ASSESSING THE PROSPECTS OF DIGITISATION AT THE UNIVERSITY OF GHANA LIBRARY SYSTEM (UGLS)

Mini-dissertation by

KWESI BABIPINA SEWE

(04810602)

Submitted in partial fulfilment of the requirements for the degree of

MASTER OF INFORMATION TECHNOLOGY

in the

FACULTY OF ENGINEERING, THE BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY

UNIVERSITY OF PRETORIA

Supervisor: Prof. Peter G. Underwood

October, 2016

Declaration

I declare that "*Assessing the prospects of digitisation at the University of Ghana Library System (UGLS)"* is my own work and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references.

Signed: 

Kwesi Babipina Sewe

Date: October, 2016

Acronyms

AHDS: Arts and Humanities Data Service

ARL: Association of Research Libraries

CHS: College of Health Sciences

DAMS: Digital Assets Management System

DATAD: Database of African Theses and Dissertations

DCC: Digital Curation Center.

DISA: Digital Imaging Project of South Africa

DPE: Digital Preservation Europe

EU: European Commission

GBS: Google Book Search

HEDS: Higher Education Digitisation Service

HEI: Higher Education Institution

ICA: International Council on Archives

IFLA: International Federation of Library Associations and Institutions

IMLS: Institute of Museum and Library Services

IR: Institutional Repository

IT: Information Technology

ICT: Information and Communication Technology

JISC: Joint Information Systems Committee

KIT: Royal Tropical Institute

LOCKSS: Lots of Copies Keeps Stuff Safe

NDIIPP: National Digital Information Infrastructure Preservation Program

NRF: National Research Foundation

NSF: National Science Foundation

OAIS: Open Archival Information System

OCA: Open Content Alliance

OCLC: Online Computer Library Center

OSUL: Oregon State University Libraries

OSS-DL: Open-Source Digital Library Software

PAC: Preservation and Conservation Committee

PDF: Portable Document Format

PLANETS: Preservation and Long-term Access through Networked Services

RDN: Resource Discovery Network

RLG: Research Libraries Group

SADA: South African Data Archive

SCAPE: Scalable Preservation Environments

TASI: Technical Advisory Service for Images

TIFF: Tagged Image File Format

TRAC: Trustworthy Repositories Audit and Certification

UG: University of Ghana

UGLS: University of Ghana Library System

UNESCO: United Nations Educational, Scientific and Cultural Organization

UNLV: University of Nevada Las Vegas

US: United States

Dedication

I dedicate this work to the Almighty God who has been the source of my strength and inspiration throughout my study.

Acknowledgment

Above all, my endless thanks are to God Almighty whose abundant mercy and favour has led me to face difficult situations and exhausting experiences with courage. This dissertation is made possible with the help and support of various individuals and institutions. I would wish to express my profound gratitude to everyone through whose help and support made this dissertation possible: this includes the Carnegie Corporation of New York, University of Pretoria (Department of Information Science-MIT-Stream-B), lecturers, MIT course mates, University of Ghana Library System, Balme Library colleagues and management, parents, siblings, family members and friends.

First and foremost, I would like to give special thanks to the Carnegie Corporation of New York and the University of Pretoria (Department of Information Science –MIT-Stream-B) without whom; this study wouldn't have been possible. Also, I would like to also express my deepest gratitude to my indefatigable research supervisor Prof. Peter G. Underwood, for his immense guidance and support throughout the study. His invaluable contributions, advice, suggestions, corrections and constant supervision has kept me on track and made the completion of this work possible.

I would like to show my deepest appreciation to my father and mother Mr. and Mrs. Goraseh to whom I am eternally indebted. Thank you, Mum and Dad, for supporting me in various ways and for the unflinching love and care I got from you two throughout my life. I also sincerely thank and appreciate my brothers and sisters, Achana, Eric, Rose, Linda and Francis Alu for their support throughout the study.

Special thanks also go to all my colleagues at the Balme Library, especially to Mr. R. O. Boateng and Mr. D. A. Afrane for their unwavering support and words of encouragement throughout the study. More so, I would like to gratefully and sincerely express specific thanks to Mr. M. Bediako for all his selfless support and encouragement in making me realise this dream.

I would also want to express, my sincere gratitude to the management of the University of Ghana, and specifically, the University of Ghana Library System for the permission given me to carry out this study. Thanks to all those whose names I could not mention in this acknowledgement who has contributed in one way or another to this study. I would like to say this dissertation would not have been possible without all of you. God richly bless you all. Glory be to God for His unfailing love and care.

Abstract

The basic aim of this mini-dissertation was to explore the prospects of digitisation at the University of Ghana Library System (UGLS). The research followed a qualitative approach and a case study research design was adopted. A thorough literature study was conducted. The primary purpose of the literature was to inform the research on the questions and objectives raised on the aspects of digitisation to understand the dynamics and complexity of digitisation. Six staff from the UGLS digitisation programme were purposively sampled for in-depth interviews for their direct involvement in the UGLS digitisation programme. Semi-structured interviews were then conducted with UGLS digitisation managers and the current IT and digitisation operations staff to collect data.

During the interviews, the following issues associated with digitisation were addressed: policy, planning, goals and priorities, selection criteria, skills and expertise, digital preservation and long-term access, issues and challenges; solutions and recommendations to digitisation constraints of the UGLS. These issues were used to identify and develop themes where thematic analyses of research data were done. Specific recommendations were also develop to share with UGLS to address the digitisation policy and planning issues, selection issues, human resource and skills requirements; the critical challenges, resource requirements, long-term preservation and access of digitised content and the sustainability of digitisation programme. Final recommendations were made based on the findings and conclusions of the research to advise on the sustainability of the UGLS digitisation programme.

Table of Contents

List of Tables

`

Chapter One
Research context

1. Introduction

The advance in technology has profoundly changed the library and information environment (Bultmann et al., 2005:23). Digitisation has become a major area of activity and research in digital libraries (Chowdhury and Chowdhury 2002:103; Sharma, 2012:135). In the last few decades, a number of major digitisation projects have been reported globally; some have taken the nature of a mass digitisation project with the aim of digitising published materials, as well as non-mass and large-scale digitisation projects. Popular cases of mass digitisation project are the Google Book Project initiated in 2004 aimed at digitising the print works held in a group of large academic and research libraries (Dougherty 2010:86).The Internet Archives project by the Open Content Alliance (OCA), as well as the Carnegie Mellon Million Book project which digitised books in India, China and Egypt are examples of large scale digitisation projects, possible today due to improvements in the scanning and digital technologies in general (Coyle 2006a :205; Coyle 2006b:642).

Though these projects, particularly the Google Books project and the Microsoft Live Search Books encountered enormous challenges, they nonetheless brought the spotlight on digitisation and generated an energetic discourse on issues germane to digitisation, in a much broader and global perspective (Rieger, 2008:1); the most prominent of these issues being technology and legal implications of digitisation. In the developed world, digitisation has become integral in the building of digital libraries whose scope spans across local, national and regional, with cultural heritage and memory institutions being the progenitors. The Europeana and Bodleian Library digital library projects are notable examples of such digital libraries. There are strong arguments for digitisation efforts: many cultural heritage and memory institutions are involved in digitising their collections on the basis that such institutions are "*convinced of the continuing value of such resources for learning, teaching, research, scholarship, documentation, and public accountability"* (Bultmann et al., 2005:22).

With the rapid development made in digital technologies, guidelines in digitisation have proliferated, spanning *"international, national, local, and institutional levels*", some attempting to reflect a set of best practices that continue to evolve (IFLA 2014:4), because of the recognition and overarching importance of digitisation. Again, some efforts are being made to provide digital content and support services to tackle the many issues confronted in digitisation and other digital initiatives, including providing standards and formats, criteria and guidelines. Bodies like the UK Data Archive, the Arts

and Humanities Data Service (AHDS), Joint Information Systems Committee (JISC), Technical Advisory Service on Images (TASI), the Higher Education Digitisation Service (HEDS), and the Resource Discovery Network (RDN), have supported the cause of digital services in the UK (Bultmann et al., 2005:74-85). In Europe in general, the MINERVA project *"discusses, correlates and harmonises the activities carried out in the field of digitisation of cultural and scientific heritage*" (De Francesco, 2004:2).

The story is however different in Africa, where digitisation is still in its nascent stages (Baro, Oyeniran and Ateboh, 2013:21 citing Kanyengo, 2006). Africa is still struggling to initiate and sustain such projects. A number of challenges, such as infrastructural development, hardware , software and internet connectivity have been attributed to this; while most of the digitisation projects in Africa had their origins outside Africa (Tsebe 2005:2-5). Tsebe, then Director of the National Library of South Africa, in reporting on digitisation activities on the African continent, noted that it was not possible to accurately measure the number of digitisation initiatives on the Continent. The report however noted that projects like the German Colonial Society collection of 55,000 photographic impressions from Africa, the West African Research Center Colonial Reports and Sabinet Online scholarly journals digitisation projects were already completed (Tsebe 2005:2). There was evidence of digitisation initiatives in Egypt and Sub-Saharan Africa. South Africa was by far the brightest spot in terms of the numbers of digitisation projects reported on the continent with the Digital Imaging Project of South Africa (DISA) being a notable example (Tsebe 2005:4).

Higher education institutions (HEIs) are taking the initiative in digitisation, and university libraries are fully involved, and are at the heart of these projects (Eke, 2011:2; Mendelsson, Falk & Oliver, 2014:318). Digitisation has become a major focus of libraries around the world in recent years because academic libraries are filled with many materials recorded in "analogue" formats (Rafiq and Ameen, 2013:39). It is acknowledged that digitisation has considerably changed the perception of library collections, services, and strategic planning (IFLA, 2014: 4). While the world is increasingly becoming digital, libraries have initiated digitisation projects to make their analogue holdings ever-available and accessible to their users by developing new library services based on digital library collections.

Thus, the last three decades has seen libraries undertaking digitisation projects, or expressing the need to digitise their physical collections in order to maximise the value of such collections in terms of access and perseveration. The preservation of original materials, as well as enhancing access has been the major reasons driving many digitisation projects globally (Astle and Muir, 2002:67-69; Lopatin, 2006:273-274; Mendelsson, Falk & Oliver, 2014:326-331). Several challenges have been outlined pertaining to digitisation projects, predominant among them are issues of costs, funding, and

sustainability. Again, the rapid change in technology, the difficulty in developing effective collaborations, the lack of skilled and professional training for digitisation personnel, and in some cases, competing technical standards and best practices were also challenges identified (Perry, 2005:524; Tsebe, 2005:3).

While libraries continue to embark on digitisation projects, academic libraries are the major and most developed segment of these libraries which are widely engaged in digitising their physical collections including books, journals, archives of newspapers, artifacts, music, theses and dissertations, and other historical documents and images of international and cultural interest (Rafiq and Ameen, 2013:39). Although this process may appear as a rather simple proposition, it is, in fact, not simple: digitisation is a complex process requiring a great deal of technical and project management efforts (Hampson, Pinfield & Upton, 1999:239; Hughes, 2004: 79-120; Cervone, 2012a:75-78; Vrana 2011).

Digitisation also requires effective managerial and technical skills in the day-to-today operations to ensure the successful completion of such projects. Moreover, it is observed that the planning and successful implementation of a digitisation project required not only technology know-how (e.g. determining technical specifications), but also, managing budgets, staff planning, workflow (e.g. digitisation processes such as scanning, quality control, creating of metadata), development of IT capabilities (e.g. in hardware, software and network), as well as, organisational and stakeholders support (Mendelsson, Falk & Oliver, 2014:318; Lopatin, 2006:274).

The University of Ghana Library System is one academic library which is embarking on such projects. Digitisation has been identified in its five-year strategic plan (2014-2019). One of the strategic objectives of the strategic plan is to *"accelerate the digitisation and Institutional Repository (IR) processes".* The purpose of this study is to assess the prospects of digitisation at the University of Ghana Library System (UGLS). The UGLS consists of the main University Library (Balme Library) and all other satellite libraries of the university. The researcher recognises that, among other things, for digitisation projects to succeed, such projects have to meet and adhere to some basic technical, managerial requirements, as well as, conform to "best practices" and widely accepted standards and guidelines in order to ensure the likely success of those projects.

The researcher seeks to identify and examine these issues and assess them against the UGLS digitisation initiatives in order to identify gaps and strong point of the UGLS digitisation initiatives. The researcher hopes this will serve as a "guide" for the UGLS digitisation project into the future. Other academic institutions, as well as cultural heritage and memory institutions in Ghana and possibly the rest of the world that are seeking for motivation and rationale in embarking on, or wishing to embark on such projects, could draw lessons and insights from this study. The study will also contribute to the body of knowledge on digitisation in the world.

1.1. Central Research Question and Sub Questions

1.1.1 Background to Problem Statement

Digitisation is gaining prominence at the University of Ghana (UG) in recent years. With the acknowledgement of the importance of the digitisation at the UG, efforts are being made to digitise vital records and documents of the university community. However, the knowledge of digitisation is still limited to few units in the university community (Barfi-Adomako and Kwadzo, 2014). The UGLS has been at the forefront of digitisation activities at the university and continues to lead digitisation initiatives at UG. The UGLS digitisation efforts have largely been possible due to initial support by international donors, notable among them are the Royal Tropical Institute (KIT) of the Netherlands and the Carnegie Foundation which provided funds for acquiring the needed resources to begin the digitisation projects (Dadzie and Van de Walt, 2015:18).

The UGLS consists of the main library (the Balme Library), which coordinates all other satellite libraries at UG. The satellite libraries comprises of all the colleges, schools and centre libraries, as well as the departmental and hall libraries, all scattered across UG campuses. The Balme Library and the College of Health Sciences (CHS) Library have since initiated some digitisation projects. Digitisation was introduced to the UGLS at the Balme Library in the year 2010. However, actual scanning of materials began at the Balme Library in 2011, of which the Africana rare materials covering the colonial period 1470-1958 – unique materials christened *"Furley and Folio Collections"* -- consisting of manuscripts, notes and books were digitised (Barfi-Adomako, 2011:3).

In addition to the Furley and Folio Collections, past examination questions, theses and dissertations as well as newspaper collections, some of which are contained on microforms from 1954-1974, are also being digitised (Barfi-Adomako, 2011:3). In 2015, the CHS Library, a satellite Library of the UGLS, set up a digitisation unit to digitise library records and documents from other departments in the CHS. The purpose is to preserve the CHS and University of Ghana heritage and research outputs and to ensure these documents are easily accessible (Barfi-Adomako, 2015:1).

Although the digitisation activities at the UGLS seem to be progressing, a preliminary investigation revealed that digitisation is still at its nascent stages. It also appears that digitisation activities are being implemented in an arbitrary manner unguided by formal digitisation policy or strategy. The UGLS five-year (2014-2019) strategic plan identifies digitisation as a strategic objective, aiming to "accelerate digitisation" in support of its strategic priority on research and scholarship; however a cursory look at the UGLS strategic plan revealed that there is no clear roadmap on how digitisation will be supported and sustained in the long-term. More so, it appears a greater preference is also given to other projects at the UGLS other than digitisation activities; consequently, critical issues associated with digitisation such as policy, project planning, funding, technology, technical requirements, skills,

and human resources, in effect cannot be ignored as these issues constitute potential hindrances to the ultimate success or otherwise of these digitisation initiatives if not adequately addressed. Keeping in mind the resource commitments involved to realise the value of digitisation to libraries and other memory institutions and its potential impact on digital libraries as well as access to scholarship, it is imperative to examine the prospects of digitisation at the UGLS by assessing the practices, processes and activities of digitisation at the UGLS and how ready it is to develop and sustain such digital library projects.

1.1.2. Aim of the Research

The overarching aim of the study is to assess prevailing digitisation practices and activities at the UGLS in order to identify opportunities and challenges affecting (or likely to affect) the prospects of digitisation at the UGLS so as to make recommendations where necessary in order to develop and sustain digitisation at the UGLS.

1.1.3. Objectives of the Research

As quoted in Hurst-Wahl (2009:23) *"There are no absolute rules for creating good digital collections. Every digital collection-building initiative* is *unique, with its own users, goals, and need".* This is the obvious challenge of adopting "best practice" in digitisation projects. Thus, the researcher is guided by the fact that there is no one prescribed best practice for implementing every single digitisation project. There are multiple best practices resulting from the diversity of information material being digitised and the diversity of ideas on how an overall digitisation project are implemented or should occur (Hurst-Warhl, 2009:23). At best, what can be said of best practice in digitisation projects are that, they are practical guides on how to implement digitisation projects. Nonetheless, each digitising organisation reserve the right to review what "best practices" are available so as to assist these organisation make informed decisions on the practices used by others and then decide for themselves what they will use or reject. The objective of this research is to assess some of critical steps and practices involved in digitisation projects with the aim of exploring the prospects of digitisation at the UGLS. Thus, prescribing any best practice or guidelines for digitisation at UGLS will imply assessing the objectives of this study as against the various practices as identified in the literature of this study in the implementation of digitisation projects. The study will assess the practices of the UGLS as pertains to the objectives of this research. The "best practice" or guidelines that will be identified in this study both in the literature review and the practices at the UGLS will

have the potential of being adopted or improved towards a UGLS digitisation programme of successful and sustainable prospects. The objectives of this research are:

1. To review the policy which guides digitisation at the UGLS.
2. To determine the adequacy of expertise required to carry out digitisation projects.
3. To determine digital preservation practices for long term access of digital content as recommended practices.
4. Identify the major issues and hindrances affecting digitisation practices.
5. To make recommendations, where necessary, to improve and sustain UGLS digitisation project.

1.1.4. Main Research Question

What are the major issues hindering and contributing to the prospects of a sustainable digitisation unit / department at UGLS?

1.1.4.1. Sub Questions to also Address

The study intends to answer the following sub research questions

1. What does the UGLS policy state in terms of digitisation?
   1.1. What are the digitisation priorities and goals of the UGLS?
   1.2. What criteria are used to select materials for digitisation at the UGLS?
2. What skills are currently available to effectively support digitisation practices at the UGLS?
3. What measures have been put in place to ensure the long-term preservation and access to digitised contents of the UGLS?
4. What measures are being used by management to measure the progress of the digitisation programme?
5. What are the major issues, hindrances affecting digitisation at UGLS?

1.2. Scope and Limitations

Due to the limited time for the student to complete this study and the nature of the topic, the researcher is unable to study the over 38 libraries that constitute the UGLS. The study will be limited to the Balme Library and the CHS Library which are the only libraries currently at the UGLS with some form of formal digitisation activities being undertaken. The Balme Library is the central library of the University of Ghana, and the CHS Library is a satellite library of the UGLS. The decision to limit the study to these two libraries is driven by the fact that, currently, Balme Library, because of its central and management role in decision making, makes decisions which are binding and often affect all other libraries of the UGLS. The CHS Library, which is also satellite library of UGLS, which has also set up a digitisation space although reports to the University Librarian of the UGLS, It nonetheless has its own management and staff that directly oversee digitisation activities at the CHS. Hence, investigating the CHS Library project will also provide additional and broader perspective on the UGLS project.

The study will therefore focus predominantly on Balme Library where most of the digitisation projects and activities are being undertaken. In digitisation, the use of the digital content is equally important, views of students and faculty are equally important to gauge the impact and value of the digital content. Thus, it would have been proper to seek their views on digitisation. But with the objectives and the nature of the research questions of this study, these categories of patrons will not be in the position to provide the needed answers, and therefore will be not included in the study.

1.3. Rationale for Study

The digital revolution has disrupted all kinds of institutions including libraries of HEIs. University libraries are witnessing a paradigm shift. These academic libraries continue to undergo transformation necessitated by the advances in Information and Communication Technologies (ICTs). Libraries are transforming from analogue based collections and services to digital collections and services. Digitisation has been one of the technologies used in mediating this transitioning of information sources and systems from analogue to electronic media.

University of Ghana libraries hold unique and important information resources. The information resources at UGLS are of different types and include rare books, microforms, VHS cassettes, manuscripts and other information material of historical worth and constitute a great potential for digitisation. While the UGLS has embarked on digitisation, it is imperative to examine the UGLS in

implementing this digital library project. The study will gauge the preparedness and readiness of the UGLS in carrying out and sustaining digitisation at the University of Ghana.

Notwithstanding, a study is yet to be conducted in Ghana assessing the prospects of digitisation at the University of Ghana and the need for digitisation. This study will assess the practices, processes and requirements for digitisation at UGLS. By assessing the status of current digitisation practices being carried out at UGLS, it will help identify existing gaps in the UGLS digitisation initiative. In addition, the study will also find out the associated issues and challenges associated with digitisation project and activities at the UGLS.

1.4. Overview of the Literature

The use of technology has become a core part of the institutional mission of museums, archives and libraries around the world (Hughes, 2004:5). Over the last few decades, many of these institutions have integrated technology into all aspects of their missions and services. Many of these institutions are adopting and deploying the potentials of technologies to capture and preserve human heritage. Digitisation is one of such technologies and services adopted by many libraries to ensure their missions in this regard are realised. The literature is replete with descriptions of digitisation activities in libraries of HEIs globally, with many of these libraries stating reasons such as access and preservation as the major priorities for digisation (Astle and Muir, 2002; Baro, Oyeniran and Ateboh, 2013; Iwhiwhu and Eyekpegha, 2009; Hampson, Pinfield and Upton, 1999; Lee, 2001:30; Lopatin, 2006; Mendelsson Falk and Oliver, 2014; Rafiq and Ameen, 2013; Smith and Rowley, 2012; Vrana, 2011, for example).

Astle and Muir (2002:78) undertook a study in UK libraries and archives examining the relationship between access and preservation in digitisation projects. Their study highlighted issues of impact of selection on access, preservation of original material and their digital surrogates; issues of funding and its implications on digitisation projects were also highlighted. In this study, Astle and Muir indicate that few digitisation projects realise their full potential in terms of preserving original materials, while little has been done to ensure the preservation of the original materials and digital objects despite the significant impact on increased access. Vrana (2011:589) conducted a study in 152 public libraries in the Croatian public library system reporting on the organisational aspects of digitisation projects. In Pakistan, Rafiq and Ameen (2013:37) analysed the prevailing digitisation practices in university libraries and observed that digitisation practices were still at a budding stage while the primary purpose for the involvement of libraries in digitisation is motivated by three digitisation goals: to

provide access via web, increase access and preservation. Shampa and Sashi (2014) also evaluated the objectives, priorities and criteria of digitisation. In respect of African HEIs, Iwhiwhu and Eyekpegha (2009:529) reported on the status of digitisation projects in university libraries in Nigeria and the effect of these projects on information delivery for libraries.

Furthermore, Astle and Muir (2002) reports that few digitisation projects realised their full potential in terms of preserving original materials, while little has been done to ensure the preservation of the original material and digital objects despite significant increase to access. With the wide spread acceptance of digitisation as a means for increasing access and supporting the preservation of original material, the Association for Research Libraries (ARL) has endorsed digitisation as an acceptable preservation strategy (Conway, 2010:65). Caplan is of the view that digital outputs of digitisation must themselves equally be digitally preserved (Caplan, 2008). Dobreva, O'Dwyer and Konstantelos (2012:73), are of the view that any developer of metrics and criteria that attempt to ascertain the impact and value of digitised collections must understand and consider how individual users or user communities benefit from the digitised collection. Showers (2012:64), argues that, in understanding the impact of digital resources, key concepts such as sustainability, usage, access, discoverability and impact which are inherent attributes of digital resources must be addressed.

Digitisation as a library digital project has been discussed from various dimensions in literature. Manzuch (2009:768-71) examined approaches to assess digitisation activities in memory institutions, addressing issues such as the need for systematic monitoring of digitisation projects, noting that monitoring the progress of digitisation is crucial for memory institutions in the evaluation of their own performance and effectiveness, in reporting progress to funders and benchmarking activities of project outcomes.

Lopatin (2006) did a survey of literature exploring issues of digital library projects He covers key issues including project management, funding digital projects, selection of materials, legal issues, metadata creation, interoperability and preservation which affects digitisation projects. Hampson, Pinfield and Upton (1999:239) identified that, in digitisation projects, the actual scanning is only one stage of a complex workflow process consisting of processes such as feasibility study, digital imaging, IT infrastructure development and project management. The study highlights the need for teamwork as well as cooperation between the library, computing department and university management: it is essential in managing these complex workflow within the institution.

Moss and Currall (2004:124) identify a mix of issues that needs to be considered before embarking on any digitisation initiatives; these encompasses the rationale for digitisation, selection of materials,

identifying audience, packaging and discovery of digitise content, as well as sustainability. In another study, Cervone (2012a:75, 2012b:126, 2012c:176), examines the importance of project planning in digital library projects, highlighting the various elements critical in the developing of a project plan, addressing issues like products and deliverables as well as assumptions and constraints which potentially affects such projects. Tanner (2001), also undertook a study highlighting the significance of digitisation project planning and management, addressing key implementation issues including project vision, associated costs of digitisation projects, skills requirements and skills development, as well as management of risks in technology-based projects.

Hughes (2004) discusses strategic issues in managing digitised collections. Hughes examines strategic choices and decision making in digitisation, the benefits and economics of digitisation, developing selection policies and setting criteria for digitisation; she further examines the importance and the need to develop a project plan, identifying funding opportunities, the digitising of rare and fragile materials and the management of the entire lifecycle of digitisation projects. Moreover, Mendelsson, Falk and Oliver (2014:318) studied the organisational and technological processes as well as strategic choices required for a successful digitisation project, their studies suggest that digitisation project requires not only a strategic planning but also some manpower expertise. Adeleke (2014:2084), notes that certain skillsets and competencies are required by librarians in carrying out digitisation. JISC (2015) suggests some training and staff requirements for digitisation projects from a management perspective. Rafiq and Ameen (2014a:18) are of the view that it is a wastage of time and dissipation of resources if digitisation projects cannot be sustained. The authors argued that the continued support and provision of institutional commitment, availability of skilled human resources, funding, regular updating and upgrading of technological infrastructure among others, entails in the sustainability of digitisation projects.

1.5. Research Design

A research design of a study is the overall strategy or plan of action that a researcher maps out to conduct an empirical investigation. It is essentially a systematic framework outlining predetermined choices of "processes and procedures" the researcher intends to follow in a scientific investigation (Pickard, 2007:52). These "plans and procedures" espouse the decisions for the research design, often along a continuum, from broad philosophical assumptions to specific methods and tools for data collection, analysis and interpretation (Creswell, 2009:3). The choice of research design is influenced by a number of factors: these include the philosophy or paradigm, preference that the researcher brings into the research process, nature of research problem or the research questions that needs to be

answered, the strategies of inquiry, the researcher's predispositions and experience, available resources and the audience of the study (Creswell, 2009:3; Pickard, 2007: 83). This study employed a qualitative case study research method.

1.5.1. Research Approach

Creswell (2009:3) advanced three broad categories of research approaches based on the kinds of data gathered for the investigation – Quantitative, Qualitative and Mixed Method. According to Creswell (2009:4), Quantitative research design is used in examining the relationships that exist among variables as a means of testing of objective theories. These variables are often measured with instruments and analysed using statistical procedures which invariably culminate in statistical and deductive representation of findings. It involves guided underlying assumptions for a deductive theory testing, clearly defined controls for alternative explanation, building internal mechanism for bias checking and ability to generalise and replicate findings (Creswell, 2009:4).

Qualitative research is essentially for exploring and understanding how individuals or groups interpret a phenomenon (Creswell, 2009:4). Data collected are inductively analysed and the meaning of the data is subject to the interpretation and perception of the researcher (Creswell, 2009:4). Qualitative and Quantitative research approaches are not dichotomous or "polar opposite": rather, they represent different extremes on a continuum (Creswell, 2009:4). The third approach, Mixed Methods, combines the qualitative and quantitative approaches in a study. The philosophical assumption of mixed method is that the strength of using both approaches is greater than using any single approach. (Creswell, 2009:4) To meet the objectives of this study, a qualitative approach was used to examine the research problem with the confirmatory plus exploratory nature of this study.

1.5.2 Data Collection and Instruments

Both primary and secondary sources of data were used in the study. Primary data was obtained through one-on-one interviews with the selected library managers and digitisation staff using the semi-structured interview guide. Interviews were used to gather data from the selected UGLS staff involved in digitisation. Secondary data was obtained from relevant print and non-print materials, e-journal publications, official documents on the UGLS digitisation projects, other sources from the internet.

1.5.3. Population

The population encompasses the entire set of individuals the study seeks information about, from which inferences or generalisations will be drawn based on the findings or outcome of the study; it is the larger target group from which the subset which constitutes the sample is selected because it is impractical or expensive to conduct the study on the population (Pickard, 2007:59, 60). The target population for this study included the staff involved in digitisation, librarians, IT and library managers at the UGLS.

1.5.4. Sampling

Sampling is a process of selecting a smaller representative number of people within a larger population to carry out an empirical research: the outcome of sampling is a sample which is a subset of the population (Pickard, 2007:59). A mixture of sampling techniques will be used to gather data. In this study, purposive or judgmental sampling -- a non-probability sampling technique -- was used. This sampling technique was used to select all library managers and digitisation staff, in gathering data on digitisation project planning, policies, digitisation processes and practices, digital preservation and human resources requirement. There were ten library managers at the Balme Library of the University of Ghana (UG) Library System three of whom were targeted for the interview. UGLS digitisation operations staffs at the Balme Library are four and all were targeted. There are five IT professionals two of whom were targeted.

1.5.5. Ethical Consideration

The following ethical considerations guided this study:

1. The study population willingly participated in the study; their consent was sought for responding to interview questions for which the purpose of the study was clearly stated.
2. All sources of information used in this study were duly and properly acknowledged.
3. Information about respondents was handled with strict confidentiality and anonymity.

4. Ethical clearance was sought for all data collection instruments used for carrying out this study from the Faculty of Engineering Built Environment and Information Technology (EBIT) Research Ethics Committee.

5. Permission was sought from authorities of the UGLS to conduct this study.

1.6. Value of the Study

The findings and recommendations of this study would have the potential of value to UGLS of the University of Ghana to understand its state of preparedness and readiness and ways to improving and sustaining current digitisation practices. The study will create awareness among librarians at UGLS and the stakeholders involved in the digitisation project at the University of Ghana. The research will also help UGLS to better understand the value of digital resources. With this, UGLS will be better positioned to meet future information needs of the users. The finding of the study will support libraries and other cultural heritage and memory institution to plan for further capacity building to initiate digitisation project. This study will serve as a foundation for future research on digitisation at the University of Ghana and HEIs libraries in Ghana and in Africa generally. The study will also contribute to the growing body of knowledge on digitisation in libraries in particular and digital libraries research and development in general.

1.7. Clarification of Concepts

1.7.1 Digitisation

Digitisation is defined for the purpose of this study as *"the process of creating a digital representation of an object, image, document or a signal, enabling it to be stored, displayed, disseminated and manipulated on a computer"* (Seljan, Dunder and Gaspar, 2013:1054).

1.8. Division of Chapters

The study is organised in five chapters. Apart from chapter one that constitutes the introduction, short review of literature, problem statement and research plan/design the following chapters are included in the mini dissertation.

Chapter 2: Chapter Two is the literature review of all related articles and research findings on the digitisation, covering digitisation in libraries, benefits of digitisation, digitisation policy and planning. It further reviewed literature on digitisation on the international scene in general and the African continent in particular. Studies on digitisation selection processes and criteria, staffing and skills requirements, digital preservation, digitisation as a preservation strategy and the approaches to digital preservation were also comprehensively reviewed.

Chapter 3: To be able to answer the research questions raised and find answers to the prospect of digitisation at the UGLS, this chapter explains the research methodology employed. This includes: research design, research approach, the study population, instrumentation, mode of data collection, ethical considerations, research trustworthiness and data analysis.

Chapter 4: In this chapter data collected is analysed and answers are generated from the analysis and findings. Some of the processes involved in this chapter are:

- The analysed data will be discussed and represented in graphical and table format for easy understanding by readers.
- This chapter will also discuss the findings of the study, highlighting major issues and answering demonstrating how the findings answer the research questions. This chapter would be related to the literature review of this study.

Chapter 5: This is the final chapter and it summarises all findings, recommendations and conclusions presented in this research study. Ideas and suggestions for future research and final remarks are also presented in this chapter.

Chapter Two
Literature Review

2. Introduction

This literature review attempts to examine the concept of digitisation, the benefits of digitisation and the place of digitisation in libraries. Recognised digitisation initiatives both in Africa and on the international scene are also discussed. This chapter also provides an overview of the selection process and criteria for digitisation, as well as the human resource. Skills and expertise requirements for digitisation discussed in the literature will also be identified and reviewed. Issues of digital preservation of digitised content, digitisation as a preservation strategy, the approaches and strategies for digital preservation are finally explained and conclusion presented.

The information sources and resources searched and reviewed for this study include books and peer-reviewed journal articles. Few magazine articles were also relied on for up-to-speed information on Google's digitisation project. A broad explorative search was conducted in Google Scholar, Scopus, Library and Information Science Abstracts and Ebscohost Discovery Services in English Language; limiting the search between the period 1998 to 2016, with the aim of reviewing the historical development and the growth of the body of knowledge in this area of research. However, special preference was given to recent sources because of the nature and area of the study. Old sources which were considered landmark to the study were used sparingly. The search was then narrowed to specific academic databases including Emerald Insight, JStor, Proquest, ProjectMuse, ScienceDirect and Sages Journal; limiting the search between the periods 2008-2016.

These academic databases were used not only because they contained only peer-reviewed journal but also because of their interdisciplinary subject content. These journals and databases scope of subjects covers subjects from the Library and Information Science, ICT, and Management which were particularly relevant fields for this study. The entire search was limited to English Language, covering the topic of digitisation in cultural heritage and memory institutions around the world with specific focus and interest in digitisation in libraries. A broad search was conducted to scan the scope of digitisation-related resources across the world before zooming into digitisation in Africa, and Ghana in particular, which is the context for this study. A multiplicity of search queries and strings were employed in the study to search and retrieve relevant online and print resources. The full strategy used in this study include: Digitization OR Digitisation; Library AND Digitization; "Digital library" OR "Digital library Project"; Selection AND Digitization; Digitisation AND "benefits OR importance"; Digitization AND Planning; "Digital library" AND planning; Digitisation AND Policy; Digitization

AND ("International initiatives" OR Projects); "Digitization projects" AND Africa; "Digital preservation"; Digitization AND Challenges; Digitization AND Sustainability".

2.1. Digitisation

The definitions available in the literature on the concept of digitisation are varied. The concept "digitisation" has been defined severally to reflect different emphases. Tharani (2012: 2) is of the view that the term "digitisation" is overloaded and is used by academic libraries in multiple contexts. According to Abruzzi (2015: 29), the concept "digitisation" could be understood and applied differently and at varying levels of complexities and "degrees of sophistication". It could simply mean scanning of just a single book to a much larger complex project of scanning vast collections. Thus, many definitions have been proposed to reflect these varying complexities. The Institute of Museum and Library Services (IMLS), USA, defined digitisation as *"the process of converting, creating, and maintaining books, artworks, historical documents, photos, journals, etc. in electronic representations so they can be viewed via computer and other devices"* (IMLS, 2002:22). Witten and Bainbridge, (2003: 58) offered a similar definition: for them, digitisation "*is the process of taking traditional library materials, typically in the form of books and papers, and converting them to electronic form where they can be stored and manipulated by a computer*. In another definition, Cathro (2007: 9-10) referred to digitisation as *"the conversion of library materials such as books, pictures, maps, music scores, manuscript collections and audio and video files into digital form. It encompasses all of the processes that are necessary to create usable digital files, including scanning or digital photography, the creation of digital files and transfer of these files into a suitable storage environment with appropriate metadata assigning".* These three definitions presuppose that libraries are at the centre of digitisation as they act as the primary providers of content for digitisation, as libraries are generally the custodians of information resources and serve as repositories for a variety of analogue information resources.

A more recent definition is offered by Seljan, Dunder and Gaspar (2013: 1054), who defined digitisation as *"the process of creating a digital representation of an object, image, document or a signal, enabling them to be stored, displayed, disseminated and manipulated on a computer".* McMenemy and Poulter (2005: 159) also offered a simple definition; they saw digitisation as *"creating a digital copy of an analogue object"*. Tharani, in his proposed "Digital Collections Framework", defined digitisation as *"the reformatting of physical or analogue materials to create digital surrogates in order to provide access"* (Tharani, 2012:2). We can see from the aforementioned definitions that the first three definitions recognise digitisation as a process of managing the digital

conversion information resources of cultural heritage and memory institutions while the last three definitions treated the concept as a purely technical activity focused on conversion of analogue information resources. From the proposed definitions above, it is obvious that digitisation, in its basic sense, converts analogue records into digital representations and by meaning excludes materials that were originally created digitally, which are often referred to as born-digital materials. Moreover, although the processes in the various definitions are not explicitly explained it should be noted that digitisation is not simply a technical process: it is a complex process that encompasses *"a set of strategic, resource management, financial and other solutions and actions that contribute to fulfilling the mission of memory institutions"* (Manzuch, 2009: 790). Manzuch points out that, how the concept "digitisation" is defined is important because the clarity and the notion of the concept as upheld by any particular memory institution, influences and guides its approach to developing of specific frameworks for its assessments and monitoring of progress and achievements of its digitisation initiatives. This expressed view points to the conclusion that, the process of digitally converting large collections invariably occurs within an institutional context requiring technical, technological, operational, management and strategic support by the digitising institution.

2.2. Digitisation in Libraries

The digital revolution, as it were, is implied to have induced digitisation; the expansion and ubiquity of global computer networks, high-speed Internet connectivity, the development of digital library services, and the exponential growth and demand for digital content actuated many memory institutions to embark on "digitalization projects" (Hughes, 2004:6; Vrana, 2011:589). Many libraries – both large and small -- are involved in digitisation projects. Among the significant projects are those projects undertaken by academic libraries and research institutes; some of these digital conversion projects are experimental exercises, while several others are driven by huge investments of resources and through some collaborative efforts (Badhusha, 2008:139). According to Verheusen (2008:28) and Hristova (2012), the 1990s were the period of "experimentation with imaging technologies" that saw thousands of libraries of all sizes initiating digitisation projects in order to scan parts of their collections, provide adequate metadata and deliver them on the Web. Early work by Kane, (2003:10) suggest that the origins of digitisation projects in libraries can be traced back to the collaborative efforts between Cornell University and the Xerox Corporation in the early 1990's. Consequently, there has been an upsurge in the uptake of digital imaging projects among academic libraries which has also spread to other cultural heritage and memory institutions including museums and public libraries, particularly those with unique and special collections; the aim being to use digitisation as a tool for providing access and for preserving unique materials in collections (Lopatin, 2006: 273). Unsurprisingly, Lee (2001) described the 1990's as the *"decade of digitization"* and sees it as *"cause*

for celebration". Bulow and Ahmon (2011:1) contend that the rapid growth of digitisation since the 1990's was a deliberate response to the advancement made on the Internet, as well as the ever-changing information user needs and expectations.

Since the advent and the widespread adoption of digitisation among libraries, a latest research (Breeding, 2014: 17) asserts that digitisation is no longer held high as an "exceptional or extraordinary" undertaking by libraries. Abruzzi (2015: 32) confirms this assertion as he notes: "*the technologies and methodologies for undertaking and completing a digitization project have certainly become more accessible, improved, and widely understood since the early days of primary source digitization"*. Consequently, libraries' digitising their rich, diverse and large collections and their special collections is only a predicted and expected development. Many libraries now have digitisation departments as part of their traditional library routine operations (Lampert and Vaughan, 2009: 116) while digitisation, even on a massive scale, might just be internally funded and coordinated without necessarily relying on external funders (Breeding, 2014: 17). These assertions point to the conclusion that the number of libraries that have implemented digitisation projects around the world has increased significantly. More so, libraries have long embraced digitisation, integrating this digital activities as part of their traditional primary library functions, operations and general services rather than, perceiving them as short-term, temporary digital library projects.

2.3. Benefits of Digitisation

This section analyses the benefits of digitisation. The scope of benefit for digitisation is enormous. As Bulow and Ahmon (2011: 49) identified, digitisation offers invaluable benefit to cultural heritage and institutional memory such that it gives "new life" to valuable collections, as well as enhancing and broadening their availability to a wider user community. Digitisation continues to gain popularity among academic libraries because of the opportunities and benefits which libraries derive from such projects. Although digitisation has several benefits for cultural heritage and memory institutions, access and preservation continue to be the major underpinning motives for many libraries to justify continuous engagement in digitisation (Lopatin, 2006: 273; Vrana, 2011: 591; Pinkas, et al., 2012: 262). Nearly all materials presently held in libraries are amenable to digitisation irrespective of their format or medium (Kannappanavar, Rajanikanta, and Satish, 2010: 61). This suggests that, digitisation offers libraries the ability to preserve and provide access to its variety of materials. These material resources encompass traditional library materials in the form of paper substrates and its variants such as text, photographs, vellum, manuscripts, birch bark, parchment, papyrus, canvas, as well as many other "analogue" surrogate forms including audio and moving image materials, glass

plates, negatives, and microforms (i.e microfilms and microfiche) (Hughes, 2004:3-4; Badhusha, 2008: 99). This variety of resources supposes that any information resources of artefactual and, or informational value, regardless of medium, once amenable to digitisation, are potential candidates to be digitally converted.

Moreover, digitisation offers imperative benefits for institutions. Hughes (2004: 11-14) mentions some of the advantages digitisation may bring to heritage institutions: these includes broader and enhanced access, supporting preservation, supporting collection development, institutional and strategic benefits, (i.e. bringing prestige, funding opportunities, raising institutional profiles as well as, research and education), as well as providing institutions a unique opportunity for developing technology infrastructure and skills of their digitisation personnel, as well as, enhancing general staff development. Andrews reports on a digital project which digitised the entire backfiles of all journals published by Oxford University Press. Andrews's highlights some of the benefits derived from the project which include full-text searching of back issues digitally converted in just a single search. Another benefit was that any Oxford Journals project backfiles which were hitherto inaccessible to researchers were rendered into digital formats and made available to a wider audience, while back runs geographically dispersed were "virtually re-unified" (Andrews, 2006: 78-79). Digitisation also offers academic institutions a unique opportunity to showcase their institutional resources through increasing the visibility and availability of such resources on the Web; supporting the preservation of endangered information resources; enhancing access to library resources, as well as improving efficiency of information search mechanisms which ultimately engenders more openness and sharing (Adeleke 2014: 2085). Despite the claimed benefit of digitisation in preserving endangered information resources; this view has been challenged by Fabunmi, Paris and Fabunmi (2006: 30) stating that digitisation is useful in preserving special collections only when "*preservation remains a secondary benefit of digital projects"*. This means that digital surrogates should only be seen as archival preservation surrogates in the protection of originals that are fragile. It follows that the originals should not be discarded after digitisation while efforts should be made to preserve the originals even after digitisation to derive the greater benefit of digitisation in support of preservation.

In addition, libraries are encouraged to make every effort to digitise and promote digitisation since digitisation provides a platform for shareability and duplication of data, by so doing, increasing access to library resources to a much wider community of users instantaneously and simultaneously, as well as improving efficiency of information searching (Otubelu and Ume, 2015: 35). Again, benefits of digitisation in research, teaching and learning cannot be overemphasised; digitisation generates exciting and new research opportunities. As McRostie (2014:13) points out: *"Digitization is a critical enabler to increasing access across our cultural heritage, bringing collections out of the dark and connecting people and communities. The value of digitized resources for learning, teaching and*

research should not be underestimated. Digitized resources continue to transform research process by increasing the value of existing research assets, enabling unrealized research, unlocking the potential of analogue resources and increasing accessibility. Digitization can also facilitate the ability to create new research data. Unlocking the potential to analyze the content of these digitized resources and combine them in new ways to create new research data." Tanner (2001:327) had earlier expressed this view when he observed that not only is digitised content an essential aspect of digital library development but that the digitisation of valued information resources has a profound impact on scholarship since it "opens up new avenues of access, use, and research" thus increasing the user base of libraries.

Moreover, Hawkins (2006:30) points out that digitisation is considered a significant component of the "entire content value chain" for the numerous institutions engaging in digitisation. Hence converting analogue materials present institutions expanded benefits by providing value-added and extended services such as "tagging, presentation, and distribution" of digitised content which allows for the creating of multimedia files which can easily be integrated into complex digital library contents with navigational links to related resources, displayed and transmitted instantly over an increasing bandwidth network which was previously impossible. Other libraries however, also simply joined the digitisation bandwagon driven by the idea that "everyone else is doing it" (Kane, 2003: 11).

2.4. Digitisation Initiatives: International Scenario

There has been a significant growth of digitisation initiatives around the world. As a result, there is an increasing engagement of all kinds of libraries participating in digitisation activities the world over. As Hughes asserts: *"There has also been a significant growth of various national and international digitization projects in the last ten years, as libraries and universities all around the world have funded major initiatives to showcase their rich cultural and scientific heritage"* (Hughes, 2004: 6). Consequently, libraries are participating in both mass and large-scale digitisation initiatives by primarily providing contents to be digitised. Early pioneers include the Library of Congress in the USA, Bibliothèque Nationale de France, and the British Library. St. Clair (2008) discussed the progress made on three major international ongoing digitisation initiatives. These are the Google Book Search (GBS), the Million Book Project and the Open Content Alliance (OCA). The GBS, hitherto named Google Print, is by far the most well-known mass book digitisation project in the world. The GBS was first announced in 2004. The vision of the GBS according to the author is to make all scholarly content on the Web easily accessible and searchable and for reading by the global scholarly community and "citizens worldwide". Google intended to achieve this through a mass digitisation strategy of digitising all of the books held in some major US libraries and make an index

of the content on the web (Coyle, 2006a: 641). By the end of 2014, Google's digitisation project has scanned over 20 million books (Samuelson, 2014: 20).

GBS, has however, not gone smoothly without any implications. Criticisms have been leveled against its quality control and assurance process regarding the quality of scans. Widespread errors in metadata and lack of quality control to correct the many scan text errors resulting from the optical character recognition (OCR) processes has been reported (Eichenlaub, 2013). The legality of GBS also been challenged for alleged potential massive copyright violations. The Google Books, as it is presently called, has had to battle with many legal lawsuits across the world from various authors and publishers over possible copyright infringements. The two most prominent and longstanding lawsuits were those brought against Google in a class action suit by authors (Authors Guild v. Google,) and the civil lawsuit by the Association of American Publishers and five large publishers in the McGraw Hill v. Google, in 2005 in the U.S. In 2013, a landmark ruling went in favour of Google, with the courts citing the principle of fair use, and "transformative use" for the basis of Google Books. In 2015, the ruling was however, challenged in an appeals court, the previous judgment was subsequently upheld by the appeals court re-affirming that Google did not violate copyright laws (Albanese, 2016; Christou, 2016:1, 24; Valente, 2016). The implications of these rulings are that Google could still continue with its Google Books project. As of October 2015, Google Books has scanned over 25 million book titles. While Google might have had a legal victory under US copyright laws. Google has equally lost in different countries in Europe and Asia (in France, China and Japan, for example) for violating copyright laws under their jurisdictions.

.

Also, St. Clair, (2008: 152) adds that, before GBS, there were earlier digitisation projects such as Project Gutenberg, which claims to have digitised more than 17,000 books in its collection and the American Memory Project of the Library of Congress which has digitised millions of diverse items of historical documents, pamphlets, photographs, moving pictures, sound recordings and maps of which includes 450,000 books. In 2005, the Open Content Alliance (OCA) was announced, with a different approach from the GBS. OCA was a "library-related mass digitisation" driven by a collaboration of libraries. This project was different from the GBS in a number of ways: The OCA claims it only digitises public domain works while its counterpart digitises every resource without discriminating, and also "opens" its technology to others. The OCA initiative seeks to digitise millions of books. As at December 20, 2006, 100 000 books had already been loaded on its website. The Library of Alexandria is hosting the materials and the digitised content made available through The Open Library and Internet Archive. (Coyle, 2006a: 641-642; Rieger, 2008: 8; St. Clair, 2008: 151-152).

Moreover, even before international digitisation projects of GBS and OCA, there were some earlier large-scale book digitisation projects. For instance, The Million Book Project which started in 2001 as a collaborative international project of universities, digitising books in China, Egypt and India. The project has a number of partners with the Carnegie Mellon and National Science Foundation (NSF) providing direction and funding respectively. Over 1.4 million books are reported to have been digitised since the inception of the Million Book Project (Coyle, 2006a: 642; St. Clair, 2008:153).

A number of digitisation activities are being carried out in various European countries. Over a span of ten years, a considerable expenditure amounting to £130 million of UK public funds, has been invested in the creation of digital content of diverse types of analogue materials including manuscripts, video and sound files mainly in the liberal arts in order to make them available on the Web (Bultmann, Hardy, Muir and Wictor, 2005: 145). This suggests that such digital initiatives require huge investments to undertake. European countries in recent times, through the Europeana (Europe's digital library, museum, and archives), an online portal, has since 2011 aggregated content of repositories of over 1,500 cultural heritage and memory institutions across Europe providing access to links of over 15 million digitised objects making the cultural heritage of Europe accessible and searchable on the Web (Sofronijević and Mitrović, 2012:58-59; Charlton, 2013: 14). In effect, international initiatives are driven generally by way of partnerships, collaborations and cooperation among various international stakeholders; it also follows that libraries invariably are at the centre of these global projects, primarily providing the needed content to be digitised; with commercially-motivated outfits providing the needed resources and financial muscles as in the case of GBS. Libraries and heritage institutions must however be guarded with caution since the long-term intentions of such commercially-driven outfits such as GBS are unpredictable although their current business model may appear to be for the general good and public benefit of all.

2.5. Digitisation Initiatives: Scenario in Africa

In Africa, digitisation is still in its nascent stages (Baro, Oyeniran and Ateboh, 2013:21 citing Kanyengo, 2006), while the few digitisation projects that are embarked upon in Africa are often confined to "relatively small, specialised collections" (Lor, 2005:2). Lor and Britz (2005) and Tsebe (2005), argue that Africa cannot afford to overlook digitisation of the continent's rich heritage resources if the continent wants to become an important player in the current knowledge-based economy where the information power of countries is assessed based on their contributions to the

global knowledge economy. Hence, deliberate and concerted efforts to digitise Africa's heritage, in Africa, and by Africans, ought to be pursued in preserving Africa's own heritage materials and made accessible in the global knowledge economy. Already, few digitisation initiatives have been undertaken on the continent for the purpose of providing access, preservation and publishing online (Limb, 2005). Nonetheless, digitisation on the African continent, is gradually showing progress.

Consequently, some digitisation projects are reported on the continent. Tsebe (2005) reports digitisation initiatives on the African continent that were already completed by 2005. In 1999, digitisation of 55,000 photographic impressions of Africa from the German Colonial Society collection had been completed. The year 2002 also saw the completion of the digitisation of 150 colonial reports completed by the West African Research Center. Sabinet Online, in 2002 and 2004, completed the digitisation of 40 scholarly journals and another 141 titles respectively. Again, in South Africa in 2003, 345 drawings of the Bleek Collection was digitised by the National Library of South Africa in cooperation with University of Cape Town. Another prominent digitisation initiative from the continent is the DISA project in South Africa which also digitised 50,000 pages by 2004. Again, by 2004, ten African journals were also digitised by the Michigan State University. In the same year, the Egyptian National Library had completed digitising 100,000 pages covering South Africa's Struggle for Democracy. The Slave Trade Archives digitisation project, which involved countries mostly from West Africa, was also completed in 2004.

Most African digital initiatives are collaborative and cooperative in nature. Ryan's (2010) study on the experiences of Aluka digitisation efforts in Africa confirms this assertion, Aluka engaged in a collaborative effort to digitise the rich and unique scholarly and heritage materials in some cultural heritage and memory institutions in Africa. Aluka through this initiative supported partner institutions providing technical support, training and equipment in Mozambique, Maputo and in Mali, Timbuktu. The primary objective of these digital efforts by Aluka was to enhance access by virtually reunifying geographically dispersed materials, preserving endangered materials and enhancing searching capabilities. Since its inception in 2004, Aluka, through the benefits of its international partnerships and collaborations, has digitised collections covering the Struggles for Freedom in Southern Africa, African Cultural Heritage Sites and Landscape and African Plants hosted on its online collections. Additionally, the Association of African Universities (AAUs) and the Council for the Development of Social Science Research in Africa (CODESRIA) with support from international bodies such as the International Federation of Library Associations and Institutions (IFLA) and UNESCO collaborated in digitising journals for the purpose of preservation and wider access in Africa thus illustrating the potential of collaboration.

In addition, other collaborative digital initiatives on the continent are the Kwetu.Net, which ensured partnership with African universities and government in developing a full-text database on East Africa, as well as the Database of African Theses and Dissertations (DATAD) project which promoted capacity building especially in the area of skills transfer in digital library projects among African universities (Amollo, 2011). Moreover, a study by Mapulanga (2013) revealed some digitisation activities in libraries in Malawi universities. In Nigeria, Ezeani and Ezema (2011) and Eke (2011) report the digitisation initiatives of University of Nigeria which digitised institutional archives and resources. It should be clear now that, with these few initiatives recorded on the continent, African institutions are gradually coming into the mainstream of digitisation; thus digitisation, with the increasing collaborations and cooperation among partners and multi-stakeholders involvement both in Africa and their counterparts in the rest of the world, Africa could gradually change the current narrative of being a net consumer of information to becoming an important player in digital heritage of the current global knowledge economy through the disseminating of African heritage to the rest of the world.

2.6. Digitisation Policies

As already observed, digitisation has become an integral part of the growth of today's libraries. To achieve success in digitisation however, Yakel (2004) suggest digitisation projects must have the support of institutional infrastructure. This infrastructure includes policy development, funding, technology, expertise, and long-term commitment of the institution since this is critical for the development of digital collections and digital repositories projects in the long-term. Thus, formulating and implementing an institutional policy on digitisation is crucial to the success of any digitisation project. A policy may be seen as *"a formal statement of direction or guidance as to how an organization will carry out its mandate, functions or activities, motivated by determined interests or programs"* (InterPARES2, 2011). Related to this view, Corrall (2002: 2), also reflects that the term 'policy' is understood as "*statement of principles, intended to provide a framework for decisions on a continuing basis"*. Noting that the term sometimes is used interchangeably with the term 'strategy'. Fabunmi, Paris, and Fabunmi (2006: 31) recognise the need for digitisation policy in their study. They contend that a policy is a "guiding statement" which must be enacted and approved to guide the digital project. The authors emphasized that: *"such a policy will serve as a reference point and guide for implementing the project".* Hence, it is imperative to ensure that a policy is developed to support digitisation activities, processes, and phases as stressed by Nash, Sterkenburg, Wentzell (2011: 11). Similarly, Shampa and Sashi, (2014: 224) admits that, as libraries continue digitising their collections, the impact of technology challenges and policy concerns surrounding digitisation have equally increasingly gained recognition. Akintunde (2007) asserts the importance of developing a digitisation

policy. He states*: "once an institution decides to digitize its materials, before embarking on any form of digitization, it is important to first formulate a digitization policy. This policy will define the purpose of the digitization process, what materials to digitize, priorities for digitization, human resources to involve in digitization, users to benefit from the digitization effort, beginning and ending date of the digitization process, hardware considerations, software considerations, access to digitized content, standards, and funding. Clear digitization policies will enhance the digitization process*", (Akintunde, 2007: 3). Fabunmi, Paris, and Fabunmi (2006: 31) explain that such a policy should typically entail the "goals of the digitization project"; identify and define the specific group of users intended to access the collection; the type of material the project will prioritize; how the users consume the digitised content; the anticipated number of users; outline "a planned procedure to market and promote the project", as well as the benefit of the project to users and institutions. The authors suggest that a user needs assessments be conducted in order to find answers to some of these issues.

As a result, Amaoge (2015: 259) proposed a process for developing a digitisation policy, as the author noted that it is extremely important to set up a committee whose mandates will be to "draw a plan and draft policy" that will determine the goals and objectives, availability of fund, selection criteria, human resource requirements and infrastructure to ensure an effective digitisation project is ultimately achieved. The study by Shehu (2016: 17), among others, argues convincingly that prior to academic libraries embarking on digitisation projects, such libraries must develop and implement policies on digital libraries and digitised resources, as well as seek approval for such policies by their parent organisations to ensure the smooth take-off of the projects.

There are several policy options discussed in the context of digital projects. With the steady adoption and growth of digitisation among cultural institutions; the growing importance of policy concerns in digitisation has equally gained centre-stage, nonetheless, studies suggest few libraries have in place a policy on digitisation -- many still do not have policies to govern their processes although policies are considered a basic element in any formal digitisation programme. An early survey (Liu, 2004: 338) by the IMLS of over 100 libraries in the United States (US) corroborate this, as the study states that many libraries in the US did not " *have policies to control the format and execution of such efforts"*. The IMLS recommended that policies regarding the selection of digitised materials, standards, and preservation need to be implemented (Liu, 2004: 338). The absence of formal digitisation policies in many of US libraries at the time supposed that the academic libraries embarked on digitisation activities unguided by formal digitisation policies.

In another study, a survey conducted by Rafiq and Ameen (2013: 41) revealed the absence of formal digitisation policies in one-third of academic and public libraries engaged in digitisation activities in

Pakistan. This revelation surprised the authors because of their position that *"digitization policy is considered a basic element in any formal digitization program"*. The absence of such digitisation policy supposes the lack of a guided policy approach to digitisation by the universities and public libraries that embarked on digitisation activities in Pakistan. Similarly, in India, Sharma conducted a comparative study examining the status of automation and digitisation projects in seven university libraries in order to ascertain the challenges that oppose automation and digitisation projects in the effective information delivery. The study revealed that with respect to digitisation, among other challenges, the libraries also lack written policies on digitisation (Sharma, 2012:141). Whilst findings on digitisation policy adoption rates from these countries may be discouraging, the findings from a study in Malaysia, however, were encouraging in terms of digitisation policy adoption rates. More than half of Malaysian cultural institutions surveyed (61%, of fourteen respondents) has policies governing their digitisation efforts; nine respondents representing 39% of the remaining cultural institutions were without any form of policy but gave a positive indication of their intentions of developing one soon. These policies ranged from selection policies, access policies, content management policies, intellectual property policies and preservation policies (Zuraidah, 2007). One can deduce from these studies that few libraries and other cultural heritage and memory institutions currently have well-developed digitisation policies to guide their projects while the majority of heritage institutions are yet to develop digitisation policies although the overwhelming majority of these heritage institutions acknowledge the importance of such policies in guiding their digitisation programme.

As already discussed, there are different types of digitisation policies addressing specific aspects of the digitisation projects. Hughes, for instance, suggests that selection policies should be a core component of any digitisation policy. She comments that the condition, nature, intellectual content and usages of collections, as well as the strategic motives and specific institutional frameworks, may influence such selection policies when initiating digitisation projects (Hughes, 2004: 32). Similarly, Bulow and Ahmon (2011: 47) advocate for the implementation of a selection policy to ensure digitisation projects are focused and selection is done based on well-informed decisions. Again, with the institutional attention that digital preservation has gained, the literature suggests that a policy also is a crucial initial step towards tackling and addressing digital preservation challenges. Sinclair (2010) reports on a survey conducted as part of the Preservation and Long-Term Access through Networked Services (PLANETS) initiative which confirms this: two hundred organisations from mainly European libraries and archives were surveyed on attitudes and procedures relating to preservation needs and activities. The study recommends that memory institutions formulate digital preservation policies to enable them to build a business case, so as to obtain institutional support for digital preservation to be included in institutions "operational, business continuity and financial planning", as

well as to guide the implementing of a digital preservation system at the institutional level. The foregoing statements are clear indications that policies are crucial in any digital project initiative.

2.7. Digital Project Planning

Planning is essential in any new or on-going digital initiative, and planning in digitisation is no different. Strategic and long-term planning is crucial when embarking on a digitisation project. In his article, Madu (quoted by Amaoge, 2015: 259) defines planning as *"the process of preparing a set of decisions for action in the future with the intention of achieving the set goals with the limits of the available resources"*. Madu outlines the planning process which encompasses formulating policies, defining the project objectives; forecasting and budgeting, and ensuring a balance between logistics and human resources in the right quality and quantity towards attaining organisational goals. Thus, planning is seen as the "building block" to most successful projects.

Adequate planning that precedes the actual implementation of digitisation projects is quite indispensable. Literature abounds on the digital projects planning (Tanner, 2001; Vrana, 2011; Zarndt, 2011; Ubugo et al., 2010; Cervone, 2012a, 2012b, and 2012c, for example). Project planning is crucial to the successful implementation of any technology-based library projects in the beginning stages (Tanner, 2001: 329; Hughes, 2004: 52; Ubugo, et al., 2010: 50; Riley-Reid, 2015: 90). Similar sentiments have been expressed by Fogg (2014: 189), he contends that the lynchpin of any successful digitisation project is to ensure that the scanning operations are streamlined and carried out according to a carefully developed plan. A study (Pandey and Misra, 2014:137-138) discusses the reasons for digitisation and also examined the processes and methodology of digitisation. The authors suggest the following factors be considered when embarking on digitisation projects in developing countries: policy enactment; policy approval; planning, budgeting, and monitoring; acquisition of appropriate technology; administrative decision on the procedure to be adopted; sensitization, psychological preparation and retraining of staff; legal/copyright issues; selection criteria; verifications; and provision of metadata.

Planning is regarded as an essential part of managing digital projects. Tanner determined the key issues for managing technology projects; formal project planning was identified as an essential component; other key issues identified include risk and resource management; accurate budgeting of the project; feasibility studies and piloting of the project; (Tanner, 2001: 328-329). Ubogu et al., (2010: 49) also emphasized that the success of digital projects depends on the extent and quality of planning prior to, and during, the implementation of a digital project. In the same way, the Department of Management Archives and Records Management Section of the United Nations,

reaffirmed the importance of planning, listing project planning as constituting one of the four main phases in preparing for digitisation, with the remaining phases being: the pre-digitisation processes, the digital conversion and the post-digitisation phases (United Nations, 2009: 5).

James-Gilboe (2005: 157) notes that several key issues need to be considered when planning a digitisation project so as to circumvent difficulties. She explains that in the planning process, one must, among other aspects, identify possible key strategic and operational routine issues, identify the source materials format; legal or rights conditions; physical collection size; define the expected user groups; define the desired user experience (i.e. how the content will be access and used), as well as how the user delivery interface will be designed for searching, navigation, and retrieval. Moreover, the technical standards for the digitisation process must be defined, the distribution and access channels for the content must also be determined during planning.

A similar conclusion was reached by Mendelsson, Falk, and Oliver (2014: 318) when they report on the technological and organisational processes, as well as strategic choices, that ensured the successful digitisation of the Albert Einstein Archives at the Hebrew University in Israel. Their study concluded that a successful digitisation project requires not only a strategic plan but also human resources which may include archival staff, IT staff, information specialists, digitisation staff for converting and processing the archival materials and, more importantly, a common language between all professionals. They, however, observe that technological know-how, human resource planning, a significant budget, and developing IT capabilities in software, hardware, as well as intra-organisational cooperation and interaction among internal stakeholders and other external stakeholders in digitisation institutions continues to be a challenge in the successful planning and implementation of digitisation projects. They conclude that it is crucial that a substantial budget is allocated and human resources issues considered, as well as "user expectations and information seeking behavior" evaluated during the planning of the digitisation project to ensure its success.

It also supposed that digital project planning is crucial since it helps reduce the prospect of digitisation project failures, which in turn, increases the likely success rates. The literature reveals that project planning is essential because there is a greater weight of evidence that points to the fact that technology-based projects fail as a result of a lack of or inadequate planning (for example, Tanner 2001; Zarndt, 2011; Fenech and De Raffaele, 2013). Tanner (2001: 329) examined some of the potential challenges encountered in digital library projects. Tanner notes that digital library projects invariably fail because of the following reasons: inadequate project management and controls; non-defined project objectives; and the project's scope and complexity not being shared with stakeholders involved in the project. Similarly, Cervone (2012a: 75) also examined the importance of project planning in digital library projects; focusing on issues that might cause a digital library project to fail.

The reasons he cited for the failure of digital library projects include the poor communication of ideas, technologies, and planning, while little may have been attributed to the technology itself. More so, Zarndt's, (2011: 171) findings regarding digital project failures corroborate the impact of some of the challenges already outlined by Tanner and Cervone. Zarndt reports inadequate planning, poorly defined acceptance criteria and poor communication between stakeholders involved, as the primary factors that present the major problems amounting to digitisation project failures. In a related discussion, Taimour Al Neitmat in a White Paper for Project Perfect, outlined the major causative factors which lead complex digital projects to fail; poor planning was prominent among the factors listed, other factors include: unclear goals and objectives; scope creep and feature creep, unrealistic time schedule and resource estimates; lack of executive and senior management support and non-user involvement. Other causative factors are a failure to communicate and act effectively as teams; and the lack of appropriate or adequate skills for specific projects (Al Neimat, 2010: 3).

Nonetheless, Riley-Reid (2015: 90) maintains that planning a digitisation initiative is not as easy a proposition as it may appear. This is because so many issues need to be considered; including analyzing current capabilities and available resources of the digitising institution, and even harder tasks such as conceptualizing and projecting the future requirements of the project to ensure the long-term sustainability of such projects. Riley-Reid suggests some steps, albeit not exhaustive, which could guide in the planning of digital projects. The steps are: determine project goals; identify financing/resources, assess the collection; identify legal/copyright issues, analyze workflows; create/maintain metadata; maintain quality control and educate/train (users and staff).

Depending on the needs and goals that the library wants to accomplish with the digitisation, Adzic, (2013: 48) calls for a detailed plan be developed. Hughes recommends four steps to facilitate the development of an institutional digitisation plan: these are a collection survey; user needs analysis or survey of users; a cost benefit analysis and consideration of strategic institutional issues (Hughes, 2004: 39). Riley-Reid (2015: 4) in examining the significance of planning in digitisation asserts that: *"the key to successful digitization is to create a comprehensive plan—as much as possible"*. Cervone (2012a:75), in a related point of view, discussed the significance of a project plan. He asserts that a critical component to ensuring the success of any digital library project is to ensure the project is implemented according to a "well-developed project plan". A project plan he points out is simply *"the document that defines and clarifies the scope and purpose of a project".* This document must ensure there is a balance among the various elements. He adds that a project plan should address the following basic concerns: the purpose, goals, and objectives of the project; project methodology, project products and deliverables; scope and risk assessment; assumptions and constraints that may affect the project, as well as management (Cervone, 2012a: 75-76). In addition, Ubugo et al., (2010) explored this dimension, explaining that a project plan must include the following minimum

elements: the broader goals of the digital collections; long-term implementation strategy and the mission statement of the project institution. The project plan may also serve as an information or public relations (PR) document for governing boards, senior management structures and other stakeholders of the institutions, as well as a help to seek funding for the project. Ubugo et al., recommends that project plans must be flexible to allow for unanticipated development and also must allow periodical reviewing and revision to reflect and accommodate *"new ideas and changing conditions within the library and its environment."* to ensure the success of the project (Ubugo et al., 2010: 49-50).

Planning is even more crucial for developing countries because of the scarcity of resources. Eke (2011) examined issues of scholarly communication as it relates to digitising of Africa's archival collections. Eke posits: "*The success of digital projects in Africa hinges not on expensive technology, but rather on sound project planning*" (Eke, 2011:6). Eke advises that digitisation projects embarked upon in developing countries must not be driven by technology but rather by the factors of: planning, goals setting, developing digitalization policies, clarifying and negotiating legal/copyright issues; developing selection criteria for digitisation; verification of selected materials for digitisation. Major challenges facing digitisation projects in university libraries in Africa are noted by Mohammed, (2013); Mapulanga, (2012); Ezeani and Ezema, 2011; Amollo, 2011; Mbambo-Thata, 2007; Fabunmi, Paris and Fabunmi 2006; Rosenberg, 2006; for example. These challenges include but are not limited to poor telecommunication, infrastructure, low internet connectivity, lack of highly skilled personnel, software and hardware challenges, high cost of equipment, poor funding, inadequate power supply, , lack of organizational infrastructure, legal and copyright laws plans and strategies, policies, lack of the coherent plan for universities ICT project sustainability; and the non-existent of National Information Communication Infrastructure (NICI) policy. Adequate and proper planning could play a critical role and be imperative in circumventing or ameliorating some of these challenges in Africa. At a national level, a report by the South African National Research Foundation (NRF) demonstrates the importance of planning in digitisation. The NRF reports expressed that: *"Planning helps to prevent inappropriate decisions from being taken [...] a well-planned project facilitates the management, quality assurance and evaluation of the project."* The NRF report recommends that in digital projects, planning must be preceded by putting in place a "planning team" which will be trusted with the responsibility to *"plan and manage the implementation of the digital collection project"* (Ubogu et al., 2010: 49). Thus, the planning team will essentially be involved in strategic decisions and choices such as the development of long-term goals, as well as identifying and evaluating strategic alternatives. Ubogu et al., further propose that the members of the planning team must be people chosen for their knowledge and expertise in collection contents, intellectual property, IT and other related and relevant fields. One can deduce from these various views propounded in the literature that failure to observe proper planning prior and during digitisation projects can lead projects to fail.

2.8. Selecting Materials for Digitisation

Cultural heritage and memory institutions, including libraries, hold disparate collections in a multiplicity of media. These collections represent an accumulated body of knowledge over an institution's history of existence; these collections are acquired, managed, preserved and sometimes discarded depending on the "demands and requirements" of the custodial institution and of its users, often through established collection policies (Hughes, 2004: 32). Selection has long been an issue in libraries. Academic library settings have traditionally had well-developed mechanisms for selecting analogue materials in their collection development efforts. Ayris (1998) maintains that similar arrangements must be made for digitisation to be undertaken in the current digitisation dispensation. Some literature has been written on selection of materials for digitisation, and most researchers have emphasized the need and the strategic importance of selection of materials within the context of digitisation projects (Hazen, Horrell & Merrill-Oldham, 1998; Lee, 1999; Hughes, 2004; Jordan, 2006; Ooghe and Moreels 2009; Bulow and Ahmon, 2011, for example). According to Teper and Shaw (2011: 717), setting parameters for what can be included in a digitisation project is the first step in assessing a collection's readiness for digitisation. This means that libraries need to do careful initial assessments of collections to inform the decision-making process of ultimately selecting the materials one wish to digitise: this is crucial since it helps in ascertaining the scope and complexity of such projects before they are implemented. A modality for assessing collections for selection is explained by Hughes (2004: 39) as she proposed that a collections survey, a user needs analysis or survey of the user, a cost-benefit analysis, as well as a consideration of strategic, institutional issues must be assessed before embarking on a digitisation project. Chowdhury and Chowdhury (2002: 105-106) insist that irrespective of the rationale for which digitisation is being undertaken, the selection of materials to be digitised must precede all other steps in the digitisation life cycle. They suggest that selection processes are influenced by various factors including: the projects' objective; the available resources; identified users; and the time available. They nevertheless contend that the process of selection (or rejection in some cases) of materials to be digitised must be guided by a clearly articulated selection guideline.

Selection is indispensable in digitisation because for most cultural heritage institutions, it is infeasible to digitise entire collections. Lor (2008: 121) is of the view that the sheer quantum of materials available to be digitised makes selection a crucial venture to pursue. Selection, Lor states, is *"making choices to avoid being overwhelmed by the sheer volume of material"*. Thus, a careful selection of materials is essential in a digital imaging project because not all valuable materials within the collections can logistically and feasibly be digitised. The following comment from Bulow and Ahmon

(2011: 47) explains the overarching importance of selection. They assert: *"astute decisions at the selection stage will build a robust programme of digitisation projects that enhance the value of an institute's holdings, broaden audience engagement and make a genuine contribution to the welfare and knowledge of a collection".* Nonetheless, selection is an issue many institutions will have to come to terms with in all heritage sectors; hence, a decision to digitise should be informed by an understanding of what makes selection fundamental in any digitisation programme.

Selecting materials for digitisation can be highly complex. There is a great diversity in the approaches to selecting materials to be digitised. It is often determined within the context of institutional goals and priorities as found by Ooghe and Moreels (2009). Thus, the criteria for selection, as observed, are determined primarily by the environment where digitisation takes place. Ooghe and Moreels (2009) suggest that this diversity of approaches to selecting materials for digitisation indicates the "complex nature of selection". This complex nature of selection choices and criteria, Ooghe and Moreels suggest, hinders the development of an acceptable and uniform framework of selection criteria that serves as a possible common ground for all selection practices. This tells us why developing an overarching framework to serve as common ground for independent and consistent decision-making across the entire heritage sector has proven difficult. A recent study conducted by Rafiq and Ameen (2013: 42) on the status of digitisation in university libraries in Pakistan revealed multiple approaches used by libraries when selecting materials for digitisation; they found out that the criteria used by libraries to select materials to be digitised varied. However, the "academic importance", "to increase access to the documents" and "to reduce damage to originals" were the three most highly-ranked elements for the selection for digitisation in Pakistani universities. Other lower-ranked reasons were: "historical/cultural value", "preservation of material", "to save library's physical space", "age of the material", "demand of the users" and "commercial/revenue generation potential." Many institutions may also select materials for digitisation on the basis of their current interpretation of what is important and is of enduring value and requires digitising for ensuring long-term access and preservation. Another approach to selection has relied on randomly selected items, to ensure that a representative sample of materials has an equal probability of being chosen (Lor, 2008:121 citing Rugaas, 1998). The difficulty in selecting materials for digitisation based on value implies some subjectivity and bias in understanding, since "value" may mean something different, to different people in different contexts or situations.

2.8.1. Selection Criteria for Digitisation

According to Ravenwood (2013: 34), selection criteria "*provide a method of articulating value, and allow comparative assessments to be made between competing materials*". It is suggested that, in the

consideration of criteria for identifying and selecting materials for digitisation, several factors come into play in the selection decision process. Bulow and Ahmon (2011: 49) examined the principles and process of selection. They noted that the selection process typically includes such activities as: establishing a proposal to proactively identify and propose a "potential collection for digitisation"; developing a selection procedure and panel for processing the proposals; as well as conducting initial assessments of materials. Hughes (2004: 32) is of the view that the process of selecting specific items to be digitised will employ standard library selection criteria such as significance to the overall collections, value, availability, user demand and interest, and fragility of the original. A criterion common in the literature is copyright. The copyright status of the original material is touted as a crucial criterion for selecting materials in digitisation, Hence, the status of material in terms of its copyright and ownership must be clarified (Hughes, 2004: 32-33; Jordan, 2006: 32; Pandey and Misra, 2014: 138) and must be applied to any materials in any approach adopted or devised for selecting content for digitisation. Institutions, therefore, are advised not to proceed with digitising materials when the ownership and copyright status are uncertain, and for which digitising institutions do not have the right or permission to digitise or the means to manage access and use of digital assets (Bulow and Ahmon, 2011: 49).

Since the 1990s, a number of criteria have emerged out of the cultural heritage and memory institutions for selecting materials in digitisation. An earlier study (Gould and Ebdon 1999: 12) surveyed over 150 cultural heritage and memory institutions including national libraries, archives and university libraries: they outlined some criteria cultural heritage and memory institutions adopted in their selection process. The survey revealed that the most prevalent criteria (in order of highest ranked first) were: "historical/cultural value"; "to increase access"; "academic importance"; "to reduce damage" and "preservation". Other less influential criteria were to: "provide document delivery service", "save space", "research into digital processes" and "commercial exploitation". It could also be inferred that the criterion "save space" suggest some digitisation projects discard originals after digitisation.

A number of systematic approaches to selection have been described in the literature and many others have developed rigorous criteria and strategies to guide in the selection of materials for conversion into digital form. In the study by Hazen, Horell and Merill-Oldham (1998: 12), they proposed a checklist for decision-making when selecting materials for digitisation. They suggest that the following structure of questions must be asked in order to reach a decision for consideration of materials for digitisation. The questions covers the following: copyright, current potential users; the intellectual nature of the source material; actual and anticipated nature of use; the format and nature of the digital product; relationships to other digital efforts; describing, delivering and retaining the digital

product; and cost and benefits. A decision-making matrix for selecting materials for digitisation was developed. The matrix applies such that, if any of the answers to these questions are "NO", an alternative approach must be considered.
The questions are summarized as follows below in table One:

Table 1: Decision-making matrix

1	Does the material have sufficient intrinsic value to ensure interest in digitisation?
2	Will digitisation significantly enhance access or increase use by an identifiable constituency?
3	What goals will be met by digitisation?
4	Does a product exist that meets identified needs?
1	Are rights and permissions for electronic distribution securable?
6	Does current technology yield images of sufficient quality to meet stated goals?
7	Does technology allow digital capture from a photo intermediate?
8	Are costs supportable?
9	Does an institution have sufficient expertise in project management?
10	Is the local organizational and technical infrastructure adequate?
11	Can the project be re-defined to recast objective?
12	Can infrastructure needs be addressed?

Decision-making matrix (Hazen, Horell, and Merill-Oldham, 1998:28).

Similarly, the selection criteria according to Vogt-O'Connor (2000) consist of three stages: nomination, evaluation, and prioritization. Vogt-O'Connor observes that, during nomination stage, a broad variety of stakeholders which may include creators, donors, researchers and managers, may recommend which groups of materials should be selected for digitisation and which ones to deselect; in the evaluation stage, a committee which may include digitisation specialists, librarians, researchers, lawyers, conservationists, and education specialists, would compare the group of materials that were nominated for selection and de-selection and sets aside the material that appears on both lists for further evaluation. The prioritization stage comes into play when too much material is nominated.

Another systematic option is to use the Technical Advisory Service for Images (TASI) proposed set of guidelines for the purpose of selection; that is: understand the copyright status of materials; get enough metadata relating to materials to ensure adequate description and retrieval of digital objects; establish and understand the modalities pertaining to the material or collections; determine the

technical feasibility of digitally imaging the materials and determine the intended and potential audience of digitised assets and how they will be delivered (Chowdhury and Chowdhury, 2002 106-107). Furthermore, the goals and priorities of an institution's digitisation strategy could also influence selection. The work by the UNESCO, IFLA and ICA *"Guidelines for Digitization Projects*" (2002: 13-15) suggest that digitisation projects selection criteria should be user-driven based on high demand for access; opportunity-driven, (i.e. when an institution has the capability and capacity to pursue.) and preservation-driven or have the need to safeguard fragile or threatened materials. Three broad criteria for selecting material for digitisation were proposed, these being: content, condition and the demand. Lor (2008: 121) also identifies some factors that affect selection decisions, these are: the mission of the institution; the anticipated needs of the library users; financial resources; copyright status; national or language biases (for example, the digitising libraries or agencies tend to concentrate on materials from their countries and in their languages).

Again, the study, *"The Digitised Content in the UK Research Library and Archives Sector"* found that the selection criteria many libraries and archives institution used in selecting materials include: materials relevance to institutional mission, access, demand, existence of coherent collections, uniqueness or rarity, and in accordance with "good collection management principles" rather than simply to meet the aims and objectives of funders. The study also indicates that, while the smaller digitisation project continues to expand in terms of information resources, some institutions have resorted to digitising materials "according to market need and user feedback" (Bultmann et al., 2005: 3, 39) whilst content value and archival value are the most preferred criteria for digitisation for both librarians and users; other less ranked criteria were the rare nature of documents; mutilated condition; users' need and cultural heritage (in descending order) as revealed in a survey of digitisation initiatives in special libraries in India (Shampa and Sashi, 2014: 233). It should be clear now that, these criteria will have to be determined and formalised in order to give digitising institutions some guide to prioritise for collections earmarked for digitisation.

Ooghe and Moreels (2009) demonstrated how guidelines for selecting material for digitisation vary for heritage institutions. Ooghe and Moreels analysed digitisation criteria obtained from policy documents in heritage institutions from various countries. They proposed a common set of twenty-five questions which are sector-independent and considered as selection criteria when selecting content from heritage collections for digitisation. They grouped the list of questions for developing selection criteria into six categories:

- Institutional frameworks: (i.e. collection policy; selection by collection design; aims and purposes of the existing digital collection; copyright and other legal restrictions);

- Value of the material: intrinsic value (content, clarity, completeness), contextual value, use value (selection and audience), selection by affiliation; accessibility and availability, representativity, sampling (arbitrary/randomised selection), aesthetics and visual appeal;
- Physical criteria: physical state of the material, accessibility of content, quality after digitisation, added value after digitisation;
- Unicity (that is, 'uniqueness') and digital multiplicity: copies and multiples within the collection, digital substitution, multiplicity across collections;
- Selection through metadata;
- Financial framework: (i.e. cost of selection, costs of digitisation, opportunity costs, cost of metadata, the cost of loss potential income (e.g. economic selection).

To conclude, it could be argued that institutions usually select/identify the materials to be digitised from their collections based on their context of value. These materials are also most often selected by digitising institutions according to selection criteria available and explicitly documented or developed to address local selection need.

2.9. Skills and Staffing Requirements in Support of Digitisation

According to Hughes (2004: 96-97), all aspects of staffing and human resources ought to be considered during the planning stages of digitisation initiatives. Breeding, (2014: 17) intimated that digitisation projects are not only aimed at realising the advantages of digitally converting a given collection, but also to ensuring the building of capacity in terms of infrastructure and expertise. Poor planning and a lack of digitisation skills could lead to project failure. The study by Bultmann et al., confirms this assertion. Bultmann et al., (2005: 5) found that lack of expertise was a major barrier in digitisation projects in UK's research and archive sector. This implies that it is important that digital projects are managed from the very beginning. The NISO framework Initiatives Principle 1 suggest that digitisation should begin with appointing competent and skilled staff, to planning and designing an efficient and effective programme (Initiatives Principle 1), the principle further explains that staffing expertise and skills should include a variety of people who can manage projects and teams working with digital equipment or maintain it and are skilled in networks, software, and communication (NISO, 2007: 48). The Initiatives Principle 2, NISO (2007: 86) also points out that appointing competent and skilled staff is essential from the start of the project planning. However, an earlier survey by Gould and Ebdon (1999: 14) suggests that determining the number and allocation of staffing required by any institution undertaking a digitisation programme can be challenging. They remark that while major digitisation projects may employ dedicated staff, the library may sometimes re-assign existing staff to work in the digitisation project as part of their normal work. They add that

institutions may sometimes engage external contractors and vendors to undertake specialist aspects of the projects which the institutions do not have the skills and capacity to undertake.

Investing in team building is critical to the success of the digital projects. Jordan (2006: 185-188), examined the skills requirement in digitisation project teams by reflecting on the staffing required to work on digital projects. Jordan contends that the project's workflow, operations, and tasks expected to be executed in a digital project should influence and inform the planning and creation of the roles, job descriptions and types of "staff position" on any digital project. Chapman (2000) suggests a list of staff roles that are frequently involved in digitisation projects: these are a project manager, selector, conservator, curator or preparation technician, cataloguers or metadata specialist, scanning technicians or photographers and data entry technician. The remaining roles are programmers and database expert, systems administrator, network administrator and web developer and designer. Although Chapman's list is broad, not all the roles may apply to every project. The workflow and conditions of the original material, for instance, could define the staff requirement to complete these operational tasks.

A number of studies have suggested skills sets and competencies which they deem core to performing digitisation activities. According to Colleran (2000: 14), a digitisation project team will be composed of individuals with a variety of skills. Tanner (2001: 335) contends that although the "skills and aptitudes" required of librarians in the managing of digitisation projects may seem challenging, the demand and expectations for librarians to possess these requisite skills in undertaking such digital projects is nonetheless, well-placed. He insists that librarians have a rich depth of transferable skills which puts them in an advantageous position in order to adapt and apply new skills to the changing technological needs of the library environment. For Tanner, the skills required to effectively undertake digitisation projects are skills in project planning and risk management. He essentially categorised the skills required by librarians in undertaking digital library projects into three main domains of expertise. The skills are management skills, technical skills and subject skills. While these skills are essentially distinct they are inextricably interlinked. Digital library projects such as digitisation, therefore, require a combination of such critical skills to ensure projects are effectively implemented.

Furthermore, developing digitisation into core skills in library staff is an essential requirement for digitisation projects in libraries. Perry (2005: 523) observed that while many Metropolitan New York Library Council (METRO) members were enthusiastic to embark on digital projects, they had a major impeding obstacle which was the lack of expertise. Adeleke, (2014: 2084) points out those librarians who are tasked with the responsibility for establishing and maintaining digital collections require "certain skill sets and competencies". In this vein, Choi and Rasmussen (2009), sought to understand

the skills and qualifications required of digital librarians. They did this by conducting a content analysis of 363 job advertisements of digital library positions published in College and Research Libraries News (CRLN) from the year 1999 to 2007. They found that knowledge/skills in technology and management were the most frequently cited as required or preferred qualifications. Skills in resource building (i.e. "creation and management of digital information, digitisation, and metadata") emerged as the most frequently mentioned technology-related competency for academic libraries. Meanwhile, their findings also revealed interpersonal, communication skills and project management skills as the most frequently mentioned management expertise. Rafiq and Ameen (2014b: 29) also surveyed staffing patterns in universities in Pakistan. They observed IT skills are increasingly required for digitisation work; Rafiq and Ameen argue that libraries use continuous development programmes to enhance the IT skills of library staff in order for them to support digitisation activities. This is common with the findings from the McRostie (2014: 12) study, reporting on the University of Melbourne efforts in establishing an enterprise digitisation capability; this revealed that skills of the digitisation staff were mostly developed "on-the-job", adding that their skills development was possible because the staff had a background and a basic knowledge in "micrographic and imaging services".

The need for requisite skills for digitisation projects is a global one. In Europe, Verheusen (2008: 28) reports that European Union (EU), under the i2010 vision, launched the European Digital Library, an ambitious plan to embark on large-scale digitisation projects with the aim of transforming "Europe's printed heritage into digitally available resources", but the lack of expertise and knowledge in digitisation is reported to have contributed to the delay in completion. In Africa, Eke (2011) observed that lack of skilled personnel was a major challenge militating against digitisation projects. Technical skills are also identified as crucial skills in digital conversion projects, yet are skills generally considered to be lacking in Africa (Ezeani and Ezema, 2011; Hamooya and Njobvu, 2010, for example). Hamooya and Njobvu (2010: 245) reviewed the digitisation project at the National Archives of Zambia and concluded that, although the project was largely successful according to what was planned, one of the few drawbacks of the project was that the National Archives did not have adequate staff and the few available staff did not possess requisite *"knowledge about computers"* and the implication of this is that the staff could not fully understand the technical requirements and aspects of the digitisation projects. They recommended training of staff involved in the digitisation projects in order to equip them with some "basic computing skills". Similarly, Ezeani and Ezema (2011: 14) also report on a digitisation project at University of Nigeria Library and observed that many librarians did fully embrace technology but did not have the requisite digitisation skills: thus the digital technology project often posed a challenge for them. With this, Ezeani (2009:14) reiterate the importance of technical skills in digitisation, noting that digitisation highly depends on technology, and that continuing education is the only means to achieve technical skills, whilst Ezeani and Ezema

(2011) suggest the training for digitisation staff should include more than just technical (that is, selection of hard and software, metadata, checking, and verifying for quality control) skills and should include project management skills also. In a related view, project management skills, technical skills, metadata handling skills and quality assurance skills have also been described by JISC (2016) as essential skills for ensuring a successful digitisation project.

As already indicated; digitisation work demands specialised skill, beyond technical to include project management skills. Good project management in essential to ensure that digitisation projects achieve their goals. The importance of a project manager in overseeing a digitisation project has well been highlighted in a number of studies (Hughes, 2004; Jordan, 2006; and JISC, 2016; for example). It is important to identify who will lead the digital project and those that will assist as support staff. As Jordan (2006: 186) and Hughes (2004: 169) recommend, a project manager should be identified to plan and take responsibility for the project, with other project staff reporting either directly or indirectly to the project manager; depending on the scope and size of the project, small projects may have just one project manager who may double as the supervisor. In large projects, the project manager may have more than one supervisor reporting to him or her. In some instances, a steering committee or advisory boards perform the role of a project manager. Hughes also throws more light on the project manager's responsibilities. The roles of a project manager in a digitisation project is the person responsible for co-coordinating the various elements of the project, right from the planning stage through to the implementation and the final delivery of the "finished product" (Hughes, 2004: 168) . The supervisor, however, is responsible for "scheduling and work queuing" (Jordan, 2006: 214).

In addition, Jordan suggests three staffing roles are required as a minimum to initiate and ensure smooth operations in digitisation projects. Project operations, he explains, are the set of activities related directly to the production of digital content. The core staffs are the supervisor, the quality control technician and digitisation technician. Jordan explains that the supervisor must have strong problem-solving skills, must be familiar with the computing environment; as well as knowledgeable about project hardware and software applications. The digitisation technician must also possess skills such as file management (e.g. file copying and renaming etc.) using the operating system; ability to interpret and follow documented workflows and processes; the ability to identify and resolve or report problems following established procedures as well as, being prepared to work on routinely repetitive tasks while still able to pay "sustained attention to detail". The quality control officer must also need to be able to perform repetitive and detailed tasks over a long period of time.

Similarly, the Joint Information Systems Committee (JISC) examined the staffing requirements of digitisation projects from a management perspective. JISC (2016), states that, it is important that

project managers are able to identify the essential "skills and knowledge" requirement within a project team and how those skills gaps can be filled so that the project objectives can be accomplished. JISC observed that the complex nature of digitisation projects require a unique "blend of skills and knowledge" which spans across project management competencies to specialists technical expertise: thus, JISC recommends that project managers who already have experience in digitisation be engaged if possible, otherwise an equally experienced project manager with a background in technology or information services could also be engaged.

Skills and staffing requirements have also been examined at the national level in South Africa. The National Research Foundation (NRF, 2009: 21-22) audit on South Africa's ongoing and planned digitisation initiatives also sought to establish the skills, expertise, and knowledge required by staff in digitisation projects. The NRF found that the qualities of digitisation staff should include: the abilities to effectively and efficiently execute digitisation project management and planning tasks; undertake activities such as collections sourcing, selection, and preparation, negotiating the copyright permissions to allow digitising and publishing of the digitised content, developing digitisation protocols and preparing appropriate digitisation workflow processes and metadata, handling all demands of digitisation. A digitisaton staff has professional skills cutting across a "wide range of domain and digitisation specialists". Repetitive tasks in digitisation such as digital image capturing and image processing, object optimisation, and enhancement which constitute largely the routine project operations could however be undertaken by "lesser skilled" staff when trained and equipped with suitable skills. The NRF staff audit report thus outlined a range of skills required in digitisation. These include: skills in collection development and management, permission negotiation, standards selection, equipment selection, image capturing and file management, metadata, material preparation protocol, project management and marketing and commercialization. The NRF recommended training and guidance and training to assist in skills upgrade.

Moreover, the growing importance of digitisation in libraries calls for the need for the greater attention to professional development and education for those working in digitisation. Maroso (2005) and Perry (2005), for instance, examined the training and educational opportunities for the professional development of staff working in a digitisation project. Workshops, they revealed, were by far the commonly available training and learning approach for developing skills germane to digitisation. Some institutions of higher education also offer professional development as credit-based courses and programs. JISC (2016) suggests that staff training is recommended to ensure digitisation staff *"develop new skills or to keep up to date with new technologies".* There are different regimes of training available to achieve this. JISC (2016) outlined the sources and levels of training required for digitisation training. The sources may include: sector-specific digitisation training; hardware or

software specific training (provided by vendors or suppliers); tailored training, provided by external consultants; "cascading training" (where one person trains others within an organisation); as well as studying a "workflow manual" which, after creation can be used for self-paced learning. These assertions buttress the fact that training is a viable solution for the tackling of lacking digitisation skills among digitisation staff which libraries must not overlook.

2.10. Digital Preservation

A number of definitions have been proposed by researchers and practitioners to explain the concept "digital preservation". According to Oehlerts and Liu (2013: 84), *"digital preservation is the conscious effort to maintain the integrity and authenticity of the master digital object and its accompanying files by creating a preservation plan and periodically reviewing the digital files to identify and correct any degradation.* Dobreva and Ruusalepp (2012: 193) also recognise digital preservation as the set of activities which assure "interoperability over time". These definitions suggest that digital preservation is not a one-off action, but a deliberate process, an on-going and active activity that ensures permanent access to digital information. In addition, although definitions are varied, there is somewhat of a consensus as regards some aspects of the definition of the concept. Caplan (2008:7) observes that in spite of the many definitions of the concept "digital preservation"; most agree that "it is a set of activities aimed towards ensuring access to digital materials over time". Caplan suggests these set of activities are generally meant to accomplish a particular core set of goals which includes ensuring the availability, authenticity, identity, fixity, renderability, viability and understandability of digital information.

2.10.1. Preservation and Digital Preservation

The role of the library is to acquire, store and disseminate information. Ross (2012: 43) and Breeding (2014: 16) draw attention to the traditional role of libraries, which is to archive, store and make the information available for reuse. There is also the recognition of the need to preserve culture and heritage for the long-term. Over the years, however, there has been a proliferation and exponential increase of digital data globally due to the increased power of computers and network technologies as well as the relative ease of creating and generating digital information (Hockx-Yu, 2006: 234). Ross (2012: 44-48) advocates that it is essential that heritage institutions be curators of their own cultural heritage, and research. Preservation is no longer just about back-up; it about preserving the life-cycle

of the original and digitised object on an institutional level. One reason attributed to this is that libraries and other heritage institutions are increasingly investing in digital object preservation and creating digital libraries (Conway, 2010: 74). In this light, digital preservation has been touted as a key aspect of digital libraries because, without it, the future access to the vast volumes of digital resources created and collected by libraries today could be jeopardized (Dobreva and Ruusalepp, 2012: 193). Gladney (2006: 111) noted that digital preservation originated through cultural heritage communities who saw a need to preserve the oral traditions, documents, images, and artifacts of their culture and heritage. Some link has been drawn between traditional preservation and digital preservation. Bradley suggests that digital preservation, not only has a lexical link to archival preservation but also "philosophical and conceptual" links (Bradley, 2007: 151). The practical and conceptual difference between archival preservation and digital preservation has, however, been delineated by Deegan and Tanner (2006: 2), they state that digital perseveration has mostly been represented as clearly different from traditional preservation, in that, the underlying concepts and "principles driving preservation imperatives" of these two concepts are intrinsically disparate. This is because digital and non-digital forms of information are essentially technically different. They assert that, although creating digital surrogates of originals does not, and cannot, replicate or preserve all the physical attributes of the original, not creating digital surrogates of the fragile originals could lead to the permanent loss of the original should the original be compromised.

Nevertheless, findings by the Human Advanced Technology and Information Institute (HATII) indicates that although there is an increasing awareness to look at the long-term preservation challenges, few libraries and organisations are actively working toward establishing preservation policies and procedures (Ross, 2012: 47). Consequently, one would concede that the subject of digital preservation has gained prominence within libraries and other cultural heritage communities in the last few decades, as facilitated by the changing field of technology. This points to the conclusion that, the preservation of digital content (i.e. both digitised and born-digital objects) is not only crucial for libraries but for the long-term access to the world's digital heritage as well.

.

2.10.2. Digitisation as a Preservation Strategy

The literature more often emphasises the differences between digitisation *per se* and digitisation as a preservation strategy. According to Şentürk (2014:11), *"digitization is one of the important techniques used in archives to protect unique archival material"*. The role of digitisation, however, as a preservation strategy has been debated variously. More and more questions have been raised about the legitimacy of digitisation for preservation. Deegan and Tanner (2006:5) assert that the role of

digitisation within the arena of preservation has to be clearly stated. This point is well-articulated by Bawden and Robinson (2012:156), who are of the view that information technologies have both helped and hindered archival preservation. They argue that having digital surrogates of analogue information records provides a viable alternative to safeguarding against loss by natural and man-made factors. A number of studies are in support of this view (Lee, 2001; Hughes, 2004; Badhusha, 2008; Bulow and Ahmon, 2011 for example), as they acknowledge digitisation as an appropriate preservation strategy, with most of them agreeing on the role digitisation can play in support of preserving the analogue record other than the digital objects themselves. Hughes relates to this position, as she noted that digital surrogates of a fragile or rare original object, for instance, provide access to users, and as it were, reduces or prevents the handling of fragile originals altogether (Hughes, 2004: 11). Nevertheless, these assertions have been challenged in the literature; particularly on the basis that information technology (IT) is perceived to present a dilemma for preservation.

As noted, contrasting opinions have been expressed, as many archivists and librarians continue to doubt the digital medium as a preservation alternative because of the belief that there is still not enough evidence of research on its viability and long-term sustainability (Deegan and Tanner, 2006:12). Routhier Perry (2014:1) attributes this dilemma to the opposing schools of thought on digital preservation. While some perceive digital preservation as the most significant advancement in the field of preservation, some also perceive it as not the only, or even the best, solution to preserving information for the long-term. Glushko summarizes this dilemma as he notes: *"Preservation is often a key motive for digitization, but digitization alone is not preservation. Digitization creates preservation challenges because technological obsolescence of computer software and hardware require ongoing efforts to ensure the digitized resources can be accessed"* (cited by Kosciejew, 2015:22). This assertion, therefore, suggests that while digital copies of digitised materials safeguard physical equivalent against loss and deterioration, the long-term preservation of the digital surrogates themselves cannot be guaranteed. This worrying concern is succinctly expressed by Kosciejew as he asserts: *"It is doubtful that individuals will be able to engage with today's digitized materials in 10 or 20 years, let alone 100 years, as they still will be able to interact with [the] centuries old physical documents*" (Kosciejew, 2015:22). The challenge is that preserving digital copies over the long-term is difficult to guarantee. Digital preservation is largely an "unchartered territory" for which the "best methods" to preserve digital objects are not yet fully known and understood. In comparison, the physical archival equivalents like paper documents however, withstands the test of time with demonstrated ability to last centuries if properly preserved (Smith, 1999: 4; Conway, 2010; Bawden and Robinson, 2012: 156). A case in point is made by Madalli, Barve and Amin (2012:163), who evaluated some selected open-source software for a digital library to identify the availability of support for digital preservation. The study concluded that "development in digital preservation is still in a very early and experimental stage".

Similarly, some authors have equally expressed their scepticism about the role digitisation plays in the preservation of digitised content (Caplan, 2008: 4; Conway, 2010 and Routhier Perry, 2014 for example). As Conway (2010:65) observed, digitisation as a preservation strategy is a relatively "new and still-controversial" phenomenon within the cultural heritage community. This difficulty leveled against digitisation as preservation strategy is not recent. In 1999, Abby Smith's article "Why Digitize?" unequivocally posited that *"digitization is not preservation – at least not yet"* (Smith, 1999:4). Smith argues that, although many benefits are derived from digitisation, which includes an *"extraordinary access to information"* of digital objects, the "permanence and authenticity" of digital files are not among those benefits (Smith, 1999:3-7).

Caplan (2008:4) and Conway (2010:65), attempt to explain the challenges digitisation faces as a legitimate preservation digitisation strategy. They distinguished between what they termed "digitization for preservation" and "digital preservation". They argued that although some find the distinction between these two terms is confusing, there is, however, a fundamental difference between both terms conceptually and practically. Caplan contends that "digitization for preservation" is a concept which emanated from the traditional archival field of preserving and conserving analogue records, emphasising that "digitization for preservation" necessitates the need for "digital preservation". This is because the "end products" of digitisation are digital natives which must themselves be digitally preserved (Caplan, 2008:7). Conway concurs with the differences in point made by Caplan, as he comments: *"digitization for preservation creates valuable new digital products, whereas digital preservation protects the value of those products, regardless of whether the original source is a tangible artifact or data that were born and live digitally*", but added that, although both concepts are closely connected, the "*underlying standards, processes, technologies, costs, and organizational challenges are quite distinct"*. Unsurprisingly, the role of digitisation as preservation strategy is yet to receive a consensus and has rather received different reactions.

Despite the foregoing dichotomy outlined regarding the role of digitisation as a preservation strategy, the Association of Research Libraries (ARL), by 2004, had endorsed and recognized digitisation, and digital preservation for that matter, as a "valid preservation method", and advocated for members of ARL and other stakeholders *"to make an organizational and economic commitment to adhere to accepted standards and best practices, and to establish policies and the capacity to maintain digital products for the long-term"* (ARL, 2004:1). It is not surprising therefore that the future of the world's digital heritage has been situated within the promising potential of digital preservation. This is echoed in comments made by Pandher as he posits that: *"digital preservation is the most viable and the only major technological alternative available to us for safeguarding our fast diminishing heritage"* (Pandher, 2012:117). This comment implies that failure of heritage institutions

to institute digital preservation measures and strategies to preserve the digital surrogates could threaten their long-term access. Vint Cerf, Google's vice-president, is reported to have underscored this difficulty as he notes, *"We digitize things because we think we will preserve them, but what we don't understand is that unless we take other steps, those digital versions may not be any better, and may even be worse, than the artefacts that we digitized*" (Kosciejew, 2015: 23). Thus it is crucial that digital preservation approaches and strategies are determined and relentlessly pursued from the onset of the digital lifecycle to reduce or possibly obviate the need to re-digitise original analogues repeatedly and to ensure the long-term preservation and access of digitised content (Deegan and Tanner, 2006:5).

2.10.3. Digital Preservation Strategies and Approaches

Digital preservation is a very complex and challenging domain. Gladney (2006) points out that, although libraries have recognised the need to digitise materials for long-term preservation, many have undertaken digitisation projects with a particular focus on storage and access. This trend is worrying since digital information needs to be preserved for future use because digital information is susceptible to loss. The long-term preservation of digital data could be compromised by a number of factors which could invariably result in the loss of digital information. Digital data is always highly at risk of permanent loss because of the transient media and coding schemes within which these data are recorded.

Deegan and Tanner (2006:6, 17) observed that the preservation of digital heritage materials is confronted by a number of challenges: "preserving the data stream's integrity"; "preserving the means by which the resource is experienced", as well as "preserving the means to interpret the data stream". Chowdhury and Chowdhury (2002: 216) outlined general factors that may lead to the loss of digital information as this may relate to; changes in an organisation, content reorganisation, cessation of sponsorship, hacking or sabotage, and disasters which could be natural or man-made. Similarly, Badhusha (2008:36) and Madalli, Barve and Amin (2012:161) also report on factors that could lead to the loss of digital information. Badhusha note that there are three fundamental factors that could cause digital materials to be inaccessible: the first is the physical decaying or degradation of the information media, the second is the emerging of new computer systems and peripherals which are not compatible with older materials, and the third is digital obsolescence of software that makes digital files unfeasible to render. Meanwhile, Madalli, Barve and Amin identified technical failures; lose of software that interprets the stored information or "inability to access physical storage media on which digital information is stored" as possible causes to the loss of digital data. It is clear that while Chowdhury and Chowdhury's factors were broad and captured sociotechnical and organizational

issues, the factors highlighted by Badhusha and Madalli, Barve and Amin essentially focused on technical issues of technological obsolescence. This supposes that there is no "one-size-fit-all" solution to digitally preserving digitised contents; some of the digital preservation problems require technical strategies to address, whereas others require organisational level solutions, or a possible combination of both.

There is recognition in the literature for digital perseveration strategies and approaches. Several approaches and strategies are employed for digitally preserving digitised contents as identified and expounded in various studies (Chowdhury and Chowdhury, 2002; Deegan and Tanner, 2006; Jordan, 2006; Dobreva and Ruusalepp, 2012, for example). Much of these research addressed technical issues in digital preservation. Chowdhury and Chowdhury (2002:219-220), for instance, suggest three broad possible technical approaches to digital preservation. These are technology preservation, emulation, and migration. Deegan and Tanner (2006) also examined some of the strategies and approaches to ensure the preservation of digital data; these include, refreshing, technology preservation, migration and reformatting, emulation, output to analogue media and data archaeology. This implies that, the choices to be made between the various preservation strategies and approaches available for adoption rely in part on the properties of the digital object that the institution wants to preserve. Deegan and Tanner (2006:41-43) described the concept of "significant properties" to illustrate this. Significant properties are the "content and functionality that is required by the archive". Thus, any particular type of strategy or approach may not be appropriate for all types of digital information.

Sustainability is central to digital preservation. Bradley (2007) discussed digital preservation strategy within the broader context of digital sustainability. Digital sustainability, Bradley explains, "*encompass[es] the wide range of issues and concerns that contribute to the longevity of digital information"*. Bradley (2007: 157-158) posited: *"technologies do not sustain digital objects: institutions do, using the available technology"*. Bradley advocates that the digitally sustainable way to preserve digital information of sustained value is to build a viable *"organizational, economic, social, structural, and technical infrastructure"* environment. This assertion fundamentally suggests that digital preservation does not happen in a vacuum, rather in a complex environment in which the heritage institution(s) are concerned. Hughes (2004: 205) recommends that the best way to ensure the preservation of digital data for long-term access is to use "standard formats and open systems" such as Open Archival Information System (OAIS) and where possible, ensuring the project is guided by a "preservation and sustainability strategy".

Nevertheless, the successful long-term digital preservation and access of digital information continues to present challenges for the digital future. Kosciejew (2015) explains that much of the future of digital information, including digitised content, is under threat of "lost for future generations due to

the corrosive phenomenon of bit rot". The bit rot he defines refers to the *"irrevocable degradation or loss of digital information when the infrastructure (the hardware and software) required to access, interpret, view, and use this information is no longer available or executable".* Vint Cerf, Google's vice-president, proposes what he calls "digital vellum" as a possible intervention and solution to help counteract, or at least reduce the bit rot's threats. In addition to the "digital vellum", open formats, checksum, platform diversification, microform, and greater research were highlighted by Cerf as other possible interventions and solution for combatting the bit rot menace (Kosciejew, 2015:21-24).

Moreover, the success of preserving digital materials requires standards for file formats. Creating multiple files in different file formats in the appropriate format could be crucial in supporting digital preservation. Verheusen (2008:38) reports on the experience of a number of large-scale digitisation projects at the Koninklijke Bibliotheek, the National Library of the Netherlands: Koninklijke Bibliotheek digitisation projects created archival master copies mostly in TIFF (Tagged Image File Format) for long-term preservation and for future reuse while derivative service copies were created from the archival master copies for delivery, as well as for presentation on the internet. In the same vein, Madalli, Barve and Amin (2012:161) conducted a study that evaluated open-source digital library software (OSS-DL) in order to investigate and understand the availability of digital preservation support that existed in these OSS-DLs. They recommended that, it is imperative to convert digital objects from "proprietary formats into open formats and open standards" before the digital objects are ingested and archived for storage, retrieval, and preservation across time. They add that, it is necessary that the software programs libraries adopt for their digital libraries have proper digital preservation support and interfaces which are user-friendly with appropriate submission guidelines which are compliant with the OAIS Reference Manual, since libraries will have to, in the future, engage with digital materials. A case study by Oehlerts and Liu (2013) described digital preservation practices and processes that were implemented successfully at the Colorado State University Libraries. They gave an account of the planning measures pursued in order to curate and archive their local digital assets for long-term preservation and access. They found that digital preservation is a crucial aspect of digital assets management which by its nature is a complex and constantly evolving practice. They conclude that libraries have often overlooked and understated the importance of digital preservation in the operation of libraries. They recommend digital preservation tools and processes be developed and implemented through collaborative approaches considering the ever-increasing resource constraints libraries face. Furthermore, Oehlerts and Liu contend that accessibility, interoperability, and sustainability are the criteria that must guide the choosing of archival file formats (Oehlerts and Liu, 2013:88).

The focus of digital preservation approaches and strategies has partly drifted away from problems of technical obsolescence toward framework issues. The OAIS framework, for example, provides a critical framework for a permanent long-term preservation of digital information (CCSDS, 2012: 1-13). Common OAIS systems include Institutional Repositories (e.g. DSpace), open source (e.g. LOCKSS) electronic theses repositories (e.g. EThOS), and centralised repositories (e.g. AHDS) (Paradigm, 2008). The LOCKSS (Lots of Copies Keep Stuff Safe) participants have perpetual access to digital copies as part of a collaborative preservation infrastructure by essentially creating redundant copies of digital content (Chowdhury and Foo, 2012). Further, the significance of Trusted Digital repositories (TDRs) cannot be overstated as far as digital preservation for long-term access is concerned. TDRs aim to provide permanent access to digital resources for a designated community (Dale and Ambacher, 2007).

The literature also reveals that, there have been several collaborative digital preservation strategies and efforts among heritage institutions and the heritage industries at the institutional, national and international levels. Deegan and Tanner (2006), Jordan (2006) Oehlerts and Liu (2013) for example, outlined some of these collaborative efforts. Oehlerts and Liu (2013: 85-87) report on some national and international efforts in the US, Australasia, and Europe. In the US, the National Digital Information Infrastructure Preservation Program (NDIIPP) spearheaded by the Library of Congress has developed a national strategy for digitally preserving US digital heritage for the digital future. Again, the Research Libraries Group (RLG) and the Online Computer Library Center, (OCLC), through collaborative efforts, came out with a report on the "attributes and responsibilities of trusted digital repositories" in 2010 by an international group of experts. The "Open Archival Information System (OAIS) Reference Model" and the Trustworthy Repositories Audit and Certification (TRAC) have been developed as critical frameworks for establishing and enhancing digital preservation services, and for the building and certifying of trusted digital repositories respectively. This implies that the digital materials must be collected, indexed, stored and managed appropriately to sustain preservation. More so, Europe in general, the European Commission's (EU) pan–European project, ERPANET, the Digital Preservation Europe (DPE), and the SCAPE Project-Scalable Preservation Environments, for example, provide a framework for a Europe-wide collaboration in digital preservation efforts. At national levels however, the Digital Curation Center (DCC) in UK and NESTOR in Germany also continue to provide capacity and capabilities to address digital curation and preservation issues. In South Africa, the South African Data Archive (SADA) is one of the important agencies with such digital preservation mandates (SADA, 2015).

2.11. Conclusion

This chapter began by examining the concept of digitisation. The advent and diffusion of digitisation in cultural heritage and memory institutions in general and in HEIs and libraries in particular, as well as the benefits of digitisation were also considered. Digitisation initiatives taking place on the Africa continent, as well as international scene were also highlighted. A comprehensive review of the literature was done to understand issues of digitisation policies and digital project planning. Again, to understand issues related to materials selection for digitisation literature covering selection criteria on digitisation was also examined.

Furthermore, studies on skills and staffing requirements in support of digitisation were also analysed. In addition, literature on digital preservation; digitisation as a preservation strategy; as well as, some of the strategies and approaches that exist for digital preservation were thoroughly reviewed. The next chapter deals with the research methodology used for this study.

Chapter Three
Research Methodology

3. Introduction

This chapter describes the research methodology and design used to achieve the objectives of the study. It begins with the research paradigm and an explanation of case study research design; the disadvantages and advantages of case study design will also be highlighted. The specific methodology used for this study is described, including population, target group and sampling techniques, data collection method and instrument used; the advantages and disadvantages of interviews. The data analysis and interpretation procedures used are also discussed in this chapter. Questions of research trustworthiness, quality and ethics are finally highlighted.

3.1. Research Paradigm

Quantitative and qualitative approaches are considered the two broad basic paradigms to research (Bryman, 2012). Quantitative research essentially employs measurement of quantity or occurrences in the analysis of data which are invariably expressed in terms of numbers. Qualitative research emphasizes descriptions and statements via an in-depth analysis of a problem or data. These two approaches can be combined within a single project with an overall strategy to collect both quantifiable data and qualitative data. This combination of approaches is referred to as a "Mixed Methods approach". This approach mutually offers a better understanding of the investigation than either qualitative or quantitative data alone can provide (Bryman, 2012).

To meet the objectives of this study, the qualitative approach of research was adopted to understand the "true picture" of the prevailing practices of digitisation at the UGLS, and to collect opinions of the subjects under investigation. According to Creswell (2013:44), *"qualitative research begins with assumptions and the use of interpretive/theoretical frameworks that inform the study of research problems addressing the meaning individuals or groups ascribe to a social or human problem".* Qualitative research is often characterized by the fact that such an approach to enquiry or a problem is emergent, and does not follow a tightly prescribed initial plan. Creswell explained that, in such an approach, the researchers often "position themselves" to investigate and collect data on the problem or issues from the natural setting of the participants under study, while multiple methods of data gathering may be employed.

More so, the researcher becomes the key instrument of data collection in qualitative research. Data collected is described and interpreted though complex reasoning with the aim to derive meanings from the statements that participants make about an issue or problem under study.

Moreover, qualitative research is an appropriate investigative tool for use when problems or issues need to be explored so as to gain a deeper understanding of the problem or issues. Qualitative research is also important when the researcher wants participants to be empowered to share their stories, and when the researcher want to employ a "flexible style" and literary approach in explaining the mechanism and linkages in models or causal theories, so as to develop alternative theories when the existing theories do not "adequately capture the complexity of the problem" under study (Creswell, 2013:43-49).

In addition, qualitative research design have some typical characteristics, some of the essential attributes that identify qualitative design includes literature review, the theoretical framework, using a human instrument, and field work in a natural setting. Other essential components are purposive sampling and other appropriate data collection techniques. More so, inductive reasoning is generally applied in qualitative approach allowing the design to emerge iteratively. Finally, grounded theory, negotiated outcomes and the formulation of tentative applicable hypothesis where the findings of the research approach are transferable "based on contextual applicability" are also characteristics of qualitative research design (Pickard, 2007:14).

Bryman is of the view that, although the preoccupation of qualitative research is with a process of describing and interpreting phenomena through the perceptions and world view of the research participants context, the qualitative research process allows flexibility of interpretive structure. Nonetheless, some criticisms have been leveled against this approach. These criticisms include: the "impressionistic and subjective" nature of the approach; the difficulty of replicating a qualitative study; the problems of generalization and the lack of transparency (Bryman, 2012:380, 405-406).

Nevertheless, considering the explorative nature of the research; the objectives of the study, the research questions to be answered, and literature of the research, a qualitative research approach was employed. This decision was attractive because the preoccupation of the researcher is to gain an in-depth understanding of the prevailing practices and processes of the UGLS digitisation programme. This approach will allow the researcher to tap into the personal experiences, opinions, attitudes and behaviour of the participants in the study.

Despite the shortfalls leveled against qualitative research process as stated in the forgoing paragraph, qualitative design nonetheless, presented the most viable option among the two main approaches to

assess the prospects of the UGLS digitisation initiatives because of the emergent nature of inquiry for this study. More so, the overarching investigative purpose is to describe, analyse and interpret the peculiar issues identified in the research objectives and objectives germane to the UGLS digitisation programme. In addition, this approach offers space for the researcher's impressions and insights.

3.2. Research Design

According to Pickard (2007:2), research design is essentially a systematic framework outlining predetermined choices of "processes and procedures" the researcher intends to follow in a scientific investigation. Creswell (2009) defined 'research design" of a study as the overall strategy or plan of action that a researcher maps out to carry out the empirical investigation. Some of the prominent qualitative research designs identified are phenomenology, ethnography, grounded theory, case study, and narrative research (Creswell, 2013:11-12).

Yin (2009) defines a case study as "an empirical inquiry that investigates the contemporary phenomenon in depth and within its real life context". Verrill (2010) is of the view that a case study can be applied to the study of occurrences in an organisation in a social environment.

A case study was the employed research design for this study among the various qualitative designs listed above as the researcher is convinced that to answer the research questions raised in this study; it is the most appropriate design to use, in order gain an in-depth understanding and to provide a holistic account of the major issues hindering and contributing to the prospects of a sustainable at the UGLS as exploring and detailed description of entities such as individuals, groups, institutions situated within a social context is the goal of case study research (Pickard 2007:86).

There are different types of case study methods (for example, see descriptions by Pickard, 2007; Bryman, 2012; Creswell, 2013) Creswell, for instance, identified three types of qualitative case studies: these are the single instrumental case study, intrinsic case study, and the collective or multiple case study. In this present study, an intrinsic case study approach was used. An intrinsic case study is conducted "for no other purpose than to give us a better understanding of the case" (Pickard, 2007:86). There are no previous studies of the UGLS in respect of digitisation, so the aim is to explore the research space and determine, as far as possible the major issues hindering and contributing to the prospects of a sustainable, as well as, the exploring the peculiar characteristics associated with the digitisation programme at the UGLS as raised in the research questions and objectives in this study. Thus the selection of an intrinsic case study is appropriate for this study because the study explored digitisation practices and processes of the UGLS. Intrinsic case study also

allowed for assessing and analyzing the UGLS's digitisation programme in order to gain an in-depth understating of the prospects of digitisation at the UGLS. The qualitative case study approach nonetheless, has some advantages and disadvantages in general, these are outlined below:

Advantages

- The results from the case study approach are much more immediately intelligible and comprehensible by a greater audience (including non-academics) as they are usually documented in a common, non-professional accessible language (Cohen, Manion and Morrison, 2007:356).

- Case study research captures features that are unique and may, otherwise, be impossible to capture in larger scale data such as surveys. These unique data might be crucial to understanding the case. The case study design can also accommodate unanticipated events (Cohen, Manion and Morrison, 2007:356 and Creswell, 2013:100) .

.

- A case study is strong on reality because it allows the intensive examination of data drawn from people's experiences and practices which are based upon reality (Creswell, 2012).

- The case study design allows generalization from specific to general in the sense that such design provides insights into other similar cases and situations hence supporting the interpretation of other similar situations or cases (Cohen, Manion and Morrison, 2007:356).

- The case study design can be conducted by a single researcher without the support of a full research team (Cohen, Manion and Morrison, 2007:356).

Disadvantages

- Despite a researcher's efforts to address reflexivity, case studies are prone to problems of researcher bias (Cohen, Manion and Morrison, 2007:356). Also, identifying the scope of a case can be challenging for the researcher and the depth of analysis can be affected when the case is complex (Creswell, 2012:101).

- Case study results may be difficult to generalize because the context of one case may differ significantly from another, thus case study findings may only be relevant based on "contextual applicability" where other researchers/readers sees their application (Creswell, 2012:101; Cohen, Manion and Morrison, 2007:356).

- Deciding or determining on where the "boundaries" start and end as related to case studies can very difficult (Creswell, 2012:101).
- Case studies are not easily open to cross-validation; hence the study may be subjective, personal, selective and biased (Cohen, Manion and Morrison, 2007:356).

3.3. Target Group and Sampling

The target population for this study constituted UGLS staff specifically involved in digitisation, totaling seventeen. The researcher targeted digitisation managers and digitisation staff (both of which constitute Library and IT staff) at the UGLS. A "purposive or judgmental sampling" method was adopted for the study where the selection of the sample is dependent on the researcher's "own knowledge of the population, its elements, and the nature of the research aims" (Babbie & Mouton 2001).

A total of six respondents were interviewed in the study which encompassed four digitisation operations staff (consisting of two digitisation technicians and two IT staff). Moreover, two library managers who are directly involved in digitisation activities of the UGLS were also interviewed.

Purposive sampling was used to select the respondents who were interviewed in the study. In-depth semi-structured interviews were conducted with the sampled population (management, IT and digitisation operations staff). The research questions, objectives and literature informed the themes raised and the category of interview questions asked. Purposive sampling is a non-probability type of sampling where the researcher chooses participants in strategic ways so that those sampled have the key characteristics relevant to the research questions posed in the study (Bryman, 2012:418). The researcher judged that digitisation librarians/managers, IT and digitisation staff at the UGLS, with their relevant experience and strategic position, were well-placed to provide the information needed by the researcher to assessing the prospects for digitisation at the UGLS which the research sought to achieve.

3.4. Data Collection Method

There are various data collection techniques available in qualitative research. Some of the commonly used data collections methods in qualitative research are focus groups, qualitative interviewing, observations, documentary and audiovisual materials (Creswell 2013: 160). This study identified interviews as the preferred technique for data collection. According to Yin (2009), case study

interviews are designed to collect in-depth data from the respondents through systematic questions asked. Pickard (2007) describes an interview simply as a conversation between the interviewer and respondent with the intention of gathering needed information from the participants. Interviews results in an interviewer accessing of needed information from, and in the minds of the respondents, typically allowing the participants to lead the conversation in the interview process only until the data analysis and interpretation where the researcher takes control (Pickard, 2007:171).

Major types of interviews are identified in research methodology literature, which includes structured, semi-structured, standardized interview, unstructured interviews among others (Bryman 2012:212 for example). Pickard (2007:174) observed that the type of interview used depends largely on the nature of the research topic and the kind of data that needs to be gathered in order to enable the researchers to answer the research questions. This research, in particular, used the semi-structured interview. Semi-structured interviews typically refer to a context where the interviewer has a series of pre-determined areas of questions in the form of an interview schedule, there is, however, a flexibility in terms of a sequence of questioning. Also, questions can be rephrased or explained if respondents are uncertain about the questions (Petty, Thomson and Stew, 2012). More so, a semi-structured interview is less formal and gives the researcher the latitude to ask further questions to clarify statements or responses made, or information provided by interviewee which the interviewer deems significant yet unclear in the course of the discussions of the topic (Bryman, 2012:212). The semi-structured interview was used. An interview schedule was prepared to guide the researcher in the interview process on questions asked, and depending upon the answers, engaged in further probing and clarification during the interview. Interviews have both advantages and disadvantages. The advantages and disadvantages of interviews are presented in the next section below:

Advantages

- Interviews are more appropriate when the motive of the researcher is to gain detailed and rich information on participants' views, feelings and beliefs on the subject being investigated (Pickard, 2007:181).

- Interviews provide an opportunity for the researcher to ask participants questions which are not easy to be asked in a straightforward way because such questions may be complex in nature and more details may be gained from answers provided (Pickard, 2007:181).

- The interview as a tool for data collection is flexible, enabling multi-sensory approach to data gathering, using channels including non-verbal, verbal as well as heard and spoken (Cohen, Manion and Morrison, 2007:349). More so, qualitative interviews tend to be much more flexible and less structured which allow for adjustment and rephrasing of the

interviewing process to accommodate significantly emerging issues in the interview with a focus on the perspectives of the interviewee (Bryman, 2012:470).

- "Rambling" or going off the tangent is often encouraged in qualitative interviewing since it offers some space for an interviewee to give valuable insights in what they deem relevant. The researchers may also significantly depart from the interview guide if it becomes necessary to gathering important data because flexibility helps to enrich the research through the gathering of unexpected information. More so, respondents may be interviewed many times for validation responses (Bryman, 2012:470).

Disadvantages

- Lack of interviewing experience could result in ineffective interviews where the interviewer ends up taking very little away from the interview situation (Pickard, 2007:170). The researcher tried to address this by practicing the interviewing technique in the form of "mock" interviewing.

- Interviews provide only filtered information that is skewed to the needs of the researcher. The researcher also summarizes the respondents' point of view according to his or her own interpretations and perceptions and, thus, may be open to bias (Cohen, Manion and Morrison, 2007:349). The researcher tried to address this by explaining questions which were not clear to the respondents. The researcher also sought for interviewees to qualify responses which seemed unclear.

- Data gathered through interview may be deceptive because the interviewee may not be articulate or clear; there is the possibility of respondents deliberately providing responses a researcher wants to hear. Responses to semi-structured interviews are usually not standard and data collected can be unique because of interviewee context and experience (Cohen, Manion and Morrison, 2007:349). The researcher attempted to address this drawback by spending a considerable amount of time in analyzing responses to derive meaningful information from the data collected.

- Interviews are known to be time-consuming (Cohen, Manion and Morrison, 2007:349). The researcher may have a limited amount of time for the interview (Denscombe 2003). The researcher ensured that the respondents were given prior notification about the topic areas the interviews would cover so that a lot of time was not consumed during the interview process.

- The interviewer may misunderstand or misinterpret the respondent's answer which may make the analyses of the data a difficult task for the researcher (Cohen, Manion and Morrison, 2007:349).

- Issues of equipment such as recording devices, as well as issues of anonymity and confidentiality, may present problems. Denscombe (2003) observed that the presence of a recorder can be inhibiting to interviewees; some interviewees may be selective about what they say because they may not be comfortable with being recorded. This brings into question whether interviews are a reliable data collection method. The researcher however, assured the respondents that any recording would be treated with confidentiality and that their responses would be anonymised. This assurance made the interviewees feel more comfortable.

3.5. Data Analyses and Interpretation

The data was transcribed. The textual data was categorised according to the topics in the interview guide and a thematic analysis of the textual data was conducted. In the absence of the availability of qualitative software for analysis, to present the content analysis of interview transcripts, the analysed data was extracted manually from the interview transcripts for discussion, organised into themes and representation of data. Interpretations, quotes, and comments from the transcripts were used to explain the contents. The anonymity of the interviewees in this study was ensured by not referring to the quotes and comments from interview transcripts by the names of the participants.

3.6. Ethical Considerations

Researchers and the research fraternity are obligated to provide data that is sound and trustworthy, free of errors, falsification, fabrication and plagiarism. Researchers must also be guided by ethics in data collection and analysis, in the treatment of participants and in the ethics of responsibility to sponsors, academia, and society (Singleton and Straits, 2010: 47- 48).

The following ethical considerations guided this study:

- The study population willingly participated in the study; their consent was sought for in responding to the interview for which the purpose of the study was clearly stated to the participants.

- A formal consent was sought from participants who completed a form stating clearly the purpose and objectives this research; thus, willingly agreed to be interviewed.

- All sources of information used in this study have been duly and properly acknowledged.

- Information about respondents was anonymised and data collected in the course of this study was held strictly confidential and used only for the purposes of the research.

- This research was subject to approval and clearance from the Research Committee of the University of Pretoria, South Africa. Ethical clearance was also sought for the data collection instrument used for carrying out this study from the Faculty of Engineering Built Environment and Information Technology (EBIT) Research Ethics Committee.

- Permission was also sought from authorities of the UGLS which was the case study for this research.

3.7. Establishing Trustworthiness in Qualitative Research

According to Pickard (2007:20) and Bryman (2012:390), the alternative criteria for evaluating trustworthiness in qualitative research are the criterion of credibility, transferability, dependability and confirmability. The researcher put in measures as much as possible to ensure the trustworthiness of this study. The researcher relied on member validation or respondent validation to ensure the credibility of the study. Member validation is one of the techniques used to establish the credibility of the findings and interpretations of the research. Here, data and interpretations arrived at are made available to the participants in the interview to give them the opportunity to confirm the credibility of their accounts by ensuring that both the data and interpretation are verified and that the researcher has accurately understood the social context of the participants (Bryman, 2012:391). The researcher ensured member validation by allowing interview participants to corroborate the data that was gathered from them and interpreted, to ensure the researcher understood the context. The dependability of this research was also ensured through the research supervisor who ensured the research process adopted for this study was examined and "audited" in ensuring the methods and techniques were applied appropriately and were relevant to the study.

3.8. Conclusion

This chapter explained the methodology employed for this research. It began with a brief introduction, an explanation of the research paradigm adopted and the research design used for this study followed. The target group and sampling were discussed; the data collection methods and tools used; the advantages and disadvantage of the interview as the adopted data collection tool were also highlighted; the data analysis and interpretation method used were also highlighted. The measures for ensuring qualitative research trustworthiness and ethics for this study were explained. Finally, a summary of conclusion was provided in this chapter. The next chapter deals with the data analysis and an interpretation of the findings.

Chapter Four
Data findings, analysis and interpretation

4. Introduction

The previous chapter on research methodology described and explained the methods and techniques used in gathering the research data. This chapter focuses on the analysis and interpretation of the data collected. This chapter presents findings from data collected from the semi-structured interviews conducted with selected UGLS digitisation staff who participated in the research. A thematic analysis was done; there were seven themes for the analysis that were derived from the various sections of the "interview schedule" (See Appendix A) which was employed to collect data from the selected respondents that participated in the research. The first six themes (in Table, 2) outline findings from the study, while the seventh theme (in Table 3) outlines suggested solutions and recommendation from participants.

In this entire chapter, the data from the research is presented in the following order: (1) summary of main themes; (2) discussions and interpretation of themes based on the research questions; (3) solutions and recommendations suggested by participants; (4) conclusion. The respondents are designated "R" throughout. In a situation where different respondents are cited together in a thread form in a particular instance, "R" is followed by a number (for example, R1, R2 R3 etc.) to differentiate responses. All direct quotations from interviews are shown in indented italics.

4.1. Research Findings

Data gathered from interviews were transcribed, from which the textual data was analysed and a summary of findings from the data was organised into themes. These themes are addressed in detail in categories and sub-categories from the questions raised in the semi-structured interview guide (See Appendix A) used for the data collection. The summary of findings is presented in table form (Table 2). The transcripts of data were discussed and interpreted. Quotes and comments from the transcripts were used where relevant to build arguments from the discussions and interpretations.

❖ **Summary of findings from themes, categories and sub-categories from the sections of the "interview guide"**

Table 2: Table Two. Summary of findings from themes

Theme	Categories	Sub-categories
1. Digitisation governance	**1.1.** Digitisation Policy and Planning	• No written digitisation policy • Lacked established digitisation plan, and procedures. • Planning responsibility not clearly defined • Decision-making process not clear
2. Selection of materials for digitisation	**2.1.** Current selection criteria	• Unique and rare materials • Out-of-print materials • Preserve endangered library materials • Selection determined by funders/sponsors
	2.2. Selection-related challenges	• No defined/formalised selection criteria • Lack of collection knowledge by selectors • No stated policy on collection selection • The absence of appropriate scanning equipment for some materials • Failure to secure copyright clearance or permissions for some materials • Improper handling of fragile materials • Defaced or discoloured materials • Uneven/odd pages and missing pages/collections
	2.3. Current selectors	• Digitisation Committee • University Librarian • Digitisation and Institutional Repository Unit Head • Senior officials of the UGLS
3. Digitisation goals and priorities	**3.1.** Reasons for digitising	• Preservation of original materials • To increase access to documents • Increase interest in the library • Preserve unique and rare library material of value • Save space in library • Support collections development • To create input for the IR • To meet users' information needs
4. Digitisation sustainability issues	**4.1.** Success contributory factors at UGLS	• Management Support • Huge initial financial and

		technology investment • Staff commitment • Initial grants from external funders/donors and partners • Initial practical training opportunities for staff • Setting up of Institutional Repository (IR)
	4.2. Measures to track progress	• No clearly stated or specified evaluative measure • No standard or some laid-down procedure or mechanism to track progress • Total number and quality of successfully digitised item uploads on the IR give progress indication.
	4.3. Identified Critical challenges of UGLS digitisation programme	• Absence of formal digitisation policy • Lack of established digitisation plan, and procedures • Frequent equipment breakdown • Low interest from authorities and management in decision bodies • Insufficient funding • Poor maintenance of digitisation equipment, • Non-acquisition of all required and necessary software • Inadequate and insecure storage facility for digital objects • Inadequate skilled personnel • Occasional transfers and re-assigning of trained and experienced digitisation professionals to non-digitisation areas • Inadequate staff in the project • Poor preservation and security of digital copies • Erratic/unreliable power supply • Use of temporary staff (National service personnel) • There is inefficient supervision of the project • No exposure and continuous training for staff.
5. UGLS staffing and skills level	5.1 Sufficient digitisation Skills available	• Basic skills in image editing software • Operating of scanning equipment • Troubleshooting minor hardware and software problems • Basic knowledge in internet and

		computer networks • Skills on uploading digital objects on institutional repository • Scanning using the standard protocols • Basic skills in generating metadata for digitised content
	5.2 UGLS skill challenges	• Web development skills • Lack project management skills • Lack expertise in equipment (high-end scanners) repairs • Management skills • Cataloguing skills(metadata and indexing) • Cataloguing of digital resources • Maintenance and servicing digitisation equipment • Database management skills • Proper document handling and preparation • Advance image, editing enhancement and optimisation skills
6. Digital preservation and long-term access of digitised contents at the UGLS	6.1 Digital preservation and long-term access activities	• No guiding digital preservation policy, plan or strategy • Poor preservation of the digital content • Digitised content is stored on Network storage server and external hard disk drives • Raw/archival and access files saved in non-proprietary open standard file formats (namely. JPEG, TIFF and PDF) • Access copies ingested into institutional repository for access • Electrical power not reliable • Frequent IR server downtime • Security inadequate at digitisation Unit • Copyright restrictions

Source: Field data, October, 2016

4.2. Discussions and Interpretations

In this section, detailed discussions and interpretations of findings from the themes, categories and sub –subcategories identified in the research study are done.

- **Research questions:**

Theme 1: Digitisation governance:

- ***What does the UGLS policy state in terms of digitisation?***

Although the researcher intended to review the policy that guides UGLS digitisation programme, data gathered revealed that the UGLS does not currently have a written digitisation policy. It turned out that almost all the interviewees confirmed that there is no formal documented digitisation policy guiding the UGLS digitisation programme. One of the respondents, however, claimed that the UGLS had a written digitisation policy; the respondent however, was unable to point out clearly what aspects the policy covers. A further investigations and follow ups revealed that the particular policy the respondent referred to as a formal digitisation policy was only an institutional repository policy which addressed scantly on digitised content from the University. Comments from one respondent from the management group make this clear:

> R: "*What I do know officially is that the UGLS doesn't have a policy on digitisation. There is however, a policy on institutional repository which has some scanty information on digitised materials: where they are supposed to be kept. So within the institutional repository policy for instance, I believe there is part that talks about once materials are digitised they should be kept on the institutional repository. But I know the UGLS officially doesn't have a digitisation policy"*

All the respondents however acknowledged the importance of formal digitisation policy and the recognised the need for the UGLS to formulate a digitisation policy. They expressed that a digitisation policy for the UGLS needs to immediately be developed to guide all digitisation activities at the UGLS. The respondents proposed the various aspect of digitisation such a UGLS policy must cover: they suggest that a UGLS digitisation policy must set out clearly digitisation issues including the digitisation technology to adopt, infrastructure to be implemented and appropriate equipment to acquire, the human resource requirements, digitisation standards and procedures to follow, preservation and management of digital objects, and content of materials that must be digitised. As one operational staff commented:

> *R: "I think the digitisation policy should set out clearly the content of materials that must be digitised, the kind of people that should be involved in... the expertise of those who will be involved in the digitisation work, as well as set out the rules and regulations regarding the digitisation process"*

The importance of adequate digitisation project planning was also noted by the respondents. Some of respondent commented that the UGLS digitisation programme lacked an established digitisation plan

and procedures which respondents attributed to the absence of a policy in the first place. Currently, UGLS digitisation lacks the thorough planning required in digitisation projects which one respondent from the management group believed was as a result of the absence of a policy to guide the entire digitisation process. The response below explains his claim. The respondent described the digitisation planning process at the UGLS as an "ad-hoc" one. As he put it:

> *R: "I will be honest to say that the UGLS did not consider everything before the digitisation project was started. If I recall largely, most of the things were ad-hoc, they were done in an ad-hoc process, we needed to digitise these, okay, so we just selected a number of people to start that project, without even asking whether those people have the requisite skills, experience and all that…but if we should go by the book, most of the things that are needed for a digitisation project to actually be carried out before UGLS started its digitisation process was not considered, it was more of an ad-hoc process, we wanted to quickly digitise our materials and make them available to people, so we sidestepped a lot of things, so it wasn't thorough"*

According to both the operation and management groups, decisions regarding digitisation at the UGLS are taken at various levels in relation to the magnitude of the decision. The respondents highlighted the lack of a clear decision-making and planning procedure as far as the UGLS digitisation programme is concerned. The respondents mentioned that decisions affecting digitisation are not clear. Nonetheless, they revealed that planning and decisions are generally made by the Digitisation and Institutional Repository Department, the Digitisation Committee, the IT Department of the UGLS and the University Librarian; they confirmed that it is not clear as to the specific mandates of these decision making entities as far as digitisation is concerned. Hence, it appears the responses from both groups indicated a lack of clarity on procedures through which decisions- making at the UGLS unfolds.

From the responses of the interviewees in this study, it is clear the UGLS does not have formal digitisation policy. It can be concluded that the UGLS digitisation planning effort follows an unplanned approach and decision-taking affecting the UGLS digitisation programme does not follow an established plan or procedures. The UGLS should recognise that a digitisation programme cannot be effectively run and be sustained without a digitisation policy. The literature study (refer to section 2.6 and 2.7. in Chapter 2) in this research on digitisation policy and digital project planning confirmed that issues of policy and planning cannot be overlooked when undertaking digitisation projects. Thus, the importance of a policy cannot be overemphasized. As pointed out in the literature review by Corrall (2002: 2), Fabunmi, Paris, and Fabunmi (2006) and InterPARES2 (2011), a digitisation policy essentially provides the framework for directing or guiding as to how "an organization will carry out

its mandate, functions or activities, motivated by determined interests or programs" on a continuing basis as it pertains to the digitisation programme. More so, digitisation project planning invariably results in an established digitisation plan which sets out "decisions for action in the future with the intention of achieving the set goals with the limits of the available resources".

In summary, developing a digitisation policy and establishing a digitisation plan to guide processes and procedures are the crucial first steps to consider before or once an institution decides to embark on any form of digitisation. This will help the UGLS address the various aspects of the digitisation programmes as reviewed in Akintunde (2007), Amaoge (2015: 259) and Shehu (2016: 17), for example, and to manage other pertinent issues examined in literature review (in sections 2.6 and 2.7) of this study. The responses calling for the development of a digitisation policy to guide and to provide the needed oversight to its digitisation programme is well-placed, since policy and planning are perceived basic elements for considerations in any formal digitisation programme.

Theme 2: *Selection of materials for digitisation:*

- **What criteria are used to select materials for digitisation at the UGLS?**

All the respondents expressed that unique/rare materials; materials of research and academic importance, materials that are out-of-print and the preservation of endangered library collections were what motivated the selection of certain collections to be digitised. All respondents, however, recognised the UGLS did not have defined or formalized selection criteria for digitisation. Thus, the responses on selection lacked clarity as to the precise criteria the UGLS uses to select materials. Some of respondents revealed that the UGLS digitisation programme was largely supported and funded by external donor/sponsors: thus these donors also determine or influence the collections to be digitised. Some respondents revealed that the UGLS had to digitise the Furley and Folio Collection which are largely written in Dutch because the Royal Tropical Institute (KIT) of the Netherlands provided the grants to support digitisation of those collections. One of the respondents also mentions that saving library space and to increase the usage of materials were some of the criteria for which the materials were selected. It appears the selection of materials for digitisation lacked any defined focus as far as selection criteria are concerned. This response made by an interviewee underscores this challenge, pointing to the lack and clarity of selection criteria for the UGLS digitisation programme:

> R: " *I will say that basically everything is in a flux, is in an ad-hoc process, there is no policy on digitisation, okay, so materials are selected for want of a better word, at random, okay, at any given time if a request is made by a department as to its materials being digitised, then the Digitisation Unit will look at it, whether to digitise or not, so things are in an ad- hoc*

process okay, there is no defined priority list… as and when requests are made then the Digitisation Unit takes up the task to digitise the materials".

When respondents were asked who are responsible for the selection of materials for digitisation at the UGLS, respondents point out that, currently, a Digitisation Committee is mandated to identify and select materials to be digitised, this Committee however, they feel, is not representative as they claimed selectors lack the requisite skills and knowledge regarding collection contents. Some respondents also noted that the Digitisation and Institutional Repository Unit Head and University Librarian were responsible for selection of material for digitisation. Some respondents claimed the lack of collections knowledge by selectors was a challenge. The respondents hence, called for a much broader consultations and stakeholder involvement in the selection process which will involve people from the wider university community in a much more representative way.

It appears the selection of materials for digitisation at the UGLS is also constrained by a number of factors. The respondents revealed that their ability to select certain materials for digitisation was also constrained. As a consequence, the interviewees mentioned the absence of a stated policy on collections selection, the absence of appropriate scanning equipment, failure to secure copyright clearance or permissions and improper handling of fragile materials as challenges to selection. Some respondent also claimed that because some materials had uneven/odd pages and missing pages, as well as defaced or discoloured images, this hampered their ability to pass certain materials for selection for digitisation at the UGLS.

Based on the responses of the interviewees, it can be deduced that the UGLS digitisation efforts is both opportunity-driven and preservation-driven as found by UNESCO, IFLA and ICA (2002). It can also be concluded from the responses that the process of selection of materials for digitisation at UGLS is not clearly defined and selection lacks focus. This is not consistent with the selection process and principles explained by Bulow and Ahmon (2011: 49), Hughes (2004: 32) and Pandey and Misra (2014: 138), as pointed out in section 2.8.1 in Chapter 2 of this study. Thus, the selection process ought to be clearly defined according to some established criteria. UGLS needs to follow a systematic selection process such as the one proposed by Vogt-O'Connor (2000) which consists of three stages: nomination, evaluation, and prioritization. The first stage is "nomination" where all the UGLS staff and other stakeholders will come together to collectively identify and recommend materials to be selected for digitisation. The next stage is "evaluation", where a selection committee which is representative of the various digitisation stakeholders evaluates all the materials that made through the nomination stage guided by criteria for selection. The final stage is the "prioritization" stage, which

will come into play when too many materials are nominated and the committee needs to prioritize selected materials according to some priority list.

More so, it appears the UGLS lacks focus on selections. Some respondents mentioned the kinds of materials the UGLS is digitising instead of mentioning criteria of selection, when asked. The reason for this could be that there are no formally stated criteria for selection for digitisation for the UGLS. As a result, it makes the selection process difficult and selecting the "right" materials for digitisation even harder. These selection issues could be addressed by the UGLS in many ways; The UNESCO, IFLA and ICA (2002) in Chapter 2 section 2.8.1 for instance, identify three broad criteria to guide selection of materials for digitisation: content, condition and demand. The UGLS could consider these criteria in developing or in adapting these into its own set of criteria that will fit their local needs and context. More, because the selection processes for digitisation at the UGLS are unclear, the Hazen, Horell and Merill-Oldham's (1998) checklist for decision-making when selecting materials; the Ooghe and Moreels's (2009) guidelines for selecting materials as well as, the Technical Advisory Service for Images (TASI) proposed set of guidelines for selection (Chowdhury and Chowdhury, 2002), among others, as examined in the literature (sections 2.8 and 2.8.1. in Chapter 2) could serve a basis on which the UGLS may consider to adopt or possibly adapt in order to suit the UGLS's own institutional circumstances and context, which would give focus and to clearly define the UGLS current selection practices.

Theme 3: Digitisation goals and priorities:

- ***What are the digitisation priorities and goals of the UGLS?***

According to all the respondents, the goals for UGLS involvement in digitisation are essentially to ensure the preservation of the library's physical materials which are rare and endangered, as well as to create increased access to the unique collections that the UGLS holds via the University's institutional repository (IR). Some of the respondents also revealed that the UGLS goal for digitisation was to primarily create digital outputs to feed the University's IR by generating digital content to populate it. One of the respondents from the management also expressed the view that the goal of the digitisation is to save space in the Library; this comment about saving space however, contradicts the goal of preserving the original materials since it is not clear how digitising the materials saves space in the library. It presupposes physical materials, once digitised are discarded. The same respondent, however, indicated that physical materials were not discarded by the UGLS after digitisation. Responses from other interviewees also confirmed materials were not disposed after digitising. One respondent also indicated that the UGLS embarked on digitisation in support of collection

development efforts and to meet what he called "the new trends of research" and users' information need since materials in the digital format augmented the Library's collection. One respondent also expressed the view that the UGLS embarked on digitisation because of the ubiquity and pervasiveness of information and communication technologies (ICTs) as he commented:

> R*: " The UGLS is digitising because I believe, today, there is much interest in using collections or materials that are in digital formats due to the enormous innovation of ICT and the presence of electronic gadgets"*

The respondents also expressed the view that the current priority of the UGLS is to digitise the rare collections held by the university. Postgraduate theses and dissertations, newspapers, microforms, audio visual records, and institutional archives of the University, were some prioritized materials. Some of the respondents expressed the hope that the scope of current digitisation priorities could be expanded to cover other materials of academic importance such as the institutional journals as well as administrative records of significant historic value to the University.

In conclusion, it appears the UGLS is motivated by the general benefits derived from digitisation as highlighted in the literature in this study (section 2.3, Chapter 2). It has been confirmed in this study that digitisation is crucial in the preservation and provision of enhanced access to physical library materials as shown by Lopatin (2006: 273), Vrana (2011: 591) and Pinkas, et al., (2012: 262), for instance, who all revealed that preservation and access are the major motives for digitisation. The responses that the UGLS digitisation programme is also to support the collections development efforts and to create new avenues to support research are in line with Hughes's (2004) and McRostie's (2015) defined benefits for digitisation. The UGLS has digitised various analogue materials which are amenable to digitisation as indicated in their digitisation priorities. The findings from the respondents however, confirmed that UGLS lacked a clearly defined set of priorities and goals, as it appears the UGLS digitised materials on the general basis for which every other digitisation is undertaken, and without clearly defined goals and priority lists. Collections are "prioritized" presumably on the basis that there is an available scanner and some accompanying materials amenable to digitisation.

Theme 4: Digitisation Sustainability issues

- ***What measures are being used by management to measure the progress of the digitisation programme?***

According to the respondents, there were no clearly stated or specified evaluative measures of which the UGLS digitisation programme is evaluated. Respondents recognised that there was no a standard

or some laid-down procedure or mechanism to track progress of digitisation when asked. This is what a respondent from the management group said when asked about measures by management to track progress of UGLS digitisation programme:

> R: "*Currently there is none, there hasn't been an evaluation of the digitisation programme so far, within the library and even across the University, nobody has carried out an exercise like that"*

All the respondents, however, were of the view that the total number and quality of successfully digitised items which have been uploaded into the University's Institutional Repository is what is unofficially used to gauge the progress of the digitisation programme. These three respondents confirm their stance:

> *R1:"For now, most of the content that we digitise, we upload them unto the University Repository, so with time we check by the repository how much we have uploaded and how much we have on the repository determines what we have worked on, so, for now… there are no a standard or some laid-down procedure or mechanism that we use to check"*

> R2: " *I think what management use to evaluate is to look at the total number of scanned materials, which am not so sure whether is the total number of scanned materials and the quality of the scanned materials."*

> R3: "*The number of the successfully digitised collections that are currently available on the Institutional Repository, that is one means of, you know evaluating the progress of our project."*

All the respondents nonetheless acknowledged that this method of tracking the progress of the digitisation programme is not the best measure of progress: one confirmed that it was problematic since the institutional repository (IR) not only contain digitised content but also born-digital content which were not the product of digitisation. Thus, it is difficult, if not impossible to know the exact amount of digitised content in the IR at any given time, making it difficult for the management to ascertain the exact or true progress made on the digitisation programme. Thus, it was the view of the respondents that a more appropriate measure for measuring progress should be developed.

In summary, from the responses, it is clear that the UGLS did not have a properly laid-on procedure to measure the progress of their digitisation programme and that this might impact negatively on the prospects of the UGLS digitisation programme. It also appears this could be a consequence of the lack of policy and the absence of thorough plan as already revealed. In the literature review in this study

(Section 1.4. Chapter 1) as established by Manzuch (2009), digitising institutions need to conduct a systematic monitoring of their digitisation projects, since monitoring of the progress of digitisation is crucial for such institutions in the evaluation of their own performance and effectiveness, and in reporting progress to funders and benchmarking activities of project outcomes.

- **What are the major issues, hindrances affecting digitisation at UGLS?**

The interviewees revealed a myriad of challenges hindering the UGLS digitisation programme. All the respondents mentioned that the major issues constraining the digitisation programme at the UGLS include an absence of digitisation policy, insufficient funding, poor maintenance of equipment, frequent breakdown of scanning equipment, inadequate storage facility, non-availability of necessary and required fully-licensed digital imaging software, poor security of digital copies and preservation of digital content. It appears the frequent breakdown of equipment and the accompanying poor culture of maintenance of digitisation equipment is the most critical challenge that is currently confronting the UGLS digitisation programme, this is having significant negative impact on the digitisation operations. Three respondents concur on these challenges:

> *R1: "I will say that the lack of interest from authorities and management in decision bodies has resulted in poor maintenance of digitisation equipment, training of staff, acquisition of required and necessary software, provision of other useful facilities such as storage facilities, are all challenges that are battling the progress and success the of UGLS Digitisation Unit"*

> *R2 : "As I mentioned earlier, one is the maintenance of our equipment, it has been a major problem, even as we speak now we have some equipment that are not working, they have broken down and that needs to be repaired, that is one critical challenge we a facing now with our digitisation--maintenance of our equipment"*

> *R3:"Sometimes when things break down, we have to call experts and it cost so much to do. The normal library IT staff have not been trained seriously in handling or repairing or troubleshooting IT equipment, it just normal installations and the rest. And that is not good, it is a very big challenge"*

All the respondents also mentioned there were critical staffing and skills issues which the UGLS digitisation programme has to deal with, these ranging from the lack of adequate training and exposure of digitisation staff, the engagement of temporary staff (National Service personnel), the occasional transfers and the re-assignment of trained and experienced digitisation staff to other non-

digitisation departments and areas of the UGLS where their skills are of no use, leaving the already insufficient skilled personnel overburdened. The issue of insufficient digitisation staff and the use of National Services persons (temporary staff) also appear to be another critical challenge militating against UGLS digitisation programme. Comments from two respondents confirm this challenge:

> *R3: "We also have the experience of training National Service men working for a year and losing them out. We've had several cases, so it means that every year we lose experienced, well-trained digitisation staff because of their status as temporary workers"*

> R1: "*We don't have enough staff, so currently we [permanent digitisation staff] are supported by National Service personnel who are temporary staff and it doesn't help with the production, because National Service people come, they get trained they work for a while and their time with the library expires and they leave, so it looks like most of the time we need more hands"*

The operations group and one member of the management group also revealed the issue of poor and ineffective supervision due to the use of digitisation supervisors who are inexperienced and lack thorough knowledge on the subject of digitisation activities and processes by supervisors. Respondents also said erratic/unreliable electric power supply was a critical challenge, hindering the digitisation programme.

It may be concluded that these challenges align to those that emerged from the literature review (section 2.7 Chapter 2) in the study. The major hindrances and challenges associated with digitisation noted by Mohammed (2013); Mapulanga, (2012); Ezeani and Ezema (2011); Amollo (2011), Mbambo-Thata (2007); Fabunmi, Paris and Fabunmi (2006) and Rosenberg (2006) are common with the UGLS digitisation programme.

- ***What factors are contributing to the success of UGLS Digitisation programme?***

Despite the myriad of challenges enumerated by respondents, they however revealed that the UGLS digitisation programme has achieved some success since its inception because of a number of factors. Respondents explained that management support ensured the digitisation project was started and is ongoing. Respondents also expressed that initial practical training and exposure for UGLS digitisation staff, as well as the commitment of staff to the work of the digitisation programme has contributed to the progress made so far. The respondents' revealed that huge initial financial and technology investment made by the UGLS through the support of some initial grants from external funders/donors and partners have been crucial to the success so far in the UGLS digitisation programme. As one respondent from the management group commented:

R: "*I would say that the success so far that the library has chalked, largely has to come from: one, contributions from donor agencies. Most of the equipment that have been bought for digitisation, funding has come from outside bodies. Secondly, I will say staff in the [Digitisation] Unit have also been dedicated to the job. Ideally extensive training and all should have been provided for these staff before they began the digitisation process, but most of them have learnt on-the-job, others have gone online to read materials, manuals etc, to operate these machines….and then also last but not the least, support from the library's management"*

One other respondent expressed that the perceived role of digitisation as a tool for generating content feed for the University's institutional repository in supporting research in the university has contributed significantly to the UGLS digitisation programme so far. It has to be said that these kinds of contributions coming in from the UGLS are crucial to ensuring a sustainable digitisation projects as noted by Rafiq and Ameen (2014a:18) in (section 4.1 Chapter 1). A continued institutional support and commitment; the availability of skilled human resources; funding; regular updating and upgrading of technological infrastructure are all critical contributions to digital projects sustainability.

Theme 5: UGLS staffing and skills level

- ***What skills are currently available to effectively support digitisation practices at the UGLS?***

The respondents explained that the UGLS staff currently possess some skills to support digitisation practices; these include skills in the use of software for image editing, operating of high-end scanning equipment, troubleshooting digitisation-related minor hardware and software problems, knowledge in internet, uploading digital objects onto an institutional repository, scanning using the standard protocols and procedures and skills in generating metadata. One of the respondents in the operations group comments confirms the availability of these skills at the UGLS in support of digitisation:

R:"Well! All the staff of the Digitisation Unit have been trained on scanning using the standard protocols, we know what to do, what not to do… after the books have been scanned, we know how to generate metadata for them, I think we adhere to all the standard rules of digitisation and have the skills in digitisation using software…, I think these are some of the skills we have."

Nonetheless, almost all the respondents both from the management and operation group also revealed that the digitisation staff lacked some skills. They noted they lacked skills in project management, management skills, cataloguing skills (metadata and indexing), cataloguing of digital resources, database management skills, web applications development, document handling and preparation, advance image enhancement and editing skills as well as expertise and skills in repairs, maintenance and servicing digitisation scanners when such equipment breaks down. One respondent in the management group however, showed some reservations, insisting that there was no lack of any skills in support of effective digitisation. Another respondent claimed he is unaware of any skills lacking in the digitisation programme. Another respondent from the operations group also claimed that as far as he is concerned they don't lack any skills as they do their work well. Contradictorily, he however bemoaned that they lack proper training and exposure which has constantly led to their inability to repair broken down scanning equipment. This admittance of lack of training and exposure of the UGLS digitisation staff contradicts his denial of lacking any requisite skills. This could be attributed to either the respondents feeling uncomfortable revealing the weaknesses of the UGLS digitisation staff, or it could be that the respondents lacked thorough knowledge of their own skills requirements in support of their digitisation project.

Findings from this study revealed the extent of skills the UGLS digitisation staff possessed. The staff had some basic computing skills (software, hardware and network), and the general use of ICTs, which enables them to execute the day-to-day operations using digital scanners, image editing software and in troubleshooting minor technical glitches that may occur during their routine operations.

In summary, these finding supports Rafiq and Ameen (2014b: 29), Hamooya and Njobvu (2010: 245) and Ezeani (2009:14) who all noted that, among other things, those institutions which undertake digitisation without IT skills are bound to face serious problems. The findings equally revealed that beyond those basic IT skills the UGLS staff possesses, these digitisation staff lacked some relevant skills in support of an effective digitisation. Notably, critical technical skills in repair and maintenance of digitisation equipment and other advanced IT skills such as web development, database skills, and cataloguing of digital collections were lacking. The project management skills, as well as expertise in archival documents handling were also lacking. The UGLS therefore needs to focus on upgrading the skills of its digitisation staff providing them with necessary training and exposure. It also appears the UGLS is also understaffed, It was also stated by the respondents that the Digitisation Unit does not have sufficient staff, while the programme is mainly supported by National Service personnel who are temporary employees. The literature review on staffing and skills requirements (section 2.9 chapter two) in this study revealed the multiplicity of skills and expertise typically required for digitisation which the UGLS must take a critical look.

Theme 6: Digital preservation and long-term access of digitised contents at the UGLS

- ***What measures have been put in place to ensure the long-term preservation and access to digitised contents of the UGLS?***

All the respondents revealed that there is no formal guiding digital preservation policy for digital objects that were borne-out of digitisation. However, the respondents revealed that the UGLS has put in place some measures to ensure long-term preservation and access of the digital objects, as they noted that the digitised contents (including archival / raw files and their derivatives) are being stored on external hard drives and internal network storage. The response from one interviewee, however, cast doubts on their claim to the possible long-term preservation of their digitised content. As the interviewee remarked:

> R: "*There is an archival server [internal network storage] where once materials are digitised they are pushed on that server. Because there is no policy, it hasn't been stated how long materials should be kept on that server"*

The possibility that the digitised content may easily be disposed off is even more likely since one respondent from the operations group bemoaned that the storage space provided by both the external storage and the network storage was woefully inadequate. The respondent revealed that the Digitisation Unit has been promised some storage space by central IT department from the University's data centre which is yet to be materialised

The respondents also indicated that access to copies of digitised content are ingested into the University's Institutional Repository (DSpace platform) which they are confident supports digital preservation and long-term access. Although all of the respondents were convinced that the digital repository (DSpace) has been set up according to international standards for digital preservation, none of respondents was able to mention what digital preservation standards that the institutional repository adhered to. The respondents also revealed that the raw/archival and derivative/access files were saved in non-proprietary open standard file formats (namely. JPEG, TIFF and PDF) which were internationally accepted standard file formats that support digital preservation and long-term access. Some of the respondents also raised concerns about lack of security which they feel could compromise the digital preservation and long-term access of the digitised contents as one respondent echoes these fears:

> *R: "We only have one network storage, where the materials are kept; there is no backup of that network storage anywhere. Ideally, there should be two or three backups of that network storage scattered across campus, so that in the event that the network storage go down then we can rely on those additional backups to retrieve the materials. Secondly, for long-term*

preservation, we would have to periodically be checking the materials that are on those servers for their integrity and all that, this is something that we haven't been doing. So I can't really say that currently the digitised contents allow for long–term access"

The respondents remarked that the UGLS set up the institutional repository purposely to ensure long-term access to the digitised content. Some of the respondents, however, revealed that there were frequent downtime of the institutional repository which is mostly either due to server technical glitch or unreliable power supply. All the respondents confirmed the provided storage facilities were inadequate considering the volumes of digital objects generated by the Digitisation Unit incrementally.

It can be concluded that the UGLS are satisfying some of the requirements as far as digital preservation of the digitised contents is concerned. First and foremost, UGLS have adopted non-proprietary and open formats and open standard which includes JPEG and TIFF for their raw/archival files while the derivative/access copies are mostly in PDFs. Certain standards for file formats are crucial to support the preservation of digital objects; creating multiple files in different standard file formats in open non-proprietary formats are such appropriate format that could be crucial in supporting digital preservation of digitised content by the UGLS as revealed in the literature review by Verheusen (2008) and Kosciejew, (2015) in (Section 2.10.3 chapter two) of this study. It also appears that the UGLS has partly archived its access copies in an institutional repository (DSpace) which supports digital preservation and long-term access; this is because DSpace is complaint with the OAIS reference model which is a critical framework in support of digital preservation. Nonetheless, there also appear to be critical challenges with respect to some aspects of UGLS digital preservation efforts.

With the absence of a digital preservation policy, it appears that UGLS digitisation projects main focus is on storage and access where digitised contents (both raw and derivatives) are basically kept on internal and external hard disk drives and network storage space which are insufficient and there is a consequent risk of permanent loss of digital objects. It is also clear that UGLS does not have any preservation plan or strategy to periodically review the digital files to identify and correct any degradation in order to maintain the integrity and authenticity of the master digital object and its derivative files over time. Caplan (2008), Oehlerts and Liu (2013), Dobreva and Ruusalepp (2012: 193) all underscored the importance of a conscious digital preservation efforts and activities that will generally ensure the availability, authenticity, identity, fixity, renderability, viability and understandability of digital objects. It also appears that UGLS digitised contents, with the exception of those ingested or archived on DSpace, were simply "dumped" onto available external and internal

drives, as well as, network storage servers without any accompanying appropriate and adequate metadata for the digital objects stored on storage facilities.

The storage network server for the digitised content also lacks appropriate digital library system (DLS) integrated with metadata store, digital object store and services of digital preservation capabilities. These are critical digital preservation issues that the UGLS must consider. The literature review (Sections 2.10 and 2.10.3 of Chapter 2) highlights and discusses the underlying meaning and significance of digital preservation and some strategies and approaches to follow in ensuring digital preservation and long-term access.

4.3. Suggested Solutions and Recommendations

This section highlights recommended solutions suggested by respondents to be considered by the UGLS in addressing the critical challenges confronted in their digitisation efforts. Some of the suggested solutions include relevant technological precautions which need to be implemented to ensure that the quality of digitisation activities is improved towards realising a sustainable UGLS digitisation programme. This section also follows the thematic subdivision of categories and sub–categories of Table Two in section 4.1 of this chapter.

❖ Summary of recommended solutions that emerged from the research

Table 3: Summary of recommended solutions

Themes	categories	Subcategories
7. Recommended solutions to critical challenges for a sustainable UGLS digitisation programme	**7.1.** Policy and planning	▪ Develop a digitisation policy that will guide our processes.
	7.2. Organisation, management and Human resource	▪ Employ permanent staff (Not temporary national service personnel) ▪ Training and exposure of employees ▪ Awareness creation for digitisation services ▪ Staff motivation (incentives) ▪ Interest and commitment ▪ Partnership and

		Collaboration
	7.3. Funding	▪ Budgetary allocations ▪ External grants and sponsors ▪ Revenue generating services to support budget
	7.4. Technical precautions for UGLS digitisation programme	▪ Implement digital assets management system (DAMS) to manage digital objects ▪ Decentralised backup sites ▪ Reliable and secure storage facility ▪ Reliable electrical power ▪ Internet access ▪ Periodic audits of digital assets ▪ Maintenance of equipment ▪ Purchase up to date technology and infrastructure ▪ Automatic standby generators

Source: Field data, October, 2016

Theme 7: Recommended solutions for a sustainable UGLS digitisation programme

The UGLS digitisation staff interviewed outlined a myriad of challenges that UGLS digitisation programme faces. Similarly, these respondents proposed solutions to these multiple problems to ensuring an effective, efficient and sustainable digitisation programme. The solutions are diverse but similar solutions are integrated into categories. The categories and subcategories of this theme follow the respondents recommended solutions.

Category 7.1 Policy and planning: The UGLS does not have a formal digitisation policy and established digitisation plan and procedures. The respondents recommended that the UGLS should develop a digitisation policy: a policy that will guide the digitisation processes. They suggested that such a policy will help address the digitisation planning and procedural issues as well as, decision-making responsibilities and mandates which are not currently clear and properly defined.

Category 7.2 Organisation, management and human resource:

- ***Permanent employees***: The UGLS largely engage National Service personnel who are by their status temporary employees of the Library. The regularization of these trained national service personnel who are temporary employees by making them permanent, or the employment of permanent staff to work in its digitisation programme is welcoming since the Digitisation Unit of the UGLS is currently understaffed, to ensure the UGLS have adequate staff to carry out digitisation work effectively. The digitisation lifecycle which includes pre-digitisation processes of selection and preparation of source materials; digitisation processes of image scanning and editing and post-digitisation activities of delivering digitised content to end-users are much more complex and demanding activities that requires enormous effort from trained and adequate employees to execute such tasks. Hence, the UGLS should employ and engage adequate and trained permanent employees to ensure the digitisation project meets its objectives.
- ***Training and exposure of employees****:* UGLS digitisation staff lack proper training and exposure. The provision of opportunities for training on a continuous basis to ensure requisites skills and expertise for digitisation staff has to be developed. The most pressing skills and expertise needed is for staff to be able to maintain and repair digitisation equipment when they become faulty or break down. The exposure of UGLS digitisation staff to other digitisation efforts both locally and internationally will impact significantly on their skills capacity and experience on digitisation and their overall quality of work.
- ***Awareness creation of digitisation services:*** Respondents indicated that the UGLS digitisation programme is not well-publicized to members of the UGLS and the University community at large. The UGLS has not done much to create awareness and sell the prospects of digitisation to most important stakeholders of the University including the University authorities. The UGLS should, therefore, create awareness of the digitisation initiatives among all its stakeholders both internal and external, as well as market the importance and benefits of digitisation services for libraries in particular and in academic institutions in general and how the UGLS and the University on the generally stand to benefit from supporting digital initiatives.
- ***Staff motivation*****:** In general, both operations and management group acknowledged that there is discipline and commitment among the digitisation staff although digitisation work is tedious, repetitive and painstaking. The UGLS should provide incentives and fringe benefits for digitisation staff. Incentives as allowances, recognition and awards for outstanding and hardworking committed staff on a periodic basis. This will be critical in motivating digitisation staff to give out their best.
- ***Management interest and commitment****:* Responses indicated the interest and commitment from the management of the UGLS and the University, in general, is low. The UGLS has prioritised

other library projects over digitisation, thus the necessary support is not necessarily adequate and it may be delayed. One respondent expressed this concerned as he said:

> *R: Currently, very little attention is given to such Unit [Digitisation] because it is considered to be a non-profit sector of the library if you compare it to the Photocopy and the Bindery, [and] other service points…so I believe that because it is a nonprofit venture, there is little that has been done in terms of support, financial support, training and all that"*

The UGLS management should show commitment and interest in the digitisation programme so as to ensure the needed support to digitisation is provided adequately and promptly.

- ***Partnerships and Collaborations****:* All respondents revealed that UGLS currently does not partner or collaborate with any entity on its digitisation efforts. The UGLS has had previous partnerships and collaborations on its digitisation efforts with some institutions including the Royal Tropical Institute (KIT) of the Netherlands, and Carnegie Corporation of New York thats have proven to be crucial to making significant progress in providing necessary funds in digital technology acquisition and capacity building. The respondents called for the need for UGLS to reconsider partnering or collaborating with other institutions in order to benefit from resultant advantages including shared resources in cost, infrastructure and technological, digital collections (to avoid duplication of effort) and skills transfer so as to share the high burden of digitisation in a way that is mutual.

Category 7.3 Funding:

- ***Budgets:*** In the past, the UGLS has received huge initial financial support from external partners including KIT and Carnegie. The UGLS currently completely funds its digitisation activities, However, based on responses from the management group, it appears they did not know, or did not want to disclose exactly how much is allocated to the digitisation activities from the UGLS budget. Currently it appears the UGLS digitisation does not have any specific budget allocation for digitisation activities and that it is mainly funded from the main UGLS annual budget which is already insufficient and constrained. It appears UGLS prioritizes other library services or projects over digitisation, which often results in very poor and insufficient allocation of funds to digitisation activities. The UGLS should clearly forecast the needs of the digitisation programme and make specific budget allocations for digitisation, which will not be redirected by any means but to solely support digitisation activities as earmarked in the budgetary allocations. This will be crucial in mitigating some of the critical challenges confronted in UGLS digitisation efforts.

- ***Seek for external grants and sponsors:*** In the past, the UGLS digitisation projects have benefitted from external grants from sponsors and partners including KIT and Carnegie which were instrumental for the UGLS in meeting the high financial cost in acquiring most of it technical and technological infrastructure and resources. The UGLS should consider forging such partnerships in securing funds and grants to augment the insufficient internal funding from the University.
- ***Revenue generation services:*** The respondents were of the view that the UGLS Digitisation Unit is perceived as simply a cost center since it does not generate any revenue for the UGLS compared to other departments of the UGLS. The respondents recommend that the Digitisation Unit should be allowed to commercialize its services to generate income to support digitisation needs of the Unit, such as repair of defective equipment, purchase of up-to-date technology including hardware and purchase of required software and training; and to complement the small budgetary allocations received from the University. As a respondent puts it:

> *R: "either the University fully funds the project or the Unit [Digitisation Unit], or the Unit should be allowed to work for charges and charge for its services, so that it could also take external jobs, external contracts, in order to get enough fund to support itself, or the Library or the institution should look for stakeholders and other funding agencies to support the work at the Digitisation Unit"*

.

Category 7.4 Technical precautions for digitisation

The respondents suggested some technological precautions that UGLS must urgently consider and address. One of the issues expressed is that the UGLS must implement a digital assets management system (DAMS) with robust metadata, preservation and access capabilities where all digitised contents of both raw/archival objects and derivative/access copies will be stored and managed, so as to obviate the current practice of just dumping digital objects into internal and external drives as well as network storage which does not provide the environment that other DAMS enjoy. Another issue is the need for periodic audits of digital assets to ensure that the integrity, authenticity and the protection of the digital objects intended for preservation and long-term access over time is maintained. The UGLS should decentralise its backup sites servers. All the digitised contents are currently kept on-site without any off site servers. Reliable and secure offsite storage and backups system are needed to manage any potential disaster recovery.

Another issue is that the UGLS should respond quickly to repair or fix all broken down digitisation equipment to ensure the smooth operations of the digitisation programme, since broken down

equipment that is not repaired or fixed in time hampers the routine operations. All up-to-date technology and infrastructure, particularly necessary digital scanners and requested software should also be purchased to render the smooth operations of the Digitisation Unit. There have been complaints also about the frequent downtime of the only institutional repository where the digitised contents are digitally archived for long-term access in order to provide the reliable form of digital preservation for it digitised content. The respondents complained that the server downtimes were mainly caused by technical glitches which are recurrent and unresolved. Some of the downtime was also caused by power outages. The technical glitches on the server should be resolved. An automatic standby generator should also be installed to ensure the constant supply of power to the servers hosting the digital collections.

To conclude, the solutions respondents recommended for the UGLS digitisation programme could be summed up as challenges in policy and planning, organisation, management, trained manpower and funding. The technical precautions also cut across technology, network and infrastructure. It appears UGLS has not done much in practice to solve the challenges because the problems still persists. The respondents' recommendations and suggested solutions nonetheless, can plausibly be argued to be realistic and applicable because these are based on the actual context.

4.4. Conclusion

An analysis of the data gathered via the use of semi-structured interviews with officials of UGLS digitisation programme was presented in this chapter. The recorded and transcribed interview responses were analysed in accordance with themes identified from the "interview schedule" with similar responses integrated to streamline the analysis and interpretations. This chapter discussed and interpreted the findings of the research which were grouped under the seven identified themes in this study. The first six themes which include digitisation governance, selection, digitisation goals and priorities, digitisation sustainability, skills and expertise and digital preservation dealt mostly with discussions and interpretation of the findings from the study in relation to the research questions of this study. The last theme presented suggested solutions from respondents that will enable an effective and sustainable UGLS digitisation programme. The analysis and interpretation was supported by findings from the literature review conducted in this study. A summary of the research findings are also outlined in this chapter. The following were the most important findings:

1. The UGLS does not have a written digitisation policy in place to guide the UGLS digitisation programme.

2. The UGLS does not follow established digitisation plan and procedures in directing and ensuring thorough planning and decision-making.
3. The UGLS does not have laid down selection criteria to guide its selection process.
4. The goal of the UGLS digitisation is to preserve its unique and rare collections and to provide access to them, while the digitisation of heritage collections and institutional archives of theses and dissertations is its priority.
5. The study found that the UGLS digitisation staff has some basic skills in support of an effective digitisation programme. Equally, Staff lacked skills they deem crucial in support of their digitisation programme. The Digitisation Unit had insufficient staff and those available few staff lacked training and exposure.
6. The UGLS does not have a laid-down procedure for monitoring and tracking the progress of digitisation. UGLS simply relied on the quantity of digital objects uploaded on the University IR to monitor progress.
7. The UGLS digitisation programme faces critical challenges that include, lack of continuous training and exposure for staff, insufficient trained employees, use of temporary employees (national service personnel), engagement of inexperienced digitisation supervisors; lack of some crucial digitisation skills, occasional transfers and re-assigning of trained and experienced digitisation professionals to non-digitisation area slack of adequate storage facilities for digital content, frequent breakdown of equipment, poor maintenance culture, budget constraints, erratic/unreliable power supply, low interest from authorities and management in decision bodies, low management support, and the non-acquisition of all required and necessary software and significant software, inadequate and insecure storage facility for digital objects server and storage.
8. It was also found that certain factors were contributory to the progress of the UGLS digitisation programme, this include management support, initial practical training and exposure for UGLS digitisation staff, the commitment of staff to the work of the digitisation programme, huge initial financial and technology investment, and initial support grants from external funders/donors and partners.
9. The UGLS does not have any formalized preservation plan or strategy to periodically review the digital files to identify and correct any possible media degradation or obsolescence and digital deterioration in order to maintain the integrity and authenticity of the master digital object and its derivative files over time.
10. The UGLS stored archival masters and derivative digitised contents on storage media without any appropriate DAMS in place with digital preservation capabilities to manage and support digital objects. However, the digitised content are saved in open and non-proprietary file formats including TIFF, JPEG and PDF, while the access copies are digitally archived on a

digital repository which are compliant to the OAIS model for digital preservation and long-term access.

11. The study found that digitised content were primarily stored on internal and external storage drives which were insufficient for the ever-increasing digitised content.
12. It was revealed that access to digitised content by users was made available via the University's institutional repository but access to these materials was constrained because of frequent downtimes of the institutional repository due to server technical glitches and erratic power supply.

The conclusions reached, the recommendations resulting from the study, areas of further studies and final remarks to the study will be discussed in the next chapter.

Chapter Five
Conclusions and Recommendations

5. Introduction

This chapter presents the conclusions and recommendations based on the findings of the seven themes from chapter four of this study, as well as the literature review of the research. The findings of this study informed the following conclusions: These conclusions are grouped into evidence of good or acceptable practices and bad, or defective, practices.

- ***The following conclusions are evidences of "good" and, or "acceptable" practices which the UGLS should improve and be sustained:***

1. Digitisation is playing a critical role in the UGLS's goal of preserving unique and rare collections held in the University, as well as providing broader access to its resources. The use of digital information resources is growing and demand for digitised contents is increasing at the University. By virtue of UGLS digitisation efforts, digitising resources has also improved the resource capacity and the quality of information services delivery of the UGLS, while it continues to contribute significantly to academic and research in the University.

2. An effective way to proceed successfully with digitisation projects is to develop collaborations and partnerships with identifiable stakeholders essentially to successfully support and meet the resource requirements of digitisation initiatives at large. This is what the UGLS had initially done with its previous engagements with KIT and Carnegie Corporation.

3. The sustainability of digitisation projects requires long-term support and commitment of the parent institution and which needs to be a part of institutional planning and this should be addressed at the digitisation project planning stage.

4. It appeared that basic skills required for carrying out digitisation projects in libraries are mostly available at the UGLS.

5. Certain factors were contributory to sustaining UGLS digitisation programme to present day, these include: management support, initial practical training and exposure for UGLS digitisation staff, the commitment of staff to the work of the digitisation programme, huge

initial financial and technology investment, and initial support grants from external funders/donors and partners.

6. The UGLS archival masters and derivatives of it digitised contents are saved in open and non-proprietary file formats, mainly in TIFF, JPEG and PDF. The practice of saving digital objects in open and non-proprietary file formats has been identified as crucial and appropriate for long-term preservation and access to digital content. The access/service copies which are digitally archived into the institutional repository is an acceptable practice for long-term preservation and access, this is because the university's repository in which these digitised content are ingested and archived, is compliant to the OAIS model for digital preservation and long-term access.

7. Access to UGLS digitised content is primarily made available via the University's institutional repository.

- ***The following conclusions are evidence of "bad" practices and, or "defective" practices at the UGLS which the Library must work towards improving:***

1. The UGLS digitisation programme is not guided by institutionally-established digitisation policies. The UGLS cannot undertake its digitisation programme without having a written and formally-endorsed digitisation policy in place to guide and direct its digitisation efforts.

2. Current digitisation activities at the UGLS are not thoroughly planned. Formal planning and processes must be followed and digitisation plans and procedures should be developed to direct the project and set clear guidelines in decision-making to ensure the real needs of digitisation at the UGLS are met.

3. The UGLS digitisation programme is critically understaffed which negatively affect the overall operations at the digitisation department.

4. The UGLS cannot continue to digitise without a laid-down procedure for monitoring and tracking the progress of digitisation. The current method where the UGLS simply relied on the quantity of digital objects uploaded on the University IR to monitor progress is misleading

and does not give a true or an accurate reflection of actual digitisation work progress done or performance targets achieved.

5. The current UGLS selection processes are not clear and there are no real guidelines or criteria for selection of materials to be digitised. The UGLS cannot continue to digitise its valuable collections in the absence a formal selections policy implemented to guide selection which addresses: (1) the process of selection and (2) selection criteria.

6. Certain advanced skills and expertise as required for digitisation are generally lacking among digitisation staff of the UGLS. advanced skills and expertise such as those identified in this research in (Chapter 4, Table 2, category 5.1.) as found to be critical skills to ensuring effective and successful digitisation initiatives are lacking at UGLS and needs to be addressed.

7. Adequate funding is crucial in digitisation project. UGLS currently relies solely on funding from the yearly budgetary allocations it receives from its portion of the UGLS budget for digitisation activities which is inadequate.

8. The UGLS cannot continue to digitise without any formalized preservation plan or strategy. This because without such a plan or strategy the long-term preservation and access of its digitised content cannot be ensured or guaranteed.

9. Access of digitised content via the institutional repository is constrained by some identified and solvable technical and infrastructural bottlenecks mainly; server downtime caused by technical glitches and unreliable/erratic power supply.

10. The digitised contents are stored on storage media without any appropriate DAMS in place with digital preservation capabilities to manage and support digital objects which are considered an unacceptable practice in ensuring long-term preservation and access to digital content.

11. The current storage facilities for digitised content are insufficient and cannot accommodate the ever-increasing digitised content generated by the UGLS digitisation programme.

❖ **A summary of conclusions on main critical challenges/hindrances to the UGLS digitisation programme**

Table 4: Critical challenges facing UGLS digitisation programme

1. Facilities and technology
▪ Insecure storage facility for digital objects server and storage
▪ Poor preservation of the digitised content
▪ Poor maintenance of facilities
▪ Frequent breakdown of digitisation equipment.
▪ Non-acquisition of all required and necessary software
2. Infrastructure
▪ Poor maintenance culture
▪ Erratic/unreliable power supply
3. Personnel
▪ Insufficient trained employees
▪ Use of temporary employees (National Service personnel)
▪ Engagement of inexperienced digitisation supervisors
▪ Occasional transfers and re-assigning of trained and experienced digitisation professionals to non-digitisation area
▪ There is inefficient supervision of the project
4. Skills
▪ Lack of continuous training and exposure for staff
▪ Lack of advanced digitisation skills
5. Management and organisation
▪ Low interest from authorities and management in decision bodies
▪ Low management support
▪ No clearly stated or specified evaluative performance measure
▪ No standard or some laid-down procedure or mechanism to track progress
6. Policy and Planning
▪ Absence of digitisation policy
▪ Lack of established digitisation plan and procedures
▪ No guiding digital preservation policy, plan or strategy
▪ Planning responsibility not clearly defined
▪ Decision-making process not clear
7. Selection challenges
▪ Lack of collection knowledge by selectors

- No stated policy on collection selection
- No defined/formalised selection criteria

Source: Researcher, 2016

5.1. Recommendations

One the basis of the conclusions and the literature review of this study the following recommendations are made:

1. The UGLS should formulate and implement a digitisation policy to guide and direct all digitisation activities, processes and practices associated with its digitisation programme. This would need a consolidated effort by the Library and the University; however, the Library should act as the leader for this: The policy should be tied to the UGLS strategic plan and developed with approval from the concerned authorities in order for it to get the necessary institutional attention and support. Developing and implementing a guiding policy will be crucial in realizing a sustainable UGLS digitisation programme.

2. The UGLS should ensure that proper planning is done even before digitisation initiative is embarked on. For a successful digitisation project, UGLS should observe careful planning before implementing a digitisation project. This planning should consider how digitisation fits into the UGLS strategic plan and the overall mission and vision of the University. The UGLS digitisation processes should also follow a clear digitisation plan and procedures developed purposely to direct the project. Clear mandates in decision-making should be stipulated to ensure clear lines of authority and responsibilities. Such a formal, careful and thorough organisational planning for a digitisation project would help ensure an effective digitisation and the successful completion of digitisation programme in much sustainable way.

3. The UGLS should devise a formalized laid-down procedure for monitoring and tracking the progress and performance of its digitisation approved by authorities concerned since the current monitoring and metric for progress of UGLS digitisation project is misleading and does not give a true and accurate reflection of actual digitisation work progress or

performance targets achieved. It may achieve this responsibility of monitoring and tracking by establishing a feasible and attainable work plan and criteria.

4. The current criteria and process of selection of the UGLS are not adequate. The UGLS should develop a formal selection policy implemented to guide selection which addresses: (1) the process of selection and (2) selection criteria: to be able to select the relevant materials from all of its numerous collections.

5. The UGLS should assess and identify rare and unique indigenous information resources of academic value as well as materials of institutional/administrative value held in the University for digitisation, in order to preserve and broaden access in meeting its academic community information needs. The availability and use of digitised contents improves the quality and of teaching, learning and the growth of research output. Thus the UGLS digitisation programme will improve and enhance the UGLS services in meeting the growing and demand for digitised contents and users' increasing information needs and expectations, hence, contributing to the development of research and scholarship.

6. A mix of IT, management and LIS skills are often required in digitisation. The UGLS should train digitisation staff in order for them to acquire all the required digitisation skills and provide them with the necessary exposure in the form of seminars, workshops, conferences etc. for digitisation staff to learn experiences in other digitisation projects and with other professionals in order for them to acquire the requisite skill and expertise needed to successfully handle digitisation projects. Emphasis should also be placed on on-the-job training and regular refresher courses on digitisation. Active formal continuous professional programmes opportunities should be made available for digitisation staff to enable continuous skills development on digitisation processes. Trainings should also be focused on proper maintenance culture of digitisation facilities. The digitisation staff should receive all the necessary trainings in repairing and fixing the digital scanners in-house which breaks down frequently, and as a result, disrupts the normal operations of the programme, until external expertise and vendors are called upon the fix the equipment.

7. In terms, of personnel challenges, the UGLS should ensure that the digitisation programme employs sufficient and trained employees. The UGLS will need to do this in consultation with the appropriate human resource departments of the University to ensure that the desired and right numbers of permanent and trained staff are employed. The Library must however, take the responsibility of identifying the number of staff needed and the areas of expertise and

skills lacking at the UGLS digitisation programme. The UGLS could employ staff in two ways: The UGLS could regularize temporary employees (National Service personnel) who have already benefited from trainings and experience on-the-job, or the University could advertise vacancies for qualified persons to apply. The UGLS should also engage experienced digitisation supervisors to ensure effective supervision. Ideally, relying on individuals internally. Otherwise could contract supervisors with the necessary experience and relevant background to ensure the effective and efficient operations of the digitisation programme. The occasional transfers and re-assigning of trained and experienced digitisation professionals to non-digitisation areas could be addressed through appropriate knowledge management initiatives, that would ensure knowledge retention, sharing and organisational learning even before the loss of any knowledge or critical staff , so that the loss doe does not stall the normal operations of the digitisation programme. A succession planning by the UGLS with the support of the University could be a long-term strategy in addressing these personnel challenges.

8. The UGLS should develop partnerships and collaborations on its digitisation efforts to ensure it reaps the benefits of such networks including sharing resources, securing funds, developing human resource capabilities and enhanced technological infrastructure for sustainability.

9. To ensure sustainability of the UGLS digitisation programme, the University in its position as the parent institution needs to make long-term commitments and provide all the needed support for the digitisation programme. The UGLS also needs to market and create awareness through diverse communication channels on the usefulness and benefits of digitisation. The UGLS should promote its digitisation through advocacy and publicity programmes in order to get the necessary buy-ins and support from the various stakeholders and users of the digitisation.

10. Adequate funding should be budgeted for digitisation activities. The UGLS management should also be more committed to implementing the amount allocated for digitisation programme without bias. Apart from the yearly budgetary allocation, the UGLS should explore alternative funding sources and opportunities. The UGLS should continue to solicit for more funds from philanthropists and donor organisations as they did in the beginning with Carnegie Corporation and Royal Tropical Institute for their digitisation. The UGLS digitisation programme should engage in services that could generate revenue to support its insufficient funds. This will enable the UGLS to procure all required and necessary software and hardware and with enough funds repair or fix all broken-down equipment immediately.

11. The sustainability of UGLS digitisation programme requires core resources of technology, infrastructure, facilities, policy, finances, human resource and skills to enable it to achieve its goals. This means UGLS should plan ahead by developing sustainable strategies to manage and address the myriad challenges confronting the operations and development of its digitisation efforts. This will help to ensure an effective and sustainable digitisation programme.

12. The UGLS should leverage and build on the contributory factors of management support, initial practical training and exposure for UGLS digitisation staff, the commitment of staff to the work of the digitisation programme, huge initial financial and technology investment, and initial support grants from external funders/donors and partners which has been found to be crucial to sustaining the project to present.

13. The UGLS should develop and institutionalize a preservation plan or strategy to ensure the long-term preservation and access of its digitised contents. The Library will however, need the support of the University's Central IT to provide the necessary digital ecosystem and technological infrastructure and facilities that will support its digital preservation and long-term access of digitised content.

14. The UGLS digitised contents should be saved in open and non-proprietary file formats. The content should also be stored on storage media with DAMS capabilities to manage and support the digital objects. The digital repository for the digitised contents should be compliant to the OAIS model for digital preservation and long-term access.

15. Storage facilities should be expanded to accommodate the ever-increasing digitised content generated by the UGLS digitisation programme. The UGLS will need to acquire robust and reliable data centres to meet the ever-increasing storage needs. The UGLS cannot do this alone; the Library will need to do this in consultation and with the support of the Central IT of the University to provide the required data storage infrastructure that will support adequate and long-term storage.

16. Technical experts should be sought to resolve all protracted technical problems constraining access to digitised content relating to the IR. Alternative power supplies should be provided to address the downtime caused by current erratic and unreliable power. The power supply is an infrastructural problem that is beyond the control of the UGLS, however, the effects of erratic

power might be ameliorated if the University could invest in renewable energy such as solar electricity or biogas as a long-term solution. The UGLS as a short-term measure could invest in high-capacity stand-by generator as backup power source dedicated to its digital repository servers and all other digitisation equipment that are power-dependent.

5.2. Suggestions for Further Studies

This research assessed the prospects of digitisation at the UGLS in understanding the current state and practices of digitisation and in finding ways for a sustainable digitisation. More research should however, be done that will concentrate on comprehensively ascertaining the scope of valuable information resources to determining available information resources held in UGLS that needs to be digitised. Further research is also needed to develop an action plan for a UGLS digitisation strategy. Further research should be done to ascertain the impact and value of digitised content on library collections at the UGLS.

5.3. Final Remarks

This research study has come up with a comprehensive list of findings, solutions, conclusions and recommendations that has the potential of value to enhance the prospects of the UGLS digitisation programme and could serve to advise and suggest to the UGLS in finding ways to sustaining its digitisation programme. The scope of issues assessed are broad and includes digitisation policy, planning, selection criteria, skills and expertise, digital preservation and long-term access of digitised content, measures to track digitisation progress, challenges in digitisation, and the sustainability of the digitisation projects at the UGLS.

It should be emphasized that the practical application and implementation of this research can be realised if these issues are adopted holistically within an overarching digitisation strategy, framework or policy put in place to deal with all the aspects assessed and the critical challenges of digitisation identified with the UGLS digitisation. The findings of this research could be of value to other HEIs in Ghana, as well as many other cultural heritage and memory institution's, particularly libraries, in the successful and sustainable implementation of digitisation initiatives.

References

Abruzzi, R. 2015. Undertaking a digitization project?. *Online Searcher,* 39(2):28-32.

Adeleke, A. A. 2014. An examination of digitization capacity and skills of academic librarians in Nigeria. *International Journal of Advanced Networking and Applications*, 5(6):2084-2091.

Adzic, A. 2013. Digitization of library materials: review, the problems and derived solutions. *INFOtheca*, 1(14): 47-57.

Akintunde, S. A. 2007. Selection and acquisition of materials for digitization in libraries. *Paper presented at the national workshop on Digitization of Library materials: Processes and Tools by the National Library of Nigeria, at the University of Jos, Jos, Plateau State, July 16-20, 2007*. [Online]. Available:http://irepos.unijos.edu.ng/jspui/handle/123456789/463/ [Accessed 5 January 2016].

Albanese, A. 2016.Google case ends, but copyright fight goes on. [Online]. Available:http://www.publishersweekly.com/pw/by-topic/digital/copyright/article/70064-the-copyright-battle-continues.html [Accessed 15 December 2016].

Al Neimat, T. 2010. Why IT projects fail. White Paper. Sydney: Project Perfect. [Online]. Available: www.projectperfect.com.au/downloads/Info/info_it_projects_fail.pdf/ [Accessed 20 January 2016].

Amaoge, D. A. 2015. Digitization of library resources in Nigeria: problems and prospects. *International Journal of Information Research and Review*, 2(1):256-260.

Amollo, B.A. 2011. Digitization for libraries in Kenya, paper presented at the 2nd International Conference on African Digital Libraries and Archives (ICADLA-2), University of Witwatersrand, Johannesburg, South Africa, 14-18 November [Online]. Available: https://core.ac.uk/download/files/979/39670299.pdf/ [Accessed 20 July 2016].

Andrews, N. 2006. The Oxford Journals Online Archives: the purpose and practicalities of a major print digitization program. *Serials Review*, 32(2):78-80.

Association of Research Libraries (ARL) 2004. *Recognizing digitization as a preservation reformatting method*. Washington, DC: Association of Research Libraries. [Online].Available: http://old.arl.org/bm~doc/digi_preserv.pdf/ [Accessed 29 March 2016].

Astle, P. and Muir, A. 2002. Digitization and preservation in public libraries and archives. *Journal of Librarianship and Information Science*, 34 (2): 67-79.

Ayris, P. 1998. Guidance for selecting materials for digitisation, *joint RLG and NPO Preservation Conference: Guidelines for Digital Imaging, Warwick*.[Online].Available: http://eprints.ucl.ac.uk/492/1/paul_ayris3.pdf/ [Accessed 30 January 2016].

Babbie, E., and Mouton, J. 2001. *The practice of social research.* Cape Town: Oxford University Press.

Badhusha, K. N. 2008. *Digital library architecture.* New Delhi: Ane Books.

Barfi-Adomako, O. 2011. Electronic Support Unit Balme Library Annual Report.[Online]. Available: http://ugspace.ug.edu.gh/handle/123456789/5095/ [Accessed 22 September 2015].

Barfi-Adomako, O. 2015. Report on the installation of the atiz bookpro scanner at the College of Health Sciences (CHS) Library. [Online]. Available: http://ugspace.ug.edu.gh/handle/123456789/6172/ [Accessed 22 September 2015].

Barfi-Adomako, O. and Kwadzo, O. 2014. Participants' perception of digitisation and institutional repository Training (IR) Workshop Held in the University of Ghana. (Unpublished).

Baro, E.E., Oyeniran, K.G. and Ateboh. B. 2013. Digitization projects in university libraries in Nigeria: the journey so far. *Library Hi Tech News*, 3(9):21–26.

Bawden, D. and Robinson, L. 2012. *Introduction to Information Science*. London: Facet.

Bradley, K. 2007. Defining digital sustainability. *Library Trends*, 56(1):148-163.[Online]. Available: http://muse.jhu.edu/journals/library_trends/v056/56.1bradley.pdf/ [Accessed 18 February 2016].

Breeding, M. 2014. Ongoing challenges in digitization. *Computers in Libraries*, 34 (9):16-18.[Online].Available: http://librarytechnology.org/repository/item.pl?id=20128/ [Accessed 10 February 2016].

Bryman, A., 2012. *Social research method*, 4th ed. New York: Oxford University Press.

Bulow, A. E., and Ahmon, J. 2011. *Preparing collections for digitization*.London: Facet.

Bultmann, B., Hardy, R., Muir, A., and Wictor, C. 2005. Digitised content in the UK research library and archives sector. [Online]. Available: http://www.rluk.ac.uk/wpcontent/uploads/2014/02/Loughborough_Digitization_Report.pdf [Accessed 21 August 2015].

Caplan, P. 2008. *What is digital preservation.?.*[Online]. Available: https://journals.ala.org/ltr/article/view/4224/4809/ [Accessed 6 August 2015].

Cathro, W. 2007. Digitization in Australasia. *Serials*, 20(1):9-15.

Cervone, H. F. 2012a. Understanding the elements of a digital library project plan: part 1. *OCLC Systems & Services: International digital library perspectives*, 28(2):75-78.

Cervone, H. F. 2012b. Understanding the elements of a digital library project plan: part 2, *OCLC Systems & Services: International digital library perspectives,* 28(3):126-129.

Cervone, H.F. 2012c. Understanding the elements of a digital library project plan: part 3, *OCLC Systems & Services: International digital library perspectives,* 28(4):176-179.

Chapman, S. 2000. *Considerations for project management: handbook for digital projects*: A management tool for preservation and access. [Online]. Available: https://www.nedcc.org/assets/media/documents/dman.pdf/ [Accessed 6 March 2016].

Charlton, J. 2013. Digitization Across the Globe. *Information Today*; 30(10):14-15.

Choi, Y., & Rasmussen, E. 2009. What qualifications and skills are important for digital librarian positions in academic libraries? A job advertisement analysis. *Journal of academic librarianship*, 35(5):457-467.

Chowdhury, G., and Chowdhury, S. 2002. *Introduction to digital libraries*. London: Facet.

Chowdury, G.G. and Foo, S. 2012. *Digital Library and Information Access: Research Perspectives.* London: Facet.

Christou, C. 2016. Authors Guild v. Google.[Online]. Available: https://www.questia.com/magazine/1G1-456582398/authors-guild-v-google [Accessed 15 December 2016].

Cohen, L., Manion, L., and K., Morrison, 2007. *Research methods in education.* 6 th ed. New York: Routledge.

Colleran, A. 2000. Information in bits: approaches to digitised content. *Vine, 30*(1):14-21. [Online]. Available: http://www.emeraldinsight.com/doi/pdfplus/10.1108/eb040735/ [Accessed 20 January 2016].

Consultative Committee for Space Data Systems (CCSDS). 2012. Recommendation for space data system practices: Reference model for an Open Archival Information System (OAIS). [Online]. Available: http://public.ccsds.org/publications/**archive**/650x0b1.PDF/ [Accessed 28 February 2016].

Conway, P. 2010. Preservation in the age of Google: digitization preservation, and dilemmas. *Library Quarterly*, 80(1):61-79.

Corrall, S. 2002. Planning and policy making. *Building a successful customer-service culture: a guide for library and information managers.* London:Facet. [Online]. Available: http://d-scholarship.pitt.edu/25160/1/Corrall_%282002%29_PPM_chapter.pdf/ [Accessed 2 April 2016].

Coyle, K. 2006a. One word: digital. *Journal of Academic Librarianship*, 32(2):205-207.

Coyle, K. 2006b. Mass digitization of books. *Journal of Academic Librarianship,* 32(6): 641-645.

Creswell, J. W. 2009. *Research design: qualitative, quantitative, and mixed methods approaches*. 3rd ed. London: Sage.

Creswell, J. W. 2012. *Educational research: planning, conducting and evaluating quantitative and qualitative research.* Boston, MA: Pearson.

Creswell, J. W. 2013. *Qualitative inquiry and research design: choosing among five approaches*. 3rd ed. Los Angeles: Sage.

Dadzie, P. S., & Van de Walt, T. 2015. Planning for digitization of university libraries in: challenges andprospects.[Online].Available:<http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=3247&context=libphilprac>[Accessed 22 September 2015].

Dale, R.L., and Ambacher, B. (ed). 2007. Trustworthy Repositories Audit & Certification: criteria and checklist. Compiled by OCLC, RLG and in collaboration with the National Archives and Records Administration. [Online] Available: http://www.crl.edu/sites/default/files/attachments/pages/trac_0.pdf [Accessed 10 March 2016].

Deegan, M. and Tanner, S. 2006. *Digital preservation*. London: Facet.

De Francesco, G. 2004. MINERVA–the Ministerial Network for Valorising Activities in digitisation towards an agreed European platform for digitisation of cultural and scientific heritage. [Online]. Available: http://elib.mi.sanu.ac.rs/files/journals/ncd/6/d001download.pdf [Accessed 20 October 2015].

Denscombe, M. 2003. *The good research guide for small-scale social research projects*. 3rd ed. New York: Open University Press.

Dobreva, M., and Ruusalepp, M. 2012. Digital preservation: interoprabilty ad modum In: Chowdhory, G.G. and Foo, S. eds. *Digital libraries and information access: Research perspectives*, 192-215. London: Facet.

Dobreva, M. O'Dwyer, A. and Konstantelos, L. 2012. User needs in digitization. In: Lorna, M. and Hughes, M. (eds). *Evaluating and measuring the value, use and impact of digital collections*, 73-84. London: Facet.

Dougherty, W. C. 2010. The Google Books Project: will it make libraries obsolete?. *Journal of academic librarianship*, 36(1):86-89.

Eichenlaub, N.2013. Checking in with Google Books, HathiTrust, and the DPLA. [Online]. Avaliable:[http://www.infotoday.com/cilmag/nov13/Eichenlaub--Checking-In-With-Google-Books.shtml[Accessed 15 December, 2016].

Eke, H.N., 2011. Digitizing resources for University of Nigeria repository : process and challenges. *Webology*, 8(1):1-19.

Ezeani, C., N., 2009. Digitizing projects in developing countries: the case of the University of Nigeria. *Library Hi Tech News*, 26 (5/6): 14-15.

Ezeani, C. N., and Ezema, I. J. 2011. Digitizing institutional research output of University of Nigeria, Nsukka. *Library Philosophy and Practice (e-journal).* [Online]. Available: http://digitalcommons.unl.edu/libphilprac/565/ [Accessed 19 February 2016].

Fabunmi, B. A., Paris, M., and Fabunmi, M. 2006. Digitization of library resources: challenges and implications for policy and planning. *International Journal of African & African-American Studies*, *5*(2):23-36.

Fenech, K., and De Raffaele, C. 2013. Overcoming ICT project failures-a practical perspective. In *Computer and Information Technology (WCCIT), 2013 World Congress on (pp. 1-6). IEEE.*

Fogg, M, 2014. Digitization: a successful collaborative partnership between library and publisher. *Insights*, 27(2):186–191.

Gladney, H.M., 2006. Principles for digital preservation. *Communications of the ACM*, 49(2):111-116.

Gould, S. and Ebdon, R 1999. *IFLA/UNESCO survey on digitisation and preservation*. Paris: UNESCO. Available . [Online]. http://www.ifla.org/files/assets/pac/ipi/ipi2%20vers2.pdf/ [Accessed 25 March 2016].

Hamooya, C., and Njobvu, B. 2010. Digitization of archival materials: the case of national archives of Zambia. *ESARBICA Journal*, 29:234-247.

Hampson, A., Pinfield S., and Upton, I. 1999. Digitisation of exam papers, *Electronic Library*, 17 (4):239-246.

Hawkins, D. T. 2006. Conference circuit-digitization: from inception to income-here's a look at why some companies now offer full-fledged format, and other highlights from the ASIDIC's spring meeting. *Information Today*, 23(5):29-29.[Online]. Available: https://www.questia.com/magazine/1G1-145883326/digitization-from-inception-to-income/ [Accessed 13 February 2016].

Hazen, D., J. Horrell, J. & Merrill-Oldham .J. 1998. Selecting research collections for digitization. *Council on Library and Information Resources(CLIR)*. [Online]. Available: http://www.clir.org/pubs/reports/hazen/pub74.htm/l [Accessed 13 February 2016].

Hockx-Yu, H. 2006. Digital preservation in the context of institutional repositories. *Program,* 40(3):232-243.

Hristova, R. Y. 2012. Digitization-is it a viable preservation alternative?. [Online]. Available: https://www.ideals.illinois.edu/bitstream/handle/2142/44873/bobcatsss2012-digitization-preservation-rhristova-fv.pdf?sequence=2/ [Accessed 14 March 2016].

Hughes, L. M. 2004. *Digitizing collections: strategic issues for the information manager*. London: Facet.

Hurst-Wahl, J., 2009. Digitization: how many best practices, guidelines, and standards do We need?. *Information Standards Quarterly*, 21(4): 22-24.

Institute of Museum and Library Services (IMLS). 2002. *Status of technology and digitization in the nation's museums and libraries report* . [Online]. Available: https://www.imls.gov/sites/default/files/publications/documents/2002report_0.pdf[Accessed 30 March 2016].

International Federation of Library Institutions and Associations (IFLA). 2014. *Guidelines for planning the digitization of rare book and manuscript collections*. [Online]. Available : http://www.ifla.org/files/assets/rare-books and-manuscripts/rbms guidelines/ifla_guidelines_for_planning_the_digitization_of_rare_book_and_manuscripts_collections_january_2015.pdf/ [Accessed 21 August 2015].

InterPARES 2. 2011. *Project glossary*. [Online]. Available: http://www.interpares.org/ip2/display_file.cfm?doc=ip2_glossary.pdf&CFID=243105&CFTOKEN=70/ [Accessed 20 February 2016].

Iwhiwhu B. E and E. O.Eyekpegha, 2009. Digitization of Nigerian university libraries. *Electronic Library*, 27(3):529-536.

James-Gilboe, L., 2005. The challenge of digitization: libraries are finding that newspaper projects are not for the faint of heart. *The Serials Librarian*, *49*(1-2):155-163.

JISC 2016. *Digitisation staff training*. [Online]. Available: www.jiscdigitalmedia.ac.uk/guide/digitisation-staff-training/ [Accessed 26 October 2015].

Jordan, M. 2006. *Putting content online: a practical guide for libraries,* Oxford: Chandos.

Kane, M.A. 2003. Digitization: study examines projects in Ohio's public libraries. *Ohio Libraries,* 16(4):10-12.

Kannappanavar, B. U. Rajanikanta, S.T. and Satish K. T. 2010. Importance of digitization of library materials. *Journal of Information Management,* 47(1):61-70**.**

Kosciejew, M. 2015. Digital vellum and other cures for bit rot. *Information Management Journal,*49: 20-26.

Lampert, C. K., and Vaughan, J. 2009. Success factors and strategic planning: rebuilding an academic library digitization program. *Information Technology and Libraries,* 28(3):116-136.

Lee, S.D. 1999. Assessment criteria for digitization" Oxford University. .[Online]. Available: http://www.bodley.ox.ac.uk/scoping/assessment.htm [Accessed 20 February 2016].

Lee, S. D. 2001. Digitization: Is it worth it? *Computers in libraries,* 21(5):28-30.[Online]. Available: http://www.infotoday.com/cilmag/may01/lee.htm/ [Accessed 20 March 2016].

Limb, P., 2005. The digitization of Africa. *Africa Today*, 52(2):.3-19.

Liu, Q. Y. 2004. Best practices, standards and techniques for digitizing library materials: a snapshot of library digitization practices in the USA. *Online Information Review,* 28(5):338-345.

Lopatin, L. 2006. Library digitization projects, issues and guidelines. *Library Hi Tech*, 24(2): 273–289.

Lor, P. J. 2005. Preserving African digital resources: is there a role for repository libraries?, *Library Management*, 26 (1/2):63-72.

Lor, P.J. 2008. Digital libraries and archiving knowledge: some critical questions, *South African Journal Of Libraries & Information Science*, 74(2):116-128.

Lor, P. J. and Britz, J., 2005. Knowledge production from an African perspective: international information flows and intellectual property, *International Information & Library Review*, 37(2):61-76.

Madalli, D. P., Barve, S., and Amin, S. 2012. Digital preservation in open-source digital library software. *Journal of Academic Librarianship*, 38(3):161-164.

Manžuch, Z. 2009. Monitoring digitisation: lessons from previous experiences. *Journal of Documentation*, 65(5) :768-796.

Mapulanga, P. 2012. Adequacy or inadequacy of budgets for University of Malawi Libraries (UML). The Bottom Line. *Managing Library Finances*, 25 (3):115-122.

Mapulanga P. 2013. Digitising library resources and building digital repositories in the University of Malawi Libraries, *Electronic Library*,3(5): 635-647.

Maroso, A. L. 2005. Educating future digitizers. *Library Hi Tech*, 23(2):187-204.

Maurya, R.N., 2011. Digital library and digitization. *International Journal of Information Dissemination and Technology*, *1*(4): 228-231.

Mbambo-Thata, B. 2007. Building a digital library at the University of Zimbabwe: a celebration of team work and collaboration, International Network for the Availability of Scientific Publications (INASP), (Ed.) Oxford [Online]. Available: http://r4d.dfid.gov.uk/PDF/Outputs/Peri/Zimbabwe_DigLib_book_Web.pdf/ [Accessed 25 July 2016].

McMenemy, D. and Poulter, A. 2005. *Delivering digital services: a handbook for public libraries and learning centres.* London: Facet.

McRostie, D. 2014. Aspiration to implementation: building an enterprise digitization capability at the University of Melbourne. *Library Hi Tech News*, 31(3): 11-14.

Mendelsson, D., Falk, E., and Oliver, A. L. 2014. The Albert Einstein archives digitization project: opening hidden treasures. *Library Hi Tech*, 32(2):318-335.

Mohammed, A., 2013. An overview of digitization project in university libraries in Nigeria: a perspective from the literature. *Control Theory and Informatics*, *3*(6):9-16.

Moss, M. and Currall, J. 2004. Digitisation: taking stock1. *Journal of the Society of Archivists,* 25(2), 123-137.

Mutula, S. M. and Ojedokun, A. A. 2008. Digital libraries. In: Aina, L.O. *et a*l., eds. *Information and knowledge management in the Digital Age: Concepts, technologies and African perspective*. Third World Information Service. 115: Ibandan.

Nash, J., Sterkenburg, S. and Wentzell, P., 2011. Project plan for digitization: a structural manual for policy development at the Greater West Bloomfield Historical Society. [Online]. Available: http://www.gwbhs.org/wp-content/uploads/2012/11/f8ecb898625f1088811b139d186dd427.pdf/ [Accessed 9 June 2016].

National Research Foundation (NRF). 2009. An audit of South African digitisation initiatives: ongoing and planned. [Online]. Available: http://passthrough.fw-notify.net/download/121334/http://digi.nrf.ac.za/download/AuditReport.pdf/ [Accessed 18 February 2016].

NISO. 2007. A framework of guidance for building good digital collections. 3rd ed. [Online]. Available: http://www.niso.org/publications/rp/**framework**3.pdf./[Accessed 28 February 2016].

Oehlerts, B., and Liu, S. 2013. Digital preservation strategies at Colorado State University libraries. *Library Management,* 34(1/2):83-95.

Ooghe B and Moreels D. 2009. Analysing selection for digitisation: current practices and common incentives. *D-Lib Magazine 15(9).*[Online]. Available: http://www.dlib.org/dlib/september09/ooghe/09ooghe.html/ [Accessed 15 February 2016].

Otubelu, B., N., and Ume, L., E., 2015. Digitization of library resources in academic libraries: challenges and implication, *IOSR Journal of Mobile Computing & Application (IOSR-JMCA)* 2(2): 35-40.

Oxford Advanced Learner's Dictionary, 2015. International students's edition. eds.Turnbull , J., Lea D., Parkinson , D., Phillips ,P. Francis , B., Webb , S.,Bull , V. and Ashby, M.. Oxford.

Pandey, P., and Misra, R. 2014. Digitization of library materials in academic libraries: issues and challenges. *Journal of Industrial and Intelligent Information, 2*(2): 136-141.

Pandher, B. K. 2012. User's perception and their feedback about digitization of manuscripts and their use in Punjabi University, Patiala & Panjab University, Chandigarh and VVRI, Hoshiarpur. *International Journal of Information Dissemination and Technology*, *2*(2):117-123.

Paradigm. 2008. *Introduction to OAIS*. [Online]. Available: http://www.paradigm.ac.uk/workbook/introduction/oais-examples.html/ [Accessed 1 March 2015].

Perry, C. A. 2005. Education for digitization: how do we prepare?. *Journal of Academic Librarianship*, 31(6):523-532.

Petty, N.J., Thomson, O.P. and Stew, G., 2012. Ready for a paradigm shift? Part 2: Introducing qualitative research methodologies and methods. *Manual therapy*, *17*(5):378-384.

Pickard, A. J. 2007. *Research methods in information*. London: Facet.

Pinkas, M. M., Schnur, A., Wolff, M., Hovde, S., & Harling-Henry, C. 2012. University of Maryland Early Dissertations for Doctor of Medicine (1813–1889): Challenges and Rewards of a Digitization Project. *Journal of Electronic Resources in Medical Libraries*, 9(4): 261-271.

Rafiq, M. and Ameen, K. 2013. Digitization in university libraries of Pakistan OCLC Systems & Services. *International digital library perspectives*, 29 (1):37-46.

Rafiq, M. and Ameen, K., 2014a. Standardization and sustainability of digitization projects in university libraries of Pakistan. *VFAST Transactions on Education and Social Sciences*, 3(2):15-23.

Rafiq, M., and Ameen, K. 2014b. Towards digitization framework: Pakistani perspective. *Pakistan Journal of Information Management and Libraries*, 15(1):22-29.

Ravenwood, C., 2013. Selection of digital material for preservation in libraries, archives and museums, doctoral dissertation, Loughborough University. [Online]. Available: https://dspace.lboro.ac.uk/dspace-jspui/handle/2134/13423/ [Accessed May 16 2016].

Rieger, O. Y. 2008. Preservation in the age of large-scale digitization. *A White Paper*. [Online]. Available: http://www.clir.org/pubs/reports/reports/pub141/pub141.pdf [Accessed 25 February 2016].

Riley-Reid, T. D. 2015. The hidden cost of digitization-things to consider. *Collection Building*, 34(3):89-93.

Rosenberg, D. 2006. Toward the digital library in Africa. *Electronic Library*, 24(3): 289-293.

Ross, S., 2012. Digital preservation, archival science and methodological foundations for digital libraries, *New review of information networking*, 17(1): 43-68. [Online]. Available: http://dx.doi.org/10.1080/13614576.2012.679446/ [Accessed 16 February 2016].

Routhier Perry, S. 2014. Digitization and digital preservation: a review of the literature. *iSchool Student Research Journal*, *4*(1/4):1-12.

Ryan, D., 2010. Aluka: digitization from Maputo to Timbuktu. OCLC Systems & Services: *International digital library perspectives*, 26(1): 29-38.

SADA (South African Data Archive). 2015. *Introduction.* [Online]. Available: http://sada.nrf.ac.za/ [Accessed 17 November 2015].

Samuelson, P. 2014. Mass digitization as fair use. *Communications of the ACM, 57 (3)*: 20-22.

Seljan, S., Dunder, I., and Gaspar, A. 2013. From digitisation process to terminological digital resources. In: *Information & Communication Technology Electronics & Microelectronics (MIPRO), 2013 36th International Convention on , 1053-1058. IEEE.*

Sentürk, B. 2014. Effective digitization in archives. *Journal of Balkan Libraries Union*, *2*(1):11-15.

Shampa P.P. and Sashi , P. S. 2014. Digitization initiatives and special libraries in India. *Electronic Library*, 32(2):221-238.

Sharma, N. 2012. Automation and digitization in university libraries: a comparative study of seven North Indian University Libraries. *International Journal of Information Dissemination and Technology*, *2*(2):135-141.

Shehu, M. 2016. Digitizaton of library materials in academic libraries: issues for consideration. [Online]. Available: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2748474/ [Accessed 20 April 2016].

Showers, B. 2012. A strategic approach to the understanding and evaluation of impact. In: Lorna, M. and Hughes, M. (eds). *Evaluating and measuring the value, use and impact of digital collections*, 63-71. London: Facet.

Sinclair, P. 2010. The digital divide: Assessing organisations' preparations for digital preservation. *A Planets White Paper*. [Online]. Available: http://www.planets-project.eu/docs/reports/planets-market-survey-white-paper.pdf/ [Accessed 30 January 2016].

Singleton, R. A. and Straits, B. C. 2009. *Approaches to social research.* London:Oxford University press.

Smith, A. 1999. *The future of the past: preservation in American research libraries*. Council on Library and Information Resources, 1755 Massachusetts Ave., NW, Suite 500, Washington, DC 20036; [Online]. Available: http://www.clir.org/pubs/reports/reports/pub80-smith/pub80.pdf/ [Accessed 24 February 2016].

Smith, A., 2001. Strategies for building digitized collections. *Council on Library and Information Resources. Washington, D.C.*[Online]. Available: http://proj1.sinica.edu.tw/~ndaplib/service/ebook/pub101.pdf/ [Accessed 20 May 2016].

Smith, L. and Rowley, J., 2012. Digitisation of local heritage: Local studies collections and digitisation in public libraries. *Journal of librarianship and information science*, 44(4): 272-280.

Sofronijević, A., and Mitrović, J. 2012. Europeana Libraries" Project: Fostering digitization across Europe. *Review of the National Center for Digitization, 21*.[Online].Available: https://www.researchgate.net/profile/Jelena_Mitrovic/publication/233893833_Europeana_Libraries_Project_Fostering_Digitization_Across_Europe/links/54b832050cf2c27adc48ac88.pdf/ [Accessed 20 April 2016].

St. Clair, G. 2008. The Million Book Project in relation to Google. *Journal of Library Administration*, 47(I/2):151-163.

Tanner, S. 2001. Librarians in the digital age: planning digitisation projects. *Program*, 35(4) :327-337.

Teper, J. H., & Shaw, E. F. 2011. Planning for preservation during mass digitization projects. *portal: Libraries and the Academy*, 11(2):717-39.

Tharani, K. 2012. Collections digitization framework: A service-oriented approach to digitization in academic libraries. *Partnership: The Canadian Journal of Library and Information Practice and Research*, *7*(2):1-12.

Tsebe, J. 2005. *Networking cultural heritage: Africa*, paper presented at the World Library and Information Congress: 17th IFLA General Conference and Council, OSLO Norway.[Online]. Available: http://archive.ifla.org/IV/ifla71/papers/157e-Tsebe.pdf/ [Accessed 21 August 2015].

Ubogu, F. N., Klapwijk, W., Groenewald, R., Nicholson, D. R., McGovern, N. Y., & Liebetrau, P. 2010. *Managing digital collections: a collaborative initiative on the South African framework*. Pretoria: National Research Foundation. [Online]. Available: http://digi.nrf.ac.za/download/AuditReport.pdf/ [Accessed 28 February 2016].

UNESCO, IFLA, and ICA. 2002. *Guidelines for digitization projects*. [Online]. Available: http://portal.unesco.org/ [Accessed 24 February 2016].

United Nations. 2009. Record-keeping requirements for digitization. [Online]. Availabe: https://archives.un.org/sites/archives.un.org/files/Standard_RKreqfor%20digitisation3.pdf/ [Accessed 31 March 2016].

Valente, M.A., 2016. Transformativeness in the age of mass digitization. *St. John's Law Review & Journal of Catholic Legal Studies*, 90 (233) :233-269.

Verheusen, A. 2008. Mass digitisation by libraries: issues concerning organisation, quality and efficiency. *Liber Quarterly*, 18(1):28-38.

Verrill, S.W. 2010. *Research methodology approaches*. Minneapolis, MN: Capella University. [Online]. Available: http://www.dissertationretreat.org/DWR_research_methodology.pdf/ [Accessed 24 June 2016].

Vogt-O'Connor, D. 2000. Selecting of materials for scanning. *Handbook for digital projects: amanagement tool for preservation and access*. [Online]. Available: https://www.nedcc.org/assets/media/documents/dman.pdf/ [Accessed 26 October 2015].

Vrana, R. 2011. Organizational aspects of digitization projects in the Croatian public libraries. *Library Management*, 32(8/9):589-598.

Witten, I.H. and Bainbridge, D. 2003. *How to build a digital librar*y, San Francisco, CA: Morgan Kaufmann.

Yakel, E. 2004. Digital assets for the next millennium. *OCLC Systems & Services: International Digital Library Perspectives*, 20(3):102-5.

Yin, R. 2009. *Case study research*: *design and methods*. 4th ed. Thousand Oaks, CA: Sage.

Zarndt, F. 2011. Project management 101. *OCLC Systems & Services: International digital library perspectives*, 27(3):170-174.

Zuraidah, A. M. 2007. The state of digitisation initiatives by cultural institutions in Malaysia: an exploratory survey. *Library Review*, 56(1):45-60.

APPENDICES

APPENDIX A

Assessing the prospects of digitisation at the University of Ghana library System (UGLS)
Semi-structured interview questions for UGLS digitisation officials

Dear Respondent,

Thank you for your valuable time and willingness to discuss issues on digitisation with me. As I informed you earlier, I would like to discuss with you issues related to digitisation policy, planning, selection criteria, skills and expertise, digital preservation and long-term access of digitised content, measures to track digitisation progress, challenges in digitisation, and the sustainability of the digitisation programme at the UGLS in order to enable me assess the prospects of digitisation at the UGLS.

More so, I will be more than happy to provide you with an opportunity to add to the conversation that you feel I should consider. With your permission, I would like to record this conversation to enable me transcribe later on.

The information gathered by way of this interview will be used for study purposes only. All responses will be documented but all names will be held confidential and information reported will be anonymised. The information gathered through this interview will be handled confidentially.

Interview questions:

Background

1. What is your job title in the library?
2. What role, if any, have you played/do you play in the digitisation program in the library?

SECTION A: UGLS digitisation planning and policy issues

1. Does your library have a written digitisation policy endorsed by management of your library? If no why?

1.1. If yes, which aspect does it covers? What other aspects would you expect to see included in a UGLS digitisation policy?

2. What are the planning steps that each digitisation project requires?
3. Who is/are responsible for the different steps in the digitisation project planning in your library?

4. How are decisions made regarding the infrastructure implemented and equipment currently used for digitisation at your library? (to understand whether there the planning procedure)

SECTION B.: Selection

1. What selection criteria are currently being used to identify/decide what items to digitise from your valuable collections?
2. In your opinion, who should be responsible for the selection process?
3. In your opinion what are the critical challenges that the library face when selecting items to digitise?
4. What changes would you like to have made to the current selection criteria so that these would be more appropriate for the UGLS?

SECTION C: Digitisation priorities and goals of the UGLS

1. What do you think were the reasons your library decided to digitise materials?
2. What are the digitisation goals and priorities for which your library has been engaged in digitising material from its collections?

SECTION D: Issues of UGLS digitisation sustainability

1. How would you characterize current support for digitisation by your library's management?
2. What factors would you consider to have contributed to the success of your library's digitisation programme so far? Could you recommend measures to sustain these success chalked?
3. What do you consider are the critical challenges for your library's digitisation programme? Could you recommend solutions for these challenges?
4. What measures are used to evaluate progress of your digitisation programme?
5. What is the main source for funding digitisation activities? How would you like to see the funding utilised in future?
6. Is your library working with partners/ or collaborating on its digitisation effort? If no, would you like to see your library working with collaborators/partners? What will be your reasons for working with partners?
7. What would be your recommendations for the library in sustaining the digital project over time?

SECTION E: Skill levels and the UGLS digitization programme

1. In your opinion, do you consider that the digitisation staff of the library possess the right knowledge and skills and are equipped to provide support for digitisation?

1.1. If yes, could you explain some of these skills that are currently available that exist in the library in support of digitisation?

1.2. If no, What kind of skills and expertise would you considers important in supporting digitisation projects. How would you rate the level of your local library staff's expertise in those areas?

2. In your opinion, what skill challenges do UGLS digitisation staff encounter when undertaking digitisation?
3. Is there staff in your library whose main job responsibility is dedicated to the oversight, development and management of the library's digitisation program?
4. Are there regular, full-time staff at your library who have as their primary or one of their primary job responsibilities to work in the digitisation Unit?

6.1. Do you consider these regular, full-time staff sufficient to effectively support digitisation at the library?

7. Does the library support staff development skills as far as digitisation is concerned? If yes, Can you please explain the nature of the skills development? If No, what area of skills development programme would you consider relevant for the digitisation staff?

SECTION F: Digital preservation of digitised contents at the UGLS

1. Does your library have a digital preservation policy?
2. What is the library's strategy to preserving digitised content? *(Follow up question if no strategy is in place.).* How does your library intend to preserve their digitised collections?
3. Do you have an annual budget for digital preservation activities? (Follow up questions, If yes, do you think the budget is sufficient for routine digital preservation activities. If no, do you think the library need to make budget allocations for digital preservation activities?
4. In your opinion, are your digital collections stored in digital repositories that have been set up according to international standards for digital preservation? Can you explain what digital preservation standards you adhere to?
5. In your opinion, is the library using storage media, file formats and preservation techniques that will ensure that digitised contents are available in the long-term? Please explain your answer
6. What are the long-term intentions for the digitised content?

SECTION G: Long-term access to the digitised collection

1. In your opinion does the digitised content allow for long-term access?
2. Do you consider the metadata records format that exists for digitised items appropriate for long-term access? Please explain your answer
3. In your opinion, what are the major constraints that hinder access to the digitised collections?
4. How could these constraints be addressed?

Closing Remarks

Thank you very much. I appreciate your time and the useful insights shared during the interview. A copy of the conversation transcript will be sent to you. Would it be acceptable for me to contact you for further questions relating to the subject if some of the content needs further clarification? I am more than willing to show you the end results of my analysis if you would like to receive a copy.

I look forward to making use of the information you shared with me today in the interview in the assessment of the prospects of digitisation at the UGLS, I believe the recommendations I will make from my findings will be useful to the UGLS and other similar institutions which are digitising, or are planning to digitise their collections.

APPENDIX B

Interview schedule

Interview schedule

Dear Interviewee,

Interview schedule for assessing the prospects of digitisation at the University of Ghana Library System (UGLS)

My name is Kwesi Babipina Sewe, M.IT student at the University of Pretoria. One of the requirements of the Masters Degree programme is that students should produce a mini dissertation in partial fulfilment of the degree. The focus of my dissertation focuses on assessing the prospects of digitisation at the University of Ghana Library System (UGLS) where I am an employee. As you are in involved in digitisation and responsible for some activities at the UGLS, you were identified as a candidate who would be able to assist and inform me.

Based on that I would like to have your opinion regarding the following:

- Policy and planning issues on digitisation
- Goals and priorities for digitisation
- Selection criteria of materials for digitisation,
- Skills and staffing issues for digitisation
- funding of digitisation and sustainability issues,
- Digital preservation and long-term access for digitised content.
- Challenges in digitisation,
- Measures that you follow in tracking and monitoring progress of digitisation.

I intend to use the information collected from interviewees to assess the prospects of digitisation at the UGLS and make recommendations where necessary in support of a sustainable digitisation programme at the UGLS digitisation departments/Units. In addition, I also hope that the recommendations could be of use to other institutions who are also engaged in, or intending to engage in digitisation. The one on one interview will take about 35 minutes. Will you be willing to participate? If so: could you please indicate a suitable date and time on any of the days between 5 September, 2016 and 15 September 2016 so that I could make contact with you?

Sincerely

Kwesi B. Sewe

APPENDIX C

INFORMED CONSENT FORM

(Form for research subject's permission)

(Must be signed by each research participant, and must be kept on record by the researcher)

1 Title of research project***: "Assessing the prospects of digitisation at the University of Ghana library System (UGLS)"***

2 I …… hereby voluntarily grant my permission for participation in the project as explained to me by

……..

3 The nature, objective, possible safety and health implications have been explained to me and I understand them.

4 I understand my right to choose whether to participate in the project and that the information furnished will be handled confidentially. I am aware that the results of the investigation may be used for the purposes of publication.

6 Upon signature of this form, you will be provided with a copy.

Signed: _____ Date: _____

Witness: _____ Date: _____

Researcher: _____ Date: _____

APPENDIX D

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Enquiries : Dr Marlene Holmner
Tel. nr. : +27 (0)12 420-5215
Fax nr. : +27 (0)12 362-5181
E-mail : marlene.holmner@up.ac.za
Office : IT 6-43

Faculty of Engineering, Built Environment and Information Technology

School of Information Technology

2016-10-04

ETHICAL CLEARANCE FOR KWESI SEWE

Dissertation Title: ***Assessing the prospects of digitisation at the University of Ghana library System (UGLS)***

To whom it may concern:

This is to confirm that the Research Committee of the Department of Information Science approved the application by Kwesi Sewe for ethical clearance. Mr Sewe complied with the standard requirements for ethical clearance as set out by the University of Pretoria's Faculty of Engineering, Built Environment and Information Technology (EBIT), as follows:

- He signed and submitted all the application forms required for ethical clearance;
- He submitted his data collection instruments for vetting by both the Research and Ethics Committees; and
- He implemented all corrections recommended by the above-mentioned committees.

The Research Committee of the Department of Information Science therefore requests permission for Mr Sewe to collect the data he needs in order to complete and submit his mini-dissertation for examination. The Committee further appreciates any effort by appropriate authorities to expedite this process, and expresses its gratitude in anticipation.

Yours sincerely

.....

Dr Marlene Holmner

Dr Marlene Holmner
Academic Coordinator: Carnegie MIT
Department of Information Science
E-mail: marlene.holmner@up.ac.za

APPENDIX E

UNIVERSITY OF GHANA

THE BALME LIBRARY

P.O. BOX LG 24, LEGON, ACCRA, GHANA

Our Ref: P/F

Your Ref:

Direct: 0302 512407/8 513292
0302-500381/502255/502257
Ext. 3507/3136/3162
Fax: 233-302 519234
http://library.ug.edu.gh
e-mail: admin@libr.ug.edu.gh

13th September, 2016.

TO WHOM IT MAY CONCERN

I, *Professor Perpetua Sekyiwa Dadzie*, as delegated authority of *University of Ghana Library System (UGLS)* hereby give permission to the primary researcher *Kwesi Babipina Sewe* of the School of IT *Department of Information Science*, at the University of Pretoria the following:

1. To engage interview with the employees of the above mentioned company. I have reviewed the interview questions given to me by the researcher. I hereby give my approval for using the interview questions by the researcher.

2. To collect and publish information about the above mentioned company that is publicly not available

for the research project titled: *"Assessing the prospects of digitisation at the University of Ghana Library (UGLS)".*

This authorization is based on a mutual understanding that the above mentioned company's name can be revealed in his project.

The information provided by the employees or any other means (such as company's archived documents or reports) of the above mentioned company is purely for academic purposes and cannot be used for any other purpose.

Regards,

Signature: Dadzie Date: 13/09/16

Name & Surname: Perpetua Dadzie

Position/Delegation of Authority: (e.g. CEO, Director) University Librarian

Tel/Email address: +233 277602328
Pdadzie@ug.edu.gh

Official stamp (if available)

UNIVERSITY OF GHANA
BALME LIBRARY
P. O. BOX 24, LEGON
ACCRA-GHANA