; Neuman, 2006) as it highlights the degree to which the results are repeatable. On the other hand, validity denotes the degree to which a measuring instrument accurately reflects the concept it is intended to measure (David & Sutton, 2004; Babbie, 2013). Validity entails the extent to which the research conclusions are dependable and suggest truthfulness (Neuman, 2006).

Therefore, before analyzing research data, instruments have to be checked for reliability and validity, especially for studies in social science (Norland, 1990; Kline, 1998). A pilot test seeks to answer the question; does the questionnaire consistently measure whatever it measures? It is important that the data-collection instrument is accurate. This study ensured that there was reliability by pre-testing and refining the instruments. The questionnaire instrument was tested using ten respondents drawn from students and academic staff selected for the purpose. Their responses were analyzed to enable the refinement of the questionnaire items. Also faculty members were approached to critically analyze the questionnaire items, towards refining it for survey purpose. To ensure accuracy and truthfulness of data from interviews, the researcher recorded each interview done with the aid of a voice recorder and then it was professionally transcribed.

In order to obtain answers for the research questions and also find the predictive value of each of the factors of the proposed conceptual framework for accessing e-Readiness, the study utilized multiple regression analysis. Such analysis demands that the instruments used to measure variables are accurate and precise (Kline, 1998; Field, 2009). Therefore, a number of tests were done to ensure reliability, validity and normality in the dataset. Such preliminary tests are important in order to come up with reliable data so that the objectives of the study are realized.

Some of the instruments used in testing for reliability included: the Kaiser-Meyer-Olkin for testing the sample adequacy of the population and Bartlett's Test for Sphericity. For normality, the Kormogolov-Smirnov and the Shapiro-Wilk tests were performed to validate whether the dataset follows a normal distribution. This was important because the results from the analysis would be generalized beyond the collected sample. It was also advisable to remove the outliers (extreme values) from the data set as they may affect the results of the analysis. These tests were necessary to prepare data for factor

analysis and through regressions; the relationships between variables and the impact of one factor over the predictor variables were identified. The next section presents some of the tests.

a) Normality Test

Testing for normality is important as it ensures validity of statistical inferences from the data set by showing the extent of the outliers in the dataset. There is need, therefore, to ensure that the dataset follows a Probability Density Function (PDF) and to ascertain whether there are any significant outliers. In order to understand which factors affect e-Readiness and hence include them in multivariable analysis, the study analysed the mean responses from the descriptive statistics as shown in Table 8 below.

Table 8: Descriptive Statistics

Factor	Mean	Std. Deviation
Accessibility to ICTs	2.5	0.914
Requisite ICT Skills	2.05	0.934
e-Readiness Indicators	2.03	1.04

Table 8 shows a normal distribution of responses as most of the responses were close to the mean. Figure 5 below shows the histogram on accessibility to ICTs with no visible outliers which may affect statistical inferences of responses from the data set.

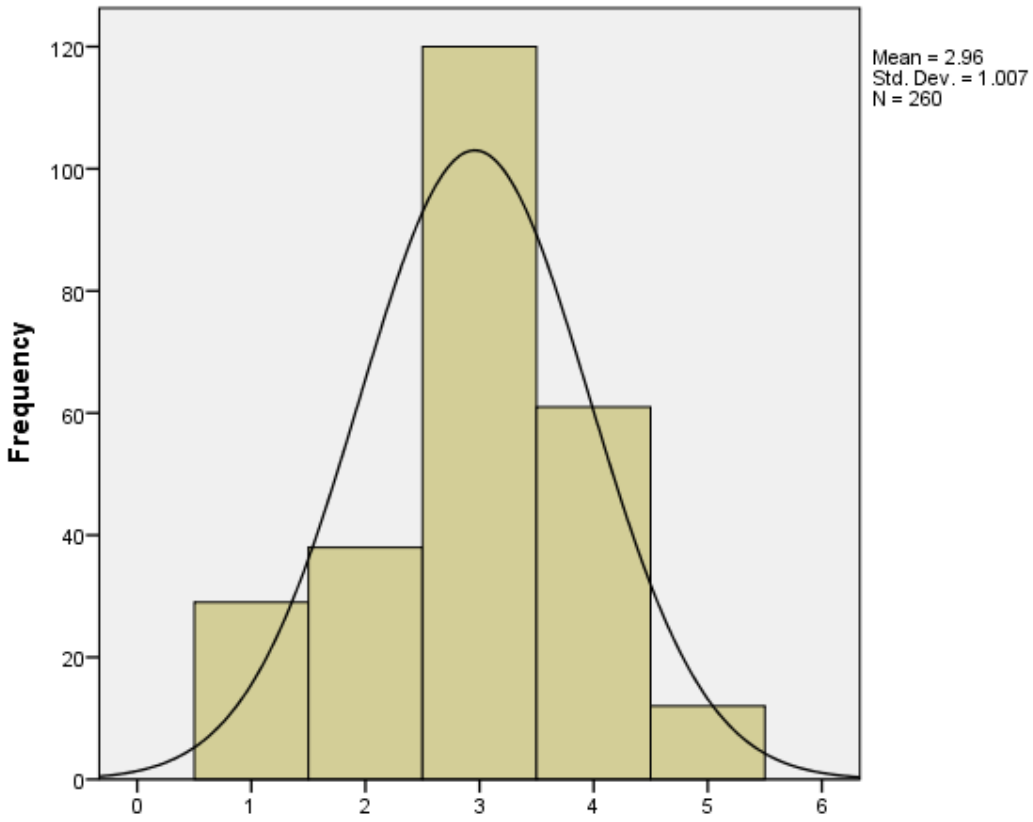


Figure 5: Histogram for Accessibility to ICTs

To supplement the result of the normality testing above, the Q-Q plot in Figure 6 on Accessibility to ICTs shows the linearity of the dataset showing the likelihood of non-existence of significant outliers which may negatively influence the results.

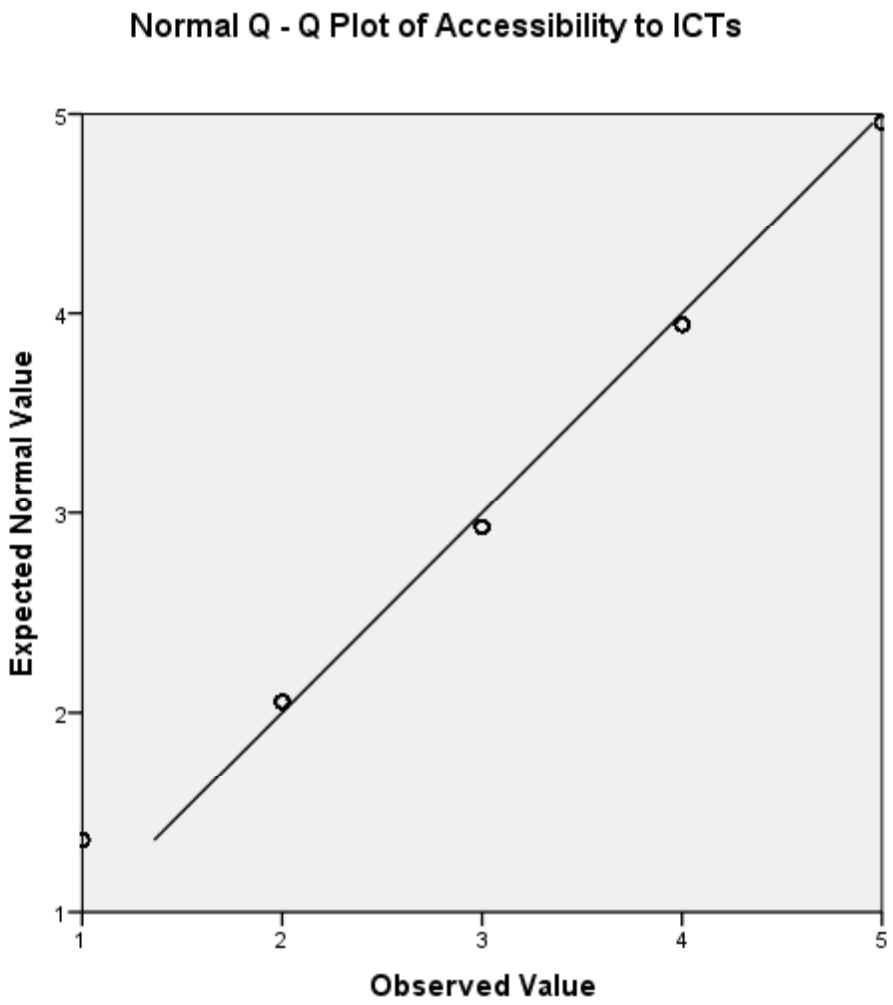


Figure 6: Q-Q Plot for Accessibility to ICTs

Figure 6 above shows the data set following a line, an indication of a normal distribution. The Kormogolov-Smirnov (KS) and the Shapiro-Wilk test for normality were also done. Statistical tests conducted on the entire data set revealed that in all the measured variables, the statistics were near one which indicates near normality. However, the tests showed significance on Social Influence, Facilitating Conditions and Awareness. Table 9 shows the results.

Table 9: Test for Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Accessibility to ICTs	.278	259	.000	.815	259	.000
Skills in ICTs	.255	261	.000	.817	261	.000

Lillie Significance Correlation

The tests for normality showed adequate normal distribution of the data and therefore it is appropriate to conclude that no visible outliers may negatively influence the statistical inference obtained from the given data set.

b) Kaiser-Meyer-Olkin (KMO)

The Kaiser-Meyer-Olkin (KMO) measures sampling adequacy of the population and prepares data for factor analysis. An adequate sample is necessary and the results obtained should be more than 0.5 to be statistically significant and allow factor analysis to be performed. For this study, the KMO was 0.471 which, statistically, is sufficiently close to 0.5 and should be considered satisfactory to assume that the items in the questionnaire were answered by a statistically significant number of study participants. Table 10 gives an illustration.

Table 10: KMO and Bartlett's Test

Kaise-Meyer-Olkin	Measure of sampling Adequacy.	0.471
Bartlett's Test of Sphericity	Approx. Chi Square	1310.514
	df	66
	Sig.	.000

The Bartlett's Test of Sphericity tests whether the correlation matrix is an identity matrix. In other words, it tests the null hypothesis that the variables in the population correlation matrix are uncorrelated, According to Field (2005: 1) some relationship is needed between variables and if the R-matrix were an identity matrix, then all correlation coefficient would be zero. Lack of correlation indicates strength of the relationship among variables. In this study, Bartlett's test was highly significant. KMO is 0.5 and X2 (66) = 1310.514, P <0.001.

Therefore, the factor analysis was suitable for this data set as the two tests provided the minimum requirements.

c) Factor Analysis

Factor analysis can be used to screen variables for further analysis, generate hypotheses regarding causal mechanisms and used to reduce data where only factors which have a non-negligible likelihood to contribute to variance are included in the analysis. This is important because the analysis keeps only big value communalities that fit well with the factor solution. Small value communalities which probably are not so useful and cannot explain most of the variance are eliminated. This way, it screens data. This study had a sample size of 353 and it passed the KMO and Bartlett‟s test of sphericity indicating the suitability of the data set for factor analysis. The Principal Component Analysis (PCA) was used as an extraction methodology.

Some factors which could explain large amounts of variance were extracted from the communalities while those with small values of less than 0.5 were dropped from the analysis as they did not fit well with the factor solution. The initial communalities are estimates of the variance in each variable accounted for by all factors. Extraction communalities are estimates of the variance in each variable accounted for by the factors in the factor analysis (see appendix d).

d) Scree Plot

A scree plot establishes how many factors should be retained in an analysis. The scree plot in Figure 3.4 below shows the factors that have been eliminated and those which have been extracted. The scree plot is a two dimensional graph with factors on the x-axis and *eigenvalues* on the y-axis. *Eigenvalues* are produced by a process called Principal Component Analysis (PCA) and represent the variance accounted for by each underlying factor. The scree plot showed that the four sub-variables or factors were extracted with *eigenvalues* of one and above. Therefore, it was clear for this study that, out of the twelve factors from two variables (Access to ICTs and Requisite ICT Skills), four had a possible impact on e-Readiness and correspondingly on the level of e-Readiness at CBU.

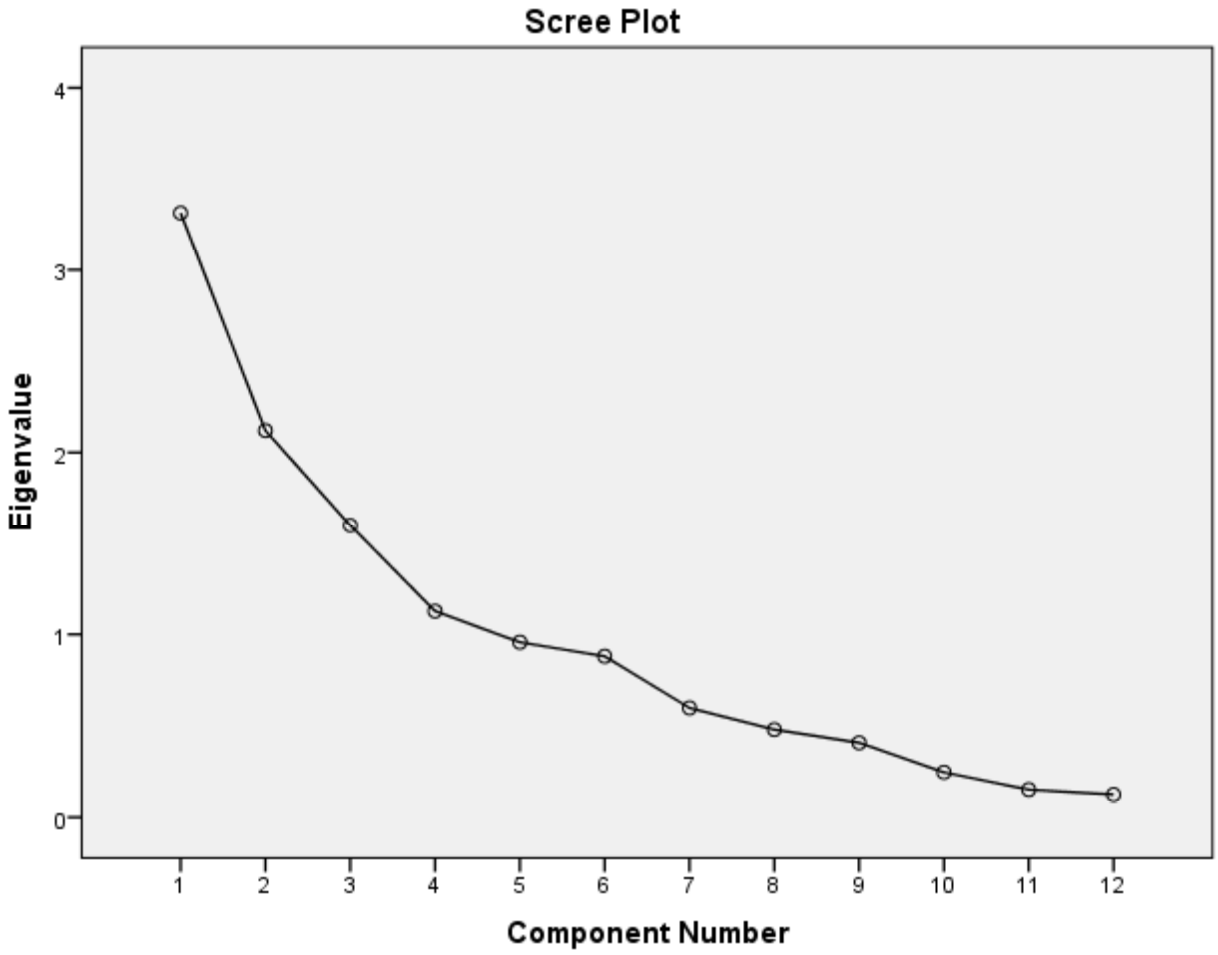


Figure 7: Scree Plot of Retained Factors

The scree plot shows the extracted factors with *eigenvalues* greater than one and those with small values which were eliminated.

Table 11 shows a total variance of extracted factors from the communalities, the extracted factors had values of more than 50%.

Table 11: Total Variance of Extracted Factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.315	27.623	27.623	3.315	27.623	27.623	3.238	26.984	26.984
2	2.120	17.663	45.286	2.120	17.663	45.286	2.106	17.553	44.537
3	1.599	13.324	58.610	1.599	13.324	58.610	1.645	13.710	58.247
4	1.127	9.395	68.005	1.127	9.395	68.005	1.171	9.758	68.005
5	.957	7.974	75.979						
6	.880	7.336	83.315						
7	.598	4.980	88.294						
8	.479	3.992	92.286						
9	.407	3.391	95.677						
10	.245	2.042	97.719						
11	.150	1.254	98.972						
12	.123	1.028	100.000						

3.10 Ethical Considerations

This research study was undertaken in a manner that respected ethical issues as put forward by the American Anthropological Association (2009) Code of Ethics. The code's principles were used to direct the interaction between the researcher and the respondents. In line with the ethical considerations of the code, the following were observed:

- Aims of the study were clearly communicated to respondents.
- Obtaining informed consent of the respondents by requesting him/her to sign an informed consent form which stated that participation was voluntary (See Appendix E).
- Respondents' privacy and confidentiality were respected.
- Respondents were informed of the right to voluntarily take part in the study.
- Respondents were informed that they were free to withdraw their participation at any stage of the research and,
- They were also informed that the questions would not be embarrassing or insulting.

These guidelines were communicated in all the data collection instruments of the study. Permission to collect data was also sought from CBU management prior to the commencement of the study.

3.11 Data Analysis

The list below articulates the stages that the researcher followed to record and analyse the data from the questionnaires, interviews and document analysis.

- Data collected using questionnaires was initially inspected in preparation for coding and entering into the SPSS V 20 programme to produce frequencies and percentages (Cohen et al., 2008; Babbie, 2013).
- The Likert scales were coded such that: "Strongly Agree" was assigned 1; "Strongly Disagree" was assigned 5. The rest of the scales were assigned values between 1 and 5, accordingly.
- For quantitative analysis, the study ensured that data were carefully checked for inconsistencies to enable the findings offer a more accurate assessment of the problem under study.
- The qualitative data was analysed using content analysis techniques (Mertens, 2010).

3.12 Data Presentation

The data for the study was collected three to eight weeks following the administering of the questionnaire; interviews and the document analysis was carried out in accordance with the prepared interview and document analysis list. The data file for SPSS was used to request for descriptive data on the Likert scale. Simple frequency counts were extracted for the thirty two items in order to determine the respondents' opinions on the constructs that were formulated for study purposes. Regressions were made with regressing items representing the dependent variables against the items representing the independent variables. Once understood, the study anticipates contributing to theory through proposing a context-aware theoretical framework for appropriate measurement of e-Readiness in a developing world and practice by contributing to the understanding of the salient factors behind implementation of ICT initiatives in universities in Africa. Data from interviews and observations were integrated into the quantitative data.

3.13 Problems Encountered in Data Collection

The research initially intended to solicit for data from students while they were still on campus. However, this was not possible because by the time the data collection instruments were ready, the university was on recess and this made data collection take longer and difficult. This hampered the distribution of the questionnaires as most of the students had gone out of campus. This problem was solved by collecting contact numbers for students from CBU, who then were followed in their respective homes and given the questionnaires. The delays experienced at the administration and

collection stages of the questionnaires explain the response rate attained. However, adequate data were collected and the objectives of the study were met.

3.14 Summary

This chapter described the methodical approach adopted for this study. The chapter also discussed the qualitative and quantitative approaches in data collection that were used for this study. A pilot study was undertaken before the actual data collection to ensure the validity and reliability of the data collection instruments. Probability and stratified sampling were used to respond to the questionnaire based on the Modified NRI Model of e-Readiness assessment factors. A purposively selected sample of respondents for qualitative data based on relevant research questions was selected from key IT personnel from CBU. Purposive sampling enabled a selection of personnel with the desired information for the study.

CHAPTER FOUR

PRESENTATION OF RESULTS

4.1 Introduction

This chapter analysed the results of both quantitative and qualitative data of the study. Qualitative and quantitative methodological approaches were utilised to overcome bias by allowing both approaches to complement each other. This also made it possible to harmonize limitations and weaknesses of either research techniques or methods. The data was collected from third to fifth year undergraduate students and graduate (Masters) students because they were likely to seriously participate in the research. Additionally, the university academic staff, Deans of Schools, the Director of ICT and IT staff were part of the respondents in that they are key stakeholders in implementing activities related to ICT at the University. The NRI model was used as a theoretical lens for the study (Dutta & Jain, 2004).

This chapter presented study findings on the following: presentation of the study response rate followed by demographic information of respondents; hardware and software facilities at the university; responses on the extent to which requisite ICT infrastructure contributes to accessibility of different ICT technologies that correspond to e-Readiness; responses on the requisite ICT skills among CBU stakeholders to use different ICT technologies; responses on the ICT policy support use of ICTs at CBU and lastly responses on how the university working environment affect effective use of ICTs. Statistical tests such as regression analysis and discussions of the results were presented. Lastly, the conceptual model for e-Readiness was presented.

4.2 Empirical Results

This section provides s a report on the results of the empirical study.

4.2.1 Response Rate

Response rate is the percentage of people who actually complete the questionnaire and return it to the investigator (Stangor, 2011). The target population for the study was 353 respondents. Out of the 353 questionnaires distributed, 286 were completed and returned representing a response rate of 81.0%. This response rate was found to be highly acceptable (Johnson & Owens, 2003; Dommeyer et al., 2004; Sivo et al., 2006; Carley-Baxter et al., 2009). Table 12 below shows the distribution of respondents according to their roles.

Table 12: Response Rates

Category of Respondents	Questionnaires Distributed	Questionnaires Returned	Questionnaires Unreturned	Response Rate
Academic Members of Staff	35	25	10	71.4%
Students	318	261	57	82.1%
Total	353	286	67	81.0%

According to Table 12, from a total of 35 questionnaires distributed to academic staff, 25 (71.4%) responded to the questionnaire, while out of 318 questionnaires distributed to students, 261 (82.1%) responded to the questionnaire. The reason that might have led to a higher non-response rate among students was that questionnaires were distributed to them at a time when CBU was going on recess. Hence, most students left the university and forgot to return the questionnaires, while other students did not have the interest to complete questionnaires as it was examination time.

In addition, a qualitative approach in the form of face-to-face interviews was conducted. The targeted 12 interviewees include: eight Deans of Schools, the Director of ICT and three IT staff. The interviewees were purposively sampled based on their knowledge, expertise and being part of the team that was implementing various ICT initiatives at CBU. In using the qualitative approach, the study aimed at establishing how the ICT policy supports the use of ICTs and if the working environment at the university affects effective use of ICTs. Table 13 below is a list of the interviewees.

Table 13: List of Interviewees

Department/School	Designation	Gender	Years in Service
Directorate of Information and Communication Technologies (DICT)	Director	M	10
DICT	ICT Training Coordinator	M	10
DICT	ICT Support Services Manager	M	5
DICT	ICT End User Support Officer	M	7
School of Mines and Minerals	Dean	M	5

According to Table 13, out of 12 interviewees targeted, only 5 were interviewed comprising 4 IT Staff and 1 Dean from the School of Mines and Minerals. The reason most Deans were not interviewed was that at the time of the research, they were busy coordinating examinations.

4.2.2 Demographics of Respondents

Questionnaires were used as a major data collection instrument. Each questionnaire opened with demographical information of respondents. Therefore, Table 14 below outlines the demographic characteristics of study participants.

Table 14: Demographic Characteristics of Respondents

		Students		**Academic Staff**	
		Frequency	Percentage	Frequency	Percentage
Gender	Male	133	51.0%	16	64.0%
	Female	128	49.0%	9	36.0%
School	Built Environment	78	29.9%	2	8.0%
	Business	63	24.1%	4	16.0%
School	Engineering	12	4.6%	1	4.0%
	Graduate Studies	13	5.0%	3	12.0%
	Mathematics and Natural Science	11	4.2%	3	12.0%
	Medicine	7	2.7%	2	8.0%
	Mines and Minerals	39	14.9%	6	24.0%
	Natural Resources	38	14.6%	1	4.0%
	Other (Library)	0	0.0	3	12.0%
Year of Study (Undergraduate and Graduate Students)	Second Year (G)	13	5.0%	0	0.0
	Third Year (UG)	1340	51.5%	0	0.0
	Fourth Year (UG)	97	37.3%	0	0.0
	Fifth Year	16	6.2%	0	0.0
Age	Below 25	197	75.5%	0	0.0
	26 - 35	56	21.5%	14	56.0%
	36 - 45	8	3.1%	6	24.0%
	46 and above	0	0.0	5	20.0%

It is clear from Table 14 that out of 261 students who returned questionnaires, 133 (51.0%) were male while 128 (49.0%) were female. Therefore, this study had a balanced representation of feedback from both males and females. Looking at the Schools of respondents, the majority 78 (29.9%) were from the School of Built Environment while few 7 (2.7%) were from the School of Medicine, a new school

that CBU recently established. Looking at year of study 13(5.0%) were graduate students doing two-year Master's programmes.

Considering the age of students, the majority 197 (75.5%) of them were below 25 years while few were in the age bracket of 36 - 45 years. None of the students were aged 46 and above. This may suggest that the younger community of CBU determined the level of e-Readiness of the University.

On the other hand, Table 14 shows that out of 25 academic staff who returned questionnaires, 16 (64.0%) were male while 9 (36.0%) were female. The majority 6 (24.0%) of academic staff were from the School of Mines and Minerals while a few 1 (4.0%) was from the School of Engineering and Natural Resources. Additionally, the majority 14 (56.0%) of academic staff were aged between 26 - 35 years.

4.3 Presentation of Empirical Results

The preceding section outlined the sample of the study corresponding with the primary data set of descriptive statistics. The data from questionnaire, interviews and document analysis was integrated where appropriate.

4.3.1 Results from Questionnaires, Interviews and Document Analysis

This section shows the actual data that was collected on each of the study's research question. It must be pointed out that not all the data collected for the study variables are shown in the descriptive tables used. However, the data described in the tables shows numbers of students and academic staff (study respondents) and their pattern of response to each and every question asked. The study research questions are as follows:

Q1) What are the available Hardware and Software ICT facilities at CBU?

The aim of this question was to identify the available ICT facilities at CBU. This was done in order to establish whether CBU has the necessary hardware and software ICT facilities that can be used to leverage the potential of ICTs in conducting its core business activities. Hence, the checklist below shows the list of the actual hardware and software facilities acquired by CBU.

Checklist of the available Hardware and Software ICT facilities at CBU

Equipment Found	**Purpose**
Barcode Readers:	Used in the Library for checking in and out library materials
Dspace Software:	Used to create the first institutional repository for CBU

Fax Machines:	Found in all schools and departments at CBU
Computers:	Used for different university core business activities
Computer Laboratories:	Found in each school to be used for accessing various e-Resources of academic nature
Library CCTVs:	Used in the Library to monitor the Library study environment and building during and after open hours.
Moodle Software:	To be used by lecturers to give and receive assignments from students.
Interactive boards:	Used for conducting lectures
Photocopying Machines:	Used for creating copies of work related documents.
Printers:	Used for printing documents of work related documents.
Projectors:	Used for conducting lectures, students' presentations and different university meetings.
Video Conference System (XVD):	To assist the University develop its e-Learning programmes.
Wi-Fi:	To enable wireless Internet connectivity for various devices within campus

From checklist, it can be seen that CBU has acquired a number of ICT facilities in an effort to ensure that it promotes and develop various ICT initiatives it has embarked on as an HEI. However, it must be pointed out that the list represents what the researcher was able to gather at the time of the research.

Q2) What are the requisite ICT Infrastructure that contributes to accessibility of different ICT technology applications that correspond to e-Readiness at CBU?

The aim of this question was to identify or establish the levels of accessibility to the university ICT facilities by the key stakeholders (students, academic staff, IT staff and managers). Hence, Table 15 below shows the actual responses of the respondents.

Table 15: Requisite ICT Infrastructures and Access

		STUDENTS					
		Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Total**
Computer with adequate software	Frequency	131	95	34	0	0	260
	Percentage	50.4%	36.5%	13.1%	0.0	0.0	100%
Internet Web sites at Campus	Frequency	89	137	34	0	0	260
	Percentage	34.2%	52.7%	13.1%	0.0	0.0	100%
Computers with Internet connection	Frequency	54	155	52	0	0	261
	Percentage	20.7%	59.4%	19.9%	0.0	0.0	100%
Wireless Internet connection	Frequency	20	147	92	0	1	260
	Percentage	7.7%	56.5%	35.4%	0.0	0.4%	100%
High speed and quality connectivity	Frequency	29	38	120	61	12	260
	Percentage	11.2%	14.6%	46.2%	23.5%	4.6%	100%
Fax Machines	Frequency	5	70	82	18	84	259
	Percentage	1.9%	27.0%	31.7%	6.9%	32.4%	100%
		ACADEMIC STAFF					
		Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Total**
I access networked computer at University	Frequency	16	7	1	1	0	25
	Percentage	64.0%	28.0%	4.0%	4.0%	0.0	100%
I access wireless Internet connection	Frequency	2	8	6	3	6	25
	Percentage	8.0%	32.0%	24.0%	12.0%	24.0%	100%
I access high speed and quality connectivity	Frequency	10	0	5	6	4	25
	Percentage	40.0%	0.0	20.0%	24.0%	16.0%	100%
I access different automated systems at CBU	Frequency	1	7	6	6	5	25
	Percentage	4.0%	28.0%	24.0%	24.0%	20.0%	100%

Looking at Table 15, the majority182 (70.0%) of the students agreed accessing: computers with adequate software; Internet websites on campus and computers with Internet connectivity. However, it was noted that 130 (50.0%) of students disagreed to having access to high speed and quality Internet

connectivity and fax machines. The low speed and low quality Internet connectivity may be attributed to the fact that CBU has had a low Internet bandwidth for some time. However, one of the interviewees observed that:

> "CBU has improved its Internet bandwidth from 4hz to 100hz. He said that the improved bandwidth will help in mitigating some of the challenges that students and staff go through in accessing various ICT facilities around campus."

As for academic staff, Table 15 shows that 15 (60.0%) of the respondents agreed to accessing networked computers on campus. However, 11 (45.0%) of academic staff disagreed to having access to: wireless Internet connection; access to high speed and quality Internet connectivity and access to different automated systems (OPAC, Moodle) on campus. One interviewee stressed that,

> "With improvements being made by expanding the university Internet bandwidth, it is hoped that such an improvement will mitigate some of the challenges that students and staff go through in accessing different ICT technology applications around CBU".

Q3) What are the requisite ICT skills that stakeholders have to use different ICT technology applications that correspond to e-Readiness at CBU?

The aim of this question was to identify the requisite ICT skills that students and academic staff have to use different ICT technologies. Hence, the study's respondents were asked to indicate their requisite ICT skills. Table 16 below shows the actual responses of the respondents.

Table 16: Requisite ICT Skills

		STUDENTS					
		Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Total**
I have the skills to operate a computer	Frequency	127	104	30	0	0	261
	Percentage	48.7%	39.8%	11.5%	0.0	0.0	100%
Skills to use search engines in finding information on the Internet (for research)	Frequency	82	108	53	11	7	261
	Percentage	31.4%	41.4%	20.3%	4.2%	2.7%	100%
I use social media (e.g. Facebook and YouTube) for academic purposes	Frequency	87	26	117	26	5	261
	Percentage	33.3%	10.0%	44.8%	10.0%	1.9%	100%
I am able to use automated systems at the University (e.g. Online Registration	Frequency	99	115	44	2	1	261
	Percentage	37.9%	44.1%	16.9%	0.8%		100%

						0.4%	
I am able to effectively participate in online discussion forums	Frequency	67	97	68	1	28	261
	Percentage	25.7%	37.2%	26.1%	0.4%	10.7%	100%
	ACADEMIC STAFF						
		Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Total**
I use search engines to find information on the Internet	Frequency	16	9	0	0	0	25
	Percentage	64.0%	36.0%	0.0	0.0	0.0	100%
I use e-mail for communication (academic/personal)	Frequency	16	9	0	0	0	25
	Percentage	64.0%	36.0%	0.0	0.0	0.0	100%
I use Moodle to give notes and receive assignments to students	Frequency	0	2	8	10	5	25
	Percentage	0.0	0.8%	32%	40%	20%	100%
I effectively participate in online discussion forums on a topic of my interest	Frequency	2	6	7	6	4	25
	Percentage	8.0%	24.0%	28.0%	24.0%	16.0%	100%
I use the university video conference system for knowledge transfer with other universities	Frequency	0	1	2	9	13	25
	Percentage	0.0	4.0%	8.0%	36.0%	52.0%	100%

According to Table 16, the majority 195 (75.0%) of students agreed to having requisite ICT Skills to operate a computer, to use search engines in finding information for research on the Internet, use automated systems and to effectively participate in online discussion forums on topics of their academic interest. On the other hand, only 31 (12%) students disagreed to using social media for academic purposes. This may suggest that that the use of social media for learning is actually growing and becoming a pervasive practice amongst students. One interviewee explained that,

> "Students have access to computer labs which are open 24 hours every day during the academic period. Through exposing themselves to ICTs, they learn different things. For instance, they learn to use different social media for exchanging academic information."

On the other hand, Table 16 also shows that all academic staff agreed to have requisite ICT skills to use search engines in finding academic information on the Internet and use e-mails in communicating

academic information amongst staff. However, the majority 20 (80.0%) of academic staff disagreed to using Moodle to give notes and receive assignments from students, participating in online discussion groups on topics of their interest and using CBU video conference system (XVD) for knowledge transfer with other universities. However, one staff interviewed explained that:

> "CBU through the Directorate of Information and Communication Technologies (DICT) is setting up deliberate measures to train and empower members of staff on the different ICT skills in order for them to use various ICT productivity packages in conducting the university core business activities. He further explained that in 2013, DICT imparted ICT skills to 196 members of staff and in 2014 about 286 members of staff from different departments were selected for training in different ICT productivity packages."

Q4) How does the ICT Policy support the use of ICTs at CBU?

It is critical for a university to have a systematic and pragmatic ICT policy as a deliberate measure to ensure effective deployment of ICTs in an institution's core business activities. Additionally, such a policy may provide a coherent picture of the university's responsibilities and user obligations for the maintenance, security, legal and appropriate use of the university networks in line with the university's educational missions (Mitrano, 2004). Hence, the fourth research question sought to interview respondents to explain whether CBU had an ICT policy to support the use of its ICT facilities.

From a total of 5 respondents interviewed, 4 (80%) observed that CBU does not have an ICT policy while 1 (20%) was not sure on issues related to ICT policy. However, it was explained that CBU has a user policy that is being used to regulate the use of ICT facilities. Furthermore, on the question of ICT policy, one of the interviewees explained that:

> "The Directorate of Information and Communication Technology (DICT), is in the process of developing a comprehensive ICT policy. The policy will cover all aspects of ICTs in regard to access and use in order to support the development of various ICT initiatives that CBU has embarked on and promote the enhancement of the institution's level of e-Readiness."

The interviewee also revealed that:

> "Through DICT, CBU is putting in place appropriate measures to ensure that once the institution's ICT policy is formulated, it works in increasing and promoting the use of ICTs at the university. Additionally, the ICT policy may help in minimising the misuse of ICT facilities amongst students and members of staff by providing guidelines on the best ways of

utilising ICTs in supporting teaching, learning and research at CBU. This would include; providing specific ICT training programmes, carrying out awareness programmes on the best ways of using ICTs and sensitising students and staff on the benefits of ICT facilities."

In a follow up question to seek clarity on how the ICT policy to be formulated would support the use of ICTs at CB, an interviewee revealed that some of the policy issues were being put in place. He pointed out that:

"For instance, students who were admitted at CBU for the year 2013 used e-Registration (online registration) for their course registration. However, concern is being raised on some distance students who are not keen or willing to use e-Registration to register remotely for their various courses but prefer coming to CBU physically to register manually. This is being attributed to lack of ICT facilities from the different geographical localities where these students come from."

He also explained that:

"During the 2013 academic year, the numbers of students who accessed the e-Registration portal at the same time overwhelmed the university e-Registration system. This affected the processing of registration entries of students in their respective programmes. Having experienced what happened to the e-Registration system, CBU is working on improving the system to ensure that it operates at its optimum in such situations."

Q5) How does the University's work environment affect effective use of ICTs at CBU?

The aim of this question was to assess how the work environment at CBU affects effective use of ICTs. It can be argued that each and every institution or organisation develops unique values and behaviour; written and unwritten rules that overtime are considered valid and constitute the norms determining how work is performed. These unique traits, which are developed in organisation or institutions, form the basic pillars on which to create an institution unique work culture or environment. Therefore, an institution's work culture is critical in determining how employees would perceive and use ICTs in its core business activities.

All the members of staff interviewed argued that the current working environment at CBU was one of the major challenges the university was facing in an effort to promote integration and use of ICTs in its core business. One of the interviewees said that:

> "It is a common practice for employees to misuse ICT facilities at CBU. There is need to educate the university community on how best to utilise ICTs by making them aware of the potential benefits of effectively using ICTs."

Another interviewee further explained that:

> "Usually employees' facebook and play games on computers during working hours. Other employees watch movies and visit certain sites which are not in the interest of learning. Also, employees use the university ICT facilities for their personal affairs like sending business advert messages to colleagues on what they are selling. Using the university ICT facilities to conduct personal activities defeats the overall purpose of leveraging the potential of ICTs to support the core business of the university."

Additionally, it was mentioned that:

> "It has been observed that majority of students have shown interest and willingness to use ICTs in doing their academic activities. However, there is need to sensitise and make everyone aware of the potential benefits of using ICTs in the main business activities of the university. ICTs are versatile technology applications that could be useful in a number of CBU activities. These may include using ICTs as teaching and learning aids, for research and to effectively manage the administrative affairs of the university."

4.4 Adoption of the NRI Model for Copperbelt University

The main objective of the study was to assess e-Readiness at CBU. It was important to find out the predictive values of the proposed conceptual framework for assessing e-Readiness at CBU. Therefore, research questions that were measured quantitatively were further analysed in order to provide or identify their impact on e-Readiness indicators at CBU. The answers assisted on identifying the factors contributing to or determining e-Readiness with the purpose of finding remedial solutions.

Based on the extracted factors, multiple regression analysis was used to identify the relationships between the independent factors (accessibility to ICTs and requisite ICT skills) and the dependant factor (e-Readiness indicators).

4.4.1 Regression Analysis on Research Questions

Regression analysis investigates the relationship between variables, typically the relationship between the dependent and independent variables. In this study regression analysis was used to investigate the relationship and impact of the independent variables (accessibility to ICTs and requisite ICT skills) on the dependent variable (e-Readiness Indicators) at CBU.

Q1) What are the requisite ICT infrastructures that contributes to accessibility of different ICT technology applications that correspond to e-Readiness at CBU?

ICTs act as enablers in the process of attaining e-Readiness of any institution. In other words, for an institution or organisation to fully utilise its communication devices and Internet services to create efficiency (e-Readiness), it must provide its user community (students, employees or managers) accessibility to ICT facilities. Hence, it is assumed that when an institution provides more accessibility to its ICT infrastructure, the institution also improves its level of e-Readiness.

Tables 17 below shows the correlations between the sub-variables of the dependent variable: e-Readiness indictors (increasing the ICT infrastructure; training in ICT skills among students; increased accessibility to ICT facilities; increased funding for ICT development, improved Internet connectivity and increased support of ICT use by management) and the sub-variable of the independent variable: accessibility to (computers with adequate software, Internet websites at CBU, computers with wired Internet connection, wireless Internet connection, high speed and quality Internet connectivity and fax machines). This was done in order to predict the strength of the relationship between these two variables.

Table 17: Correlation between Accessibility to ICTs (IV) and e-Readiness Indicators (DV)

Sub Q1. Accessibility to (computers with adequate software) and e-Readiness Indicator: (training in ICT skills among students)		**e-Readiness Indicator**	**Accessibility to ICTs**
Pearson Correlation	e-Readiness indicator	1.000	-.273
	Accessibility	-.273	1.000
Sig. (1-tailed)	e-Readiness indicator	.	.000
	Accessibility	.000	.
N	e-Readiness indicator	260	260
	Accessibility	260	260
Sub Q2. Accessibility to (Internet websites at CBU) and e-Readiness Indicator: (increasing the ICT infrastructure)		**e-Readiness Indicator**	**Accessibility to ICTs**
Pearson Correlation	e-Readiness indicator	1.000	.505
	Accessibility	.505	1.000

Sig. (1-tailed)	e-Readiness indicator	.	.000
	Accessibility	.000	.
N	e-Readiness indicator	260	260
	Accessibility	260	260
Sub Q3. Accessibility to (computers with wired Internet connection) and e-Readiness Indicator: (increasing accessibility to ICT facilities)		**e-Readiness Indicator**	**Accessibility to ICTs**
Pearson Correlations	e-Readiness Indictor	1.000	.060
	Accessibility to ICTs	.060	1.000
Sig. (1-tailed)	e-Readiness Indicator	.	.166
	Accessibility to ICTs	.166	.
N	e-Readiness Indicator	260	260
	Accessibility to ICTs	260	260
Sub Q4. Accessibility to (wireless Internet connection) and e-Readiness Indicator: (increasing funding for ICT development)		**e-Readiness Indicator**	**Accessibility to ICTs**
Pearson Correlation	e-Readiness Indicator	1.000	.176
	Accessibility to ICTs	.176	1.000
Sig. (1-tailed)	e-Readiness Indicator	.	.002
	Accessibility to ICTs	.002	.
N	e-Readiness Indicator	260	260
	Accessibility to ICTs	260	260
Sub Q5. Accessibility to (high speed and quality Internet connectivity) and e-Readiness Indicator: (improved Internet connectivity)		**e-Readiness Indicator**	**Accessibility to ICTs**
Pearson Correlation	e-Readiness Indicator	1.000	-.153
	Accessibility to ICTs	.153	1.000
Sig. (1-tailed)	e-Readiness Indictor	.	.007
	Accessibility to ICTs	.007	.
N	e-Readiness Indicator	260	260
	Accessibility to ICTs	260	260
Sub Q6. Accessibility to (fax machines) and e-Readiness Indicator: (increased support of ICTs use by management)		**e-Readiness Indicator**	**Accessibility to ICTs**
Pearson Correlation	e-Readiness Indicator	1.000	.133
	Accessibility to ICTs	.133	1.000
Sig. (1-tailed)	e-Readiness Indicator	.	.016
	Accessibility to ICTs	.016	.
N	e-Readiness Indicator	257	257
	Accessibility to ICTs	257	257

According to Table 17, respondents indicated that accessibility to ICTs is correlated with e-Readiness indicators. This implies that respondents agreed that accessibility to ICT facilities had an influence on e-Readiness that corresponds to the level of e-Readiness at CBU. However, variables are said to have a perfect relationship when the correlation coefficient is either + 1.00 or -1.00. For this study, there was a positive correlation between the four sub-variables of accessibility to Internet websites at CBU,

computers with wired Internet connection, wireless Internet connection and fax machines with e-Readiness indicators, while accessibility to: computers with adequate software and to high speed and quality Internet connectivity had a negative correlation with e-Readiness indicators. Hence, four of the sub-variables of accessibility to ICTs had a weak positive relationship or impact on e-Readiness indicators while two have a negative relationship with e-Readiness indicators at CBU.

Table 18 below is the model summary that shows the R square values of sub-variables of accessibility to ICTs on e-Readiness indicator sub-variables. The R square value indicates the coefficient of determination that allows determining the proportion of variability of e-Readiness indicators that can be attributed to accessibility to ICTs.

Table 18: Model Summary

Model	R	R Square	Adjusted R square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig F Change
Sub Q1	.273[a]	.074	.071	.817	.074	20.762	1	258	.000
a. Predictors: (Constant), Accessibility to: computers with adequate software b. Dependent Variable: e-Readiness Indicator: training in ICT skills among students									
Sub Q2	.505[a]	.255	.252	.991	.255	88.305	1	258	.000
a. Predictors: (Constant), Accessibility to: Internet websites at CBU b. Dependent Variable: e-Readiness Indicator: increasing the ICT infrastructure									
Sub Q3	.060[a]	.004	.000	1.221	.004	.943	1	258	.333
a. Predictors: (Constant), Accessibility to: computers with Internet connection b. Dependent Variable: e-Readiness Indicator: increasing accessibility to ICT facilities									
Sub Q4	.176[a]	.031	.027	1.220	.031	8.203	1	258	.005
a. Predictors: (Constant), Accessibility to: wireless Internet connection b. Dependent Variable: e-Readiness Indicator: increasing funding for ICT development									
Sub Q5	.153[a]	.023	.020	1.110	.023	6.204	1	258	.013
a. Predictors: (Constant), Accessibility to: high speed and quality Internet connectivity b. Dependent Variable: e-Readiness Indicator: improved Internet connectivity									
SubQ6	.133[a]	.018	.014	.689	.018	4.624	1	255	.032
a. Predictors (Constant), Accessibility to: fax machines b. Dependent Variable: e-Readiness Indicator: Increased support of ICT use by management									

In summary, Table 18 shows that the R square values for all the sub-variables of accessibility had some impact on e-Readiness indicators at CBU. The R square value determines how much of the variation in one of the variable is due to the other. Hence, Table 18, shows that the sub-variable: accessing Internet websites at CBU had the highest R square value of 25.5% while accessing e-mails

had the lowest R square value of 0.01%. In other words, in order to determine the how much variation e-Readiness indicators was due to accessibility, it was necessary to add all the individual R square values for individual or sub-variables of accessibility and find the average as a representation of an overall R square value of accessibility. Hence,

(0.074 + 0.255 + 0.004 + 0.031 + 0.023 + 0.018)/6 = 0.0675.

The R square value of accessibility to ICTs was 0.0675. This means that 6.75% of the variations in e-Readiness indicators at CBU were attributed to accessibility to ICT facilities. It is clear that the multi-dimensionality of the independent variable (accessibility to ICTs) was emphasized by combining individual R squared values of different sub-variables. Therefore, it entails that each R squared value is part of the whole component of accessibility to ICTs. The analysis of variance is presented in Table 19.

Table 19: Analysis of Variance (ANOVA)

Model		Sum of Square	df	Mean Square	F	Sig.
Sub Q1	Regression	13.849	1	13.849	20.762	.000[a]
	Residual	172.090	258	.667		
	Total	185.938	259			
a. Dependent Variable: e-Readiness Indicator: training in ICT skills among students b. Predictors: (Constant), Accessibility to: computers with adequate software						
Sub Q2	Regression	86.747	1	86.747	88.305	.000[b]
	Residual	253.449	258	.982		
	Total	240.196	259			
a. Dependent Variable: e-Readiness Indicator: increasing the ICT infrastructure b. Predictors: (Constant), Accessibility to: Internet websites at CBU						
Sub Q3	Regression	1.404	1	1.404	.943	.333[b]
	Residual	384.330	258	1.490		
	Total	385.735	259			
a. Dependent Variable: e-Readiness Indictor: increasing accessibility to ICT facilities b. Predictors: (Constant), Accessibility to: computers with Internet connection						
Sub Q4	Regression	12.207	1	12.207	8.203	.005[b]
	Residual	383.928	258	1.488		
	Total	396.135				
a. Dependent Variable: e-Readiness Indicator: increasing funding for ICTs development b. Predictors: (Constant), Accessibility to: wireless Internet connection						
Sub Q5	Regression	7.646	1	7.646	6.204	.013[b]
	Residual	317.965	258	1.232		
	Total	325.612	259			

a. Dependent Variable: e-Readiness Indicator: improved Internet connectivity b. Predictors: (Constant), Accessibility to: high speed and quality Internet connectivity						
Sub Q6	Regression	2.196	1	2.196	4.624	$.032^b$
	Residual	121.111	255	.475		
	Total	123.307	256			
a. Dependent Variable: e-Readiness Indicator: increased support of ICTs use by management b. Predictors: (Constant), Accessibility to: fax machines						

Table 19 shows the analysis of variance (ANOVA) of the six sub-variables of accessibility to ICTs. It is evident that five sub-variables of accessibility to ICTs (accessibility to computers with adequate software, to Internet websites at CBU, to wireless Internet connection, to high speed and quality Internet connectivity and fax machines) showed a p value of < .05 which indicate their statistical significance on e-Readiness at CBU. However, it is also clear that the sub-variable (accessing computers with Internet connection) showed a p value above the acceptable p value of < 05. This indicated that this sub-variable had a low impact on e-Readiness at CBU. Table 20 shows the coefficients.

Table 20: Coefficients between Accessibility to ICTs and e-Readiness Indicators

	Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig**	**Collinearity Statistics**	
		B	Std. Error	Beta			Tolerance	VIF
Sub Q1	(Constant)	2.185	.101		21.547	.000		
	Accessibility to: computers with adequate software	-.169	.037	-.273	- 4.557	.000	1.000	1.000
a. Dependent Variable: e-Readiness Indicators: training in ICTs skills among students								
Sub Q2	(Constant)	.718	.179		4.012	.000		
	Accessibility to: Internet websites at CBU	.883	.094	.505	9.397	.000	1.000	1.000
a. Dependent Variable: e-Readiness Indicators: increasing the ICTs infrastructure								
Sub Q3	(Constant)	1.911	.250		7.660	.000		
	Accessibility to: computers with Internet connectivity	.116	.119	.060	.971		1.000	1.000
a. Dependent Variable: e-Readiness Indicators: increasing accessibility to ICTs facilities								

Sub Q4	(Constant)	1.640	.290		5.654	.000		
	Accessibility to: wireless Internet connection						1.000	1.000
a. Dependent Variable: e-Readiness Indicators: increased funding for ICTs development								
Sub Q5	(Constant)	2.432	.214		11.362	.000		
	Accessibility to: high speed and quality Internet connectivity	-.171	.069	-.153	-2.491	.013	1.000	1.000
a. Dependent Variable: e-Readiness Indicators: improved Internet connectivity								
Sub Q6	(Constant)	1.438	.128		10.526	.000		
	Accessibility to: fax machines	.077	.036	.133	2.150	.032	1.000	1.000
a. Dependent Variable; e-Readiness Indicators: increased support of ICT use by management								

Table 20 shows the Coefficients of six sub-variables of accessibility to ICTs. From the analysis done it is clear that the p values for all the sub-variables were statistically significant as they were less than $p < 05$. In other words, for this study the six sub-variables of accessibility had a significant impact on e-Readiness indictors and consequently on the level of e-Readiness at CBU. Hence, they were added to the model as sub-variables of accessibility to ICTs.

Q2) What are the requisite ICT skills that stakeholders have to use different ICT technology applications that correspond to e-Readiness at CBU?

In order for CBU stakeholders (students, lecturers, managers and IT staff) to effectively use communication devices and Internet services, they must be able to acquire the requisite ICT skills. Hence, the second research question focused on identifying the requisite ICT skills among CBU stakeholders in order to establish their capabilities to effectively utilise the institutional ICT facilities in improving the core business of the university (teaching and learning, research and community outreach). It was assumed that having the requisite ICT skills contributes to the attainment of a higher level of e-Readiness at CBU.

Table 21 below shows the correlations between the sub-variables of the dependent variable: e-Readiness Indictors (training in ICT skills among students; increasing ICT infrastructure; increased accessibility to ICT facilities; increased funding for ICT development, and increased support of ICT use by management) and the sub-variables of the independent variable: requisite ICT skills to (operate a computer, use search engines in finding information on the Internet, to use social media for

academic purposes, use automated systems at CBU like online results checking and online registration and participate in online discussion forums on a topic of my interest). This was done in order to predict the strength of the relationship between the two variables.

Table 21: Correlation between Requisite ICT Skills (IV) and e-Readiness Indicators (DV)

Sub Q1 Requisite ICT Skills to (operate a computer) and e-Readiness indicator:(training in ICT skills among students)		**e-Readiness Indicator**	**Requisite ICT Skills**
Pearson Correlation	e-Readiness Indicator	1.000	-129
	Requisite ICT Skills	-.129	1.000
Sig. (1-tailed)	e-Readiness Indicator	.	.019
	Requisite ICT Skills	.019	.
N	e-Readiness Indicator	261	261
	Requisite ICT Skills	261	261
Sub Q2 Requite ICT Skills to (use search engines in finding Information on the internet) and e-Readiness Indicator (increasing ICT infrastructure)		**e-Readiness indicator**	**Requisite ICT Skills**
Pearson Correlation	e-Readiness Indictor	1.000	.418
	Requisite ICT Skills	.418	1.000
Sig. (1-tailed)	e-Readiness Indicator	.	.000
	Requisite ICT Skills	.000	.
N	e-Readiness Indicator	261	261
	Requisite ICT Skills	261	261
Sub Q3 Requisite ICT Skills to(use social media for academic purposes) and e-Readiness Indicator: (increasing accessibility to ICT facilities)		**e-Readiness Indicator**	**Requisite ICT Skills**
Pearson Correlation	e-Readiness Indicator	1.000	.504
	Requisite ICT Skills	.504	1.000
Sig. (1-tailed)	e-Readiness Indicator	.	.000
	Requisite ICT Skills	.000	.
N	e-Readiness Indicator	260	260
	Requisite ICT Skills	260	260
Sub Q4 Requisite ICT Skills to (use automated systems at the university) and e-Readiness Indicator: (increasing funding for ICT development)		**e-Readiness Indicator**	**Requisite ICT Skills**
Pearson Correlation	e-Readiness Indicator	1.000	.258
	Requisite ICT Skills	.258	1.000
Sig. (1-tailed)	e-Readiness Indicator	.	.000
	Requisite ICT Skills	.000	.
N	e-Readiness Indicator	261	261
	Requisite ICT Skills	261	261

Sub Q5 Requisite ICT Skills to (effectively participate in online discussion forums on a topic of my interest) and e-Readiness Indicator: (increased support of ICT use by management)		**e-Readiness Indicator**	**Requisite ICT Skills**
Pearson Correlation	e-Readiness Indicator	1.000	.232
	Requisite ICT Skills	.232	1.000
Sig. (1- tailed)	e-Readiness Indicator	.	.000
	Requisite ICT Skills	.000	.
N	e-Readiness Indicator	259	259
	Requisite ICT Skills	259	259

It can be seen from Table 21 that respondents indicated that all the sub-variables measuring requisite ICT skills were correlated with e-Readiness indicators at CBU. However, variables are said to have a perfect relationship when the correlation coefficient is either + 1.00 or -1.00. For this study, the four sub-variables of requisite ICT skills (to use search engines in finding information on the Internet for academic purposes, use social media for academic purposes, use automated systems at the university and to effectively participate in online discussion forums on a topic of one's interest) had a significant positive relationship with e-Readiness indicators while (skills to operate a computer) had a weak negative relationship with e-Readiness indicators.

Table 22 below shows the model summary with the R squared (R^2) value. The R squared value indicates the coefficient of determination that allows that determining the proportion of variability of one variable is due to the other variable. In other words, R squared measures how well the model parameters are able to predict the model performance. This allows a direct comparison of the variance.

Table 22: Model Summary

Model	**R**	**R Square**	**Adjusted R square**	**Std. Error of the Estimate**	**Change Statistics**				
					R Square Change	F Change	df1	df2	Sig F Change
Sub Q1	$.129^a$	.017	.013	.842	.017	4.374	1	259	.037
a. Predictors: (Constant), Requisite ICT Skills to: operate a computer									
Sub Q2	$.418^a$	.175	.172	1.041	.175	54.951	1	259	.000
a. Predictors: (Constant), Requisite ICT Skills to: use search engines in finding information on the Internet									
Sub Q3	$.504^a$	.254	.251	1.056	.254	87.847	1	25	.000
a. Predictors: (Constant), Requisite ICT Skills to: use social media (e.g. Facebook and YouTube) for academic purposes.									

Sub Q4	.258[a]	.067	.063	1.195	.067	18.468	1	259	.000
a. Predictors: (Constant), Requisite ICT Skills to: use automated systems at the University (e.g. online results checking and registration)									
Sub Q5	.232[a]	.054	.050	.680	.054	14.604	1	257	.000
a. Predictors: (Constant), Requisite ICT Skills to: effectively participate in online discussion forums on topics of my interest									

Table 22 shows the predictive values of requisite ICT skills on e-Readiness indicators sub-variables. In summary, the findings shows that the R squared for all the five sub-variables of requisite to ICT skills have some impact on e-Readiness indicators at CBU. Table 22 indicates that requisite ICTs skills sub-variable to use social media (e.g. Facebook and YouTube for academic purposes) has a more statistically significant value to determine e-Readiness indicator at CBU with the higher R square value of 25.4%, while requisite ICT skills (to operate a computer) has the lowest R square value of 1.7%. In other words, in order to determine how much variation in e-Readiness indicators is due to requisite ICT skills, it was necessary to add all the individual R square values for individual or sub-variables of requisite ICT skills to find the average as a representation of an overall R square value of requisite ICT skills. Hence,

(0.017 + 0.175 + 0.254 + 0.067 + 0.054)/5 = 0.1134.

Therefore, the R square value of requisite ICT skills is 0.1134. This means that 11.34% of the variations in e-Readiness indicators at CBU can be attributed to requisite ICT skills. The analysis of variance is presented in Table 23.

Table 23: Analysis of Variance (ANOVA)

Model		**Sum of Square**	**df**	**Mean Square**	**F**	**Sig.**
Sub Q1	Regression	3.098	1	3.098	4.374	.037[b]
	Residual	183.454	259	.708		
	Total	183.552	260			
a. Dependent Variable: e-Readiness Indicator: training in ICT skills among students b. Predictors: (Constant), Requisite ICT Skills: to operate a computer						
Sub Q2	Regression	59.560	1	59.951	54.951	.000[b]
	Residual	280.724	259	1.084		
	Total	340.284	260			
a. Dependent Variable: e-Readiness Indicator: increasing the ICT infrastructure b. Predictors: (Constant), Requisite ICT Skills: to use search engines in finding information on the Internet						
Sub Q3	Regression	97.978	1	97.978	87.847	.000[b]

	Residual	287.756	258	1.115		
	Total	385.735	259			
a. Dependent Variable: e-Readiness Indicator: increasing accessibility to ICT facilities b. Predictors: (Constant), Requisite ICT Skills: to use social media (e.g. Facebook and YouTube) for academic purposes						
Sub Q4	Regression	26.379	1	26.379	18.468	$.000^b$
	Residual	369.950	259	1.428		
	Total	396.330	260			
a. Dependent Variable: e-Readiness Indicator: increasing funding for ICT development b. Predictors: (Constant), Requisite ICT Skills: to use automated systems at the university (e.g. online results checking and registration)						
Sub Q5	Regression	6.754	1	6.754	14.604	$.000^b$
	Residual	118.860	257	.462		
	125.614	258				
a. Dependent Variable: e-Readiness Indicator: increased support of ICT use by management b. Predictors: (Constant), Requisite ICT Skills: to effectively participate in online discussion forums on a topic of my interest						

Table 23 shows the registered p-values for the five sub-variables of requisite ICT skills. Each sub-variable indicates the significance requisite ICT skills have on the corresponding sub-variable of e-Readiness indicator. It is evident that all the sub-variables of the independent variable (requisite ICT skills) show p values < .05 indicating that they all have an impact on e-Readiness indicators. In other words, requisite ICT skills have significant impact on e-Readiness indicators in this study. Table 24 below shows the coefficients.

Table 24: Coefficients between Requisite ICT Skills and e-Readiness Indicators

	Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**	**Collinearity Statistics**	
		B	Std. Error	Beta			Tolerance	VIF
Sub Q1	(Constant)	2.062	.144		14.323	.000		
	Requisite ICT Skills to: operate a computer	-.165	.079	-.129	-2.091	.037	1.000	1.000
a. Dependent Variable: e-Readiness Indicators: training in ICT skills among students								

SubQ2	(Constant)	1.275	.152		8.386	.000		
	Requisite ICT Skills to: use search engines in finding information on the Internet	.497	.067	.418	7.413	.000	1.000	1.000
a. Dependent Variable: e-Readiness Indicator: increasing the ICT infrastructure								
Sub Q3	(Constant)	.822	.155		5.288	.000		
	Requisite ICT Skills to: use social media (e.g. Facebook and YouTube) for academic purposes	.558	.060	.504	9.373	.000	1.000	1.000
a. Dependent Variable: e-Readiness Indicator: increasing accessibility to ICT facilities								
Sub Q4	(Constant)	1.682	.191		8.787	.000		
	Requisite ICT Skills to: use automated systems at the University	.418	.097	.258	4.297	.000	1.000	1.000
a. Dependent Variable: e-Readiness Indicator: increasing funding for ICT development								
Sub Q5	(Constant)	1.290	.094		13.734	.000		
	Requisite ICT Skills to: effectively participate in online discussion forums on a topic of my interest	.137	.036	.232	3.821	.000	1.000	1.000
a. Dependent Variable: e-Readiness Indicator: increased support of ICT use by management								

In Table 24, it is clear that the five sub-variables of requisite ICT skills are statistically significant with all their P values less than $p<.05$. This shows that for this study, these five sub-variables of skills in ICTs have a significant impact on e-Readiness indicators and consequently on the level of e-Readiness at CBU and should be added to the model as sub-variables of requisite ICT skills.

Through multiple regressions that explored the relationships between e-Readiness indicators at CBU as the dependent variable and (accessibility to ICTs and requisite ICT skills) as independent variables, it was concluded that the relationship between accessibility to ICTs, requisite ICT skills and e-Readiness indicators was statistically significant. In other words, the results mean that the two variables have a significant impact on e-Readiness indicators at CBU. Table 25 below shows the results.

Table 25: Multiple Regression Analysis

Dependent Variable	R Square	Independent Variable: Accessibility to ICTs	Beta	t	Sig.
e-Readiness Indicators	.255	To Internet websites at CBU	.505	.000	.000
	.074	To computers with adequate software	-273	-4.56	.000
	.004	To computers with Internet connection	.060	.971	.333
	.031	To wireless Internet connection	.176	2.864	.005
	.023	To high speed and quality Internet connectivity	-.153	-2.491	.013
	.018	To fax machines	.133	2.150	.032
e-Readiness Indicators		**Independent Variable: Requisite ICT Skills**	Beta	t	Sig
	254	To use social media for academic purposes	.504	9.373	.000
	.017	To operate a computer	-.129	-2.091	.037
	.175	To use search engines in finding information in the Internet	.418	7.413	.000
	.067	To use automated systems at CBU (e.g. online results checking and e-Registration)	.258	4.297	.000
	.054	To effectively participate in online discussion forums on a topic of my interest	.232	3.821	.000

Table 25 shows the coefficients for accessibility and requisite ICT skills. In summary, the findings show that all the constructs had some impact on e-Readiness indicators. It can be concluded that all the sub-variables of accessibility statistically have some impact on e-Readiness indicators in the model for CBU. Also, the sub-variables of requisite ICT skills have some impact on e-Readiness indicators thus can be included in the proposed model on e-Readiness at CBU.

Given the various statistical approaches performed above, Table 26 shows a snapshot of the results of the study.

Table 26: Summary of Findings

Factor	Effect on e-Readiness	
Accessibility to ICTs: Sub-Variables		
To Internet websites at CBU	R^2= .255	P value .000
To computers with adequate software	R^2= .074	P value .000
To computers with Internet connection	R^2 = .004	P value .333
To wireless Internet connection	R^2= .031	P value .005
To high speed and quality Internet connectivity	R^2= .023	P value .013
To fax machines	R^2= .018	P value .032

Requisite ICT Skills: Sub-Variables		
To use social media (e.g. Facebook and YouTube) for academic purposes	R^2= .254	P value .000
To have the skills to operate a computer	R^2= .017	P value .037
To use search engines in finding information in the Internet	R^2= .175	P value .000
To use automated systems at CBU (e.g. online results checking and Registration)	R^2= .067	P value .000
To effectively participate in online discussion forums on a topic of my interest	R^2= .054	P value .000

Looking at Table 26 above, the study has proved statistically (using R squared values and P-values) that:

With the two variables that were investigated using the NRI model, the CBU context shows that both accessibility and requisite ICT skills have a significant impact on e-Readiness indicators. These were identified using the p- value (<0.05) and the contributions which are determined by the R squared value.

4.4.2 Proposed Conceptual e-Readiness Assessment Model for CBU

The assumption of the NRI model from which the research model was derived is that there are various factors which contribute to attaining a higher level of e-Readiness in a given country or institution. However, the NRI model categories these factors into three major groups: the conduciveness of the environment to support use of ICT; the readiness of key stakeholders to access ICTs and the network usage amongst these stakeholders. Based on these 3 major factors, the researcher conducted a regression analysis on the factors or variables of the modified NRI model which were measured quantitatively. The two factors measured quantitatively are: accessibility to ICTs and requisite ICT skills. Conducting a regression analysis on these two variables was necessary in order to establish the correlation and impact of the quantitatively measured variables have on e-Readiness indicators that correspond to e-Readiness at CBU. The impact of the two variables on e-Readiness indicators is shown in the Figure 8 below:

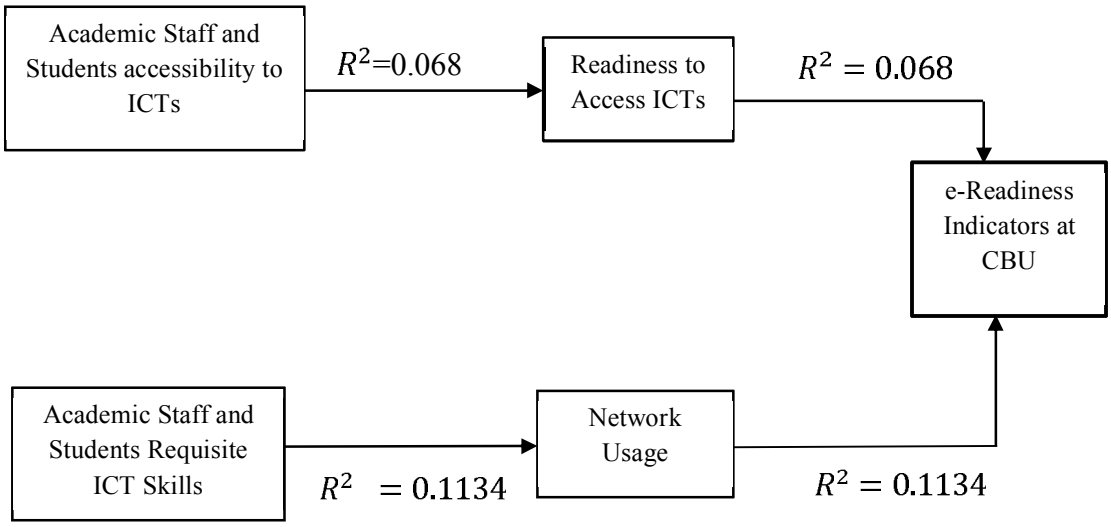


Figure 8: The Conceptual e-Resource Adoption Framework for CBU.

Figure 8 shows the adopted model for CBU. The R squared values are displayed for the two constructs that were measured quantitatively. In other words, the R squared values and statistical significance of the two variables represents the impact these variables have on e-Readiness indicators that correspond to e-Readiness at CBU. Hence, the results show that accessibility to ICT facilities predicts 6.8% of e-Readiness indicators while requisite ICT skills predict 11.34% of e-Readiness indicators. However, it is important to note that other factors which are part of the adapted NRI model were measured qualitatively. Therefore, this is a limitation to this study.

4.4.3 The Implication of the Framework on Practice of e-Readiness at CBU

According to the findings of this study, the following are the implications:

- The framework used in this study only applies to CBU and not to other universities in Zambia.

- The two variables or constructs that were measured quantitatively in the modified NRI model (accessibility to ICTs and requisite ICT skills) have some impact on e-Readiness indicators that correspond to e-Readiness at CBU. This shows that the study respondents (students, managers and academic members of staff) believe that empowering them with accessibility to

ICT facilities and the requisite ICT skills will become useful and beneficial to their effective utilization of university ICT facilities.

- The ease of use brought about by computer competences, the enabling environment to encourage improved use of ICT facilities and sensitizing the university community on how to access and use these ICTs should be put in place by CBU management. The study used and modified the NRI model to focus on the impact of different factors on e-Readiness level at CBU.

- The findings have important implications for e-Readiness assessments. In CBU, accessibility and requisite ICT skills are found to have a significant impact on e-Readiness indicators and corresponding to the level of e-Readiness. The CBU model shows the connectivity between the independent constructs and e-Readiness indicators. This study found that the NRI model is valid in the context of CBU e-Readiness assessment. CBU stakeholders and management will benefit from the knowledge of this study.

4.4.4 Recommendations for Further Research

This research recommends that further studies be done considering that the current one included only some third to fifth year undergraduate students, graduate students and academic staff and to the exclusion of the rest of the University community. Hence, there is need to carry out another research where students from other academic years and non-academic staff can be included so as to achieve statistical significance and representativeness.

Additionally, it may be argued that because of its multi-dimensional nature, e-Readiness can further be assessed by including other factors that affect CBU. For instance, e-Readiness can be assessed by adding the behavioral attributes (perception and attitude) of students and academic staff towards ICTs including the historical and cultural aspects that form the University.

Another recommendation is that there is need to carry out similar studies in other universities in the SADC region using the adopted model. This would help determine the strength and weaknesses of the model and the validation of the framework for it to qualify to become a model.

4.5 Summary

This chapter reported on the responses gained from empirical data aimed at assessing CBU e-Readiness. A model based on (Dutta & Jain, 2002; Bridge Organization, 2005) NRI model was designed. The NRI model is a composite of three components: the environment for ICTs offered by a

given country or community, the readiness of the community's key stakeholders (individuals, businesses, and governments) to use ICTs and the network usage amongst these stakeholders. Some of these independent constructs were tested to show the impact they have on e-Readiness indicators at CBU. Findings show that accessibility to ICTs and requisite ICT skills have a significant impact on e-Resources indicators and consequently on e-Readiness levels at CBU.

CHAPTER FIVE

INTERPRETATION AND DISCUSSION OF RESULTS

5.1 Introduction

This chapter presents an interpretation and discussion of the data that was presented in the previous chapter. Blaxter and Tight (1998) argue that interpretation is a process by which a researcher attaches meaning to collected data and findings and compares that meaning to other authors. This chapter therefore intends to bring the findings into the fold of the existing literature on various e-Readiness assessments. The aim of this study was to conduct an e-Readiness assessment of CBU in harnessing the opportunities offered by the e-Society and the emerging knowledge economy in advancing its core mandate of teaching and learning, research and community outreach. To achieve this aim four main objectives and research questions were formulated. This chapter provides a discussion of the findings in line with the following research questions:

- What are the available ICT hardware and software facilities at CBU?
- What are the requisite ICT infrastructures that contribute to accessibility of different ICT technology applications that correspond to e-Readiness at CBU?
- What are the requisite ICT skills that stakeholders have to use different ICT technology applications that correspond to e-Readiness at CBU?
- How does the ICT policy support the use of ICTs at CBU?
- How does the University's work environment affect effective use of ICTs at CBU?

In the preliminary stages of the chapter, some important aspects of the study such as respondents' biographical information are discussed to give a clear context of the study.

5.2 Respondents' Biographical Information

The first part of the questionnaire and the interview guide used in this study opened with respondents' biographical information. According to Table 14, the patterns of responses indicate that this study had a fairly balanced representation of gender from both males and females. However, it must be pointed out that the majority of respondents (students) were from the School of Built Environment being the biggest school at the University. It can be observed that apart from the targeted third to fourth year students, Table 14 show that the study also collected research data from graduate students who were entered as second year students. This is because Master's programmes at CBU are conducted as two-year programmes.

Additionally, Table 14 shows that most respondents were below 25 years indicating that the younger community of CBU participated in the study. Therefore, there may be need to carry out another e-Readiness assessment that would include the older community of CBU as well as first and second year students who were not part of the first study in order to have a more holistic view of the level of e-Readiness at the University.

Table 14 also show that the majority of academic staff respondents were male. Further, the majority were from the School of Mines and Minerals. However, compared to students the majority of academic staff was aged between 26 - 35 years.

Further, it can be pointed out that based on what was coming out of the questionnaire and general interactions with students and academic staff in the university corridors and offices, the researcher observed and noted that the majority of students showed eagerness to use the university ICT infrastructure for their daily academic activities. This may suggest that there is need to continue promoting the adoption and use of ICTs among the university's key stakeholder (students, lecturers, managers, CBU community) in all business processes in order to realise positive impacts of ICTs and achieve competitive edge in providing tertiary education. Dutta & Jain (2004) posit that an economy, institution or organisation can only achieve ICT impacts if ICTs are widely used by all key actors (individuals, businesses and governments). They further argue that the process of leveraging ICTs is a society-wide effort where those actors demonstrating better preparedness and greater interest are likely to use ICTs more and more effectively thus contributing to a greater impact on competiveness and development. In a study by Kashorda et al. (2007), it was observed that if a university is to achieve e-Readiness, it must develop and train its key workforce to adopt ICTs into classrooms and learning settings.

5.3 Research Questions

a) What are the available ICT hardware and software facilities at CBU?

The aim of this question was to identify the available ICT facilities at CBU. It must be pointed out that identifying the available hardware and software ICT facilities is necessary in order to establish the preparedness of the university stakeholders to access and use ICTs to achieve a greater impact on its competitiveness and development (Dutta & Jain, 2004). According to the data gathered during the research, CBU performed generally well in infrastructural availability in an effort to ensure that it promotes and develops its ICT initiatives. But there is need to conduct awareness among its stakeholders on how to access and effectively use the university ICT facilities. Similarly, studies done by Trepels (2012) and KENET (2007) on the assessment of integrating ICTs in higher education in

Africa found out that that there is inadequate awareness on the benefits of integrating ICTs in the administration of the delivery chain in the education sector.

b) What are the requisite ICT infrastructures that contribute to accessibility of different ICT technology applications that correspond to e-Readiness at CBU?

There are a number of scholars and researchers who have done studies to show that accessing ICTs is one of the critical factors in reducing or lowering the digital divide (e-Readiness) in an economy or organisation (Epstein et al., 2011). For instance, Dutta and Jain (2004) and Epstein et al. (2011) argued that issues of accessibility to ICT facilities especially in developing countries are important given the need to reduce the digital divide. Hence, the importance of having access to ICTs and how this contributes to improved e-Readiness indicators and corresponding to the level of e-Readiness in an economy or organization cannot be overemphasized.

According to Table 15, the study established that majority182 (70.0%) of the students agreed to having access to: computers with adequate software, Internet websites on campus and computers with Internet connectivity. However, 130 (50.0%) of students disagreed to accessing high speed and quality Internet connectivity and fax machines. The low speed and low quality Internet connectivity was attributed to the fact that CBU has had a low Internet bandwidth for some time. The study done by Adams (2005) argued that for HEIs to encourage universal accessibility and effective use of ICTs, it is critical for them to invest in acquiring the necessary bandwidth.

Additionally, Table 15 shows that 15 (60.0%) of academic staff agreed to having access to networked computers on campus. However, 11 (45.0%) of academic staff disagreed to having access to: wireless Internet connection; access to high speed and quality Internet connectivity and access to different automated systems (OPAC, Moodle) on campus. With the improved bandwidth at CBU it is hoped that this will help in mitigating some of the challenges that students and staff go through in accessing various ICT facilities around CBU. In their studies, Mutula and Van Brakel (2010) and Kettani (2013) argued that the digital divide, a disparity in access to ICTs between countries and with communities is caused by a number of factors and among them inadequate infrastructure, high cost of access to ICTs and inadequate Internet bandwidth.

Further analyses were done to establish the relationship and impact of accessibility (independent variable) on the dependent variable (e-Readiness indicators). The study revealed that all the six sub-variables of accessibility were correlated with e-Readiness indicators and corresponding with e-Readiness at CBU (see Table 17). In order to determine how much variation in e-Readiness indicators

is due to accessibility to ICTs at CBU, it was necessary to compute individual or sub-variable R squared values for accessibility and then come up with the average as a representation of the overall R squared value for accessibility. Hence, Table 18 revealed that for this study, the R squared value for the six sub-variables of accessibility was:

(0.074 + 0.255 + 0.004 + 0.031 + 0.023 + 0.018)/6 = 0.0675.

The averaged R squared value or impact of accessibility to ICTs on e-Readiness indicators at CBU was 0.0675. This means that 6.75% of the variations in e-Readiness indicators can be attributed to accessibility to ICT facilities (see Table 18). We cannot reject the fact that accessibility to ICTs has some impact on e-Readiness indicators at CBU.

Additionally, it must be pointed out that this study finding is consistent with Kashorda et al. (2007) and Olatokun and Opesade (2008) studies which argued that accessibility to ICTs facilities positively impacts on e-Readiness indicators and consequently on e-Readiness levels of an economy or institution.

c) What are the requisite ICT skills that stakeholders have to use different ICT technology applications that correspond to e-Readiness at CBU?

The recognition of the link that exists between having requisite ICT skills and achieving a higher level of e-Readiness indicators has prompted a numerous studies on ICT use. For instance, scholars (Ahmed, 2006; Mutula, 2010; Mutula & Van Brakel, 2006; Kashorda et al., 2007) have conducted studies to understand how requisite ICT skills promote higher level of e-Readiness.

In this study, the majority (over 70.0%) of students agreed to having the requisite ICT Skills to operate a computer, to use search engines in finding information for research on the Internet, use automated systems and to effectively participate in online discussion forums on topics of their academic interest (see Table 16). This may suggest that the majority of students have high ICT skills or competences to utilise ICT facilities for their daily academic activities. This is also evident as only 11.9% of the students disagreed to using social media for academic purposes indicating that the use of ICT facilities in general and social media in particular for learning is a growing and pervasive practice amongst students. Similarly, Mutula (2010) argued that improving personal competences among key stakeholders to effectively use ICTs can positively affect their perception of the relevance and applications of ICTs in various activities.

On the other hand, Table 16 showed that all academic staff agreed having the requisite ICT skills to use search engines in finding academic information on the Internet and use e-mails in communicating

academic information amongst staff. However, the majority (over 75.0%) of academic staff disagreed to: using Moodle to give notes and receive assignments from students, participating in online discussion groups on topics of their interest and using CBU video conference system (XVD) for knowledge transfer with other universities. One interviewee argued that CBU must sensitize and make aware its entire key stakeholders on the best ways to utilise the university ICT facilities. In their studies, Ahmed, (2006) and Kashorda et al. (2007) claimed that academic policy makers lack general understanding of how to reposition or align teaching, learning and research with the global domain. They further argued that there is need for more elaborate training programmes for students, faculty members and the whole university community on ICT literacy to promote the ability to access and effectively use ICTs. This it is hoped would be an additional effort to empower CBU members of staff on the different ICT skills in order for them to use various ICT productivity packages in most business activities.

Additionally, further analysis was conducted to establish the impact requisite ICT skills (independent variable) have on e-Readiness indicators that correspond to the level of e-Readiness at CBU (dependent variable). The study revealed that all the five sub-variables of requisite ICT skills were correlated with e-Readiness indicators (see Table 21). In order to determine how much variation in e-Readiness indicators is due requisite ICT skills, it was necessary to compute R square values for each sub-variable of requisite ICT skills and then come up with the average as a representation of the overall R square value for requisite ICT skills. Hence, Table 22 revealed that for this study, the R squared value for the five sub-variables of requisite ICT skills was:

(0.017 + 0.175 + 0.254 + 0.067 + 0.054)/5 = 0.1134.

The R square value of requisite ICT skills was 0.1134. This means that 11.34% of the variations in e-Readiness indicators at CBU can be attributed to requisite ICT skills.

Additionally, the findings of this study were consistent with the results from the studies done by Addom (2004); Olatokun & Opesade (2008); Eweni et al. (2013) and Ranjbarzadeh (2013), who found that having the requisite ICT skills has a significant effect on e-Readiness indicators. These studies also noted that having the requisite ICT skills promotes effective use of new technologies. However, the study findings are in contrast to a study done by Keoduangsine and Robert (2009) who did not add requisite ICT skills as a critical factor in measuring levels of e-Readiness. This study was carried out in the west but those carried out in Africa found the opposite.

d) How does the ICT Policy support use of ICTs at CBU?

It is critical for a university to have a systematic and pragmatic ICT policy as a deliberate measure to ensure effective deployment of ICTs in an institution's core business activities. Additionally, such a policy may provide a coherent picture of the university responsibilities and user obligations for the maintenance, security, legal and appropriate use of the university networks in line with the university's educational missions (Mitrano, 2004). Hence, the fourth research question sought respondents to explain whether CBU had an ICT policy to support the use of its ICT facilities.

From a total of 5 respondents interviewed, 4 pointed out that CBU did not have an ICT policy while 1 was not sure on issues related to ICT policy. However, it was explained that CBU has a user policy that is being used to regulate the use of ICT facilities. There is need for CBU to expedite the process of developing a comprehensive ICT policy that will cover all aspects of ICTs with regard to accessibility and use in order to support the development of various ICT initiatives that enhance the institution's level of e-Readiness.

A number of studies by Addom (2004), Minocha (2009) and Afolabi and Abidoye (2011) have argued that lack of systematic ICT polices in most universities in developing countries impedes the deployment of ICTs by these institutions. They further argue that for the education sector ICT policies provide a sense of focus and direction and spell out clearly how improving the ICT capacity can help to address issues of access, equity and quality at all levels. Therefore, the need for CBU to develop a robust and systematic ICT policy to provide guidelines on the best ways to integrate ICTs in the university's core business activities cannot be overemphasized.

e) How does the university's work environment affect effective use of ICTs at CBU?

The aim of this question was to assess how the University's work environments affect effective use of ICTs. It can be argued that each and every institution or organisation develops unique values and behaviour; written and unwritten rules that overtime are considered valid and constitute the norms determining how work is performed in a particular institution. These unique traits form the basic pillars on which to create an institution unique work culture or environment. Therefore, an institution's work culture is critical in determining how employees would perceive and use ICTs in its core business activities.

All the members of staff interviewed pointed out that the current working environment is one of the major challenges the university is facing as it embarks on promoting integration and use of ICT. One interviewee claimed that there is need to educate the university community on how best to utilise

ICTs by making them aware of the potential benefits of effectively using ICTs. He explained that usually employees Facebook and play games on computers during working hours. Other employees watch movies and visit certain sites, which are not in the interest of learning. This defeats the overall purpose of leveraging the potential of ICTs to support the core business of the university. Tusubira and Mulira (2004); Woodrow (1992) and Dutta and Jain (2004) argue that lack of awareness goes along with attitude. However positive attitude towards ICTs is widely recognized as an essential condition for their effective implementation

5.4 Summary

This chapter presented the interpretation of the results and discussed the findings of the study. The findings show that accessibility to ICTs and requisite ICT skills contribute or impact on e-Readiness indicators and correspondingly on the level of e-Readiness at CBU. Additionally, this study points out that other factors (conduciveness of environment for ICT use, work culture and ICT policies) are critical in measuring e-Readiness on an institution. Most importantly, the study findings are consistent with other findings from similar studies in different HEIs.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents summary of findings and conclusions of the study. The chapter restates the primary objective of the research, which was to conduct an e-Readiness assessment of the Copperbelt University (CBU) with the aim of finding remedial solutions. The NRI model was employed as a theoretical lens. The study objectives guided the presentation of the summary of findings, conclusions and recommendations. The chapter is presented in four parts. The first section presents a summary of the findings based on the research objectives, the second part presents the conclusions, followed by the recommendations, and the last part presents suggestions for future research.

6.2 Summary of Findings

This section presents the summary of findings with respect to the objectives of the study.

a) The first objective was to identify the available ICT hardware and software facilities at CBU. Findings show that CBU has acquired a number of ICT hardware and software facilities. It is clear that since 2009, CBU has invested in developing the university ICT infrastructure to enhance teaching and learning; research and community outreach and eventually become a competitive force in providing quality education.

(b) The second objective was to identify the requisite ICT infrastructure that contributes to accessibility of different ICTs technology applications that correspond to e-Readiness at CBU. The findings show that the majority (over 70%) of the respondents agreed that accessibility to ICTs has a significant impact on e-Readiness indicators and corresponding to the level of e-Readiness. It scored an R squared value of 0.0675 towards e-Readiness indicators and corresponding to e-Readiness at CBU. The R squared value of 0.0675 indicates a predictive value of 6.75%. Even though the percentage is small, it shows that respondents agree that increased accessibility to ICTs impacts positively on the level of e-Readiness of the university. This is consistent with the studies done by Kashorda et al. (2007) and Olatokun and Opesade (2008) who postulated that increased accessibility to ICTs constituted one of the strongest determinants of e-Readiness indicators.

c) The third objective was to identify the requisite ICT skills stakeholders have to use different ICT technologies applications that correspond to e-Readiness at CBU. The study findings reveal that the majority (73.0%) of the respondents agreed that having the requisite skills to use ICT facilities has a

significant impact on e-Readiness. It scored an R squared value of 0.1134 indicating a predictive value of 11.34%. This shows that respondents agree that having the requisite ICT skills impact positively on the level of e-Readiness of the university. This is consistent with studies done by Addom (2004); Olatokun and Opesade (2008); Eweni et al. (2013) and Ranjbarzade, (2013) who found that having the requisite ICT skills has a significant effect on e-Readiness levels. Additionally, it was noted that the higher the capabilities to effectively use ICTs, the more likely to leverage ICTs. For instance, the study showed that the majority (over 85.0%) of the respondents with higher requisite ICT skills to use ICTs also utilized social media for academic purposes. However, it was also noted that there is need for CBU to create more deliberate measures through workshops to sensitize the university stakeholders (students, academic members, managers and general staff) on how they can effectively utilize ICT facilities especially social media for academic purposes**.**

d) The fourth objective was to determine whether the ICT policy at CBU supports the use of ICTs. The findings show that the majority (80.0%) of interviewees indicated that CBU did not have an ICT policy but has a user policy that regulates the use of ICT facilities. One of the interviewees mentioned that DICT is in the process of developing a comprehensive ICT policy that will cover all aspects of ICTs with regard to access and use in order to support the various ICT initiatives that will enhance the institution's e-Readiness.

e) The fifth objective was to find out how the University's work environments affect effective use of ICTs. The findings show that all members of staff interviewed pointed out that the current working environment is one of the major challenges the university is facing as it embarks on promoting integration and use of ICTs in its core business. One of the interviewees mentioned that it was a common practice for employees to misuse ICT facilities at CBU. It was also mentioned that the majority of students are eager to use ICTs in doing their academic activities. However, a number of academic staffs do not show the more desire and willingness to learn how to use ICTs as teaching aids or facilities to optimize core business activities. Therefore, it was observed that there is need to educate the university community on how best to utilise ICTs by making them aware of the potential benefits of effectively using ICTs.

This study was on e-Readiness assessment of the Copperbelt University based on the NRI model. The modified model comprised of three composite constructs namely: network usage, environment readiness and readiness to access ICTs as key aspects in measuring e-Readiness indicators and corresponding on the level of e-Readiness. Findings show that all constructs that were quantitatively measured have significant impact on e-Readiness indicators that correspond to the level of e-

Readiness. The predictive power of independent constructs on the model was 18.14% variance on e-Readiness indicators that correspond to on the level of e-Readiness. This, however, is low as compared to the NRI variance of 70%.

6.3 Conclusions

From the information gathered, it is evidently clear that the study succeeded in answering its research questions. Firstly, it may be argued that CBU has acquired a number of ICT hardware and software facilities since 2009, in effort to ensure that it provides enhanced teaching and learning, research and community outreach and eventually become a competitive force in providing quality education.

Additionally, the findings show that the majority (over 70%) of the respondents agreed that accessibility to ICTs has a significant impact on e-Readiness indicators and corresponding to the level of e-Readiness at CBU. However, there were over 20% of students and academic staff without requisite ICT skills to use different ICT facilities that correspond to e-Readiness at CBU.

It must also be pointed out that the findings revealed that the majority (80.0%) of interviewees indicated that CBU did not have an ICT policy but has a user policy that regulates the use of ICT facilities. It was further revealed that the lack of ICT policy at CBU has resulted in difficulties in creating an enabling environment to implementing CBU's ICT initiatives. For instance, findings show that all the members of staff interviewed pointed out that the current working environment is one of the major challenges the university is facing as it embarks on promoting integration and use of ICTs in its core business.

From the above findings, the researcher can say that accessibility to ICTs and requisite ICT skills had a significant impact on e-Readiness indicators at CBU. However, it must be pointed out that other factors from the modified NRI model were measured using qualitative approach. These factors include: ICT infrastructure development, institutional ICT policy and conduciveness of environment for ICT use as critical factors to holistically measure e-Readiness of an institution. The use of NRI model as a guiding tool has been significant. The study has shed some light on levels of the factors that contribute to e-Readiness indicators at CBU. The study confirms the efficiency of the NRI model which can be used successfully in the Zambian environment but with changed variables to represent the contextual characteristics of the study area.

6.4 Recommendations of the Study

The researcher would like to make the following recommendations that could help CBU management to improve accessibility and use of ICT facilities at and consequently the level of e-Readiness.

a) Based on the finding that accessibility to ICTs has a significant impact on e-Readiness indicators, the study recommends that CBU management puts up deliberate measures to avail University ICTs to all its key stakeholders. This will create an enabling environment to leverage all university processes. As stated earlier, this finding is in line with the findings of many researchers including Kashorda et al. (2007) and Olatokun and Opesade (2008) who postulated that increased accessibility to ICTs constituted one of the strongest determinants of e-Readiness indicators that correspond to e-Readiness.

b) There is need for CBU to sensitize the university community (students, lecturers, managers and general staff) on the benefits and potential opportunities that come with ICTs. This may motivate and encourage CBU stakeholders to adopt ICTs in all university business processes. This finding is consistent with studies done by Addom (2004); Olatokun & Opesade (2008); Eweni et al. (2013) and Ranjbarzadeh (2013), who found that having the requisite ICT skills has a significant effect on e-Readiness indicators. These studies also noted that having the requisite ICT skills promotes effective use of new technologies.

c) It is equally important that CBU may consider installing the wireless service on campus and in the boarding houses that the university rents for off-campus students so that they have access to and be able to use the university ICT facilities. The ICT impact can arise only if ICT are widely accessed and used by key stakeholders.

d) Recall that other factors from the modified NRI model were measured qualitatively in order to generate a holistic assessment of the actual e-Readiness levels at CBU. This therefore entails that there must also be a coordinated approach in the adoption and implementation of initiatives targeted at the deployment of ICTs within the management system and business processes at CBU.

e) There must be adequate awareness programmes on the benefits of integrating ICTs amongst the university key stakeholders by management. For instance, Moodle can be effectively used by lecturers to receive and give notes and assignments to students. There are also other packages that CBU staff can use in doing their daily business activities. But this can only be realized if adequate awareness is done by CBU management.

f). There is need for CBU to come up with a comprehensive ICT policy that would provide consistent guideline on the integration of ICTs in the university business processes. This is critical because achieving a coherent campus wide strategy is one of the difficult tasks when integrating ICTs in an organization's business processes.

6.5 Recommendations for Further Research

It can be argued that part of the strength of any study lies in the recognition of its limitations. These limitations form the direction for future research and point to theoretical implications. For this study, the researcher recommends further study be done considering that the current study included only third to fifth year undergraduate students, graduate students and academic members of staff and excluding the rest of the school community. Hence, the other study must include students from other academic years and all university staff that a holistic picture to the level of e-Readiness at CBU can be achieved. The model explains only clearly 9.045% of the variance of the level of e-Readiness due to accessibility to ICTs and requisite ICT skills. A big percentage of 91.0% of variance is not clearly explained.

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APPENDICES

Appendix A: Questionnaire for Students

THE UNIVERSITY OF BOTSWANA

SCHOOL OF GRADUATE STUDIES

Department of Library and Information Studies

Questionnaire – Student

Dear Respondent

Introduction

My name is Matuka Chipembele a student at the University of Botswana doing a Master's Degree in Library and Information Studies. I am carrying out an academic research entitled ***Assessment of e-Readiness of Zambia's Copperbelt University.***

This research intends to assess Copperbelt University readiness to integrate ICTs in its business processes. Hence, you are kindly requested to complete this questionnaire as part of the study.

The questionnaire assesses ***your accessibility to ICTs and the requisite ICT skills for using ICTs for learning.*** As a respondent, your participation in this research is voluntary and you have the right to terminate participation at any time. In addition, your answers will be treated with strict confidentiality and all responses will be used sorely for academic purposes.

Finally, your participation in this research is highly valued and appreciated.

Thank you

Matuka

Please answer the following questions by ticking (√) or providing an explanation in the space provided.

SECTION A: Biographical Information

This section aims to obtain background or biographical information

Gender		School
a)	b)	a) Business [ ] b) Built Environment [ ] c) Engineering [ ] d) Graduate Studies [ ] e) Mathematics and natural Sciences [ ] f) Medicine [ ] g) Mines and Minerals [ ] h) Natural Resources [ ]
Male	Female	

1: What academic programme (Degree) are you currently pursuing? (e.g. Mining Engineering)

……

2: What year are you in? **(e.g. 1)**

……

3: What is your current age?

	Below 25	26 – 35	35 – 45	46 and above
Select only **one** option				

SECTION B: ICT Infrastructure and Access

This section of the questionnaire explores your level of access to different ICT Infrastructure at the University.

6: By placing a tick (√) where appropriate, indicate the type of ICT facilities you can access at the University?

Please indicate your **level of agreement on access to ICTs**	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Computer with adequate software (e.g. Microsoft word, Adobe Acrobat)					
Internet Web sites at the University					
Computer with wired Internet connection at the University					
Wireless Internet connection (e.g. Eduroam)					
High speed and quality Internet connectivity					
Fax Machines					

SECTION C: Requisite ICT Skills

This section explores your skills and use of ICTs.

7: By placing a tick **(√)** where appropriate, indicate your skills in the use of ICT facilities at the University?

Please indicate your **skills in the use of ICTs**	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
I have the skills to operate a computer (e.g. saving files, creating folders)					
I have the skills to use search engines in finding information on the Internet (for research, academic purposes or personal interest).					
I use social media (e.g. Facebook, and YouTube) for academic purposes.					
I am able to use automated systems at the University (e.g. Online results					

checking and e-Registration)					
I am able to effectively participate in online discussions forums on a topic of my interest					
Other (Please Specify) ……					

8: Have you ever undergone any formal or informal training to improve your ICTs skills?

	Yes	No
Please select only **one** option		

9: If **Yes to Q 8**, please tick **(√)** the appropriate option underneath.

How you acquired your ICTs skills	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
I picked the skill through a workshop organized by my department /school					
I got trained in one of the courses offered in the academic curriculum at the University					
I got trained independently by registering in a computer school					
I picked up the skill by continuous practice					

10: What are your **major challenges** of using ICT facilities at the University? Please tick **(√)** where appropriate.

Challenges in using ICTs at CBU	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Inadequate computer knowledge among students because of lack of training in ICT skills					

Inadequate ICT infrastructure at the University					
Inadequate accessibility to ICT facilities					
Gender discrimination in the use of ICT facilities at the University					
Lack of human resource with adequate ICT skills					
Lack of Internet or slow connectivity					
Other (Please Specify) …….....					

11: In your opinion, what level of importance do ICT developments listed below have in promoting e-Readiness of the University? Please tick **(√)** where appropriate.

Level of importance to improving e-Readiness indicators at CBU	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Training in ICT skills among students					
Increasing the ICT infrastructure					
Increasing accessibility to ICT facilities					
Increasing Funding for ICT development					
Improved Internet connectivity					
Increased support of ICT use by management					
Other (Please Specify) …….....					

Thank you for your time, your participation is greatly appreciated.

Appendix B: Questionnaire for Academic Staff

THE UNIVERSITY OF BOTSWANA

SCHOOL OF GRADUATE STUDIES

Department of Library and Information Studies

Questionnaire

Academic Staff

Dear Respondent

Introduction

My name is Matuka Chipembele a student at the University of Botswana doing a Master's Degree in Library and Information Studies. I am carrying out an academic research entitled ***Assessment of e-Readiness of Zambia's Copperbelt University.***

This research intends to assess Copperbelt University's readiness to integrate ICTs in its business processes. Hence, you are kindly requested to complete this questionnaire as part of the study.

The questionnaire assesses ***your accessibility to ICTs and the requisite ICT skills for using ICTs for teaching and research.*** As a respondent, your participation in this research is voluntary and you have the right to terminate participation at any time. In addition, your answers will be treated with strict confidentiality and all responses will be used sorely for academic purposes.

Finally, your participation in this research is highly valued and appreciated.

Thank you

Matuka

Please answer the following questions by ticking (√) or providing an explanation in the space provided.

SECTION A: Biographical Information

This section aims to obtain background or biographical information.

Gender		**Category**
a)	b)	a) Professor [ ] b) Associate Professor [ ] c) Senior Lecturer [ ] d) Lecturer III [ ] e) Lecturer II [ ] f) Lecturer I [ ] g) Other (Please Specify) ……
Male	Female	

1: What is the name of your School? ……

2: What is the name of your Department? .....

3: What is your current age?

	Below 25	26 – 35	35 – 45	46 and above
Select only **one** option				

SECTION B: ICT Infrastructure and Access

This section explores your level of access to different ICT Infrastructure at the University.

4: By placing a tick **(√)** where appropriate, indicate the type of ICT resources you can access at the University?

Please Indicate your level of agreement on the accessibility	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
I have access to networked computers at University (e.g. a computer connected to the University Internet Network)					
I have access to wireless Internet connection (e.g. Eduroam)					
I have access to high speed and quality Internet connectivity					
I have access to different automated systems at the University (e.g. Remote access to Library Open Access Catalogue (OPAC), Moodle, Dspace).					

SECTION C: Requisite ICT Skills

This section explores your skills and use of ICTs.

5: By placing a tick **(√)** where appropriate, indicate your skills in the use of ICT facilities at the University?

Please indicate your skills in the use of ICTs	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
I use search engines to find information on the Internet (for research or personal interest).					
I use e-mail for communication (Academic/personal information).					
I use Moodle to give notes to and receive academic assignments from					

my students.					
I effectively participate in online discussions forums on a topic of my interest.					
I use the University video conferencing system (XVD) to enable knowledge transfer with other Universities (e.g. University of Zambia)					
Other (Please Specify) ……					

6: Have you ever undergone any formal or informal training to improve your ICT skills?

	Yes	No
Please select only **one** option		

7: If **Yes to Q 6,** please tick **(√)** the appropriate option underneath.

How you acquired your ICT skills	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
I picked the skill through training/workshop organized by my Department /School					
I got trained in one of the courses offered in the academic curriculum at the University					
I picked up the skill by continual practice					
I got trained independently by registering in a computer school					

8: What are your major challenges of using ICT facilities at the University? Please tick **(√)** where appropriate.

Challenges in using ICT at CBU	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Inadequate computer knowledge among staff because of lack of training in ICT skills					
Inadequate ICT infrastructure at the University					
Inadequate accessibility to ICT facilities					
Gender discrimination in the use of ICT facilities at the University					
Lack of human resource with adequate ICT skills					
Lack of Internet or slow connectivity					
Other (Please Specify) ……					

9: In your opinion, what level of importance do the ICT developments listed below have in promoting e-Readiness of the University? Please tick **(√)** where appropriate.

Level of Importance to improving e-Readiness indicators at CBU	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Training in ICT skills among students					
Increasing the ICT Infrastructure					
Increasing Funding for ICT development					
Improved Internet connectivity					
Increased support of ICT use by management					
Other (Please Specify) ……					

Thank you for your time, your participation is greatly appreciated.

Appendix C: Interview Guide Template

UNIVERSITY OF BOTSWANA

SCHOOL OF GRADUATE STUDIES

Department of Library and Information Studies

Assessment of e-Readiness of Zambia's Copperbelt University

INTERVIEW GUIDE

Name of Respondent:

Department:

Designation:

Number of years in the current position:

The objective of the interview is to assess the policies, ICT leadership and the work culture at the Copperbelt University to support e-Readiness

1. Are you aware that Copperbelt University has developed a number of ICT initiatives to promote its e-Readiness? (Interviewer briefly explains concept in layman's terms and provides examples of ICT Initiatives)
2. Are there any policies encouraging e-Readiness at the University? (please explain)
3. What is the awareness level of the identified policies among academic members of staff/ students at the University?
4. Do you think the identified policies support the use of ICT in learning, teaching and conducting research at the University? (Please explain)
5. How well are academic members of staff and students supported in the use of ICT?
6. How does the University's work environment affect effective use of ICTs?
7. What are your experiences with the attitude of academic staff and students towards the use of ICTs in the University?
8. What do you think should be done to improve the use of ICT facilities at the University?

END OF INTERVIEW

Appendix D: Communalities

	Initial	Extraction
Accessibility: Computers with adequate software	1.000	.804
Accessibility: Internet Web sites at Campus	1.000	.750
Accessibility: Computers with Internet connection	1.000	.673
Accessibility: Wireless Internet connection	1.000	.694
Accessibility: High speed and quality Internet connectivity	1.000	.543
Accessibility: Fax machines	1.000	.729
Accessibility: E-mails	1.000	.672
Skills in ICT: I have the skills to operate a computer	1.000	.681
Skills in ICT: I have the skills to use search engines in finding information on the Internet	1.000	.438
Skills in ICT: I use social media (e.g facebook & Youtube) for academic purposes	1.000	.735
Skills in ICT: I am able to use automated systems at the University (e.g Online results checking and registration)	1.000	.643
Skills in ICT: I am able to effectively participate in online dicussions forums on a topic of my interest	1.000	.798

Appendix E

Consent Letter

Dear Respondent,

I am a student at University of Botswana and I am pursing a Master's Degree in Library and Information Studies. As part of the requirements for the completion of the programme, I am required to undertake a research project whose title is: *Assessment of e-Readiness of Zambia's Copperbelt University.*

I request you to participate in the research by accepting to fill in this short questionnaire. Place a tick (√) in the selected box.

The information collected will be used solely for academic purposes. There are no risks involved in participating in the research and your confidentiality will be maintained. The results collected can be used to bring about improvements in the accessibility and usage of ICTs at CBU.

AUTHORIZATION: I have read the above and I understand the nature of this study. I understand that by agreeing to participate in this study, I have not waived any legal or human right and I may contact the researcher (Matuka Chipembele, Cell: 0977 821481 or Email: matmwila@gmail.com) at any time. I agree to participate in this study. I understand that I may refuse to participate or I may withdraw from the study at any time without prejudice. I also grant permission to the researcher to publish the data from this study provided my identity is anonymous.

Participant Signature Date

Researcher Signature Date

Appendix F: Research Permit Letter

THE COPPERBELT UNIVERSITY
OFFICE OF THE VICE CHANCELLOR
P.O. Box 21692, Jambo Drive, Riverside
KITWE, ZAMBIA

Your Reference:

Our Reference:

Tel: 260-02-220797
Fax: 260-22-2469/230590
E-Mail: staff.development@cbu.ac.zm
Website: www.cbu.edu.zm

01st January 2014

Mr Matuka Chipembele
Private Bag 00706
Gaborone
Botswana

Dear Mr. Chipembele

RE: PERMISSION TO CONDUCT RESEARCH – MR. M. CHIPEMBERE

With reference to your request to conduct an academic research in partial fulfillment of your Master's Degree at University of Botswana, I would like to let you know that permission has been granted for you to collect data at the University.

Yours sincerely

Dr. John M. Kangwa.
Staff Development Officer

Cc: Deputy Vice Chancellor
Registrar
Librarian