



UNIVERSITY OF KWAZULU-NATAL

A framework for digital archiving at selected public universities in Kenya

By

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July 2022

DECLARATION

I, **Juliet Awinja Erima**, declare that:

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Date: July 2022

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ABSTRACT

Archival records are knowledge assets that preserve the overall historical scholarship, memory and identity of organisations and institutions of higher learning. The rapid transformations witnessed on the digital landscape today have led to the increased generation of digital records, prompting the growing interest by universities to adopt sustainable digital archiving implementations to ensure the continued access of archives. This research investigated digital archives management practices in selected public universities in Kenya. The objective of the study was to develop a digital archiving framework for the archival repositories at the institutions. To achieve this objective, the study sought to answer five research questions which were: what is the state of digital archiving readiness of public universities in Kenya? How are digital archives identified and administered in Kenyan public universities? Which legal and regulatory frameworks govern digital archives management in Kenyan public universities? Which risk factors are digital archives exposed to in these universities? What possible solutions can be adopted to mitigate the identified risks and support sustainable digital archiving implementations in Kenyan public universities? The study subscribed to the pragmatic school of thought which formed the basis for adopting a mixed methods approach that prompted the use of qualitative and quantitative methodologies, with a qualitative priority. The study was underpinned by the records continuum (RC) model, Open Archival Information System (OAIS) Reference model and the Archives and Records Management Association (ARMA) Records Management Maturity model which were triangulated to coin a conceptual framework for the study. The study adopted a multiple-case (embedded) design using cross-sectional survey. Six universities were purposively selected from 23 fully accredited public universities in Kenya namely: the University of Nairobi, Jomo Kenyatta University of Agriculture and Technology, Moi, Kenyatta, Maseno and Egerton Universities. Purposive sampling was used to select a sample of 205 respondents comprising of deputy vice-chancellors, finance officers, legal officers, ICT directors, archivists, records managers, records officers, ICT staff and administrative staff. Questionnaires were administered to 169 respondents; 36 participants were targeted for interviews, and document review was used to confirm the data. Quantitative data was analysed using Statistical Package for the Social Sciences (SPSS) and presented using inferential and descriptive statistics. Qualitative data was analysed thematically using NVivo and presented using charts, graphs and tables as applicable. The key findings suggested that public universities in Kenya have not attained the desired optimal state of readiness for digital archiving. This was evidenced by the absence of functional archival repositories in five of the universities, insufficient harnessing of the available ICTs for d-archiving, inadequate skilled and competent staff, low prioritization for the education and training of recordkeeping staff and absence of dedicated budgets for records and archives management functions in the institutions. Furthermore, there were no formal processes guiding the lifecycle management of digital records and the generated metadata. The situation was exacerbated by weak and/or non-existent legal and regulatory frameworks for recordkeeping at national and institutional levels. Subsequently, digital records were exposed to risks at various stages of their lifecycle which included records technology risks, legal and regulatory risks, administrative risks and records control risks. The risks further occasioned a cocktail of challenges that called for urgent interventions. The overall conclusion of the study was that even though the institutions have

instigated various approaches and strategies to mitigate the identified risks, a lot needed to be done to improve the state of digital archives management in the universities. Taking into consideration the study findings, this research recommends a framework for digital archiving that brings into perspective a collaborative approach, whose core focus is to enhance d-archiving practices in archival repositories of collaborating institutions.

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“For lack of guidance a nation falls, but victory is won through many advisers”

(Proverbs 11:14 – New International Version)

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“Inkosi Ikubusise – God bless you”.

DEDICATION

*At the still point of the turning world. Neither flesh nor fleshless;
Neither from nor towards; at the still point, there the dance is,
But neither arrest nor movement. And do not call it fixity,
Where past and future are gathered. Neither movement from nor towards,
Neither ascent nor decline. Except for the point, the still point,
There would be no dance, and there is only the dance.* (Poem by T. S. Eliot, titled
“Burnt Norton”, II. In: Upward 2019:261).

I dedicate this thesis research to Mzee Damasen Wanjala Erima - my Papa, my friend and life-coach; the one who dared to dream big about me and never lost focus over the years. Thank you for remaining *fixed and constant* throughout my life.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACM	: Association for Computing Machinery
AIPs	: Archival Information Packages
ARMA	: Association of Records Managers and Administrators
CAMiLEON	: Creative Archiving at Michigan and Leeds: Emulating the Old on the New
Cap	: Chapter
CCSDS	: Consultative Committee for Space Data Systems
CRKM	: Clever Recordkeeping Metadata
DAM	: Digital Archives Management
DANS	: Data Archiving Network Services
DCC	: Digital Curation Centre
DIPs	: Dissemination Information Packages
DIRKS	: Designing Information and Recordkeeping Systems
DLT	: Distributed Ledger Technology
DRAMBORA	: Digital Repository Audit Method Based on Risk Assessment
DRM	: Digital Records Management
DVC	: Deputy-vice chancellor
ECM	: Enterprise Content Management
ECM3	: Enterprise Content Management Maturity Model
ERMS	: Electronic Records Management System(s)
ESARBICA	: East and Southern Africa Regional Branch of International Council on Archives
ETD	: Electronic Theses and Dissertations
EU	: Egerton University
FO	: Finance Officer
GARP	: Generally Accepted Recordkeeping Principles
ICA	: International Council on Archives
ICT(s)	: Information and Communication Technology(ies)
IFMIS	: Integrated Financial Management System
IG	: Information Governance
InterPARES	: International Research on Permanent Authentic Records in Electronic Systems
IRMT	: International Records Management Trust

ISO	: International Organization for Standardization
IT	: Information Technology
JISC	: Joint Information Systems Committee
JKUAT	: Jomo Kenyatta University of Agriculture and Technology
KARMA	: Kenya Association of Records Managers and Archivists
KENET:	: Kenya Education Network Trust
KLA	: Kenya Library Association
KNADS	: Kenya National Archives and Documentation Service
KODI	: Kenya Open Data Initiative
KU	: Kenyatta University
LIS	: Library and Information Science
LOD	: Linked open data
LMER	: Long-Term Preservation Metadata for E-Records
MER	: Management of Electronic Records
MIS	: Management Information Systems
MMR	: Mixed Methods Research
MSU	: Maseno University
MU	: Moi University
NAA	: National Archives of Australia
NACOSTI	: National Commission for Science, Technology and Innovation
NARA	: National Archives and Records Administration
OAIS	: Open Archival Information System
ODeL	: Open Distance and e-Learning
OGIM	: Open Government Implementation Model
PAIA	: Promotion of Access to Information Act
PDI	: Preservation Description Information
PRAAD	: Public Records and Archives Administrative Department
PROV	: Public Record Office Victoria
QUAL	: Qualitative
QUAN	: Quantitative
RAM	: Records and Archives Management
RC	: Records Continuum
RCM	: Records Continuum Model
RI	: Representation Information

RIM	: Records and Information Management
RLC	: Records Lifecycle
RM	: Records Management
SAA	: Society of American Archivists
SCECSAL	: Standing Conference of Eastern, Central and Southern African Library and Information Associations
SIP	: Submission Information Package
SPSS	: Statistical Package for the Social Sciences
SPIRT	: Strategic Partnerships with Industry – Research and Training
TII	: Turn-It-In
UK	: United Kingdom
UKOLN	: United Kingdom Office for Library and Information Networking
UKZN	: University of KwaZulu-Natal
UN	: United Nations
UNESCO	: United Nations Educational, Scientific and Cultural Organization
UoN	: University of Nairobi
UPS	: Public Service of Uganda
USA	: United States of America
USIU-A	: United States International University-Africa
UDHR	: Universal Declaration of Human Rights
USA	: United States of America
VERS:	: Victorian E-records Strategy
WB	: World Bank
WWW	: World Wide Web

CHAPTER ONE

BACKGROUND AND INTRODUCTION

“As we move into the electronic era of digital objects it is important to know that there are new barbarians at the gate and that we are moving into an era where much of what we know today, much of what is coded and written electronically, will be lost forever...it falls to librarians and archivists to hold to the tradition which reveres history and the published heritage of our times”
(Kuny 1998).

1.1 Introduction

Current advances in the global Information and communication technology (ICT) landscape have enhanced business operations, enabling organizations to enjoy greater efficiency and effectiveness in service delivery (United Nations [UN] 2013:3). Notably, 21st century organizations have been characterized by exponential growth in the amount of information generated for business purposes, arising from developments in Information and communication technologies (ICTs). Consequently, global economies have transmuted from traditional paper information systems to digital information systems (Lemieux 2015:3) for business efficiency. Information being key organizational assets require proper management and storage as records because they hold valuable content for organizations. Failure to properly manage digital records may have dire effects like loss of records, eventually leading to financial, legal and business-related consequences (Luyombya 2010:1).

There has been no consensus on the definition of a “record”, hence various scholars and organizations have come up with different definitions of the term, yet conveying the same meaning. The International Organization for Standardization (ISO) (2016) described records as information generated and kept as assets and as evidence by individuals or organizations in fulfilment of lawful requirements or in the course of business transactions. Duranti (2010) views records as documents made or received during an activity as byproducts or instruments of the activity and kept for reference or future action. The Society of American Archivists [SAA] (2020a) defined a record as printed or written work of an official or legal nature that can be used as proof or

evidence. Clearly, these definitions and many others in the literature portray records as information created or captured as evidence of an event or activity, irrespective of format or media, a definition that has been adopted by this study. In light of the present-day electronic dispensation, digital records are defined as records created, disseminated and maintained using computerized technology (National Archives of Australia [NAA] 2004:13). Thus, digital records are created or captured electronically and are therefore intangible, as opposed to manual records which are captured on physical media and are tangible.

Records are crucial to all aspects of governance since they provide evidence of transactions of individuals, organizations as well as governments (Sichalwe 2010:1). Poor management of records may therefore result in serious risks for example strategic, operational, compliance, reputational, financial and technical risks (Erima 2013:111). Digital records are particularly sensitive due to their inherent and complex nature, posing challenges to their management and preservation as a result of the frequent and rapidly changing technologies. Luyombya (2010) identifies technological issues such as file deterioration, media decay, hardware and software obsolescence and media fragility, which require proactive intervention to safeguard the accessibility of digital records. This implies having systematic regimes for records management in organizations from creation to disposal, hence the need for formal recordkeeping programmes.

Records management (RM) is an essential function in the development of institutions and society, resource management, supporting civil rights and human rights entitlements, fostering rule of law and public accountability, fighting against corruption and enhancing global economic stability (World Bank [WB] 2000). ISO 15489-1 (2016) advocates a well-coordinated and proactive approach to RM for the effective preservation of records as evidence of transactions in businesses and society at large. Generally, records management entails the creation, arrangement, storage, retrieval, dissemination, retirement and final disposal of records irrespective of their form and media. NARA (2007:10) describes records management from a managerial perspective as entailing planning, controlling, directing, organizing, training, promoting and other managerial activities involved in the management of records from creation to disposal in order to achieve proper documentation of the policies and

transactions of the organization and attain effective and economical management of operations. National Records of Scotland (2020) also uses a lifecycle perspective to describe RM as the systematic control of organizational records, throughout their life span, in order to meet business needs, compliance requirements and societal needs. The records management function is therefore essential in preserving records and archives indefinitely as proof of business activities.

Businesses today are giving due attention to the identification, management, preservation and access to archives. This is because archival records wield the power to redefine a nation's identity, societal memory and historical scholarship (Schwartz and Cook 2002). They promote accountability, transparency and good governance by empowering citizens to exercise their rights (Murambiwa and Ngulube 2011). This is because archives provide essential evidence and proof of decisions made and actions taken by officers.

Literature defines archives from three perspectives namely the information materials, the building/facility within which these materials are housed, and the organization or service responsible for both. Pearce-Moses (2005) viewed archives from the following three perspectives:

1. As an organization's non-current records preserved for their continuing value;
2. As an agency tasked with selection, preservation, and access of archives; and
3. As a building or part of a building housing archival materials.

Similarly, the Society of American Archivists (2020b) defined archival records as inactive records generated by an organization, family or person and preserved indefinitely for their continuing importance. Likewise, Lee (2018:287) acknowledged that the Glossary of Archival and Records Terminology by Pearce-Moses (2005) offered six different definitions of "archives," but that one could cluster these into three higher-level concepts as follows:

- i. The materials that serve as traces of human activities (stuff);
- ii. The sociotechnical capabilities and resources that support the care for, and support the users and creators of, archival materials (people/process); and
- iii. The location where materials are managed, preserved, and shared (place).

Digital archiving embraces the above three concepts, which will further be elaborated in Section 1.9.1. Notwithstanding, digital archiving function involves identifying, appraising, describing and tagging, storing and retrieving, preserving and disposing of digital records, as well as developing and implementing guidelines, policies and systems that can safeguard the physical and logical integrity of records for posterity (Council of Australasian Archives and Records Authorities 2006:7). The definition though lengthy embraces all activities undertaken to protect the entirety of records throughout their lifecycle with consideration for their longevity and access as archives. Thus, digital archiving refers to the act of storing copies of non-current digital data in an off-line but electronic environment.

The archive sector has been undergoing a paradigm shift from paper to digital, culminating in a paradigm shift from traditional archives management practices to digital archiving. Traditional archiving is the preservation of physical objects carrying information such as photographs, papers, artifacts, microfilms and samples. In contrast, digital archiving is the preservation of information in digital format irrespective of the storage medium of that information (Nivel 2014). The 21st century has witnessed a debate on the possibility of the ‘paperless office’ in the business world. Archival practices such as appraisal, acquisition, preservation, access, maintenance and use have been transformed by the shift to digital platforms (James, Johnson and Hunter 2018). Amenta (2014) avers that libraries and cultural organizations are facing the challenge to create and adjust digital archives in order to respond to the changing archiving processes and meet the demands of their audiences. Consequently, there has been much interest recently in the concept of digital archiving and its relevance to the longevity of archives both in society and within organizations, the ultimate goal being to ensure long term access. This is because archives have no value if they are not utilized (Ngoepe and Ngulube 2011).

The concept of sustainability is emerging as an integral part of archival discussions. The existence or absence of supportive legislations and regulations have an impact on access to archives (Mnjama 2008:61). Additionally, the cost that accompanies digital archiving cannot be ignored because it is an expensive organizational activity that requires investment in the purchase of software and hardware (Flecker 2003). Organizations must also be prepared to deal with challenges such as technological

obsolescence, fragility of storage media and shortage of skills. Hence, organizations are involuntarily acknowledging the fact that they must tow the line by developing strategies that will ensure their archival records survive to be accessed and used by future generations, their present formats notwithstanding.

Developing nations are grappling with a myriad of challenges in their digital archiving undertakings. Yadav (2016:69-72) identifies the following issues:

- Constantly changing software and hardware
- Lack of technical expertise;
- Funding for digital archiving projects;
- Inadequate technical infrastructure;
- Technological obsolescence;
- Impact of refreshing;
- Problems introduced by continuous migration;
- The “scramble” problem;
- Lack of legislation/policy; and
- Deterioration of digital media (This will be further elaborated in Chapter Three).

Though the rest of the world is endeavoring to keep in step with technology, Africa still lags behind in developing and adopting initiatives for permanent preservation of its digital knowledge content (Kanyengo 2009). Consequently, the state of digital archives management in Africa raises concern. For instance, studies reveal that the national archival system in South Africa is struggling with problems of inadequate skilled staff and poor infrastructure which have hampered efforts towards permanent preservation and use of digital records (Ngoepe 2018; The Archival Platform 2015; Ngoepe and Keakopa 2011).

On the global landscape, various initiatives have been developed in Western countries to address identified and foreseen issues in digital archiving. Koopman and De Jager (2016) identified the following: The Digital Curation Centre (DCC) established at Edinburgh University in 2004 to give guidance on data curation and preservation, and; Data Archiving and Networked Services (DANS) in the Netherlands established in 2004/2005 to encourage permanent access to research data. Other initiatives

include: Victorian E-records Strategy (VERS) developed in the 1990s by Public Record Office Victoria (PROV) to provide guidance on the management of digital records (Kadir and Yunus 2017); Creative Archiving at Michigan and Leeds: Emulating the Old on the New (CAMiLEON), established in 1990s to develop feasible strategies for long term preservation of digital content (Society of American Archivists [SAA] website); International Research on Permanent Authentic Records in Electronic Systems (InterPARES) Project launched in 1999 by the University of British Columbia researchers in collaboration with scholars, archival institutions and private sector representatives. The project aims to consolidate specialized content essential to long-term preservation of authentic digital records, and to provide plans of action, strategies, policies and standards to ensure longevity of electronic records (International Research on Permanent Authentic Records in Electronic Systems 2 Project 2009a); and Long-Term Preservation Metadata for E-Records (LMER) established in 2005 as a metadata schema based on National Library of New Zealand model (International Research on Permanent Authentic Records in Electronic Systems 3 Project 2009b:7). The University of Surrey, United Kingdom (UK) has been undertaking a project dubbed ARCHANGEL since 2017 which aims to deliver long-term sustainability of digital archives using blockchain technology, a type of Distributed Ledger Technology (DLT) that focuses upon ensuring the integrity and accessibility of digital archives (Collomosse et al. 2018). Most recently, State Records of Australia developed a draft archive strategy dated 2019 – 2022 which among other important issues states that it will explore a variety of options for providing a digital archive capability for South Australian agencies and local councils.

On the Kenyan scene, literature reveals that no direct initiatives for digital archiving have been explored in the country as yet. A good number of public universities in the country do not have operational archives and for those that do, a small fraction of them (if any at all) are actively involved in digital archiving. Katuu (2016) notes that the InterPARES Trust project has been exploring issues concerning digital records in networked environments to generate theoretical and methodological frameworks that address aspects related to the management of these records. Team Africa forms part of this project and is undertaking six case studies in the region. Kenya is part of this team, even though national initiatives in digital archiving are yet to be implemented.

Kanyengo (2009) emphasizes that sustainability of digital collections in research-oriented organizations should be proactively undertaken by developing and implementing digital archiving policies to ensure permanent access to the digital content. This view among others, led to the conviction that archival institutions in the African region must embrace modern capacities and skills to ensure that digital records continue to be kept and used sustainably. It is against this backdrop therefore that this research is undertaken with the intention of placing Kenya on the digital archiving map by carrying out an investigation that will unveil the state of digital archiving in public universities and chart the way forward by developing a framework that can be adopted by archival repositories in public universities and other academic institutions.

1.2 Study area

Six of the earliest public universities to be founded in Kenya were chosen from the 23 government accredited institutions to make up the study sites. The following section presents brief historical descriptions of the six institutions.

1.2.1 University of Nairobi (UoN)

According to University of Nairobi (2015), the establishment of the institution can be traced back to 1956, when the Royal Technical College was established and admitted the first group of A-level graduates for technical courses. The College was transformed into the second university college in East Africa on 25 June 1961 by Prof. James Morton, formerly of the University of Witwatersrand, South Africa, and acquired special linkages with the University of London. Following this new development, the institution admitted students in the faculties of Arts, Science and Engineering for award degrees of the University of London.

Royal Technical College, Nairobi was renamed University College, Nairobi on 20 May 1964. The institution proceeded to prepare students for bachelor's degrees awarded by the University of London, but continued to offer diploma programmes. The University College, Nairobi began preparing students exclusively for degrees of the University of East Africa, with the exception of the Department of Domestic Science. With effect from 1 July 1970, the University of East Africa was dissolved and the three East African countries of Kenya, Uganda and Tanzania each had their

own national universities. As a result, the University College, Nairobi changed its name to University of Nairobi, thus becoming the first public university in Kenya (Chacha 2004; Kavulya 2004).

Since 1970, the university expanded from a faculty-based university serving a student population of 2,768 to a college focused university presently serving over 68,000 students. The university underwent a major restructuring in 1983 by creating six colleges headed by Principals, resulting in a decentralization of the administration,. The six colleges are: College of Architecture and Engineering, College of Health Sciences, College of Biological and Physical Sciences, College of Humanities and Social Sciences, College of Agriculture and Veterinary Sciences and College of Education and External Studies. The University of Nairobi's main campus is located in the capital city of Nairobi. Other campuses of the institution are: Open, Distance and eLearning Centre; Kenyatta National Hospital Campus, Chiromo Campus, Upper Kabete Campus, Lower Kabete Campus, Kikuyu Campus, Parklands Campus, Kenyatta Science Campus, Kisumu Campus, Mombasa Campus and Eldoret Campus (University of Nairobi 2015).

1.2.2 Moi University (MU)

Moi University was established in 1984 by the Moi University Act (1984), making it the second public university in Kenya after UoN. The Act has since been repealed by the Universities Act, 2012 which is in force to date. The first cohort of 83 students was admitted in 1984 through inter-university transfer from the Department of Forestry, UoN. Since 1984, the University has experienced phenomenal growth leading to the establishment of several constituent colleges across the country, many of which have since grown to fully fledged Universities namely Maseno University, Masinde Muliro University of Science and Technology, Maasai Mara University, University of Kabianga, University of Eldoret, Karatina University and Rongo University (Moi University 2014).

As the institution grew, new Schools were added, namely Education, Arts and Social Sciences, Agriculture and Natural Resources, Business and Economics, Information Sciences, Engineering, Medicine, Human Resource Development, Nursing, Biological and Physical Sciences, Dentistry, Public Health, Tourism, Hospitality and Events

Management, Law, Agricultural Sciences and Aerospace. Recently, in a quest to optimize available scarce human resources and harmonise programmes, Moi University re-opened School of Post Graduate Studies and relocated programmes under the School of Human Resource Development to the School of Information Sciences and School of Business and Economics. The former School of Human Resource Development has since been converted into the Institute of Entrepreneurship and Development Studies (Moi University 2018).

The University presently has satellite campuses strategically located across the country to bring university education closer to the communities in line with the Vision 2030 as follows: Kitale Campus, Nairobi Campus, Coast Campus, Eldoret West Campus and Annex Campus located about five kilometers from Eldoret Town. The institution offers diverse academic programmes at undergraduate, masters and doctoral levels. It currently has a student population of 39,786 students via onsite and offsite courses in 233 degree programmes offered by the Institution's 15 schools (Moi University 2018).

1.2.3 Kenyatta University (KU)

According to Kenyatta University (2015), the history of KU dates back to 1965, three years after Kenya got its independence from the British who then handed over Templer Barracks to the Kenyan Government. The barracks were converted into a mid-level institution known as Kenyatta College, with a secondary education division and the Division for Teacher Education. In 1975 Kenyatta College became a branch of the University of Nairobi, following a parliamentary act where the name was changed from Kenyatta College to Kenyatta University College. The first cohort of two hundred students were admitted in 1972 to undertake a Bachelor of Education Degree. Kenyatta University then commenced the establishment of other new colleges, including Jomo Kenyatta College of Agriculture and Technology (JKUAT), now a fully-fledged university (Kenyatta University 2015).

As a result of these changes, certificate courses were wiped out to pave way for undergraduate diplomas. In August 23, 1985, the presidential assent was granted, and the institution became a full-fledged University. The act came into force on 1 September 1985 prompting the institution's inauguration later on 17 December 1985.

Kenyatta University College was renamed Kenyatta University (KU 2013). Kenyatta University has since grown to establish five constituent colleges situated in twelve campuses that are spread all over the country, with a current enrollment of over 38,000 students. Kenyatta University main campus is located in Ruiru, Kiambu County. Other campuses include Nairobi City Campus, Ruiru, Parkland, Kitui, Mombasa, Nakuru and Dadaab Campuses. The university offers degree programmes in Humanities and Social Sciences, Visual and Performing Arts, Education, Pure and Applied Science, Engineering and Technology, Environmental Studies, Law, Agriculture, Medicine, Public Health, Applied Human Sciences, Hospitality and Tourism among others (Kenyatta University 2015).

1.2.4 Jomo Kenyatta University of Agriculture and Technology (JKUAT)

Jomo Kenyatta University of Agriculture and Technology (JKUAT) was founded in 1981 as a middle level college offering certificate and diploma courses in agriculture and engineering. It became a constituent college of Kenyatta University and admitted the first batch of students to the undergraduate degree programmes in 1989. JKUAT became a full-fledged university through the Jomo Kenyatta University of Agriculture and Technology Act, 1994 which has since been repealed under the Universities Act No. 42 of 2012 and replaced by the Jomo Kenyatta University of Agriculture and Technology Charter, 2013 (Jomo Kenyatta University of Agriculture and Technology 2017).

The university has since expanded and established nine campuses in Kenya and Tanzania, with a student enrollment of 29,500 at present. JKUAT's main campus is located in Juja, Kiambu County. The university offers degree programmes in engineering, human resource development, architecture and building science (Jomo Kenyatta University of Agriculture and Technology 2017).

1.2.5 Egerton University (EU)

The establishment of Egerton University can be traced back to 1939 when a British settler Lord Maurice Egerton of Tatton established a Farm School. The school started offering diploma courses upon being upgraded to an Agricultural College in 1950. Thereafter in 1955, the Egerton Agricultural College Ordinance was passed. In 1986, the College was gazetted as a constituent college of the University of Nairobi and

thereafter in 1987 the college became a fully-fledged university through an Act of Parliament. The University is presently serving a student population of 19,000 and is offering degree programmes in agriculture, engineering and technology, science and veterinary medicine, commerce, arts and social sciences among others. Currently, EU comprises of three campuses and one Campus College. The main campus is located in Njoro, Nakuru County (Egerton University 2017).

1.2.6 Maseno University (MSU)

The history of Maseno University can be traced back to the merger between Maseno Government Training Institute (GTI) and Siriba Teachers' Training College, forming Maseno University College under Moi University. Maseno University was instituted by an Act of Parliament in 1991, and thereafter got its full status as a university in 2001. The Department of Nursing within the School of Medicine developed into a stand-alone School of Nursing in 2017, following recommendations of the Nursing Council of Kenya. Master of Medicine postgraduate programme also received Senate approval in 2017. The University is in the process of developing other postgraduate programmes, including Master of Medicine in Obstetrics and Gynaecology which is awaiting Senate approval.

Presently, Maseno University has one constituent college, one college and four campuses. The degree programmes offered by the University include Arts and Social Sciences, Education, Biological and Physical Sciences, Health Sciences, Development and Strategic Studies, Business and Economics, Medicine, Pharmacy, Agriculture and Food Security, Mathematics and Actuarial Science, Computing and Informatics, Planning and Agriculture, Gender Studies, among others. Maseno University main campus is located in Maseno, Kisumu County. The overall student enrollment at the institution presently stands at 21,000 (Maseno University 2017).

1.3 Digital archiving in Kenyan public universities

Kenya is following in the wake of digitization trends set by the developed world. The government of Kenya has been increasing delivery of services using ICTs in public institutions (Majeed 2012). This has resulted in increased generation of digital records in government-owned organizations. As echoed by Wamukoya (1999), the advent of modern technologies and their increased usage in businesses has had a major impact

on service delivery in organizational activities such as communication, decision making processes and documentation of business processes. This has escalated the need for records custodians in organizations to pay greater attention to proper management of these electronically generated records, alongside traditional record formats.

Examples of digital records emanating from business activities in public universities are financial records, administrative records, Personnel records; ICT records; Architectural records; Medical records; Academic reports; Students records; Senate, Council, Deans' and other Committee records;. Other records such as minutes, circulars, internal memos, notices, advertisements, statistical records, audit and other reports, correspondences, conference and research records, among others (Musembe 2015; Erima 2013). Just like manual records, digital records require proper management right from creation, through to ultimate appraisal and selection of those records with enduring value, and to their permanent preservation as archives. Katuu (1999) acknowledges that the appraisal of digital records poses challenges to records professionals. These concerns threaten to endanger the archival heritage of public universities, prompting the present study.

1.4 Statement of the problem

Schmidt, Ghering and Nicholas (2011) observed that universities create and receive large volumes of digital information which include institutional records, research content including theses and dissertations, research publications, teaching content, among others. Studies undertaken in Africa paint a picture of poor RM practices throughout government-owned organizations including universities (Mnjama 2003, Kemoni 2007; Moloi and Mutula 2007; Thurston 2005). Katuu (2009) lamented that while records professionals in the West tackle the problems introduced by digital media, Africa is still battling with streamlining paper recordkeeping systems in organizations. Kenya is no exception as public sector organizations including universities are struggling with problems emanating from poor recordkeeping in manual and electronic environments as illuminated by Musembe (2015), Erima (2013), Nasieku (2010), Kemoni (2007), Mnjama (2003), Kemoni and Wamukoya (2000) and Githaka (1996)).

Cain et al. (2001) noted that although the limelight has shifted from manual to digital records, archivists and other records professionals must acknowledge the fact that they are working in a hybrid environment where paper and digital records are generated simultaneously. Archivists must face up to the challenge of managing archives in a mixed environment where they are required to preserve analogue material alongside their electronic counterparts. A lot has to be done in streamlining paper-based records management systems in the country as a preliminary step to digital archiving endeavours.

The concept of electronic governance (e-governance) has gained recognition as a good governance model for realizing democracy, transparency and accountability in the governance process by governments. Continued expansion of ICT-enabled services is being witnessed in public organizations and institutions in Kenya following flagging off of the Kenya Open Data Initiative (KODI) in July 2011 by the immediate former President, Mwai Kibaki (Majeed 2012). The initiative was aimed at empowering citizens by enabling them to access data on the country's progress and development agenda, to enable them take part in the country's development initiatives. As part of this project, public organizations were directed to automate their information systems. Government-owned organizations including public universities embraced computerized systems for example payroll systems, Integrated Financial Management Information systems (IFMIS), Management Information Systems (MIS), amongst others, resulting in the proliferation of electronic records. This became a wake-up call for recordkeeping professionals to manage the myriad of digital records created daily, not just for current business needs, but also for posterity.

The starting point for successful digital records management in an organization is an efficient and effective paper records system. Garaba (2010) supported the views of Katuu (2009) and Ramatlhakwana (2009) who argued that the management of paper records in the African region should be prioritized and measures put in place to curb the risk of losing electronic memory. In Kenya, the problem is that public universities (with the exception of the University of Nairobi) lack formal and comprehensive digital records and archives management programmes or set of guidelines. Intentional digital archiving strategies are necessary from the initial stages of records creation or

receipt in order to respond to the increase in digital content, especially in technology-dependent formats.

Barata (2004) cautioned that in the light of modern technologies where digital records are in danger of destruction due to lack of planning, it is important that archivists should be actively involved throughout the records lifecycle. A successful archive management programme requires involvement of archivists in the life of records right from their creation (receipt) to their ultimate disposal. This responsibility demands that archivists must possess appropriate skills and competencies in order to meet their obligations towards digital archives. Kamatula (2010) noted that many archivists lack know-how to adequately address issues related to the management of digital records as opposed to traditional paper records management.

Various studies previously undertaken revealed a state of deficiency for digital records management in Africa (Chikomba, Rodrigues and Ngoepe 2020; Ngoepe 2018; Ambira 2016; Ngoepe and Saurombe 2016; Maseh 2015; Mulaudzi et al. 2012; Asogwa 2012; Munetsi 2011). Kalusopa (2011:117) highlighted that most ESARBICA countries have made progress in developing and implementing records management programmes, but strategies to manage digital records or carry out systematic e-records assessments remain obscure. The existing scenario calls for self-assessment by organizations to determine their individual levels of preparedness for digital recordkeeping. Responding to the prevailing situation, International Records Management Trust (IRMT) (2004) advised on the need to carry out assessments of key areas of digital records preparedness viz-a-viz important aspects of governance in governments and organizations, to find out whether or not the infrastructure for digital records management is supportive of e-governance initiatives. Various studies have since been carried out to assess electronic records management readiness in organizations. For example, Koopmang and De Jager (2016) undertook a study to specifically assess digital archiving readiness for research data in South Africa. In Kenya, Odhiambo (2018) also carried out a study to assess digital archiving readiness of United States International University - Africa. Further research should be undertaken to provide a holistic picture of the digital archiving infrastructure in Kenyan public universities and determine their digital archiving readiness.

Barata (2004) pointed out that active involvement in records management means that an archival repository collaborates with the records management unit in the organization, or that the archive takes responsibility for records management in the organization. A university archive should exist to identify records in all formats throughout the organization, give policy guidance on their management and ensure their usability for research purposes. Perrin, Winkler and Yang (2015) warned that digital records face dangers which may seem theoretical and part of risk assessment matrices, but which become a reality when an organization loses important data files. Notably, many public universities in Kenya do not have stand-alone institutional Archives responsible for the identification, acquisition, preservation and provision of access to archives.

Many organizations are unable to maintain accurate, authentic and meaningful records of their activities. Digital records are especially vulnerable in this aspect, posing a challenge to their usability. Authenticity Task Force (2002) strongly emphasizes the importance of maintaining authenticity with digital records so that they can be proven to be what they purport to be and that they are complete and unaltered or corrupted. The only way to ensure the authenticity of digital records is by having a digital preservation regime in place. Ross (2012) affirmed that digital preservation concerns maintaining the semantic meaning of the digital object and its content, its provenance and authenticity, retaining its interrelatedness, and securing contextual information of its creation and use. Metadata initiatives are a crucial element in preservation of information materials, especially for digital records. Few universities in Kenya, especially public universities, have records preservation programmes, least of all digital records preservation programmes.

Another important issue in managing digital records is to develop and implement legislative and regulatory framework for recordkeeping (Asogwa 2012). Ngoepe and Saurombe (2016) pointed out that records and archives legislations in many countries are inadequate and do not address records generated in digital environments. Mnjama (2003) gave a snapshot of the shortcomings of the Kenya Public Archives and Documentation Service Act, Cap 19 (1965) and its ensuing amendments. To date, Kenya has covered ground in development of records-related legislation. The Evidence Law Cap 80 was revised in 2009 to allow use of digital records in a court of

law as evidence. However, this is not enough as there is need to address the issue of archival legislation in the present era of digital archives. Gilliland-Swetland (2000) cautioned that even as archival institutions provide access to records, they must take into cognisance legal issues that are more pronounced in an electronic environment. These include conditions under which certain types of materials can be accessed and made available, privacy of individuals mentioned in materials, protection of the integrity of digital materials from accidental or deliberate tampering and intellectual property. Archival institutions must be awake to these legal requirements that regulate the access domain. Few studies have been carried out in Africa to examine the role of records and archives legislation in organizations (Netshakhuma 2019; Dwoya 2014; Hamooya, Mulauzi and Njobvu 2011). None of these studies has holistically examined legal and regulatory framework for digital archives in public universities. Literature reveals that public universities in Kenya with the exception of University of Nairobi, lack legal and regulatory framework to govern the management of digital records and archives.

The present study was conceived in 2017 when the researcher took part in a two-week international training in the management of Sound and Image Archives (SOIMA) at the University of Accra, Ghana from 9 to 23 July 2017. The training was jointly organized by The International Centre for the study of the preservation and restoration of cultural property, Rome and Institute of African studies at the University of Ghana. A key emerging issue during the training was the importance of adopting sustainable strategies to ensure long-term access for digital records. This inevitably raised concerns over the digital formats that eventually gain entrance into archival repositories. The focus of this research study is therefore to determine what is happening in public universities in Kenya as regards digital archiving and to develop and propose a common framework that can be adopted by these institutions to support long term custody of digital archives.

1.5 Objective of the study

The objective of this study is to develop a framework for sustainable maintenance of digital archives in selected public universities in Kenya.

1.6 Research questions

To achieve the above objective, the study is guided by the following research questions:

- i. What is the state of digital archiving readiness of public universities in Kenya?
- ii. How are digital archives identified and administered in Kenyan public universities?
- iii. Which legal and regulatory frameworks govern digital archives management in Kenyan public universities?
- iv. Which risk factors are digital archives exposed to in these universities?
- v. What possible solutions can be adopted to mitigate the identified risks and support sustainable digital archiving implementations in Kenyan public universities?

1.7 Delimitations of the study

The scope of a research study refers to what is and what is not relevant to a particular study (Enslin 2014:275). The focus of this study is to assess the current state of digital archiving within archival repositories in selected public universities in Kenya. The chapter covered current digital archiving practices undertaken in universities which include identification, acquisition, arrangement and description (including archival metadata application), digital archives preservation, dissemination, digital archives discovery (findability) and access. Issues on digital archives readiness, legal and regulatory requirements for digital archives management, risk management and mitigation were also discussed. This study though focusing on digital archiving did not restrict itself to electronic records only but also extended its scope to cover paper-based records with archival value that require digitization and ingestion into archival systems.

Research undertakings can never be without limitations and delimitations. Enslin (2014:275) describes limitations as constraints or limits in a research study that are out of the researcher's control, such as time, financial resources, access to information, and so on. Similarly, other authors have defined limitations as conditions that have an influence on findings of the study, particularly on validity, but are beyond a researcher's control. They give examples of limitations such as absence of previous studies requiring more work from the researcher, a naturally restricting

sample, difficulty to get to the participants and time constraints (Simon and Goes 2013). Given that digital archiving is a relatively new area in archives management, preliminary literature revealed that there is limited published content on the topic. The researcher had to rely heavily on journal articles and studies in related fields such as electronic records management, digital preservation, digital librarianship, digital information repositories, and digital curation, among others. This notwithstanding, the study did not progress as anticipated in the research schedule owing to the unforeseen global disruption triggered by the onset of the Corona Virus (COVID-19) pandemic, which made it impossible for fieldwork and other research activities to be undertaken within the projected timeframe as a result of the lockdown in Kenya. Due to the COVID 19 global pandemic, the Human and Social Sciences Research Ethics Committee (HSSREC) at UKZN issued guidelines on 6 April 2020 on how to conduct research in these unprecedented times punctuated by a raft of lockdown measures in a bid to contain the virus (University of KwaZulu-Natal Research Ethics Office 2020). Thus, the researcher had to consider alternative data collection techniques such as telephone and on-line interviews to make up for the lost time.

Delimitations result from very specific and definite choices a researcher makes when s/he decides on the scope of a particular research study (Enslin 2014:276). Other authors have defined delimitations as the research boundaries or scope of the study, for example on the literature review, methodology or sampling technique (Creswell 2009). Hence, delimitations are within a researcher's control. Regarding the sampling frame, the study confined its coverage to senior management officers whose decisions impact upon records, and staff who are directly involved in digital records and archives management in the selected institutions. The study was confined to digital archives management practices in the six universities, selected in the order of their dates of inauguration on the assumption that each of these universities had large accumulations of legacy records created and generated on old systems, some of which are obsolete, requiring migration to newer systems. Therefore, the six universities were assumed to have the largest accumulation of archival collections in comparison to the other institutions in the same category. The universities covered included UoN (established 1970), MU (established 1984), KU (established 1985), EU (established 1987), JKUAT (established 1994, and MSU (established 2001). Data was collected from the six universities only and the recommendations were therefore addressed to

these institutions. However, considering that digital archiving practices are similar in universities due to the similarities in business processes, the study findings may be generalized and applied to archival repositories in other universities. The entire study including the literature review was limited to the period commencing 1970, henceforth. This was in consideration to the date of establishment of public universities in Kenya. The decision helped in making the study manageable since the field of records and archives management though still an emerging area has a rich body of recorded evidence which can prove overwhelming even to the best of researchers. The above demarcations in the study were necessitated by financial constraints since the researcher was self-sponsored.

1.8 Significance of the study

Researchers ought to make modest claims that affirm the importance of their studies (Badley 2009:339). In this respect, Creswell (2003) advised that the key research purpose of a study should be to contribute to the existing body of knowledge, improve on practice and policy development. The present study was motivated by the prevailing poor state of archives management in public organizations in Kenya, including state-owned universities. The findings of the study will contribute to literature in the fields of Records and Archives Management (RAM), and more specifically, digital archiving where empirical studies are currently very few. The researcher found that only one study had been undertaken in Kenya on digital archiving (See Section 1.8). The recommendations put forth and the proposed framework for digital archiving can thus be adopted for implementation by public university archives and other academic institutions in the country, thereby improving digital archiving practices. Lastly, this study is expected to inform on policy formulation at institutional and national levels on the establishment and operation of functional archival repositories that are ‘digitally’ ready to manage archival records irrespective of format.

1.9 Originality of the study

Any good research comprises some aspect(s) of originality. There is no universally accepted definition for ‘originality’ (Baptista et al. 2015:57), the term carries different connotations for different disciplines making it a difficult criterion to demonstrate in research (Badley 2009:337). Guetzkow, Lamont and Mallard (2004:191) describe

originality in the Social Sciences as the production of new theories and findings, while Clarke and Lunt (2014) suggest that originality in the Arts, Humanities and Social Sciences specifically denotes intellectual originality. Phillips and Pugh (2015:75) gave a more detailed explanation of the term by submitting that the originality of a research can be determined from the study's ability to:

1. Carry out research on an area that appears to have been under-researched;
2. Re-do research in different contexts such as a different country;
3. Contribute to the existing body of literature in a manner that has not been done before;
4. Verify existing ideas in previous studies;
5. Perform empirical work that has not been previously done;
6. Come up with a framework based on the collected data;
7. Propose a new phenomenon or consolidate the existing one;
8. Make new conclusions and interpretations about an existing theory probably in a different context;
9. Confirm, approve or disapprove an existing piece of work.
10. Use available notions to a new area of research;
11. Provide a significant amount of new data for the first time;
12. Provide a new interpretation using existing information;
13. Corroborate, present and analyze data in a different way;
14. Employ a distinct research methodology to address a research problem;
15. Build a new research technique;
16. Take a particular technique and apply it in a new area and;
17. Provide a critical discourse of a concept that has not been previously examined.

Similarly, Silverman (2017) opines that evidence of originality is demonstrated by discovering new facts and/or exercising independent critical thought, in other words displaying professionalism in one's research study. Researchers can successfully display professionalism or independent critical thinking by undertaking either/all of the following:

- i. Thinking critically about one's research approach;
- ii. Being prepared to change direction of their research;
- iii. Building on existing studies, and;
- iv. Developing concepts and/or methodology (Silverman 2017).

Taking into cognizance the above views, the originality of this study derives from its anticipated contribution to the existing body of literature, considering that the study was undertaken on an apparently under-researched topic. Research and scholarship on digital records globally and in Africa has largely focused on digital records management in the government sector and the impact of widespread ICT implementation on the creation, management and preservation of records (Kamatula 2018; Kofi 2015; Ambira 2016; Phiri 2016; Maseh 2015; Msibi 2015; Munetsi 2011; Luyombya 2010; Nengomasha 2009; Kalusopa 2008;2011; Kemoni, Ngulube and Stilwell 2007; Moloi and Mutula 2007; Ngulube 2007; Ngulube and Tafor 2006; Wato 2006; Wamukoya and Mutula 2005). Few studies of similar magnitude have been undertaken globally in digital archives management in the African region as well as globally (Magama 2017; Koopman and De Jager 2016; Klareld 2015a; Peyronnin 2015; Boutard 2013; Kim 2013; Ravenwood 2013; Wangutusi 2013; Douglas 2013; Asif 2011; McGovern 2009; Quisbert 2008;2006). Of significant relevance to the present research are the following studies: Wanis 2018; Tomasek 2018; McHugh 2016; Boehmer 2016; Amenta 2014; Elves 2012; Laughton 2011 and Lee 2005). In Kenya, one study worth mentioning was undertaken by Odhiambo (2018) to assess digital archiving readiness of United States International University, Kenya. Notably, all these studies have addressed important issues in digital archives management such as long-term preservation, digital archiving readiness, risk management and Open Archival Information Services (OAIS) reference model implementation, among others which are pertinent to the present study. However, none of these studies has proposed a framework for digital archiving for implementation in Kenyan public universities and this constitutes a knowledge gap. This study is therefore inadvertently modelled from previous related studies in digital archiving by developing some aspects of the studies.

Additionally, the current research gathered empirical evidence regarding digital archival practices in public universities which was collated, analyzed and interpreted, and conclusions drawn to enable the submission of possible recommendations and design of a framework as the key study output. For this to be accomplished, the researcher gave critical thought to the research approach at the onset of the study. The study therefore utilized theoretical triangulation to address the study's objective and

research questions, giving the research a unique dimension (Badley 2009:337) by developing a conceptual framework, thereby contributing to conceptual development.

1.10 Discussion of key concepts and terms

The present study revolves around digital archives, digital archiving and archival repositories. This section explains the usage of these and other related terms as used in the study. Accordingly, Williams (2014:9) averred that though definitions are never ‘definitive’, they are significant for ensuring communication with colleagues in the same profession, achieving consistency of practice and decision making in the workplace.

1.10.1 Archives

The word ‘archive’ is hard to define, as it is used in various ways, depending on the context. According to Schellenberg (1956:15) in Ketelaar (2004), there is no single definition of the term archives. Ketelaar (2004) contended that because of this fact, the ISO standard 15489 (2001) refrains from a definition of ‘archive’. According to Oregon State University (2003) as cited in Garaba (2010:6), the term ‘archives’ is defined as follows:

- i. A building or area of a building used to house permanent records;
- ii. A government agency, programme or organization responsible for appraisal, records scheduling, accessioning, preservation, and access of archival materials, and;
- iii. Records generated and accumulated by an organization during its business transactions and kept for their enduring value.

Szekely (2017) presented a European understanding of the term ‘archives’ which refers to records transferred from the creating agency to the archives. According to European Council’s recommendation No. R (2000) 13 as cited in Szekely (2017), the term has the following meanings:

- i. When written with an upper case ‘A’ - the public institution charged with preservation of archives; and
- ii. When written with an ‘a’ lower case - all documents generated by an individual or organization during their business transactions and deposited to the Archives for permanent preservation because of their enduring value.

In this study, the word archive will refer to the building where archival records are housed; the government agency or programme responsible for the keeping of archival records; non-current records with enduring value; and the act of adding non-current records of enduring value to an archive/archival repository.

1.10.2 Digital archives

Bettivia (2016) submitted that the term digital archive is difficult to define because it has a wide coverage. Owens (2015) cited in Bettivia (2016) identified the following items that are covered by this term:

- i. Born-digital archival collections;
- ii. Web archives;
- iii. Collections of user-generated born-digital primary sources;
- iv. Collections of aggregated digitized primary sources; and
- v. Digitized copies of entire archival collections.

1.10.3 Digital archiving

Digital archiving aims at being able to transmit interpretable digital records over time. According to National Archives of Australia (2006), digital archiving covers the identification, appraisal, description and tagging, storage, preservation, management and access of digital records, including all supporting policies, guidelines and systems, so that the logical and physical integrity of the records is securely maintained over time. In line with this definition, digital archiving will be used throughout this study to refer to the management regime for digital records throughout their entire lifecycle.

1.10.4 Digital archive repositories

Archival repositories are home to records about people, their place of habitation and culture. The Task Force on archiving of digital information cited in Commission on Preservation and Access and the Research Libraries Group (1996:8) defined digital archives as repositories of digital information that ensure the integrity and long-term accessibility of a country's social, economic, cultural and intellectual digital heritage, through various migration strategies. This definition fits well in the context of the present study and shall be adopted for this research study. The terms digital archive

and digital archival repository have similar meaning and shall be used interchangeably throughout this research study.

1.10.5 Digital preservation

The terms digital preservation and digital archiving are often used interchangeably within Library and Archives fields, but they are distinct in meaning. This is because digital preservation is an important and key component of digital archiving necessary for ensuring longevity of digital objects (NAA 2006), hence it is undertaken as an activity within digital archiving. Langley (2019) views digital preservation as the activities geared towards maintaining continued access to digital materials in the face of threats such as media decay, organizational and technological changes. The SAA Dictionary of Archives Terminology (2020c) defines digital preservation as the management and protection of digital information to ensure authenticity, integrity, reliability, and long-term accessibility. Thus, digital preservation broadly entails managerial activities, standards and best practices, strategies, procedures and policies that ensure continued access to born-digital and digitized content, in the face of challenges such as hardware/software obsolescence, media decay, changes in technology, intentional harm and human error (Society of American Archivists 2020c).

1.10.6 Digital curation

Digital curation occurs alongside the practices of digital preservation and digital archiving. Digital Curation Centre [DCC] (2020) posits that digital curation refers to the maintenance, preservation and addition of value to digital research content throughout its lifecycle. Value addition to data is achieved by creating context and linkages between data and data sets. In the context of this study, digital curation shall be defined as the active involvement in the long-term preservation, management and use of digital resources.

1.10.7 Recordkeeping

According to Clause 4.19 of the Australian Standard AS 4390 (1996:5), recordkeeping is defined as the creation, capture and maintenance of accurate complete and reliable recorded information as evidence of business transactions. In

the context of this study, recordkeeping refers to all activities associated with the management of records throughout their lifecycle.

1.10.8 Risk management

Risk is incorporated into various disciplines; hence there is little consensus about how to define risk. Franks (2018) states that the process of risk management involves understanding, analyzing and addressing risk to ensure organizations meet their laid-down objectives. This definition is adopted for use in this study. ARMA (2016) cited by Franks (2018) provides steps in the risk management process, which include risk identification, analysis, assessment, treatment and monitoring of the process, and has been adopted for this study.

1.11 Models for the study

This section provides a prologue of the models upon which the study is anchored. An in-depth discussion will follow in Chapter Two (Conceptual Framework). The current study was underpinned by three models namely, the Records Continuum (RC) model, the OAIS Reference model and the Archives and Records Management Association (ARMA) Records Management Maturity model. The RC model is “a consistent and coherent process of records management throughout the life of records, from the development of recordkeeping systems through the creation and preservation of records, to their retention and use as archives” (International Council on Archives [ICA] 2008). The RC is a broad-spectrum model widely lauded as ideal for the management of all record formats. The model is appropriate in answering the second and third research questions of the study but is however incapable of addressing the fourth and fifth research questions, necessitating the use of other models to compensate for this deficiency.

The five functional units of the OAIS Reference model jointly address digital archiving risks, making it appropriate for addressing the third, fourth and fifth research question in the present study. However, the model completely disregards the pre-ingest period that digital records undergo and seems to assume that records creators know what kind of digital objects to submit into the repository. The model also disregards all records management activities when digital records enter the archives. These aspects are satisfactorily addressed by the RC.

The ARMA Records Management Maturity Model is based on the Generally Accepted Recordkeeping Principles (GARP) and the legal (regulatory) requirements, best practices and standards surrounding information governance. The model is meant to be deployed as a quality improvement tool (Eusch 2016). The purpose of this model is to assist organizations in conducting preliminary evaluation of their recordkeeping programs and practices (Eusch 2016). This model therefore complements the RC and OAIS models in addressing the study's first and fifth research questions. The model will be specifically useful in assessing the state of digital archiving readiness for the six public universities in Kenya. The three models will be triangulated to jointly inform the designing of a framework for digital archiving.

1.12 Preliminary literature review

A comprehensive discussion of the literature for the study will be provided in Chapter Three (Literature Review). This section gives an overview of the themes covered in the literature review and the emerging issues thereof. Preliminary empirical and conceptual literature required to answer research questions for this study was obtained from books, journals, theses, conference proceedings, databases, among others. The literature reviewed was informed by key variables of the models underpinning this study as well as related concepts to the statement of the problem and research questions. The themes reviewed included records and records management, electronic and digital records, management of electronic records, archives concept and importance of archives, risks facing digital archives and legal and regulatory frameworks for digital archives. The literature reviewed encompasses both theoretical and empirical studies conducted globally, regionally (Africa) and locally (Kenya) on digital archives management. The information gives a picture of the present state of digital archiving in public sector organizations and provides guidance on enhancing the process for the posterity of digital records of enduring value.

The literature review undertaken reveals a deficiency on the available content on digital archiving in public universities in Kenya. The present study therefore seeks to bridge this knowledge gap by addressing the research questions presented in Section 1.5.

1.13 Research methodology

This section provides a summary of the research methodology for this study. A detailed description of the methodology ensues in chapter four of this study. The creation of new knowledge in any scientific field is determined by the research methodology used (Ngulube 2015:125). The literature predominantly identifies three research approaches, that is, qualitative (QUAL), quantitative (QUAN) and mixed methods research (MMR) (Ngulube and Ngulube 2015; Creswell 2014; Burke and Christensen 2014). Two other approaches identified by Bangura (2019:33) include the emergent and African Centered methodologies (See Chapter Four). The study adopted the pragmatic research paradigm owing to the promise of flexibility derived from MMR. Mixed methods research assumes that a combination of QUAL and QUAN methods will result in a deeper understanding of the research problem as opposed to using either one of the approaches alone (Creswell 2014). Methodological triangulation was employed by applying methodological eclecticism to select the best techniques from the QUAL and QUAN “toolboxes” to address the study’s research questions (Teddlie and Tashakkori 2012:776-777). The study had a qualitative methods priority.

The study adopted a multiple-case (embedded) design using cross-sectional survey. Six of the earliest public universities were purposively selected from the twenty-three fully accredited public universities in Kenya namely: UoN, MU, KU, MU, JKUAT and EU. The population for the study constituted Deputy-vice chancellors, Finance Officers, Legal Officers, ICT Directors, Archivists, Records Managers, ICT staff and Administrators. The target population was 451 out of which 205 respondents were selected using Krejcie and Morgan’s (1970) formula for sample size determination.

Survey questionnaires, semi-structured interviews and documentary review were used for data collection. Questionnaires had open and closed ended questions seeking to obtain data from 169 respondents, while semi-structured interviews were used to collect data from 36 respondents. Document review was used to support the researcher’s understanding of the study problem and complement the other data collection instruments. Qualitative and quantitative data collection was undertaken concurrently in a single phase during the study.

Qualitative data was analyzed along themes using NVIVO content analysis software, while quantitative data was analyzed using Statistical Package for the Social Sciences (SPSS) to generate descriptive and inferential statistics. The interview data and questionnaire data were independently analyzed and thereafter the quantitative results were integrated with the qualitative results in the final discussion.

1.14 Ethical considerations

For research to be accepted as valid, it must be conducted in an ethical manner. Hennink, Hutter and Bailey (2011:61-80) identify principle ethical considerations as including seeking prior informed consent, minimization of harm, anonymity and confidentiality among others. Ambira (2016:37) emphasizes that researchers must avoid all forms of misconduct by adhering to ethical guidelines. This research study complied with ethical standards of informed consent, confidentiality and anonymity as stipulated by the University of KwaZulu-Natal Research Ethics Code (University of Kwa-Zulu Natal 2014). Among other requirements for cluster level research proposal defense, the researcher submitted a Turn-It-In (TII) report reflecting not more than 15% similarity index as a safeguard against plagiarism and other research irregularities. The researcher obtained ethical clearance from the Humanities and Social Sciences Research Ethics Committee. Official authorization was also sought by the researcher from the National Council of Science and Technology Institute (NACOSTI) to carry out research in Kenya, and from the offices of the Deputy-vice chancellors in charge of research in all six universities. Prior to the actual data collection process, informed consent of the respondents was sought before they could take part in the study. They were requested to sign a consent form indicating that they understood the nature of the research and were willing to participate. The respondents were assured that their privacy and confidentiality would be protected by way of treating their responses with highest levels of confidentiality and anonymity, and that they would participate in the study voluntarily and withdraw from participation any time at their own volition. Allied to the foregoing, we are living in unprecedented times with COVID-19 which is not just altering everyday life but is also transforming how we conduct research. The Human and Social Sciences Research Ethics Committee (HSSREC) at UKZN issued guidelines on 6 April 2020 on how to conduct research in view of this pandemic. Consequently, amendments to informed consent forms and adjustments to data collection instruments and methods had to comply with

national guidelines, directives and laws during this COVID 19 crisis as spelt out in the HSSREC protocol (University of KwaZulu-Natal Research Ethics Office 2020).

1.15 Structure of the thesis

This thesis is comprised of seven chapters, each of which is briefly described below.

Chapter One: Background and introduction

This chapter presented the background information to the study and introduced the concept of digital archiving that this thesis investigates, from the global, regional and local perspectives. It explained the meaning of key concepts and terms used, provided brief histories of the study sites, and the thesis structure. The chapter also presented background to the problem area, statement of the problem, study objective, research questions, originality of the study, study scope, limitations/delimitations and significance of the study. Overviews of the conceptual framework, preliminary literature review, research methodology and methods used were provided. Lastly, ethical considerations and a summary of the chapter were provided.

Chapter Two: Conceptual and Theoretical Framework

The chapter begins by giving an overview of theories underpinning the study which include records continuum model, Open Access Information Systems Reference model and ARMA Records Management Maturity model. A discussion on the justification for selection of the models is also included. Theoretical triangulation leading to formulation of a conceptual framework for the study is explained. Related models to the study such as Records Life Cycle and Digital Data Curation are also discussed. The ensuing discussion positions the study in literature and determines the direction of the study.

Chapter Three: Literature review

This chapter outlines the importance of reviewing literature in research and presents a review of related literature. The section contextualizes the study by explicating the relevant concepts touching on the study variables. It discusses key concepts which include records and records management, electronic and digital records, management of electronic records, archives as a concept and importance of archives, risks facing

digital archives and legal and regulatory frameworks for digital archives. Similar studies done are reviewed a in relation to the current study.

Chapter Four: Research methodology and methods

This chapter provides the methodological perspective of the research and focuses on the variety of approaches adopted by the study including: the research paradigm and justification; research methodology and evaluation; research design; population of the study; sampling techniques; data collection; validity and reliability of the instruments; ethical considerations and presentation and analysis of data.

Chapter Five: Data analysis and presentation of findings

The chapter deals with the central part of the thesis, where the research data is presented, which forms the basis of the investigation, shaped by the researcher's own thinking. It analyzes and presents the results of qualitative and quantitative data based upon research questions and relevant theories. Quantitative data is analyzed using Statistical Package for the Social Sciences (SPSS) to generate inferential and descriptive statistics while qualitative data is analyzed using thematic analysis.

Chapter Six: Interpretation and discussion of findings

This chapter provides a discussion of the findings in accordance with the research problem, objective and questions. The researcher develops the story found in the data, making connections between the results of the data analysis and existing theory and research.

Chapter Seven: Summary of findings, conclusions and recommendations

The chapter provides a summarized discussion of the research purpose, methodology and results of this study. Conclusions are discussed, derived from the major research findings of the study. Recommendations are proposed, which include a digital archiving framework that borrows from the study's underpinning models as well as other existing frameworks, for example DRAMBORA which addresses the aspect of risk assessment and evaluation in trusted digital repositories. Suggestions for future research are provided.

1.16 Summary

This chapter served as the foundation upon which this research is structured by contextualizing the study and serving as a “curtain raiser” for the phenomenon under investigation. It provided background information to the study and introduced the concept of digital archiving that this thesis professes to investigate, from global, regional and local perspectives. An overview of the historical background of the study sites served to give an understanding of the contemporary phenomenon within the context of its real life. The chapter illuminated poor digital archiving practices in Kenyan public universities as the key problem instigating the research. The objective of the study was to investigate digital archiving practices in archival repositories of selected public universities to ascertain the state of affairs in these institutions. Research questions were formulated to inform the development of a framework for sustainable maintenance of digital archives in the institutions.

The chapter outlined areas covered in the research in relation to the concept of digital archiving. Constraints impacting the study such as scarcity of published content on the topic were pointed out and approaches to overcome the identified limitations were explained to lend soundness to the study. The boundaries delineating the study such as the selected research sites and respondents were specified to ensure the study remained within manageable borders. Whilst acknowledging that seemingly similar studies have been undertaken on digital archiving, the importance and originality of this study was spelt out to distinguish it from the other related studies. The meaning of key terms and concepts as used throughout the thesis were explained to ensure precise comprehension of the research. A prelude to the conceptual framework formulated from the triangulation of theories derived from three underpinning models was provided. Themes stemming from the conceptual framework were highlighted in the preliminary literature review to provoke a clear understanding of the phenomenon under investigation. An overview of the research methodology adopted ensued to inform on the data collection process and techniques used. Ethical considerations pertinent to the study were stipulated to lend validity and authenticity to the research. Last but not least, an outline of all the chapters of the thesis was presented as a culmination to this chapter, providing a bird’s eye view of the entire research. A detailed discussion of the theories and conceptual framework for the study supervenes in the subsequent chapter.

CHAPTER TWO

CONCEPTUAL AND THEORETICAL FRAMEWORK

“The social sciences is a minefield with a plethora of theoretical constructs for understanding and interpreting phenomena. Almost any issue will appear as a contested terrain with a multiplicity of interpretations gleaned from a myriad of theoretical schools” (Munene 2019:9).

2.1 Theories, models, theoretical and conceptual framework

Present times are characterized by intellectual turbulence, necessitating reliance on basic assumptions by scholars regarding the nature of reality, purpose and methods of investigation (Garaba 2010:80), calling for the use of theories in research. Theories lend sense to complicated social phenomena and interactions (Collins and Stockton 2018) by explaining phenomena meaningfully and logically, usually along narrative structures (Goodson 2010:11). They comprise of a series of interrelated definitions, concepts and propositions predicting, or explaining phenomena by specifying relations among variables (Case and Given 2016:185). Creswell (2014:110) postulates that theories develop when researchers test a prediction about the relationship between the variables repeatedly with different populations and in different settings. Researchers use theories to enable them develop the existing body of knowledge by understanding and explaining relationships between variables and drawing conclusions on phenomena, thereby providing a basis for further research, understanding and theorization (Kivunja 2018:46). Theory therefore seeks to focus upon the linkages between pertinent variables within the situation under investigation.

Case (2007:120) speculated that models are usually discussed in relation to theories and described a model as a basic depiction of an actual situation, taking into consideration, key features of the situation represented. A model is therefore a basic illustration of a process that can be used to help understand the nature of theories, constructs and concepts in a specific context. Ngulube (2019:21) explained that models are not theories, but they may be used to represent or test theory, thereby qualifying as conceptual frameworks rather than theoretical frameworks. They assist to identify and illustrate the most important concepts of a theory and the dynamics of

the relationship between concepts (Bezuidenhout 2014:47-48). Hofman (2017:639) posits that models may act as powerful research tools for the following reasons:

- iii. They help to understand how things interact or have interacted based on an analysis and interpretation of collected empirical data (case studies);
- iv. They envisage and reflect ideas and theories or theoretical concepts and help to facilitate understanding within or across domains;
- v. They help to design something that does not yet exist with the intent to develop or build it, and;
- vi. They support and stimulate cross-disciplinary communication.

When theories and models are used in research, they result in the formation of theoretical frameworks. Tamene (2016:51) asserts that a theoretical framework is an important and central aspect of the research design guiding the researcher on the progress of the research, what needs to be done and how it is to be done. It is a blueprint usually ‘borrowed’ by a researcher to build his/her research inquiry (Adom, Hussein and Agyem 2018). According to Imenda (2014:189), a theoretical framework is developed when a theory or concepts derived from one theory are used to explain a phenomenon or event. It can be viewed as a travel plan or map that guides a researcher so that s/he does not stray from the limits of the acknowledged theories to make his/her ultimate scholarly and academic contribution (Fulton and Krainovich-Miller 2010). Grant and Osanloo (2014) concur that a theoretical framework serves the purpose of lending structure to research by determining how a researcher defines his/her study philosophically, epistemologically, methodologically and analytically. Therefore, a good theoretical framework guides the researcher in selecting a suitable methodological approach and analytical tools for the research inquiry.

The term ‘theoretical framework’ is applicable when only one theory underpins a given study (Ngulube 2018; Green 2014:34-38; Nieswiadomy 2012:87-88), but when more than one theory is used, then the result is a conceptual framework (Ngulube 2018:11). Thus, a conceptual framework is used when a single theory cannot sufficiently be applied in a study. The use of more than one theoretical perspective to investigate and interpret data is referred to as theoretical triangulation or theoretical pluralism (Hoque, Covalski and Gooneratne 2013). Oswick, Fleming and Hanlon (2011) in Ngulube (2019:29) liken this to “conceptual blending” where contextual

variables are added to conceptual theories, resulting into a conceptual framework which is contextually relevant. The adoption of more than one theory to guide a study is strongly supported by Ngulube (2018) who ponders that theories can shed light on a set of data and create shadows at the same time, making it necessary for researchers to ‘scout’ the literature in the quest for additional theoretical framework(s) to entirely address the research problem at hand. The resultant conceptual theory forms a tentative theory explaining the phenomena under study, which informs the entire research design (Imenda 2014:189; Maxwell 2013:39) as is the case in the current study. Section 2.3 gives a detailed discussion of the conceptual framework for this research study.

2.2 The use of theories and conceptual frameworks in quantitative, qualitative and mixed methods researches

In research, it is important to take cognisance of the roles that formal or existing theories play in the formulation of research questions, objectives, research design and analysis (Ravitch and Carl 2016:46). Theoretical and conceptual frameworks act like ‘glue’ holding in place the multiple components of a research study (Ngulube 2018). Polit and Beck (2004) opined that theoretical and conceptual frameworks stimulate research and knowledge extension by giving direction and motivation. Specifically, theoretical frameworks are used in qualitative, quantitative and mixed research studies to give structure to every aspect of a study (Grant and Osanloo 2014). Therefore, a good research study must be founded upon a relevant theoretical or conceptual framework which steers and keeps the study on course, from conception to conclusion.

In quantitative studies, theories are used deductively and are positioned at the beginning of proposed studies, hence they are typified by *a priori* theories (Creswell 2009; Kitchel and Ball 2014). Data is then collected and analyzed with the intent of verifying or testing the theory as opposed to developing a theory. Hence the theory doubles as a framework for the entire research study. In contrast, qualitative studies use theories inductively, building from the data, which is then categorised into broad themes, and finally coming up with a generalized theory or model as the *end point* (Creswell 2013). Therefore, use of theoretical frameworks in qualitative studies aids

in uncovering weaknesses and strengths of some theories, providing a vernacular and situating a research study in scholarly discussions (Anfara and Mertz 2006:192).

Using of theory in mixed methods studies may involve deductive usage of theory in quantitative theory testing and verification, or inductive usage of theory such as in an emerging qualitative theory or pattern. It has a defined framework that guide's researchers in data collection, analysis and integration (quantitative and qualitative). The framework used may either be in the form of a social science framework or a transformative framework (Creswell and Clark 2011). Thus, mixed methods research can test and develop theories, and vice versa. For example, explanatory mixed methods research designs can use theory deductively in quantitative phases, then inductively develop broad explanations about the phenomena under investigation in the qualitative phase. In contrast, sequential exploratory mixed methods research design can be developed in the quantitative phase and seek to generalize the findings to larger populations or test theory developed in the qualitative phase (Ngulube 2019). The present study engaged a mixed methods approach involving qualitative and quantitative approaches, albeit with a qualitative priority. Three models were triangulated to advance a conceptual framework which guided the research and served as an orienting lens for the entire study.

2.3 Theories and theoretical underpinning of the study

Adom, Hussein and Agyem (2018) pointed out that conceptual and theoretical frameworks play the important role of explaining the pathway of a research and firmly grounding it in theoretical constructs. The present study cuts across records management and archival science, igniting a discussion on recordkeeping theories for purposes of identifying specific theories which address this study's constructs. Marutha (2016:57) opined that archival practice is a function of records management and encompass permanent preservation of records and continued access provision to the corporate memory of an organization. Therefore, a discussion of archival theories must by necessity constitute a discussion of records management theories.

The recordkeeping profession has experienced almost a 'quantum leap' in theoretical thinking over the last two decades. Many different models have been developed,

including the Records Continuum (RC) model and the InterPARES activity models (Hofman 2017:633). Kemoni (2008) noted that a number of records management theories and models had been developed which included: Records life-cycle (RLC) model; International Council on Archives Electronic Records Model; National Archives of Australia Digital Recordkeeping Guidelines 2004; Electronic Records Management Guidelines Model; Records Continuum model; and National Archives and Records Service of South Africa Guidelines. Hofman (2017:643) identified the following recordkeeping models developed to address challenges of the digital age: those published by the University of British Columbia (UBC) and InterPARES Projects, the Australian Records Continuum model and the related recordkeeping metadata models developed in the Strategic Partnerships with Industry – Research and Training (SPIRT) Recordkeeping Metadata Project as well as the Clever Recordkeeping Metadata (CRKM) Project.

Archival theory is the whole body of ideas about what archives are, and the archival methodology used to treat and handle archival materials, which makes up the entire system of archival science (Duranti 2013:45). Thus, archival theory comprises ideas about the nature of archival materials, principles and methods for controlling and preserving them. There are two major established models in the archival world: the records life cycle approach and the records continuum approach. According to Upward (2001), the records life cycle model is a means of modeling knowledge and approaches for managing records based on the separation of space and time, whereas the records continuum recognizes the unity of space and time, and re-patterns knowledge and structures to manage records and archives in space-time. Another model which has impacted the recordkeeping community is the Open Archival Information System (OAIS) reference model, developed by the Space Data Community in collaboration with the library community and a few archival institutions. It aims to define what processes are necessary to store and preserve digital information (Hofman 2017:646).

The next section presents three models that formed the theoretical foundation upon which the present study was anchored namely the records continuum model, Records Management Association (ARMA) Records Management Maturity model and OAIS reference model and the Archives. Relevant concepts of the models were used to

develop a conceptual framework to inform the present study. The Records Life cycle (RLC) model and Digital Data Curation Centre (DCC) model are also discussed as complementary models to the study.

2.3.1 Records Continuum (RC) model

The origin of continuum thinking can be traced back to the work of government archivist Ian Maclean in the 1950s and later to the development of the Australian ‘series’ system (also called the context relationships system) by Peter J. Scott in the 1960s (Soyka 2015). The RC model was first made public by Jay Atherton in 1985. Atherton referred to the records life-cycle concept of transfer of responsibilities for records, pointing out its weaknesses by questioning the occurrence of records management activities as defined in the life cycle model (Flynn 2001). However, it was not until 1996-1997 that Frank Upward came up with a conceptual model of the RC which elicited global debate. The initial article on the RC was written by Australian archivist Ian Maclean in 1959, allegedly using an approach described by archivists Philip Brooks and Margaret Cross Norton in the United States, but the publication of the model is attributed to Frank Upward (Soyka 2015).

McKemmish (1998) defined “continuum” as a continuous series of elements passing into each other with no noticeably separate parts. Further, McKemmish and Gilliland (2013:93) described records continuum as “(...) a continually interacting and evolving set of contingent activities with individual, institutional, and societal aspects”. In a like manner, the Society of American Archivists (2020d) defined records continuum as a model depicting recordkeeping by theorizing records connections over interconnected axes and dimensions, disregarding the start-and-end points of creation and consistent management of records and archives.

These definitions allude to an integration of documents, records and archives in business activities, meaning that their constituent management is also inter-related. As earlier mentioned, development of the RC model was in response to the shortcomings of the records life-cycle model. The key difference between the RC and RLC models is that the RC model is a ‘consistent and coherent’ management regime for records, whereas for the RLC model, records move through defined stages from creation and active use in the office, through semi-active and inactive storage in record centres, to

appraisal and selection for destruction or permanent preservation in archival repositories. Significantly also, the starting point for records in the RLC model is at creation or 'birth' while in the RC, the management regime encompasses the designing of recordkeeping systems or the pre-natal phase of records.

The RC model is based upon four principles which are of particular relevance to the present study. The first principle of recognition of Archival Science as the foundation for organising knowledge about recordkeeping situates this study within the broad recordkeeping context. This signifies an undisputable nexus between records management and archives management. The second principle advocates for institutionalisation of the recordkeeping profession's role and emphasises on the need to integrate recordkeeping into business and societal processes and purposes. Therefore, continued capture of records as evidence of business transactions is a continuum priority. Thirdly, the concept of 'record' which is inclusive of records of continuing value (archives), stresses their use for transactional, and evidentiary and memory purposes, and unifies approaches to archiving or recordkeeping whether records are kept for a split second or a millennium. Hence, records ought to be properly managed from creation to ensure their long-term existence. The fourth principle focuses on records as logical rather than physical entities, regardless of whether they are in paper or electronic form (Upward 2001).

The present study takes place in an organizational context where records in paper and digital formats are created as a result of business activities, calling for careful planning and designing of recordkeeping systems for the management of these records. In this respect, the RC depicts the following four actions for records management: the creation or acquisition of records, classification or description, appraisal for continuing value and maintenance and use (Upward 2001).

Further, Upward (2001) identified four axis or recordkeeping entities in the RC which relate to the above-mentioned actions of RM, forming a framework within which archivists and records managers work closely together (recordkeeping). The identity axis relates to creators of records or authorities by which records are created or received and kept while the transactionality axis refers to records as byproducts of activities, requiring them to be classified. Evidentiality axis relates to records as

evidence of actions, requiring them to be described and relevant metadata attached. Last but not least, the recordkeeping containers refer to the objects created to store records after appraisal, and which contain custodial history for ease of access.

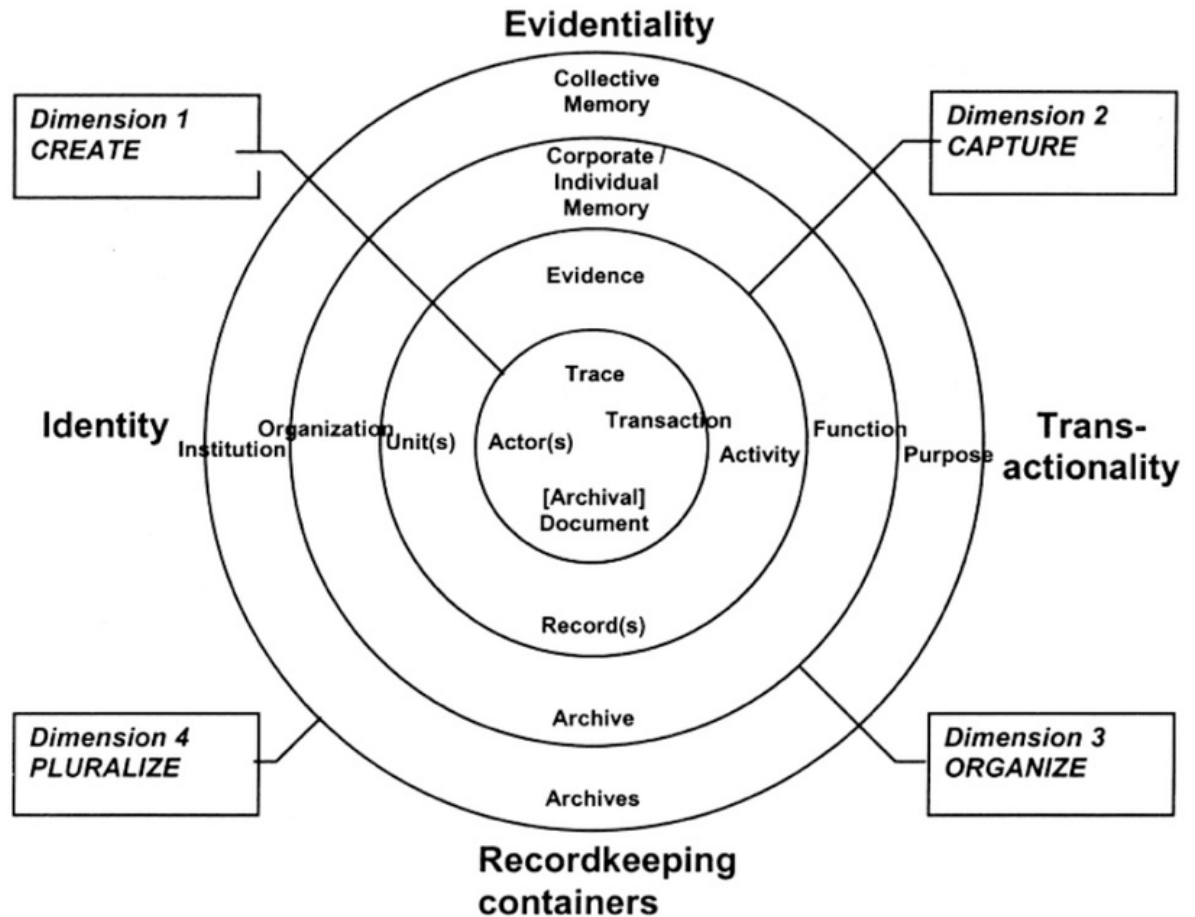


Figure 2.1: Records Continuum Model (Source: Upward 2000:123)

As depicted in Figure 2.1 above, the recordkeeping entities are subsequently represented in four ‘continuas’ or dimensions as recorded by Soyka (2015:41):

- i. Create dimension – this is at the center of the diagram, signifying the starting point of a record as a result of individuals’ activities. This dimension places the record in its specific context;
- ii. Capture dimension - the record created in the first dimension is placed into a broader group context or unit of the organization through coherent and consistent use of recorded information by people. It includes adding information concerning the record and its communication as well as the relevant metadata into the recordkeeping system;

- iii. Organize dimension – this dimension converges records created and captured in the first two dimensions into a common place where the same systems and structures are put in place for their storage and management. This can be described as the organization of institutional memory; and
- iv. Pluralize - this dimension is situated furthest from records creation. It includes representation and re-use of the record for new purposes and meanings and possibly multiple audiences in ways that are less controllable and predictable.

An (2003) explained that there are no separate steps in a continuum, rather, records management is seen as a continuous process in which one continuum element seamlessly passes into another. Therefore, the continuum model presents a holistic process towards recordkeeping (Garaba 2010) which is in contrast to the life cycle model which separates archives administration and records management. In agreement with this view, Millar (1997:14) identified the following four actions of records care under the records continuum approach:

- Identification and acquisition distinguish records management actions as the creation or acquisition of records, while archives management actions relate to the selection and acquisition of archives;
- Intellectual control constitutes records management actions that include classification of records within a logical system, while archives management actions relate to the arrangement and description of archives;
- Physical control constitutes records management actions pertaining to either disposal of records by destruction, or their transfer to the national archives, while archives management actions relate to the preservation of archives; and
- Access involves records management actions that relate to the maintenance and use of records, while archives management actions relate to the description of archives.

Hence, the records continuum model presents an integrated collaborative approach to the management of records by record managers and archivists, otherwise referred to as recordkeepers. There is no separation of stages and all recordkeeping activities are jointly undertaken by both groups of professionals at appropriate stages of the continuum. Suffice it to say that the records continuum model presents an exclusive worldview that has made a marked contribution to the fields of recordkeeping and

information management. However, Karabinos (2015:11) clarifies that there is a distinction between the records continuum theory and records continuum model. According to the author, the purpose of the records continuum model is to use the records continuum theory to aid in the understanding and description of records characteristics, whereas the records continuum theory relates to records management and recordkeeping. Hence, the records continuum model helps to envisage recordkeeping functions from designing of recordkeeping systems to the management of records as archives.

2.3.1.1 Relevance of the Records Continuum Model to this study

Flynn (2001) highlights four themes in archival science that are captured in the model namely identity (provenancial context), transactionality, evidentiality and recordkeeping containers. The four themes link up the four dimensions in the continuum, that is, creation, capture, organise, and pluralize. The four dimensions depict the lifecycle of records emanating from business transactions, right from creation/capture to their final disposition in an organizational context. Considering these key features of the model, Garaba (2010) postulated that the RC offers a holistic approach to RM which is viewed as an enjoined process where one element of the continuum passes seamlessly into the other. This representation of the model makes it appropriate for application in public universities which generate a lot of records as a result of their business transactions. Hence, the RC model addresses all aspects of digital records management that are under investigation by the present study.

The RC model depicts a management regime which covers recordkeeping systems' design, thus controlling the pre-natal phase in the life of a record. McKemmish (1998) lauded the RC model by observing that archivists and records managers are brought together under a common recordkeeping framework with the same focus which is to guarantee the authenticity and integrity of records. In this study, the RC model provides guidance on recordkeeping requirements from creation, thereby ensuring that proper records are created, and that identified archival records will have the required qualities, that is, reliability, authenticity, integrity and completeness, thereby qualifying them for permanent preservation as archives. The model thus ensures that the final archival objects ingested in the organization's corporate memory are of the

right quality, also referred to as 'record-ness' which is guaranteed by the promise of cooperation between archivists and records managers.

The RC model focuses upon records as logical rather than physical entities (Upward 2000), thereby providing a unified best practice criteria, consistent standards, common understanding, and interdisciplinary approaches in recordkeeping and archiving processes for all record formats. This aspect of the model is appropriate considering that the study though focused upon digital archives will also have to factor in the permanent preservation options for paper-based archives.

Kemoni (2008) succinctly pointed out that the RCM has gained international acceptance as a basis for RM, both paper and electronic records. Citing State Records of Australia (2004), Kemoni (2008) also noted that the RCM offers an integrated approach to digital records management, resulting in a number of benefits namely: creation of the right records in the right formats with the right information; organization of records to facilitate ease of use; systematic disposal of ephemeral records, and; protection and preservation of records. Bearman (1996), Cook (2000) and Upward (2000) who are renowned scholars in the field of archives management concurred that RCM is an appropriate model for the management of digital records, making it appropriate for use in this study which examines management of all record formats.

In research, the relevance of the RCM is evidenced by the fact that the model has been adapted and used effectively in studies of similar magnitude, some of which applied theoretical triangulation. For example, Kemoni (2007) used RCM to investigate recordkeeping practices in Kenya to establish their impact upon service delivery in government ministries. The study revealed a state of poor service delivery occasioned by poor recordkeeping practices, and proposed recommendations to enhance recordkeeping in public bodies. Garaba (2010) used RCM to investigate how national and private archival institutions were managing records and archives management of former liberation movements in East and Southern Africa. The findings revealed that liberation struggle archives mainly existed in image formats, which necessitate information custodians to possess basic knowledge and skills in the

care and maintenance of these records. The study endorsed the application of the RCM for the management of records in archival institutions.

Luyombya (2010) used the RCM in a study that sought to establish whether Uganda had a framework for the effective management of digital records. Deficiencies in the design and integration of electronic systems in the Ugandan public sector were revealed, and a framework for improving the management of public digital records in the country was proposed. Adu (2015) triangulated the RCM, the RLC, OAIS and the integrated records management model in a study examining digital preservation of e-government in Ghana. The study identified financial issues, loss of e-records, privacy and security issues, technological obsolescence and skills training as the key hinderances to digital preservation in Ghana. A digital preservation framework was proposed for adoption public sector organizations in the country. Maseh (2015) triangulated the RCM, E-records Readiness Tool and the Open Government Implementation Model (OGIM) to investigate the state of records management readiness in the Kenyan Judiciary. The study proposed recommendations to improve the records management regime in the Kenyan Judiciary which was found to be weak. Saurombe (2016) made use of the RCM in a study that sought to describe public programming activities in the public archives in ESARBICA region by assessing how these institutions communicate their archives to the public and how they encourage utility of their archival resources. The findings of the study indicated that public programming initiatives were not prioritized in comparison to other activities at the national archives. An integrative and inclusive framework for enhancing public programming initiatives in the ESARBICA region was proposed by the study.

Karabinos (2015; 2018) tested the universal suitability of the RCM and its ability to interpret the nature of records by using two cases from the decolonization of Southeast Asia that is, the Djogdja Documenten and Migrated Archives. Each case was placed on the continuum model, mapping each action to a corresponding dimension. Karabinos (2015:139) argued that the universality of the RCM can only be a reality after pluralization of the records being examined and that the successful implementation of the model was dependent on a culture of openness and accessibility. The study proposed a “shadow continuum” to analyse the migrated archives whose existence and context remained unknown to the public. In response to

Karabinos analysis, Frings-Hessami (2020) asserted that the addition of the “shadow continuum” was needless because it was based upon a fallacy of the dimensions of the RCM and the reasons why the model was developed. Therefore, the model was applicable even in contexts where records have not been made public. Frings-Hessami (2020) proposed an alternate method of mapping Migrated Archives onto the RCM, highlighting significant issues concerning ownership of the archives and how they have been managed and utilized.

Last but not least, Kabata (2019) carried out a study to investigate the readiness of public bodies in Kenya for the implementation of the Access to Information (ATI) Act (2016), by establishing whether the elements necessary for successful ATI implementation were present in public bodies in Kenya. The study triangulated the UK Department of Constitutional Affairs (DCA) Model Action plan (2003), the ‘Carter Centre Implementation Assessment Tool’ (IAT), the ‘concept of meaningful engagement’ and the ‘records continuum model. The study revealed ATI implementation weaknesses and strengths in the government sector and provided a roadmap for successful implementation of ATI.

The above observations make RCM appropriate for adoption as one of the underpinning models for this study, whose setting is against a hybrid environment, where records in both traditional and digital formats have to be managed for posterity.

2.3.1.2 Gaps in the model

Despite the fact that the RCM is a broad-spectrum model widely lauded as ideal for the management of all records, the model falls short of addressing long-term preservation of digital archives. As discussed in section 2.3.1 above, four actions of records and archives management identified in the RCM are identification and acquisition; intellectual control; access and physical control. Although preservation action is alluded to in the fourth action of physical control, closer engagement with literature reveals that the RCM is silent about specific digital preservation activities that should be undertaken for the long-term preservation of digital archives. Frings-Hessami (2018) observed this limitation of the RCM in an analysis of Care Leavers records in Australia and Migrated Archives of the Mau Mau rebellion in Kenya, noting that the RCM could not accommodate the special processes that needed to be

applied on archival records before they were released to the Care Leavers and to the Kenyan government respectively for continued access. This prompted addition of the Reclaim dimension in the proposed Repurposed Archive Continuum Model to incorporate the special processes that needed to be undertaken to permanently preserve the records.

The above deficiencies disqualify RCM from being used as a stand-alone model in the study since it is appropriate only in answering the first research question, and partly the second and third research questions. The model is incapable of helping to identify risks that digital archives face in institutions and their mitigation, hence the need for other models to cushion these deficiencies.

2.3.2 The Open Archival Information System (OAIS) Reference Model

The field of digital preservation has a good number of models in digital archives, record keeping systems, digital libraries and digital repositories. The most widely used model for digital records and archives preservation is the OAIS reference model (Quisbert 2008). In 2002 the Consultative Committee for Space Data Systems (CCSDS) published the Open Archival Information System Reference Model (2002), a digital archive model that achieved International Organization for Standardization (ISO) in 2003, that is, ISO 14721:2003 (Consultative Committee for Space Data Systems 2012).

The OAIS defines six functional entities namely ingest, archival storage, data management, administration, preservation planning and access. The term “open” is used in recognition of the engagement process used by the creators to seek input from various stakeholders in different disciplines and fields. In May 1997 and May 1999, draft versions of the reference model were released for review. The model was approved and published as a draft ISO standard in June 2000. The reference model was approved in January 2002 as ISO standard 14721 after a final period of review and revision. The OAIS reference model was formalized into an ISO standard in 2002 and was further updated in 2012, with the latest review being published in 2018.

The OAIS reference model is a two-in-one model. It has within it the functional model, which defines archival functions, tasks and information flows; and the

information model which spells out the different components of the objects that an archive receives, curates and disseminates. The model pays particular attention to the types of information required for long-term preservation and dissemination, as well as metadata necessary to access and understand archived objects. The model also specifies the relationship between the different types of information and how they are structured. These combinations of content and metadata come in different forms depending on the phase of the archiving process in which they occur: there are submission information packages, archival information packages, and dissemination information packages (Consultative Committee for Space Data Systems 2012).

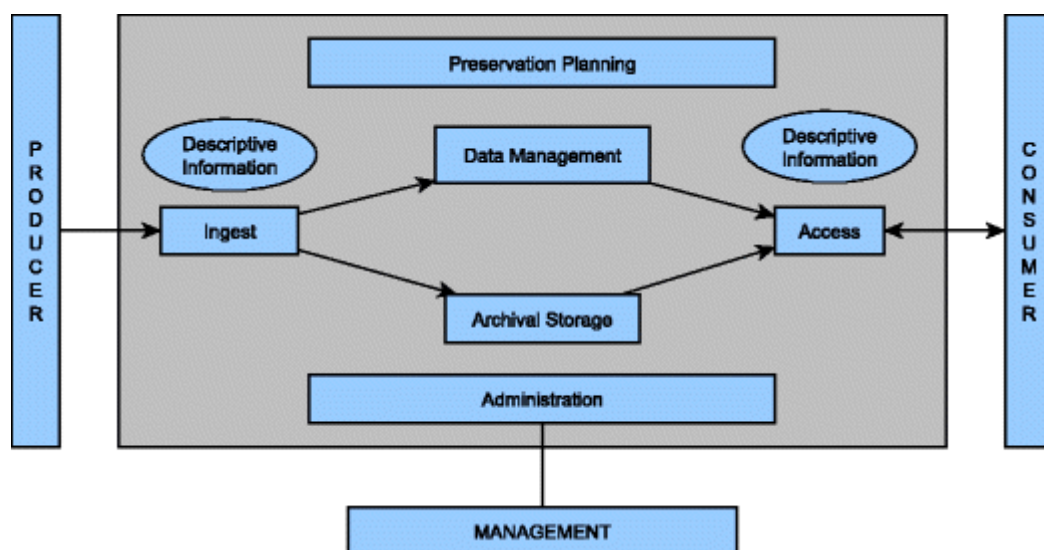


Figure 2.2: OAIS Reference model (Source: Flathers, Kenyon and Gessler 2017)

Figure 2.2 (above) shows the functional entities of the OAIS model namely: ingest, archival storage, administration, preservation planning, data management and access. The starting point of the OAIS model is at ingest, where an ‘information package’ also known as a Submission Information Package (SIP) is received from the producers into the archival repository. The SIP comprises of the data and its accompanying metadata. Records creators in the various units of the institution make up producers. At the ingest stage, the archival repository and producers interact, and the information objects are checked and enhanced to meet repository standards which are determined by the consumers (users of the archives). The consumers make up the archival repository’s ‘designated community’.

The second functional entity of the OAIS model is archival storage. This is where Archival Information Packages (AIPs) are received from ingest and added to permanent storage. Other activities that occur at this stage of the model include management of the archival objects including the storage hierarchy, regular media refreshing, carrying out routine and special error checks, provision of disaster recovery capabilities and enabling access to the AIPs (Consultative Committee for Space Data Systems 2012).

The third functional entity in OAIS reference model is data management. Descriptive and system information are stored at this point of the model, usually in a database. Other responsibilities of this entity include database maintenance, performing queries sent by the access function and reports generation (Allinson 2006). Thus, the implementation of this section of the model requires archival staff to be well versed with modern technologies and their application to effectively undertake the above technical activities.

The fourth OAIS functional entity is administration. The entire operation of the archive system takes place here, including sourcing for and negotiating submission agreements, configuration management, system engineering, auditing, activating stored requests, and standards and policies establishment and maintenance (Consultative Committee for Space Data Systems 2012). Hence, archivists in archival repositories must possess administrative skills.

Preservation planning is the fifth functional entity where monitoring of the environment for important technological changes and needs of the designated community takes place. Other activities that occur here include evaluating the changes identified and handling them appropriately; designing information package templates; providing design assistance and review to specialize these templates into SIPs and AIPs for specific submissions; providing periodic recommendations for archival information updates, standards and policies; and developing detailed migration plans, software prototypes and test plans (Consultative Committee for Space Data Systems 2012). This section of the model determines the long-term survival of digital objects in the archival repository.

Last but not least, the sixth functional entity of OAIS model known as access controls consumers' ability to request, discover, and receive information from the archive, including Dissemination Information Packages (DIPs), "result sets" and reports (Consultative Committee for Space Data Systems 2012). The archival repository must be clear about who comprises its designated community (authorized customers). The designated community is central to the OAIS reference model and is defined as an identified group of potential consumers who are able to understand a particular set of information. The archival repository staff must be informed about the legal issues surrounding the archives in their custody to efficiently manage the access function.

The Open Archival Information System (OAIS) reference model provides common terminology and a conceptual framework for the preservation and dissemination of digital assets. It gives a set of processes, functions and roles relevant to long-term preservation. Thus, the OAIS Model provides an understanding of the activities undertaken by archives when preserving digital information objects (Consortium of European Social Science Data Archives 2015). The mandatory responsibilities that must be met by an OAIS are that it must:

- i. Negotiate for and accept the right information from producers;
- ii. Determine, either by itself or in conjunction with other parties, which communities should become the *designated community* and, therefore, should be able to understand the information provided;
- iii. Obtain sufficient control of the information provided to the level needed to ensure long-term preservation;
- iv. Ensure that the information to be preserved is *independently understandable* to the designated community, without needing the assistance of the experts who produced the information;
- v. Make the preserved information available to the designated community; and
- vi. Follow documented policies and procedures which ensure that the information is preserved against all reasonable contingencies, and which enable the information to be disseminated as authenticated copies of the original, or as traceable to the original (Lavoie 2014:7).

2.3.2.1 Suitability of the OAIS Reference model to the study

The creation of OAIS was purposely for its wide applicability for long-term preservation to any context, but principally in a digital environment, hence its relevance to the present study. Lavoie (2004) revealed that in designing the OAIS reference model, the space data committee collaborated with many organizations in government, private industry and academia. This model is therefore suited for application in organizational and institutional set-ups. Vinton (2018) reiterates that the OAIS reference model is an important model of a functional archive and holds the promise of allowing for interoperability among archives. The OAIS model provides a common terminology and deliverables which must be adhered to. This makes it ideal for adoption in a collaborative scenario, such as in the university sector. Additionally, Allinson (2006) pointed out that the OAIS reference model results into good practice by providing a standard model that gives guidance on preservation, making it part and parcel of other archival functions and activities.

The OAIS Reference Model has proven to be very useful for application in archival systems and has been used successfully in previous studies of similar magnitude. Allinson (2006) used OAIS to evaluate the drawbacks and benefits of its application in long-term preservation of digital content across institutional repositories in the education sector within the JISC community. Using the model's checklist of mandatory responsibilities (Section 2.3.2 above) the study affirmed that the OAIS can be used by Institutional Repositories to ensure and maintain good practice in long-term preservation.

Laughton (2011) involved fifty-two individual data centres from different scientific disciplines who were members of the World Data Centre (WDC) in an online survey to establish the extent to which it was possible to develop a standard framework for the curation of digital content. The study identified a number of models and frameworks used for data curation such as: Victorian Electronic Records Strategy and Metadata Encoding and Transmission Standards; Keep Research Data Safe 2 activity model; Tsinghua Digital Preservation Platform; Data Document Initiative combined lifecycle model, and; Digital Curation Centre lifecycle model. OAIS was the most documented model by the study and aided in identifying the gaps in current data curation practices. The model informed the process of identifying best practices from the cases studied as well as the practices outlined in the OAIS model, enabling the

study to conclude that to a large extent it was possible to develop a framework for data curation in WDC. Last but not least, the OAIS was one of the three models used by Adu (2015) to examine digital preservation practices of Ghana's e-government, resulting in the design of a framework for digital preservation for government organizations in Ghana.

In view of the above, the OAIS model was deemed appropriate for the development of a digital archiving framework, thereby addressing the fifth research question. The present study used OAIS Reference model to inform the study on suitable risk mitigation strategies and development of a framework for digital archiving for public universities in Kenya.

2.3.2.2 Gaps in the OAIS Reference model

The starting point for OAIS model is ingest functional entity, where digital archival objects are admitted into the archival repository. The model completely disregards the pre-ingest period that digital records undergo and seems to assume that the records creators know what kind of digital objects to submit into the repository. Beedham et al. (2005:34) proposed that the OAIS model should pay greater attention to activities that occur prior to ingest and do away with the second model. This deficiency in the model elicits the use of the RCM in the study, which seamlessly integrates records management and archives management activities.

Another 'unforgivable' oversight in the OAIS model is that it seems to drop off all records management activities when digital records gain entrance into the archival repository. McGovern (2009) noted that the model disregards the need to keep a record of the digital objects received into the archives from ingest. As if that is not bad enough, the model does not give due attention to explicating the process of metadata capture. According to Allinson (2006), the model lacks descriptions of how metadata schemas have been applied in each information delivery SIP, AIP and DIP. As emphasized by Gilliland (2008), metadata such as textual description, classification terms or comprehensive entity-relationship database schemas should be captured to ensure good management and access to records for long-term purposes. These shortcomings make it impossible for the model to be adopted in isolation as an underpinning model for the present study.

2.3.3 Information Governance (IG) Maturity Models

A renewed interest in records and information management has resulted in a call by many to use fundamental records management principles as the foundation for sound information governance (Franks 2013). Information Governance (IG) is a relatively new approach to managing information within an organization. It blends aspects of legal, risk management, and information technology, along with the more familiar records management. This approach provides Records and Information Management (RIM) practitioners with an increased strategic view of their role within an organization (Zimmerman 2019:1).

According to Franks (2013), information governance is a vital organizational asset. It is an integrated, strategic approach to managing, processing, controlling, archiving, and retrieving information as evidence of all transactions of the organization. Information Governance Maturity models were first developed in the 1970s to 1980s to assess quality management and capability in software engineering. Since then, the underlying concept has been adapted to focus on various organizational features. Gartner IT Glossary (2019) defines information governance as:

The specification of decision rights and an accountability framework to ensure appropriate behavior in the valuation, creation, storage, use, archiving and deletion of information. It includes the processes, roles and policies, standards and metrics that ensure the effective and efficient use of information in enabling an organization to achieve its goals.

Various definitions of the term maturity exist but each one is relevant to the context in which the particular maturity model was developed. Anderson and Jessen (2003) defined maturity as the ability of an organization to achieve its set goals. Fitterer and Rohner (2010) associated maturity with an assessment to determine if an organization has reached a state of being perfect, ready and complete. The definition put forth by Mettler (2009) fits well into the present study. The author relates maturity with the gradual organizational development towards achieving its goals.

Röglinger and Poppelbus (2011:2) defined maturity models as “a series of sequential levels, which together form an anticipated or desired logical path from an initial state to a final state of maturity”. Maturity models are widely accepted and used and, both in academia and industry. Proenca, Vieira and Borbinha (2016) agreed that maturity model spell out a developmental growth path for organizations, which is depicted by levels of maturity. Proenca, Vieira and Borbinha (2016) commended the use of maturity models in assessing and/or achieving compliance because they enable measurement of an organization’s maturity level by identifying the gap between the current and pursued level. Planning of activities, objectives and priorities can then be done to achieve set goals. The following are selected examples of maturity models developed for the fields of records management and information management:

- vi. Enterprise Content Management (ECM) Maturity Model – Business organizations need to develop strategies that will enable them to deal with ECM challenges systematically. ECM maturity models are appropriate for organizations since they provide a systematic approach to ECM improvement. They provide a roadmap leading from the current state of ECM to the ideal and required maturity level (Pelz-Sharpe et al.2010 cited in Proenca and Borbinha 2018:4).
- vii. Recordkeeping Maturity Model and Roadmap (2010) – Developed to improve recordkeeping practice in Queensland public authorities. It builds on the premise that periodic assessment and review to ensure optimal performance of systems and processes are precursors for good business operation (Queensland State Archives 2010 cited in Proenca and Borbinha 2018:5).
- viii. JISC Records Management Maturity Model (2013) – This model was developed by JISC infoNet to be used by institutions of higher learning in Wales and England as a self-assessment tool (JISC InfoNet 2014 cited in Proenca and Borbinha 2018:4).
- ix. ARMA Information Governance Maturity Model (2010) – The model incorporates the generally accepted recordkeeping principles (GARP) developed by the Archives and Records Management Association (ARMA). These principles give guidelines of good recordkeeping practices (ARMA International 2017 cited in Proenca and Borbinha 2018:4).

The ARMA Information Governance Records Management Maturity Model is discussed in greater depth in the following section due to its relevance and applicability to the present study.

2.3.3.1 The Archives and Records Management Association (ARMA) Records Management Maturity Model

The ARMA Records Management Maturity Model is based on the Generally Accepted Recordkeeping Principles (GARP) and the legal/regulatory requirements, best practices and standards surrounding information governance. The GARP principles constitute the following:

- i. **Transparency:** Requires documentation of an organization's business processes and activities, including its information governance program in an open and verifiable manner, and the documentation availed to all personnel and appropriate, interested parties;
- ii. **Accountability:** Requires a senior executive to oversee the information governance program and delegate responsibility for information management to appropriate individuals;
- iii. **Compliance:** An information governance program shall be designed to comply with applicable laws, other binding authorities, and the organization's policies;
- iv. **Availability:** An organization shall maintain its information assets in a manner that ensures their timely, efficient and accurate retrieval;
- v. **Protection:** An information governance program shall be constructed to ensure an appropriate level of protection to information assets that are private, confidential, privileged, secret, classified, essential to business continuity, or that otherwise require protection;
- vi. **Integrity:** Requires construction of an information governance program so the information assets generated by or managed for the organization have a reasonable guarantee of authenticity and reliability;
- vii. **Disposition:** An organization shall provide secure and appropriate disposition for information assets no longer required to be maintained, in compliance with applicable laws and the organization's policies, and;

- viii. Retention: An organization shall maintain its information assets for an appropriate time, considering its legal, regulatory, fiscal, operational, and historical requirements (ARMA International 2017).

The ARMA Records Management Maturity Model is meant to be deployed as a quality improvement tool (Eusch 2016). In recognition of the applicability of maturity models in assessing recordkeeping maturity levels, ARMA developed the GARP to guide:

- i. Records management professionals to design comprehensive and effective programs for RM;
- ii. Chief Executive Officers to make decisions on how to protect their organizations in the use of information assets; and
- iii. Legislators to craft laws for holding organizations accountable (ARMA 2010 as cited in Eusch 2016).

The ARMA Records Management Maturity Model describes the recordkeeping characteristics at each level as shown in Table 2.1.

Table 2.1: ARMA Records Management Maturity Model Levels (Source: ARMA International 2013)

Maturity Model: Levels of Effective Information Governance
Level 5 (Transformational): The organization has integrated information governance into its overall corporate infrastructure and business processes to the extent that compliance with the program requirements is routine. The organization has recognized that effective information governance plays a critical role in client service, competitive advantage and cost containment.
Level 4 (Proactive): The organization is initiating information governance program improvements throughout its business operations. Information governance issues and considerations are integrated into business decisions on a routine basis, and the organization easily meets its legal and regulatory requirements.
Level 3 (Essential): Describes the key requirements that must be addressed in order to meet the organization's legal and regulatory requirements. It is characterized by defined policies and procedures, and more specific decisions taken to improve recordkeeping.
Level 2 (In Development): Describes an environment where there is developing recognition that recordkeeping has an impact on the organization, and that the organization may benefit from a more defined information governance program. However, in Level 2, the organization is still vulnerable to legal or regulatory scrutiny since practices are ill-defined and still largely ad hoc in nature.
Level 1 (Sub-standard): This level describes an environment where recordkeeping concerns are either not addressed at all, or are addressed in a very ad hoc manner, and hence do not meet legal or regulatory scrutiny.

The purpose of this model is to assist organizations in conducting preliminary evaluation of their recordkeeping programs and practices (Eusch 2016). The model will help an institution to:

- i. Identify areas of good practice which can act as standards for future development;
- ii. Identify its strengths, thereby providing evidence of the impact of previous/current investment in this area;
- iii. Provide data for internal audit and quality assessment purposes;

- iv. Help identify gaps and weaknesses and where best to target resources and focus efforts;
- v. Raise the overall profile of records management as a strategic priority;
- vi. Provide evidence of its ability to comply with the Freedom of Information Act (FOIA);
- vii. Measure progress in this area overtime through repeated application of the model after set intervals; and
- viii. Provide evidence to help inform risk management decisions (Eusch 2016:2).

2.3.3.1.1 Suitability of ARMA Records Management Maturity Model

The current study found ARMA Record Management Maturity Model to be suitable for adoption as one of the underpinning models mainly because of its inclination towards recordkeeping practices. The eight GARP principles discussed above (section 2.2.3.1) are key deliverables for efficient recordkeeping in organizations, hence the model has potential to measure the level of successful recordkeeping implementation. Additionally, the model was designed for use in industries and institutions of higher learning. Further, although the present study is specifically an archival research study, the model is suitable in that it focuses on the entirety of the recordkeeping function in an organization. The model is suited for both traditional and paperless environments and is therefore relevant to digital archiving. It is the researcher's view that this model complements the RC and OAIS models in addressing the study's research questions. The model will specifically be useful in assessing the state of digital archiving readiness in the selected universities.

IG maturity models have been lauded and successfully used in previous studies, an indication that the models have been tried and tested. Katuu (2013) carried out a research study to examine the utility of the Enterprise Content Management Maturity Model (ECM3) within the context of organizations in South Africa. The study revealed inadequacies of the model which was specifically designed to assess digital records within ECM applications and was therefore not ideal in addressing long-term preservation concerns. The study therefore disqualified ECM3 from serving as a digital preservation maturity model and concluded that no one maturity model can single handedly address all assessment concerns in a given domain or subject. Phiri (2015) carried out a multiple case study to critically explore the nexus between

recordkeeping and governance, audit and risk in an organizational setting. The research revealed that most of the universities studied did not acknowledge recordkeeping as an important function of governance, resulting in missed opportunities in effectively achieving organizational goals and objectives. The study proposed a governance and recordkeeping relationship model as an approach to documents and records management to enhance the processes of governance, audit and risk. A study by Proenca, Vieira and Borbinha (2016) looked at how to design an IG maturity model using current records. The development process was structured along existing methods for the development of maturity models, which allowed for systematic approaches to the development of maturity models supported by a popular and proven scientific research method known as Design Science Research. The outcome of the study was development of a maturity matrix comprising of five levels and three dimensions. Grazhenskaya (2017) carried out a study commissioned by InterPARES Trust to assess IG, its nature and implementation from the European Public Administration's perspective. The study captured and reviewed important issues pertinent to IG in the public sector and identified key challenges in IG implementation. A number of maturity models were examined as assessment tools, including ARMA IG Maturity Model and recommendations that included a framework of IG best practices, applicable across European public administrations were proposed. Last but not least, Mosweu (2018) used ARMA's Generally Accepted Recordkeeping Principles to examine the governance of liquid communication generated by the government of Botswana through the use of social media platforms. The study revealed that regardless of the continued utilization of social media platforms since 2011 resulting in the generation of liquid communication, formal procedures and processes for their governance and control were absent. This was a source of risks for the government, relating to compliance and legal requirements. The study proposed a framework for liquid communication, based on the ARMA Records Management model.

Considering the above, the ARMA Records Management Model was deemed appropriate as an assessment tool for digital archiving risks in public universities, thereby addressing the fourth research question.

2.3.3.1.2 Gaps in the ARMA Records Management Model

Although the model is inclined towards recordkeeping, it does not include guidelines on records and archives management practices. Additionally, the model does not address the management of digital archives. It could not therefore be adopted as a lone underpinning model for the present study.

2.3.4 Complementary models of the study

The present research considered other models in the field of recordkeeping before choosing the three underpinning models of the study. This section discusses the records life cycle and the Digital Centre Curation (DCC) life cycle models which were considered and discarded by the study.

2.3.4.1 The Records Life Cycle (RLC) model

RLC model is the ground model for recordkeeping, despite its focus upon paper records. Shepherd and Yeo (2003) posited that the development of the RLC model can be traced to the 1930s when the model was developed by Theodore Schellenberg while employed by National Archives of USA. Shepherd and Yeo (2003) affirmed that RLC has been the key model for North American records managers and Archivists since 1960s.

According to Upward (2001), a life cycle is “the entire series of processes constituting the life history of an organism”. This refers to the life experiences of a record so-to-speak. Various scholars have presented these phases of records in different ways. Penn, Pennix and Coulson (1994) opined that records begin from the current or active phase, to a semi-current or semi-active phase and then to a non-current or non-active phase. An (2003) used a birth-to-death analogy to describe records as passing through a series of stages where a record is created, used as long as it had continuing value and subsequently transferred to the Archive or destroyed.

Karabinos (2015:7) identified three distinct stages that records go through under the RLC model, similar to a living organism. The first stage, also known as the active stage, is where records are created and used for day-to-day business activities by the creating agency. At the second stage, also known as the semi-active stage, records are no longer required for current use but are referred to frequently by the creating office.

During this stage, selection and appraisal is undertaken periodically to identify records that are to be discarded or moved to the third stage, also known as the inactive or archival stage where records become archives and are stored and preserved indefinitely.

According to Bantin (1998), a small percentage of records in an organization (approximately five per cent of the total documentation) is sent to an archival repository.

Bantin (1998) asserted that besides describing what will happen to a record, the life cycle model also defines who will manage the record at each stage. The record creators have a primary responsibility for managing the record during the creation and active periods, although records managers may be involved. The records manager takes center stage at the semi-active stage. Finally, the archivist takes the lead in preserving, describing, and providing access to the archival record in the inactive stage. In this analogy therefore, the records life-cycle model presents a clear demarcation in the roles and responsibilities of records managers and archivists by treating each stage in isolation and restricting the activities of each professional group to a particular stage.

2.3.4.1.1 Gaps in the Records Life Cycle (RLC) Model

The isolation of recordkeeping stages in the life-cycle model has been a bone of contention in the recordkeeping profession, in light of the new technologies that have given rise to digital records. Acker (2017:291) reported that in the 1990s, scholars such as David Bearman, Terry Cook, Sue McKemmish and Frank Upward argued for a new paradigm in archives. They argued that this paradigm should account for the new realities of e-record environments that moved beyond the discrete stages of the life cycle approach and the limited archival oversight of inactive records only. Yusof and Chell (2002) agreed that the RLC model is not applicable in the management of e-records. Shepherd (2006:55) concurred that digital records can only be managed successfully as a continuous process. The RLC model is therefore inappropriate for the present study which majorly concerns digital archives.

As has been discussed, the records life cycle model is divided between records management and archives management phases. The RLC model creates the impression that RM and archives management are separate activities, implying that the archivist is only responsible for archival records and is not involved in the early stages of a record's life. The model draws a line between the functions of records managers and archivists. In a resounding statement, Artherton (1985) shunned this misleading view by stating that even though the life cycle has been supportive of general RM practices, strict adherence to its principles undermined any trends towards greater cooperation and coordination among archivists and records managers, and ignored the many ways in which records and archives operations are interrelated. The records life-cycle model is therefore not appropriate for use in the foregoing study as an underpinning model.

2.3.4.2 The Digital Centre Curation (DCC) Lifecycle Model

Digital Curation Centre (2004) defines digital curation as follows:

Digital curation is about maintaining, and adding value to, a trusted body of digital information for current and future use: in other words, it is the active management and appraisal of digital information over its entire life cycle.

Pennock (2007) concurs that data curation is about maintaining and adding value to a trusted body and appraisal of digital information over its entire life. Data are defined in the DCC Curation Lifecycle model as “any information in the binary digital form”. Harvey (2010) describes the breadth of data as encompassing all things digital, based on the United Nations Educational, Scientific and Cultural Organization (UNESCO)'s Guidelines for the Preservation of Digital Heritage.

The DCC Curation Lifecycle model was launched on 1 March 2004, following a successful response to Joint Information Systems Committee (JISC) Circular 6/038 by a consortium comprising the University of Edinburgh, University of Glasgow, UK Office for Library and Information Networking (UKOLN) at the University of Bath, and Science and Technology Facilities Council (STFC). The development of DCC curation lifecycle model involved groups engaged in digital preservation and curation activities which included UK higher and further education, data specialists, records

managers, librarians, archivists, researcher (as data creators), and policy makers. During its development, the public and commercial sectors, international organizations and standards working groups were also engaged (Higgins 2008).

Higgins (2008) explains that the DCC lifecycle model supports the management of digital objects throughout their lifecycle to allow for successful curation and preservation, from conceptualization to their ultimate disposition or selection for long-term preservation. Figure 2.3 depicts the Data Curation Centre (DCC) lifecycle model.

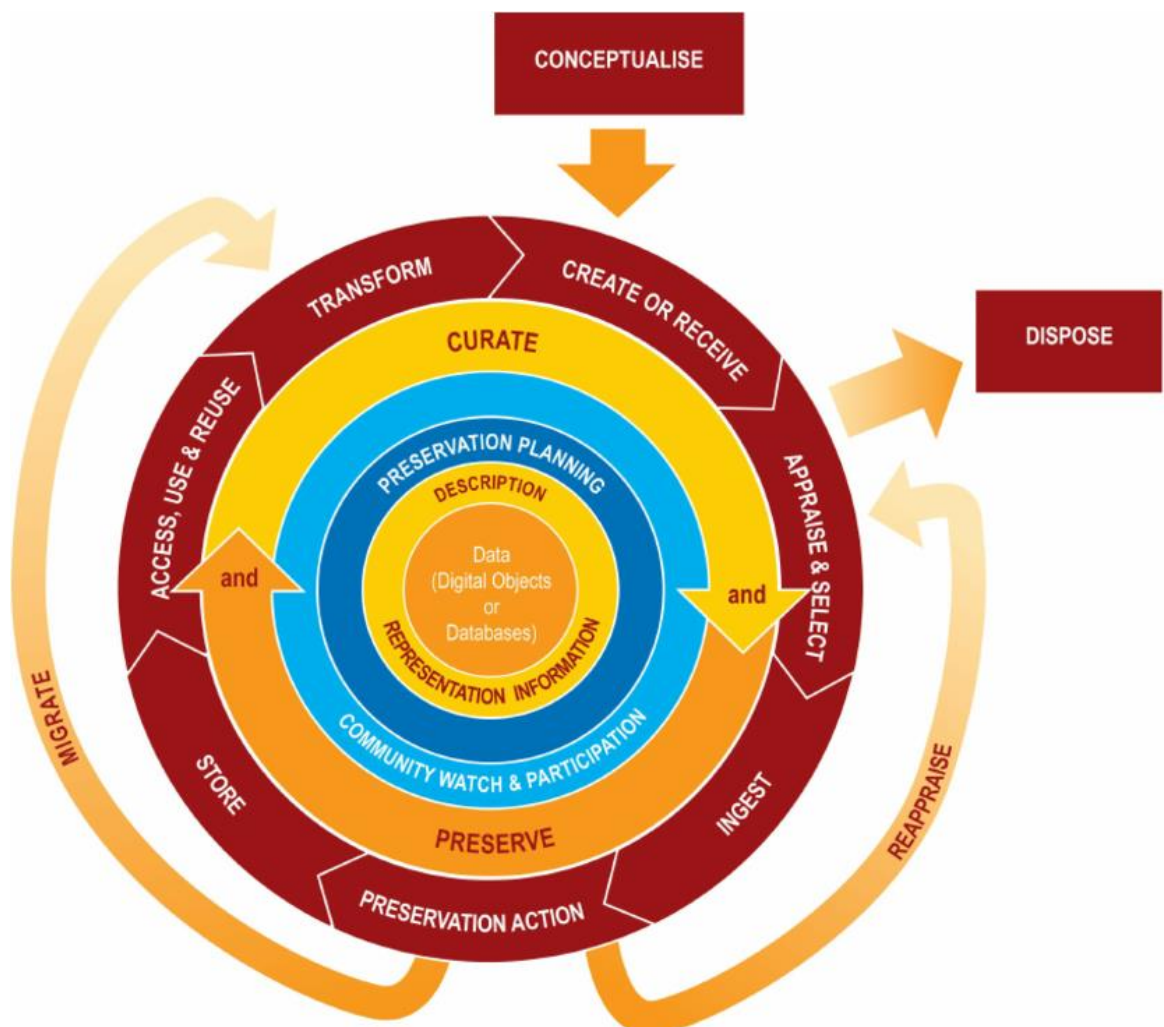


Figure 2.3 Data Curation Centre (DCC) Lifecycle Model (Source: UK Digital Data Curation Centre 2008)

The DCC Curation Lifecycle model comprises three action groups namely, full lifecycle actions, sequential actions and occasional actions. As illustrated in Figure

2.3, lifecycle actions are shown inside the sequential actions (Digital Data Curation Centre 2008). These activities take place at any time during the digital curation lifecycle and are discussed hereunder.

Full lifecycle actions - Description and Representation Information (see inner ring surrounding the data, Figure 2.3) involves assigning metadata (administrative, descriptive, technical, structural and preservation metadata). This action is carried out to assign representation information to understand and render digital data and associated metadata, enabling data to be used and reused. Preservation planning (ring surrounding description and representation information), plans for preservation throughout the data curation lifecycle and includes plans for management and administration of data. Community watch and participation (ring surrounding preservation planning) are implemented to monitor or watch appropriate communities and share standards and tools for digital curation. Data curation and preservation actions (ring surrounding community watch and participation) caution communities to manage and assign preservation and curation actions (Digital Data Curation Centre 2008).

Sequential actions - Sequential actions in the DCC lifecycle model (Figure 2.3) form the basis for active data curation and guide the data curation process in a systematic manner. Higgins (2008:138) identifies the following actions:

- i. Conceptualization: This entails conception and planning for data creation, capture and storage;
- ii. Creation and receipt: This activity entails creation of metadata such as technical, administrative, descriptive, structural and preservation metadata. Receipt of data from data creators, archives and other data repositories is accomplished in line with formal collection policies;
- iii. Appraisal and Selection: This entails data evaluation and selection for long-term preservation and curation in accordance to formal policies, guidelines and laws;
- iv. Ingest action: Data is transferred to the Archive, data repository or other custodial authority in accordance to formal policies, guidance or laws;
- v. Preservation Action: Actions to ensure long-term preservation and access of data are undertaken such as assigning preservation metadata, validation,

- data cleaning, ensuring acceptable data structures or file formats and assigning representation information;
- vi. Store: Data is stored securely in adherence to relevant standards;
- vii. Access, use and reuse: Actions are undertaken to ensure continued data access by publicly availing the information. Access control and authentication procedures are also put in place; and
- viii. Transformation: New data is created from the original data through data migration or creation of a data subset.

These sequential actions have a logical orderly flow of actions, hence the name sequential actions. Data curation requires such logical processing to maintain and add value to data effectively (Higgins 2008:138).

Occasional Actions - There are three actions in this third category of the DCC curation lifecycle model which are located outside of the sequential actions, namely dispose, reappraise and migrate (see Figure 2.3). Data that has been selected for long-term storage needs to be stored in accordance with policies and requirements. To reappraise data, data which fails the validation procedures must be returned and reintegrated into the cycle for re-selection. Finally, data needs to be migrated into different formats in accordance with the storage environment (Higgins 2008:138).

Franks (2013) comments that institutions that generate research data must put a data preservation plan in place to ensure that digital research data, as well as digital media content and information acquired from third parties is reliable, usable and authentic, and maintains its integrity. The DCC Lifecycle model is the model of choice for organizations whose key concern is to organise and preserve digital information for future access and use.

2.3.4.2.1 Gaps in the Data Curation Centre (DCC) lifecycle model

Higgins (2008) acknowledges that DCC Curation Lifecycle Model complements the OAIS model but points out the recognition of appraisal in DCC model, which is not the case in OAIS. However, Higgins (2008) reveals that though the DCC Curation Lifecycle Model may complement the OAIS model, it does not show a clear relationship between the SIP, AIP, Representation Information (RI) and Preservation

Description Information (PDI). This points to the fact that there is a disconnect in the information as it passes through various stages of growth, which disqualifies it from adoption as an underpinning model for the present study. In addition, the DCC Curation Lifecycle Model was developed specifically as a data curation and preservation model. Therefore, it was not appropriate for the study which focuses on digital archives that must permanently be maintained as authentic records.

2.4 Conceptual framework

Conceptual frameworks grow out of pre-existing theoretical frameworks that are used as a theoretical basis for doctoral studies (Berman 2013). Cobb (2007) in Ngulube (2018) advised that researchers should act as *bricoleurs* by adopting different theories to guide their studies. Interestingly, there is an element of pragmatism in adapting ideas from a range of theories, resulting in the formation of a conceptual framework (Ngulube 2018). Munene (2019) concurs with the variegated opinion that exists amongst social scientists with regards to theoretical and conceptual frameworks in research. Rather than interpreting this as a hardliner-stance by researchers, Munene (2019) advocates for an open-minded approach in selecting theories from the diversity of theoretical constructs. The present study conforms to the view that models may lead to the formulation of theories, which in turn “lead to the construction of another model for the verification of a theory” (Celine 2011 cited in Ngulube, Mathipa and Gumbo 2015).

By definition, a conceptual framework is a system of theories, concepts, assumptions, beliefs and expectations that inform and support a research study (Maxwell 2013:39). Mugizi (2019) describes conceptual frameworks as comprising concepts which can be developed into constructs and value added to them to become variables. Antonenko (2015) views a conceptual framework as an evidence-driven and theory-based perspective, formulated to define relevant concepts, justify the significance of the problem, establish empirical and theoretical rationale, guide selection of appropriate methods, and carry out data analysis and interpretation. Ngulube, Mathipa and Gumbo (2015) affirm that a conceptual framework is derived from concepts or constructs and shows the link between concepts and how they impact on the phenomenon under

investigation. Sources of conceptual frameworks include existing theory, knowledge based on experience, thought experiments and exploratory research (Maxwell 2013). The importance of conceptual framework in research cannot be over-emphasized. Grant and Osanloo (2014) reveal that a conceptual framework describes the link between the key concepts in a study and aids researchers to identify and construct their own worldview on the phenomena under investigation. Emphasizing on the importance of conceptual framework utilization in research studies, Ravitch and Riggan (2012:9) asserted that a conceptual framework helps to explain, justify and clarify methodological decisions in a study. Ngulube (2019) supported that theoretical triangulation enriches research by presenting several theoretical perspectives which enhance the understanding of the phenomenon under investigation.

For this study, the conceptual framework was useful in condensing multiple theories into one whole to shed light on the phenomenon under investigation. A conceptual framework was developed from the three underpinning models, based upon selected concepts in each theory and the subject matters derived from the research questions as illustrated in Table 2.2.

Table 2.2: Relationship between theoretical models and research questions

Research Question (s)	Theoretical Model(s)	Key Variables Addressed by the model(s)
What digital recordkeeping activities are undertaken in Kenyan public universities?	RC model	Records creation, use, distribution, storage, maintenance, appraisal, disposition and preservation (irrespective of format).
What is the state of digital archiving readiness in public universities in Kenya?	ARMA RM Maturity model	Accountability, transparency, integrity, protection, compliance, availability, retention, disposition.
Which legal and regulatory frameworks govern the management of digital archives in Kenya?	RC model	Records and Archives Management laws, policies, rules and regulations; Archives management responsibilities.
Which risk factors are digital archives exposed to in these universities?	ARMA RM Maturity model	Record technology risk, record control risk, legal and regulatory risk, administrative risk, environmental risk.
What possible solutions can be adopted to mitigate the identified risks and support sustainable digital archiving implementations in Kenyan public universities?	OAIS Reference Model and ARMA RM Maturity model	Risk mitigation strategies and suggestions towards developing a digital archiving framework.

Table 2.2 indicates the study's research questions, theoretical models used to address each research question and key variables emerging from the models. Using this information, a diagrammatic representation of the conceptual relationships amongst the key concepts under investigation is provided in Figure 2.4.

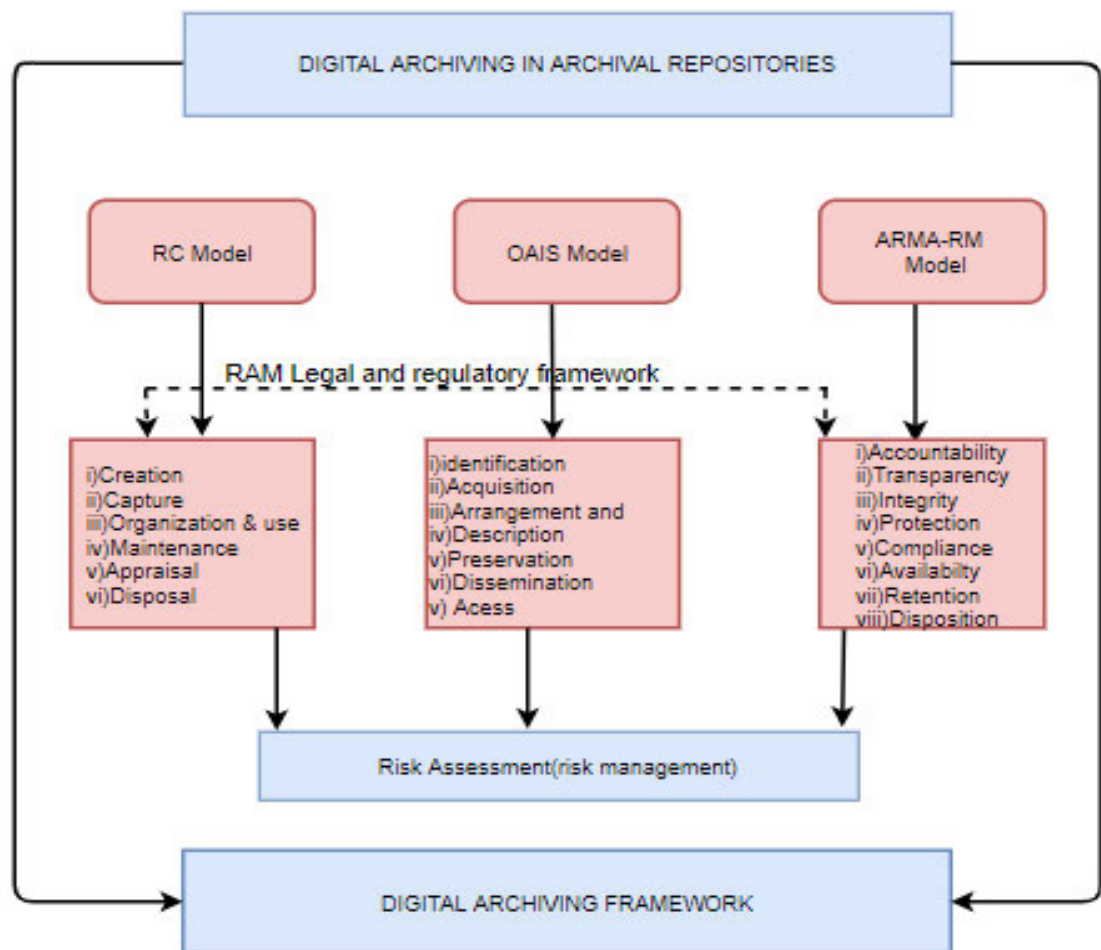


Figure 2.4: Conceptual framework (synthesized by the researcher)

The study took up an inductive approach that commenced with observations so as to develop theories and generalisations, as opposed to a positivist or deductive approach where research starts with a theory (Ngulube, Mathipa and Gumbo 2015). Preliminary literature review was undertaken to identify the three ideal models for the study which are the RCM, OAIS and ARMA information governance models. Key variables in each model were identified and synchronized with literature review content (see Figure 2.4). Data collection was subsequently undertaken and linked with this information to enable the development of a digital archiving framework which integrated the key aspects of the three underpinning models adopted for the present study.

2.4.1 Utility of the conceptual framework in the study

Utility of conceptual frameworks stems from their importance in defining of the research problem, creating theoretical coherence, shaping the research design and execution as well as formulation of conceptual conclusions (Berman 2013:2-3). In addition to these, a conceptual framework guides the literature review process by determining the themes along which it will be structured.

The research problem conceptualization for this study arose from the need to amass content on the current state of digital archiving in public universities in Kenya, which would later be useful in informing the formulation of approaches to enhance digital archiving practices, including the development of a framework. Therefore, all concepts pertinent to digital archiving required to be synthesized under a single conceptual framework. Hence, the conceptual framework provided the language and key terms to be used, and the professional context from which the research problem was derived.

Secondly, the conceptual framework was useful in achieving theoretical coherence by drawing together the multiple theoretical perspectives from the three underpinning models forming the reality within which the present study was defined. Formulation of the conceptual framework for the study was useful in establishing theoretical coherence of the research problem, articulating and bringing together the multiple theories involved and providing a foundation for theorizing and generating new knowledge.

The conceptual framework was also useful in aligning the research questions to the research problem and shaping the research design and fieldwork activities to be implemented. The concepts emanating from the research questions were embedded in the conceptual framework which was used to guide the literature review and methodology of the study. The research questions and themes were mapped to the conceptual framework, illustrating their relationship to the theoretical bases of the reality. The research design was therefore designed in response to the research questions as articulated in the conceptual framework. The data collection and subsequent analysis were also aligned to the conceptual framework and undertaken accordingly.

Lastly, the conceptual framework enabled meaningful interpretation of the findings in line with the reality of the study and theoretical underpinnings, thereby demonstrating validity of the entire research (Knight and Cross 2012). As insinuated by Leshem and Trafford (2007:101), the conceptual framework links the study to its conceptual conclusions. In particular, the framework provided a point of reference for the conceptual and practical study conclusions, including the key research outcome which was the digital archiving framework.

2.5 Summary

This chapter provided an in-depth discussion of the models that guided the study to enable an understanding of the phenomenon under investigation. The present study cuts across the fields of records management and Archival Science, classifying it as an interdisciplinary study even though the two fields fall under the broad umbrella of recordkeeping. The meaning of theories, models, theoretical framework and conceptual framework were unveiled, and relevant theories were reviewed to enable the reader to gain an understanding of the study's theoretical basis. Careful search of the literature revealed that there was no single model that could sufficiently address all the variables of the study in isolation, necessitating the development of a conceptual framework by theoretical triangulation.

The chapter reviewed five models in reference to digital records and archives management. The RC, OAIS and ARMA records management models formed the theoretical basis for this research and were triangulated to communicate a conceptual framework that guided the study. This was done to establish consistency and rigor throughout the study and to enable the reader to understand why and how the study was undertaken. The relevance and gaps in the three models were discussed, justifying their selection as underpinning models for the formation of a conceptual framework for this study.

The chapter took cognizance of the fact that the RC model has gained global acclamation as the choice model for the management of digital records and archives (Maseh 2015; Garaba 2010; Kemoni 2007; An 2001). The model advocates a holistic approach in the management of records (Kabata 2019), taking into consideration the

design of recordkeeping systems to create and capture quality records, their proper management and use and disposal by destruction or selection for permanent preservation. The RC model stands out as a best practice model for determining the quality of archival objects that gain access into archival repositories in organizations. Notably though, the model does not address the element of preservation and risk management for digital archives, necessitating the need for additional underpinning models for the study.

The chapter discussed the OAIS reference model in line with the acquisition, maintenance and dissemination of digital archives. Sufficient evidence pointed to the appropriateness of this model in preserving the integrity and authenticity of institutional memory for posterity, which is the gist of this study. However, the model was found wanting as a stand-alone model because it did not include a pre-ingest phase. The chapter also walked the reader through ARMA records management model which provides a benchmark for assessing institutional readiness for digital records and archives management, which is a key concern for this study. The model aids in assessing organizational preparedness for digital archiving but falls short of addressing other key issues which are jointly addressed by the RC and OAIS reference models.

The chapter reviewed the records life-cycle model and the Digital curation centre model and found them inadequate as underpinning models for the study on grounds that they fell short of addressing the study's variables which resonated around digital archives management as opposed to the management of paper archives. The main bone of contention with the records life-cycle model however is that it has been found inadequate in digital environments (Garaba 2010), mainly because the model is inclined towards the management of paper records by assuming that records go through a birth-to-death cycle like that of a living organism. This assumption is discredited by Barry (1994) cited in Garaba (2010) who argued that documents in digital environments have a dynamic and recursive nature and may exist in different stages simultaneously, making the model unfit for adoption in this study. The chapter also reviewed the DCC curation life cycle model which was specifically developed for data curation and preservation and was therefore found unsuitable for adoption as an underpinning model in the present study which focuses on digital archiving.

The use of theories and conceptual framework in the present study was also elucidated. The conceptual framework articulated in this chapter formed the thrust for the next chapter, which is a discussion of the literature review. Concepts embodied in the conceptual framework made up the themes for the literature review namely digital archives administration, digital archives readiness, legal and regulatory framework for digital archiving, risk management and digital archiving framework for universities. The literature review themes shade light on the research problem and are instrumental in addressing the study's research questions.

CHAPTER THREE

LITERATURE REVIEW

A research imagination takes time to develop: something that is part of the research apprenticeship. [...] the research imagination is about: having a broad view on a topic; being open to ideas regardless of how or where they originated; scrutinizing ideas, methods and arguments regardless of who proposed them; playing with different ideas in order to see if links can be made; following ideas to see where they might lead; and it is about being scholarly in your work (Hart 1998:29-30).

3.1 Introduction

Chapter Two elucidated the theories and conceptual framework underpinning the present study. This chapter provides an exhaustive review of empirical and theoretical literature in the context of the dominant theme in the objective of this study which was development of a digital archiving framework for university archives. The literature review was organized around themes derived from research questions, theoretical framework variables, and the broader issues emanating from the research problem. The themes covered included records and records management; archives and archives management; digital archiving; digital archiving readiness; digital archiving practices; digital preservation; the role of metadata in digital archiving; legal and regulatory frameworks for digital archiving; risks and risk management in digital archiving; the archivist's role in digital archiving; sustainable digital archiving. As a prelude to the review of literature, the meaning, significance and process of literature review were discussed to set the stage for the actual deluge into the discussion. A literature review map was developed to guide the chapter and keep it in focus.

3.2 Literature review in research

Every empirical study whether quantitative, qualitative or mixed research study should as a necessity be engrained within the literature (Rocco and Plakhotnik 2009:121). Hart (1998:29-30), a renowned scholar with various works on the subject of literature review asserted that researchers should not underrate the importance of unearthing what is known on a topic under investigation before beginning a research study. Rather, researchers should be willing to “look again” at or “re+view” works

that are related to their topics of investigation (Leedy and Ormrod 2015:70). Literature reviews serve as frameworks and foundations for empirical studies because they are instrumental in the understanding and development of a field or topic under investigation (Brocke et al 2015:9). Thus, extensive literature review enables researchers to understand the overarching context of their individual studies and situate them within the broader historical and scholarly context comprising of what is known about the topic under investigation (Mertens 2010:90). Marutha (2016:18) succinctly poses that carrying out a review of literature allows the researcher to benchmark with previous related studies to affirm the need to undertake one's own study. Systematic review of existing literature is therefore quintessential in academic research undertakings as it defines the scope of a study.

University of Wolverhampton (2018) describes literature review as a discussion and review of the studies, theories, perspectives and bodies of relevant works to the research question(s) of a study, thereby showing the shortcomings or gaps in earlier research that will be addressed by one's study. Therefore, literature review is a summarized review of research content on a given topic which is useful in providing background information. For literature review to contain meaning and be useful, it must be progressively cumulative; learning from and building on previous scholarship and research on the topic. The style of discussion in literature review is usually from general to specific, in accordance with the research problem of the study (Creswell 2014:61). Further, Creswell (2014:61) identified four types of literature reviews which included the following:

- i. Identify issues of key importance in a field;
- ii. Criticize previous scholarly works;
- iii. Integrate what has been said and done by others
- iv. Link up related topics.

Nevertheless, the general aim of literature review is to present a recap and synthesis of previous research in order to provide an overview on what has been done regarding a particular research problem (Khoo, Na and Jaidka 2011).

The importance of carrying out literature review as part of research cannot be overemphasized, but the process of conducting it remains a debatable subject. Hart (1998:29-30) alludes to the process of conducting literature review, giving the

impression that it is an intellectual development process with no laid-down procedure. Creswell (2014:64) advised that literature review should follow a series of steps which entail identifying key terms, searching and locating relevant literature, selecting and evaluating literature, organizing literature and finally writing the literature review. Boell and Cecez-Kekmanovic (2014:258) described the process of literature review as involving literature search, selection and synthesis stages. However, the present study conforms to the sentiment of Boell and Cecez-Kekmanovic (2014:260) who agree that reading, carrying out empirical research and writing the literature review are not a linear process but rather a repetitive one. Therefore, the activities involved in reviewing the literature for this study were undertaken iteratively throughout the study to achieve exhaustivity and rigor.

A good literature review is dependent upon the quality of sources consulted by the researcher. Leedy and Ormrod (2015:71) advised that compiling a good literature review requires reading widely and synthesizing the information selected from a diversity of sources. Isaac Newton made the following legendary philosophical statement that has remained true in the world of research:

if I have seen a little further, it is by standing on the shoulders of giants
(Newton 1676).

The above statement underscores the importance of referring to numerous sources of previous literature when undertaking the present research. The empirical and conceptual sources of literature required to address the research questions for this study entailed primary, secondary and tertiary sources. Primary sources included theses, reports, government publications, unpublished manuscripts and conference proceedings. Secondary sources included books, journals and newspapers while tertiary sources included catalogues, databases, indexes, bibliographies and encyclopedias (Saunders, Lewis and Thornhill 2012:84). The researcher made use of mind maps and concept maps to develop a literature review map for this study, which was used to enable organization and abstraction of important information from the various sources.

3.3 Literature review map

Mapping of literature has been used on a large scale as a guiding strategy for literature reviews in doctoral studies. A literature review map is a diagram that represents

linkages between the major concepts in literature review of a given research topic, showing the relationships and interconnections that guided the decisions of a researcher in reviewing the literature (Machi and McEvoy 2016:58). One such strategy is the use of mind maps, which aid researchers in classifying and representing information. The key concept becomes the central word in the study and marks the starting point. Five to ten other concepts (also known as child words) are plotted around the central word, with linkages back to the central word. An additional five to ten ideas can be attached to the child words, creating mutating concepts around the central word (Buzan 1989). Figure 3.1 depicts the use of a mind map as a literature review map for a topic on corporate website, with homepage as the central word.

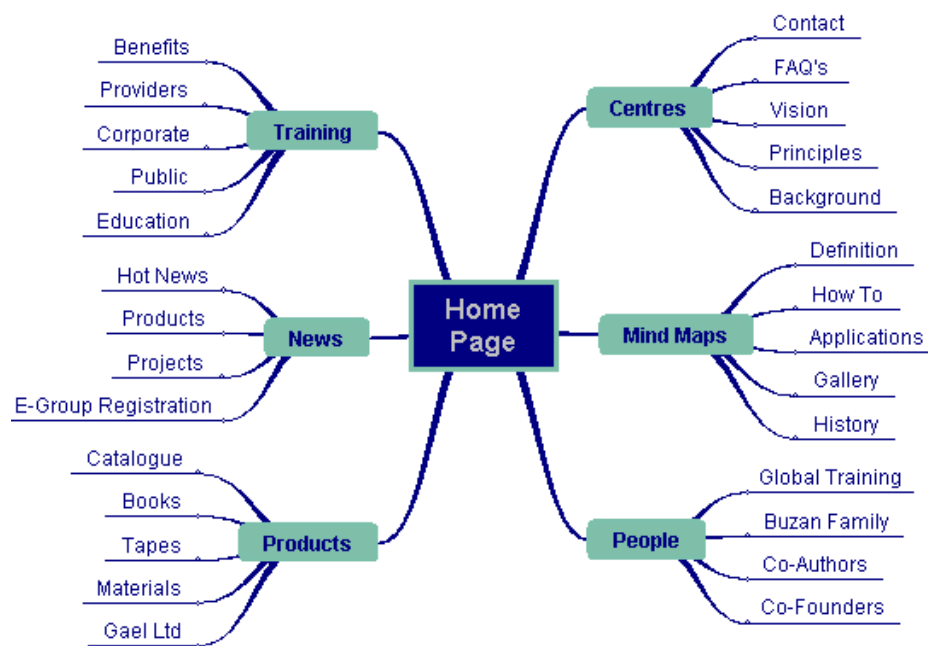


Figure 3.1: Example of a literature review mind map (Source: Weideman and Kritzinger 2003)

Another strategy in literature review mapping is the use of concept maps which take on a two-dimensional structural representation of linkages and hierarchies existing amongst concepts in a given field of study (Martin 1994:11). Rovira (2016:60) defines a concept map as a graphic diagram made up of concepts and relationships between concepts. The idea of using concept maps to graphically depict information structure was conceived by Novak in the 1960's (Novak 1991:45). Notably therefore, the key distinguishing aspect between these two strategies of literature review mapping is that mind maps have only one central concept while concept maps may

have multiple concepts. Figure 3.2 presents an illustration of a literature review concept map.

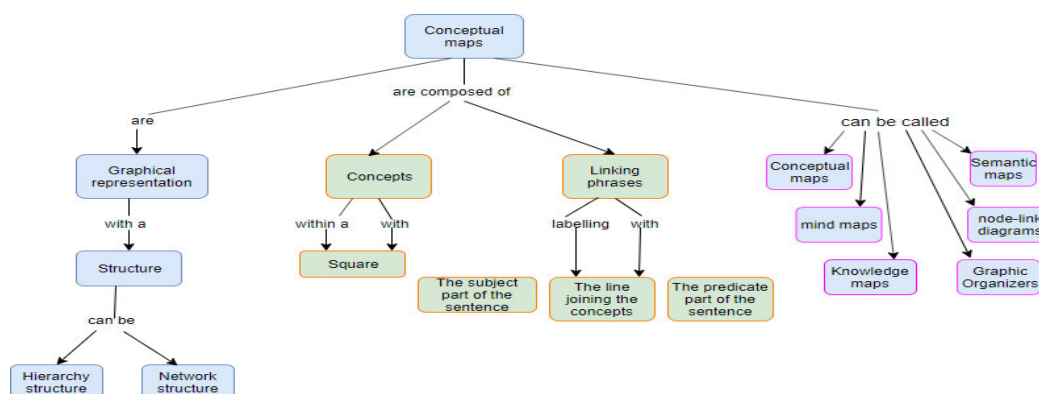


Figure 3.2: Definition of a literature review concept map (Source: Rovira 2016:61)

In view of the logic behind mind maps and concept maps, the present study used the main concepts derived from research questions guiding this study and the key variables enshrined in the theories underpinning the study (Table 3.1) to devise a roadmap for the literature review.

Table 3.1: Mapping research questions to theoretical framework variables

Research Question	Literature Review Concept(s)
What is the state of digital archiving readiness of public universities in Kenya?	The state of digital archiving in Kenya.
How are digital archives identified and administered in Kenyan public universities?	Record; Records management; Records: electronic or digital? Archives and their importance
Which legal and regulatory frameworks govern the management of digital archives in Kenyan public universities?	Legal and regulatory framework governing digital archiving.
Which risk factors are digital archives exposed to in these universities?	Risks in digital archiving; Risk management in digital archiving.
What possible solutions can be adopted to mitigate the identified risks and support sustainable digital archiving implementations in Kenyan public universities?	Sustainability concept in digital archiving. Role of metadata in digital archiving; Ensuring authenticity of digital archives; Risk management in digital archiving.

Table 3.1 shows the research questions and corresponding concepts from the literature which are discussed in this literature review section. The information depicted was used to develop a literature review map for this study. It was developed using ideas from Weideman and Kritzingers (2003) proposed model of a literature review mind map (Figure 3.1) and Rovira's (2016) diagrammatic explanation of concept mapping (Figure 3.2). The ideas in the two models have been merged by the researcher to come up with the literature review map for the present study (Figure 3.3). This was necessary to achieve robustness in the literature review process and the entire study by grounding the research upon a literature review map that allowed the researcher to interrogate the literature thematically.

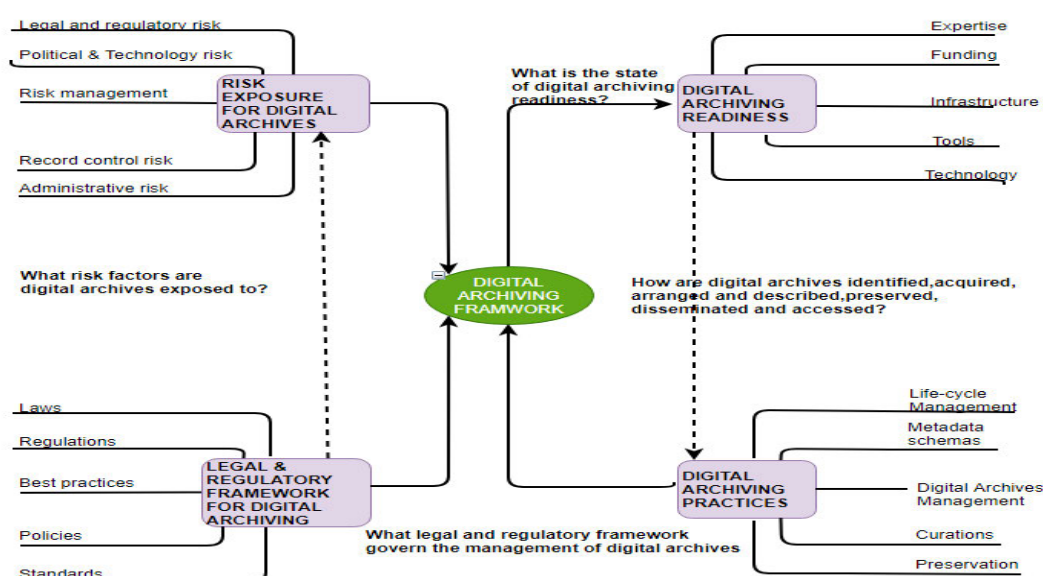


Figure 3.3: Literature review map: (Synthesised by the researcher)

The literature review map above enabled the researcher to pick out trends and patterns of research, carry out an intensive interrogation of the research objective and contextualize, analyze and interpret the study findings (Rovira 2016:64-65).

3.4 Review of literature based on the main themes of the study

The purpose of this study was to investigate digital archiving practices in archival repositories of selected public universities in Kenya in order to develop a framework for sustainable maintenance of digital archives in the institutions. The following research questions were instrumental in addressing this objective:

1. What is the state of digital archiving readiness of public universities in Kenya?
2. How are digital archives identified and administered in Kenyan public universities?
3. Which legal and regulatory frameworks govern digital archives management in Kenyan public universities?
4. Which risk factors are digital archives exposed to in these universities?
5. What possible solutions can be adopted to mitigate the identified risks and support sustainable digital archiving implementations in Kenyan public universities?

The subsequent section discusses the key themes emanating from the research questions and related concepts as depicted in the literature review map.

3.4.1 Digital records management

The term ‘record’ is a central concept in the field of archival science (Quisbert 2006). Although all records are information, not every information has qualities of a record. Many scholars in previous literature attempted to bring out this distinction (Roper and Millar 1999; Schellenberg 2002; Ohio State University 2011; Duranti 2014). Shepherd and Yeo (2003) argued that records are not defined by their physical appearance, period they have been in existence or the information they contain, but rather by their capacity to provide evidence of an activity or event. Acker (2017:290) defined records as information with content, context and structure captured on a fixed media. Considering the various definitions and opinions available in the literature, this study chooses to adapt the definition of a record provided by ISO 15489–1:2001, where records are defined as the information that is generated and maintained as evidence by an individual or organisation, in pursuance of legal obligations or in the course of business transactions. The researcher holds the view that this definition is sufficiently extensive and relevant to the present study.

The term electronic record describes data sets that have been recorded digitally (Quisbert 2006), or records that are computer-generated (Kamatula 2010). National Archives of Australia (2015) defines the term digital record as:

Records created, maintained and communicated using computer technology. Such records could be 'born digital' or converted into digital form from their original format.

Ambira (2016:87-88) attempts to distinguish between e-records and digital records and explains that electronic technology includes analogue technology and supersedes the digital technology on which computers operate. This encompasses digital records such as emails, and analogue records like such as cassettes which are computer-generated. Various authors agree that the term electronic record is an umbrella concept covering digital and analogue records (Ambira 2016; Luyombya 2010). This researcher holds the view that the term digital records is synonymous with electronic records, and refers to records generated, maintained and used by computers or digital technologies. The term digital records/archives will be used interchangeably with electronic records/archives in this study.

Acker (2017:290-291) aptly notes that records are increasingly being created, transmitted and stored in distributed infrastructures and large-scale technical networks of digital ICTs ranging from mobile phones to cloud storage services. Digital records stored on these platforms may either be born-digital (have been created by use of computers), or they may be converted from their original formats into digital formats (for example, through scanning technologies). Johnson, Ranade and Thomas (2014) posit that born-digital records are basically dissimilar to paper records on account of content and structure but cannot directly be compared in practice. Digitally created files are typically more extensive than their paper equivalents; they contain more ephemera, multiple copies and versions, and more background and supporting material. The logical “file” may be distributed across multiple workspaces or storage locations, such that the traditional concept of a “file” may not even be meaningful to the original creators and users of the information (Johnson et al. 2014:226). This uncertainty drove Duranti (2001:53-54) to pose the question of whether ‘originals’ actually exist in the digital world National Archives of Australia (2004:13) identifies spreadsheets, multimedia presentations, word-processed documents, websites and emails as examples of digital records existing in organizational systems like databases, business information systems, hard drives and shared folders.

Duranti (2010) points out that a piece of information becomes a record when it is generated during a business transaction. Thus, a record bears witness to, serves as memory and evidence of, and reflects the business transaction and context that gave rise to its creation or receipt (Carbone 2020:753). This underlines the significance of

proper management regimes for records to maintain their evidential values. There is as yet no universal definition for the term records management considering that it is still a young discipline. However according to Garaba (2010:79), many authors have defined records management as the lifecycle administrative and systematic control of records to achieve economy and efficiency and in their creation, control, maintenance, use, handling and disposition.

As the records management profession continues to evolve with changing technologies, the definition of the term record has taken on the context of the business world and is equated to the success of business processes. The present study conforms to the understanding that digital records management is synonymous with electronic records management. Based on the definition for records management presented by the International Organization for Standardization, Australian Standard 15489-1:2016, this thesis holds that digital records management is the systematic and efficient control of the generation, maintenance, use and disposition of digital records as evidence of business transactions.

3.4.2 Digital archives management

Digital records and archives management constitute the backbone of open government (Hare 2013:9). Archival records are knowledge assets, identities, memories and evidence of creators, useful for preserving and safeguarding their interests and lawful rights in a specific environment (An, Bai, Deng, Zhong and Dong 2017:19). The International Council on Archives [ICA] (2016) defines ‘archives’ as the byproducts of human activities, which have been documented and retained for their enduring value. Records emanate from the business activities of organisations and individuals and present a picture of past events. These records occur in different formats such as moving image, photographic, sound, written, analogue and digital (International Council on Archives [ICA] 2016). Archives as records are different from other information materials because of the following unique characteristics:

- i. Archives occur in digital and analogic media, not only paper documents. Examples include electronic resources (including web sites and email), film, photographs, sound recordings and written documents;
- ii. A record does not become an archive because it is old, but because it is no longer required for its original use;

- iii. Archives are not consciously created as historical records but as a result of business transactions. They must therefore be viewed in the light of who drew up that document and why; and
- iv. Archives are retained for their enduring historical value. Thus, archive collections do not and cannot hold every document created (International Council on Archives [ICA] 2016).

Further, ICA (2016) pointed out that for an archive to be valuable it must be a trusted resource, possessing the following qualities:

- i. Integrity: the content has not been altered or changed;
- ii. Usability: the archive must be in a usable condition and accessible location.
- iii. Reliability: the information in the record accurately represents the event; and
- iv. Authenticity: the record is what it purports to be, was created at the time purported, and by the person that the document purports to have been created (International Council on Archives [ICA] 2016).

Creation, sharing and use of digital content has risen to great heights in virtually every area of human activity in society but mainly in research, scholarship and science. Management of these digital assets for present and long-term use is however very important for societal continuity. Quoting Cohen et al. (2006:11), Laughton (2011) described digital archiving as the ability to collect, safeguard and ensure access to digital data. Quisbert (2006:24-5) broke down archiving into four components as follows:

- v. The Intellectual aspect of archiving - This aspect entails the people within the Archives who must meet set intellectual requirements.
- vi. The Function aspect of archiving - This aspect informs on the purpose (function) of the Archive.
- vii. The Activity aspect of archiving -This aspect concerns all activities undertaken in the course of the archival process for example categorization and cataloguing.
- viii. The Support aspect in archiving - This entails the support system of the Archive, which comprises the people (archivists) and tools (current technology including software tools).

From the foregoing, the archival object takes centre stage and the identified aspects interact with and handle the archival object (Quisbert 2006:24-5).

Personal archives, business archives, government archives and educational archives with digital archival resources, also known as online (or digital) archives, support the management of digital collections. Digital archives can be described as archival repositories dedicated to ensuring the integrity and long-term access and usability of a nation's intellectual, economic, cultural and social heritage which are in digital form, by continually migrating to newer formats (Commission on preservation and access and the Research Libraries Group (1996:8). Digital or online archiving therefore encompasses preservation as a function. Developing and implementing preservation strategies to maintain the evidential value of archives encompasses methodologies, procedures, laws and policies which address digital information resources throughout their lifecycle (National Archives of Australia 2006). This is affirmed by Doueihi (2011) who states that "digital archiving is not only about converting the record of the past into digital form, not only about preserving the digital present: it is also about the future: a future of access, of relevance ...". Therefore, lifecycle management of electronic records is a key issue in digital archiving and the key to 'unlocking' archival resources.

Sustainability of digital archiving activities is crucial in public organisations. Boamah (2014) noted that the term digital sustainability is often used interchangeably with digital preservation. The concept of sustainability is applicable in different fields, disciplines and industries. According to Chengalur-Smith, Sidorova and Daniel (2010), sustainability is the ability of a system to survive and thrive over time, both environmentally and economically. In the context of digital services and collections, Rieger (2011) defined sustainability as the state of being able to gain access to the necessary resources for the maintenance, protection, increase and development of the value to digital content and its usability. Therefore, the focus of sustainability efforts in a digital archive is prolonging the lifespan of digital archives through various long-term preservation strategies and providing continued access to the archival resources. With this understanding, archival repositories are shifting from the place of institutional thinking, to building of organizational networks in order to achieve sustainability in their digital archiving endeavors.

3.4.3 An overview of digital archiving

The genesis of the African “archival story” dates back to the early 19th century when Europe discovered the “dark continent” (Africa) and delved into the process of colonization and the scramble for Africa - the rest is history. One reason why Africa was infamously referred to as “the dark continent” is because the arts of writing and recordkeeping had been alien in the region prior to the 19th century (Asogwa 2012:198). Ironically, colonization triggered continental development which was as a result of the introduction of religion, education, among other social activities. Formal records management gradually became a reality, albeit with shortfalls, such as the failure of colonial masters to enact sound and solid archival legislations in their colonies, leading to defunct recordkeeping systems and a state of archival under-development (Asogwa 2012:207).

Today, the integration of ICT as a tool for enhancing efficiency and effectiveness in service delivery has prompted governments throughout the world to acknowledge and prioritize digital archiving within the public sector and institutions of higher learning. An et al (2017:27) aver that rapid development of ICT has had the effect that digital recordkeeping has become a crucial element that should be entrenched as a risk-control measure in an enterprise records and information architecture in support of organizational business processes in order to ensure responsible generation, preservation and use of digital records. Public agencies all over the world are increasingly shifting from paper-based to digital procedures (Klareld 2015b:12), with the effect that government business has become increasingly reliant on digital records (Cumming and Findlay 2010:265). As a matter of fact, the past decade generated the largest volume of records compared to previous decades of humanity (Mutula 2014:363), though ironically most of these records are less retrievable, reliable or accessible (Duranti 2010:79). Gantz and Reinsel (2012:2) record a report claiming that in the year 2010, one thousand two hundred and fifty gigabytes of data were generated. The report predicted an estimated annual growth of fifty eight percent. Rosenthal (2018) affirms that as opposed to the past where records were predominantly created on paper and archived in the library, today’s record formats are predominantly digital, encompassing tweets, websites with damaged inaccessible links, blogs, emails and files that can no longer be read. Johnson et al. (2014:226) speculate that the continuously growing heterogeneous digital records in government-

owned organisations can aptly be denoted as big data. These digital formats are essential not only for enabling and supporting business operations, but they also make up the collective memory of the government (Cumming and Findlay 2010:265).

Digital archiving involves various steps aimed at managing digital records which include creating, acquisition, arrangement and description, storage, preservation and provision of access (Yadav 2016:65-9). Various studies have been undertaken in developed countries to examine the practices for managing digital records and archives in light of new and emerging technologies. For instance, Poole (2020), Lemieux (2016) and InterPARES (2015) focused on the management of d-records and archives. Xiao, Xu and Liu (2019), Stuart (2017), Klareld (2015b) and Adam (2010) examined the impact of, and threats introduced by new record types and formats. Baron and Thurston (2016), Duranti (2010), Cumming and Findlay (2010) and Caplan (2010) suggested sustainable solutions and strategies for effective management of digital records and archives. While these studies found a place in the current research because of their empirical focus upon digital archiving aspects, their methodological orientations were largely dissimilar to the present study which focused on multiple cases with a higher degree of generalization.

In Africa, various authors have discussed the increase in the generation of digital records and their management in government organisations in the past decade (Ambira 2016; Maseh 2015; Lowry 2013; Mulauzi, Wamundila, Mtanga and Hamooya 2012; Asogwa 2012; Nengomasha 2013). The studies established that unlike paper and microfilm formats, digital records and archives require continued proactive management because of their unique makeup, which should be done in a consistent and systematic manner. As a consequence, recordkeeping practitioners and archivists are re-evaluating traditional solutions about creating, managing, preserving and providing access to records and archives by acquainting themselves with new technologies such as cloud computing, block-chain technology, cryptography and biometrics as well as big data and open data initiatives, among others (Mutula 2013; Musembe 2019). One such study undertaken by Elragal and Paivarinta (2017) proposed that the access and distribution of digital collections and archives can be realized by innovatively utilizing big data analytics technology to enhance the processes of appraisal, preservation, maintenance and use of digital archives.

Ngoepe and Saurombe (2016) postulated that legislation has a tremendous impact on the management of digital records and archives in a country. The authors observed that laws in a country affect the manner in which records (including digital records) are managed. They further explain that legislation gives clear mandate for the management of records by outlining the procedures and practices to be undertaken throughout the lifecycle of records. Developed countries such as the UK, Denmark, Republic of Korea, among others have policies addressing e-records management (Musembe 2019; Mutula 2013). Notably, studies carried out in Africa revealed that many of the countries in the continent have legal and regulatory frameworks for records and archives management. However, for close to three decades, a good number of authors have bemoaned the inadequacy of these legal and regulatory frameworks (Maseh 2015; Mutula 2013; Erima 2013; Asogwa 2012; IRMT 2011). Studies have been carried out to examine the role of records and archives legislation in organisations (Netshakhuma 2019a; Dwoya 2014; Hamooya, Mulauzi and Njobvu 2011) and affirmed that sound legal and regulatory framework for digital records and archives are essential for their effective management. None of the studies focused on impact of the legal and regulatory environment on digital archives in Kenya.

The adoption and use of ICTs in records and archives management has presented challenges in the preservation and management of digital records and revolutionized methods and practices of recordkeeping across the globe (Asogwa 2012:199). In particular, digital archiving is hampered by problems of selection of the right content for archiving, effective archiving of the selected data and ensuring that the archived data can be accessed and used, which if unaddressed will result in an “information black hole” (Rosenthal 2018). Studies undertaken by Ngulube (2012), Sigauke and Nengomasha (2011) and Masenya and Ngulube (2019) drew attention to the challenges that organisations in Africa face with respect to records and archives preservation. The issues illumined in these studies included problems of media fragility, hardware and software obsolescence, rapid technological advancements, and inadequate metadata. In addition, digital records are prone to alteration and corruption, improper handling, unauthorized disclosure of information, mislabeling of storage devises and accidental erasure (Greizter, Strozer, Cohen, Moore, Mundie and Cowley 2014:237-8).

Other authors have specifically highlighted issues and risks that accost digital archiving activities in public organisations (Akussah and Asamoah 2015; Mutula 2014; Asogwa 2012). Today, African countries are still struggling with risks arising from the integration of digital technologies in records and archives management, which have necessitated the need for proactive digital recordkeeping to be integrated in organizational business processes. Consequently, this thesis is founded on the premise that best practice in digital archiving is the sustainable solution for addressing records-related problems emanating from technological orientations. The next section discusses the state of digital archiving readiness in universities.

3.5 Digital Archiving Readiness

The concept of “readiness” in the field of recordkeeping is yet to have a formerly accepted definition. Nevertheless, an understanding of the concept can be borrowed from other fields that have applied readiness in a similar manner. In the context of Human Resources, Weiner (2009:2) considers readiness as being a critical prerogative for success in implementing intricate changes which may be felt at an organizational, departmental, unit, group or individual level. Further, the author concurs with the use of the term readiness as connoting a state of being behaviorally and psychologically prepared to act, that is, being able and willing (Weiner 2009:2). Sebastian-Coleman (2013:41) views organizational readiness as an organization’s cultural habits towards solving problems of any kind. Additionally, Scaccia et al (2015:486) defined organizational readiness as a strategy of implementation which addresses hindrances to new programmes by offering solutions that have the potential to enhance the efforts of implementation. From these definitions, it is evident that the concept of readiness is in itself an indicator for successful implementation of a new initiative.

There has been no consensus on the meaning and definition of the ‘digital records readiness’ (d-readiness) concept. Debate still lingers globally on what constitutes digital readiness. Taiwo (2019:23) reiterates that digital recordkeeping has emerged in parallel with ICTs, implying that the more advanced in technology an organisation is, the greater the quantity of digital records the organisation will generate as a result of its business processes. Taiwo (2019:24) concludes that d-readiness is a pre-cursor to digital recordkeeping readiness and ponders that the concept of d-readiness mushroomed from the emergence and advances in the utilization of ICTs, and

especially the rapid diffusion of the internet in the business world (Taiwo 2019:24). Wamukoya and Mutula (2005) noted that the concept of d-readiness stemmed from the need to have an integrated approach for evaluating the depth and breadth of the digital divide between the developing and developed countries in the late 1990s. Lipchak and McDonald (2003 n.d.) averred that d-records management readiness was an organisation's ability to create, capture, manage, preserve and disseminate electronic records and connected technologies to improve global security, support and enhance governance processes and other activities, and realize business sustainability. In essence, this encompasses an organisation's ability to adopt digital technologies and utilize them optimally in the generation of and use of digital records for the execution of business processes and to make a worthy contribution to the national and global good. According to Bridges (2001), d-readiness denotes a society having the required infrastructure and the legal and regulatory framework that will enable it to compete with other business organisations globally. IRMT (2011) equated d-readiness to an organization's capacity to have the required ICT infrastructure, legal and institutional framework as a result of a systematic recordkeeping system. Assessment of digital records readiness aims to measure the extent to which d-recordkeeping systems manage, store and avail records for access as reliable evidence, and in conformity to the requisite recordkeeping best practices (IRMT 2011). With this understanding therefore, the present study perceives digital archiving (d-archiving) readiness as an institution's preparedness for d-archives management by having the required ICT infrastructure and tools, resources, legal and regulatory framework for the identification, capture, arrangement and description, preservation and access of digital archives as evidence, in conformity with archival best practices.

Literally speaking, the 'elephant in the house' regarding the management of information in organizations is preparedness for digital records and archives management. Chigariro and Khumalo (2018) asserted that research into digital records readiness constituted a gap in ERM literature in Africa. Studies in digital records readiness would be instrumental in informing on existing risks, strengths, weaknesses and opportunities for digital records and archives management. The few studies that have been undertaken on the topic have shown variations in e-readiness, with South Africa taking top ranking as the most advanced country in matters of strong leadership and comprehensive policy development and implementation (Taiwo

2019; Katuu 2012). In Kenya, the study by Odhiambo (2019) investigating the readiness of United States International University-Africa (USIU-A) for digital archives management revealed that the institution has a good internet connectivity to support digital archiving but lacks adequate hardware, support for preservation including disaster planning, storage and backup strategies, inadequate funding, staffing, lack of top management support, among other challenges. Being a private university, the findings are contrary to the expectations in comparison to public universities. The key issues enshrouding digital archiving are discussed in the next section.

3.5.1 ICT infrastructure

The increased use of ICTs by government organs, also known as Digital Governance, e-Governance, e-Government, or i-Governance, took effect in the late 1990s with the purpose of enhancing efficiency in government and improving service delivery (Lemieux 2016:5). To this end, The World Bank has to date financed the designing and implementation of 122 financial management information systems in 66 countries (World Bank 2014 cited in Lemieux 2016:5). The integration and use of ICTs has been a revolutionary game changer in the business processes of organisations and institutions (Kalusopa 2016:102). The IRMT is one of the bodies that have consistently advocated ICT application in the management of government sector records in developing countries. One end product of this global agenda has been the generation of records in new formats which has revolutionized recordkeeping in public organisations. Notably, ICTs have been utilized in setting up digital archiving systems, archival resource management systems and public access platforms that allow for the control and efficient utilization of archival resources. The relevant ICTs include various technologies used in the creation, acquisition, storage, dissemination, retrieval, manipulation and transmission of information.

ICT infrastructure is a key driver for digital records and archives management in public sector organizations. A study by Nkala, Ngulube and Mangena (2012) on e-readiness at the National Archives of Zimbabwe drew attention to the enormous generation of digital records in various formats (some of which end up as archives) as a result of the widespread adoption of ICTs in the country. A study by Kamatula and Kemoni (2018:79) investigating whether the existing e-records management practices

promote or undermine the implementation of e-government in Tanzania established that all public offices had adopted ICT in their business functions, thereby generating large volumes of digital records. Additionally, Kenya Association of Records Managers and Archivists (KARMA) Digital Records Preservation Training Handbook (2020:47) reports that organisations throughout the world create an estimated 2.5 quintillion data bytes each day. The present study is taking place in the wake of COVID-19 during which the generation of d-records has sky-rocketed beyond the realms of such predictions by scholars and scientists, as a consequence of the working-from-home government directives using the numerous ICT platforms. This has spiraled the prerequisite for digital archiving readiness in organisations and institutions of higher learning, public and private alike, primarily because a good ICT infrastructure is a precursor for successful digital records and archives management programmes, and ultimately organizational success. The existing scenario has led to the increased adoption and implementation of digital records management and archiving systems by organisations.

Digital archiving in the context of public organisations and institutions entails taking advantage of IT to create databases of archival holdings and disseminating them online for user access, as well as digitizing archival holdings which have originally existed in traditional formats to ensure their longevity (Sobczak 2016:8). Mulauzi et al (2012:2-3) expound on the opportunities presented by ICTs in recordkeeping practices in Zambia from a lifecycle perspective by describing how recordkeeping functions are enhanced during creation (easy to create records in multiple copies and formats), use (multiple access to a record, enhanced data processing, searching and retrieval) active storage and retention (reduced costs of storage in terms of staffing, space and processing time), transfer (elimination of the physical transfer cycle) and disposal (use of automated retention schedules resulting in relatively easy disposal cycles).

Successful digital archiving requires installation of suitable digital recordkeeping systems, existence of Local Area Networks (LAN) and Wide Area Networks (WAN), strong internet connectivity and a modern, well-equipped building (Katuu 2015:135-136; Asogwa 2013:803). Person and Plumb (2017:256-7) advise that setting up an archival repository for the preservation of an organization's memory calls for serious

investment in terms of sophisticated equipment such as quality archival scanners, image editing programs and online screen capture software, among others. On the flipside however, Barry (2010:168) cautions that the acquisition of ICTs for digital records and archives management is not the issue, rather, the rapid and increasing changes in technological innovations continue to deal a relentless onslaught upon digital records. Therefore, rapid developments make it difficult for prior planning to be an absolute guide for appropriate ICT acquisition. For example, USA which is the leading global economic superpower with supposedly the most advanced capacity and infrastructure for digital content management faces challenges with respect to the preservation, management and retrieval of digital information (Mutula 2014:364). Thus, due diligence should always be observed when planning for ICT infrastructure in organizations to ensure that recordkeeping requirements are factored in with the future in perspective.

In a contrasting scenario, government sector organizations and academic institutions in developing countries continue to face challenges related to recordkeeping mainly because they lack efficient infrastructure to support digital records management. A study by Hamid (2018) in the Malaysian public sector sought to establish the readiness of government organizations towards implementing electronic records management system (ERMS) in Malaysia and revealed a state of inadequate ERM implementation due to lack of prior planning for ERM. Abuzawayda, Yusof and Aziz (2013:350) identified inappropriate IT infrastructure as a key hindrance to the success of digital records management programmes in institutions of Higher Learning in Libya. In East Africa, studies investigating the integration of ICTs in records and archives management have shown low preparedness of ICT infrastructure as the cause for the poor state of digital archives management in the region. Despite South Africa's dominance in terms of technological advancement, findings from studies by Ngoepe and Keakopa (2011) and Ngoepe (2017) revealed that the National Archives of South Africa lacked adequate infrastructure for ingesting digital records into archival repositories. Lowry (2013) reported findings of a research project conducted by the IRMT from 2009-2011 to examine integration of records management components into ICT/e-government and Freedom of Information initiatives in East African member countries namely Kenya, Tanzania, Uganda, Burundi and Rwanda. The focus was on the court case management system functionality in the countries. One

important observation in the Kenyan context was that the Judicial Information Communication Technology (JICT) committee did not have representation from the Kenya National Archives and Documentation Service (KNADS) or from RM staff in the judiciary, but only comprised of government representatives and representatives from the Kenya ICT Board. Lowry (2013) interpreted this as a misguided focus on software and hardware while disregarding the digital content being managed as well as the necessary controls that should be integrated for the life-cycle management of d-records. The crux of the matter is that for the application of ICTs into recordkeeping functions to be successful, records and archives professionals must be involved right from the planning stage.

The study by Kamatula and Kemoni (2018) found that although public sector organisations had implemented ICTs, they lacked digital recordkeeping systems and skilled staff to guide the e-government initiatives. Luyombya (2010:1590) reported that networking and interconnectivity of digital systems in most government ministries in Uganda was lacking, leading to widespread inter and intra incompatibility of digital systems. Tshotlo and Mnjama (2010) carried out a records management audit at Gaborone City Council and established that there was poor integration of ICTs in records management. Similarly, Kalusopa and Ngulube (2012) carried out separate studies on the management of information and records in Botswana labour organisations. The study pointed to the sluggish and evolving pace of ICTs adoption as one of the indicators for low digital records readiness in labour organisations. In Ghana, Akussah and Asamoah (2015) carried out a survey to evaluate the management of digital records in the Public Records and Archives Administrative Department (PRAAD). The study established that PRAAD had inadequate technological capabilities to sufficiently perform in the relatively unstable digital records environment. Asogwa (2013) investigated the readiness of three Nigerian universities for electronic records management. Among other findings, the study established that the technological infrastructure for digital records management were inadequate, implying that a good number of Nigerian universities were ill-prepared for digital records and archives management.

On the Kenyan landscape, Namande (2011), Wangutusi (2013) and Belator, Mwai, Wasike and Ratemo (2019:74) point to poor ICT infrastructure including problems of

low internet connectivity and bandwidth as the barriers to successful digital records and archives management implementation at the Kenya National Archives and Documentation Services. Another recent study by Ambira, Kemoni and Ngulube (2019) established that the state of ICT infrastructure in public sector organisations and institutions was poor, leading to the conclusion that the readiness of ministries for e-governance service provision was below bar. Further, Ambira, Kemoni and Ngulube (2019:306) cite a report by Ministry of State and Public Service (2011) which revealed that the integration of ICTs in the management of public sector records and information has been uncoordinated and disjointed, with individual ministries implementing their own approaches and strategies. The overall effect has been a flawed implementation process for digital records and archives management, affirming the notion of poor ICT infrastructure and lack of readiness for digital recordkeeping in public sector organisations in Kenya, a gap that this study attempted to address.

3.5.2 Resources for digital archiving

Digital archives constitute an important resource for a nation and require to be generated, arranged and described, preserved and utilized for public good and governance (Johare and Masrek 2011:686). In a traditional recordkeeping environment, a host of additional clerical staff and archivists would be required as well as greater storage space. In contrast, digital archiving requires state of the art, trustworthy software tools, new skill sets and dedicated staff time to carry out digital archiving functions (Barry 2010:164). National Archives of Australia (2012) in their guideline on business requirements for managing digital information and records identified money, people and time as key resources required for the implementation of suitable recordkeeping systems. Barry (2010:164) specifies that the key requirement for archival repositories are the resources needed to successfully implement digital archiving strategies that are highly adaptive to changing technologies, as discussed hereunder.

People: The human factor can be an impediment to the readiness of an organization for any new project including digital recordkeeping (Taiwo 2019:25) and can also be a key success factor for the same. Taiwo (2019:25) explains that the impediment can be reflected in form of resistance to change. User perceptions are imperative

considerations in ERM and digital archiving solutions because they are an indicator of an archival repository and organization's commitment to support the project and the extent to which the employees can genuinely and actively take part in the process (Hamid 2018:17). In particular, McLeod and Childs (2013:17) noted that people issues are basic but complicated because they encompass philosophical attitudes, awareness recordkeeping issues as well as knowledge and skills possessed by staff. A study of the New Zealand public sector by Yin (2014) established that user involvement during planning process was among the top-ranking social factors contributing to lack of user buy-in and lack of senior management support during the implementation of digital recordkeeping systems. Hamid (2018:17) advises that users of digital recordkeeping systems should receive timely communication concerning proposed changes and be involved in consideration of available options and subsequent decision making (Hamid 2018:17). Summarizing on the aspect of people as an important resource in digital records and archives management projects, Hamid (2018:17) cites Self (2007) who proposed five key questions that should be considered when determining staff readiness for change, which in the context of this study is digital archiving:

- i. Is there a need for digital archiving?
- ii. Is digital archiving the right change to make?
- iii. What should be done to boost staff confidence in the digital archiving project?
- iv. What is the actual organizational support for digital archiving? and
- v. How can staff be facilitated to understand the nature of digital archiving project outcomes?

Education and training: Digital records and archives management initiatives are doomed to failure if they are not supported by qualified and experienced staff as well as regular training programmes for the staff (Asogwa 2012:203). Consequently, continuous education and training for records professionals have become a global concern for governments and organizations (Johare and Masrek 2011:699). In Australia, electronic records management programme was a success because the government allocated above 80 percent of the budget to staff training (Asogwa 2012:205). In Africa however, there has been growing concern that archival institutions and records management units are being run by recordkeeping

professionals who are not well versed with issues regarding creation, appraisal, preservation, access, security, disposal and dissemination of digital records and archives (Asogwa 2012; Erima and Wamukoya 2012; Mulauzi et al. 2012; Kamatula 2010; Groenewald and Breytenbach 2010). A study of three state-owned universities in Nigeria by Asogwa (2013) assessing the extent that employees were conversant with digital records management painted a distraught picture in the country, with 69 percent of the respondents indicating that they lacked knowledge to manage records throughout their lifecycle. Similarly, Mulauzi et al. (2012:7) asserted that recordkeeping professionals require core competencies and skills to develop and set up comprehensive ERM and d-archiving strategies. Mulauzi et al. (2012:7) further noted that the competencies and skills are varied and can be classified into technology skills, information management skills and project management skills which include skills to create, capture, classify, index, appraise, store, preserve, retrieve, track, dispose and archive digital records. The competencies required include but are not limited to knowledge of the digital environment for records, knowledge of digital recordkeeping trends and practices, knowledge of digital record types as well as knowledge of IT applications for recordkeeping (Mulauzi et al. 2012:7). Of interest to this study, Kamatula (2010) drew attention to the prevailing research gap on minimal studies in the area of skills for digital records and archives, pointing out that records management and archives practitioners are struggling with issues relating to lifecycle management in today's digital dispensation.

Finances: The success of digital recordkeeping programmes is dependent upon sufficient funding and budgetary allocations. Construction and maintenance of a digital archive constitutes costs for activities such as data capture, selection, storage, maintenance, description and discovery, use, preservation, among others. Citing Anderson (2004), Taiwo (2019:26) postulates that the key barrier to the success of digital records and archives management implementations is failure to sufficiently meet the cost of funding the project. The problem of low budgetary allocations for recordkeeping in general is common in Africa and has commonly been attributed to embezzlement, fraud and general mismanagement of funds as noted in a number of studies. For example, Asogwa (2013) revealed that the problem of budgeting in Nigeria was attributed to corruption with cases of money meant for development projects finding its way into individuals' pockets and records evidencing authorization

of these projects disappearing or otherwise being burnt through supposed cases of arson. Similar cases of funds mismanagement have been reported in public universities in Kenya, a recent example being in September 2019 when the nation was shocked by a local television station, Citizen Television's investigative story on Maasai Mara University dubbed "The Mara Heist" that put the institution on the spot over allegations of misappropriation of 190 million Kenya shillings. Records management issues were brought to the limelight as evidence was sought to pin down the culprits. In another study, Belator et al (2019) found that lack of preparedness for digital recordkeeping at KNADS was also attributed to insufficient budget allocations. The present study investigated the financial soundness and preparedness of public universities in Kenya for digital archiving.

3.6 Digital Archives Identification and Administration

This study sought to investigate the processes by which digital archives are identified and administered in Kenyan public universities. This was achieved by understanding the practices that constitute digital archiving.

3.6.1 Digital archiving practices

Digital archiving commences with digital records creation in a recordkeeping system, followed by identification and transfer of records with continuing value, processing of the records, their arrangement and description in the archival management system, and their subsequent access in the archives public access system (Zhang 2012:175). The practice of digital archiving involves examining recordkeeping processes in archival repositories from conception to understand the requirements for capturing a record and fixing it in its creation context for easy retrieval and access (Kallberg 2012:102). Ismail and Jamaludin (2009:138) view digital records archiving practices as the recordkeeping function which comprises long term preservation of archival records and provision of continued access to the records as collective memory of the organization. The authors explain that digital archiving enables archival records to be permanently preserved by virtue of their inherent values through appraisal, retention scheduling, applying preservation strategies and storing the records appropriately (Ismail and Jamaludin 2009:138).

The diffusion and use of ICTs in records and archives management has ‘disrupted’ archives management practices and shifted them from the ancient traditional practices to technology driven processes, commonly referred to as digital archiving. The variety, volume and velocity of d-records produced, coupled with the ensuing technological challenges have compounded the complexities of archival practice (Note 2020:1). A continuum approach is therefore necessary from the initial point of records creation to ensure contextual representation of the organizational business processes so that records and archives are proactively managed, maintained and preserved as evidence (Kallberg 2012:102). Importantly, these disruptions have had the effect of bringing the records continuum understanding to reality by “flattening the curve” between records managers and archivists and converging the roles of the two groups of professionals. The next section describes archives management practices and the manner in which they are carried out in a digital environment.

3.6.1.1 Creation

The *raison d’être* for archivists and archives are the selection, organisation, maintenance and preservation of records in all formats including digital archives (Akmon, Zimmerman, Daniels and Hedstrom 2011:330). However, creation of records is a key concern for archivists as it determines the quality of digital objects that eventually gain entry into the Archives. Efficiency in the process of managing records and archives is a guarantee for the creation and capture of reliable records which will be useful for the proper running of organizational business (Asogwa 2013:792). Akmon et al. (2011:329) observed that the current technological dispensation has had a great impact on the creation of data, leading to the proliferation of digital records, also referred to as a “data deluge” – an era in which our capability to create digital content, has seemingly outrun our ability to comprehend and manage it efficiently. Recordkeeping research globally has shown that ICTs have led to the increased generation of records in digital formats which include websites, e-mails, and databases, among others.

With the foregoing global developments, questions have come to the fore regarding which data should be preserved; who should be responsible for preserving it, what kind of metadata should be captured to sufficiently describe the data, and how to protect privacy and confidentiality while providing access to it (Akmon et al. 2011).

With these issues in mind, Colwell (2020:181-2) postulates that in the digital environment there is a thin line between records and archives management, records objectivity and the role of records creators and custodians. Further, Colwell (2020:181-2) raises pertinent issues concerning records creation in general and ponders that unlike in the Library Science domain, the focus on user orientation in the recordkeeping profession is skewed, with the record taking centre-stage as opposed to the user who is the originator of the record. In this regard, Thomas (2015:544) recommended that archival repositories should integrate programmes to train and re-train users on digital records creation and use.

The increased use of ICTs for records creation, storage and dissemination in public sector organisations has introduced challenges which have aggravated weaknesses in recordkeeping systems and lessened their probability to produce records of integrity for accountability and transparency in organizations (Lemieux 2016:6). Kwatsha (2010) conducted a study to examine recordkeeping problems in South Africa's office of the President and noted that some of these problems emanate from the diverse methods of creation and storage introduced by ICTs. Similar conclusions were made by studies done in Kenya (Ambira 2016; Ambira, Kemoni and Ngulube 2019), affirming Asogwa's observation that digital technologies impact upon records creation (Asogwa 2012). Therefore, Dikopoulou and Mihiotis (2012:126) advise that public organizations should inculcate effective controls in the creation of records because this ensures:

- i. Records created within an organization are linked to business processes;
- ii. Creation, storage, appraisal and disposal of non-essential records is prevented, thereby cutting down on the costs of managing large volumes of records and reducing the risk of misuse of records; and
- iii. Vital records in an organisation are identified at creation and managed accordingly.

Citing the Digital Preservation Coalition (2002), Mutula (2014:364) posits that there are two formats in which digital content is created: (born digital (referring to materials that were never meant to have analogue equivalents and made digital (connoting the conversion of analogue formats to digital by scanning or other means).

Born-digital archives

Cocciolo (2014:239) notes that born-digital records are those that originate on computer systems and may have (or may not have) analogue equivalents, for example print copies. Born-digital archives are distinct from archives created by digitization to create access copies or surrogates which originated from film, paper or any other analog medium. Cocciolo (2014:239) defines the concept of born-digital archiving as the task of appraisal, preservation and provision of access to born-digital records that have enduring values within an institution or organization. It is prudent therefore, that born-digital records should be subjected to suitable stewardship or digital preservation strategies from creation to secure the long-term persistence of the content therein (Lavoie 2004:4).

The quantity of digital records created in organizations today is a subject of concern to records and archives practitioners. Johnson et al. (2014) carried out a study on the implications of volume on tomorrow's archives and focused their research on the growth in the volume of born-digital archives and its implication on information professionals. In the words of the authors, "the scale and breadth of data being created, retained and used is enormous; a volume boom so enormous and unprecedented that it has coined its own term: big data" (Johnson et al. 2014:225). The concept of 'big data' is commonly defined in terms of its research value, that is, data so large that they require new methodologies to enable their interrogation and use. The Arts and Humanities Research Council (2013:3) defined big data as follows:

Big data are high volume, high velocity, and/or high variety information assets that require new forms of processing". In other words, "big data comprises information resources which are so large that they exceed the capacity of commonly used software and other tools, so that users have perforce to develop new approaches and methodologies to analyze them.

The study by Johnson et al. (2014) revealed that large-scale data creation is a concern for recordkeeping because of challenges that arise from handling unprecedented volumes of records. Connected to this concern are issues of variety and velocity which have serious implications on recordkeeping. Specifically, big data poses the following challenges in digital archiving:

- i. Straightforward functions in digital archiving become complex and demanding;
- ii. It's no longer feasible to undertake human operations such as file-by-file sensitivity reviews due to the prohibitive costs involved;
- iii. Technical processes like migration, backing up and carrying out integrity checks have to be done in short intervals, which is computationally expensive; and
- iv. The problem of scale introduced by the very Big-ness of big data has a big impact on cost (McDonald and Leveille 2015:111; Johnson, Ranade and Thomas 2014:226).

Made-digital (converted) archives

Archival institutions the world over have been managing collections in manual environments for a long time but are being forced by technological advancements to transit to hybrid and digital recordkeeping systems. This has forced archival repositories to recognize the necessity to come up with permanent solutions for the survival of born-analogue archival materials that are facing the risks of damage both physically and internally. Archival repositories have had to harness technological solutions that enable conversion of analogue records to digital formats and migrating the digital records to more durable formats. This process is what is generally referred to as records conversion, which brings forth the “made-digital” archives. Cohen (2015:28) explicates the distinction between paper (analogue) and digital records as follows:

Paper documents are fixed to media in a documentary form that is altered over time by intentional acts and natural effects of the environment. But digital documents, as created, are not fixed to a documentary form. They are composed of depictions produced by finite state machines (FSMs) and displayed to the originator who uses input devices to alter the form, often reflected in an updated displayed form, temporarily fixed to the display, but periodically (at a rate too fast to notice) updated from a different form fixed temporarily in digital memory as a feedback loop, and replaced by newer versions over time as a result of acts by the user and other mechanisms.

Converting of analogue records into digital formats is done using computerized applications, hence the term digitization, for example scanning of paper records. Jones (2001) in Manaf and Ismail (2015:108) explain that the process of digitization enables conversion of information materials from formats that can be read by humans (analogue) to machine-readable formats (digital). The advantages of digitization for archival repositories include but are not limited to: facilitating permanent preservation by producing high-quality digital images; increased accessibility; and enhanced profiling of archival repositories (Manaf and Ismail 2015:108). Martin and Vacca (2018:337) affirm that digitization and the online dissemination of archives increases opportunities for archival memory utility. Rahman (2020:22) agrees that creation of born-digital records and digitization of records from their original analogue formats are the demand of the new era.

With the increased creation of born-digital and made-digital collections, archivists are facing constant changes as they circumvent through the hybrid terrain. Therefore, recordkeeping professionals should lay down strategies for creating and generating records that can be trusted. Duranti (2010:85-6) proposes three cardinal rules that should be adhered to for trustworthiness of records to be guaranteed during creation. The first measure is to embed routine records creation rules in the centralized, agency-wide recordkeeping system, as well as for business integration and documentation. Secondly, institute procedures for linking the digital and non-digital records within the organization. Thirdly, integrate the management of digital and non-digital records belonging within a hybrid recordkeeping system. In retrospect, an emphasis should be placed on the maintenance of standardization and consistency in naming and describing digital records across an organization to facilitate easy access and retrieval.

After all is said and done, the crux of the matter for digital recordkeeping ultimately lies in creating records that can withstand the challenges of time and still maintain the qualities of 'recordness'. Mutula and Mostert (2010:39) reported that the Kenyan government had undertaken a number of initiatives in line with regulatory framework, policy issues and ICT infrastructure to ensure creation of sound digital records, some of which include formulating and implementing the ICT policy, freedom of information policy and the Universal Access policy (Mutula and Mostert 2010:39-40). A study by Mosweu (2018) investigating the governance of liquid communication

generated through social media by the Botswana government emphasized the significance of proper management of such records to ward off privacy, security and trust issues. The present study acts as a follow-up to such related studies by benchmarking on progress made in digital archiving practices which included creation.

3.6.1.2 Acquisition: selection and appraisal of archives

Collection development is a key function for archival repositories, just as it is for libraries and other heritage organizations. Klett (2018:86) affirmed that the value of archives in theory is the satisfaction of needs substantiated by accessing the records. In archival repositories, collection development is achieved by carrying out rigorous selection and appraisal programmes which aim to identify and preserve records values and restrict the content of the Archive. The appraisal of records and archives in archival repositories is guided by archival rationale, theories, formal policies and procedures (Craig 2015:16). Cushing (2010:307-8) opines that appraisal is amongst the most well documented concepts in archival science, defined by the Society of American Archivists' Dictionary of Archives Terminology (2020a) as the process of identifying materials offered to an Archive that have sufficient value to be accessioned. Ngoepe and Nkwe (2018:131) define records appraisal as the process of assessing records to ascertain those that are valuable as to merit permanent preservation and those that can be destroyed. Citing Ham (1992), Cox (2011-8-9) defined appraisal as the "process of evaluating actual or potential acquisitions to determine if they have sufficient long-term research value to warrant the expense of preservation by an archival repository". Appraisal is therefore a value test to distinguish between valuable and valueless records for the purpose archival retention.

The concept of appraisal in archival science was developed by Theodore Schellenberg in 1956 during the post-World War II era when the United States National Archives was dealing with the proliferation of government records as a result of the war. According to Schellenberg, records have primary values (useful to creators) and secondary values (useful to researchers). The archivist's task was therefore to use the value system to identify and select records that warranted permanent preservation based on their secondary (continuing) values (Cushing 2010:308). Archival values as depicted in the Swedish Archives Act include: research value; informational needs for

administration of justice, and; the right to access official records (Klett 2018:88). Additionally, Note (2020:28) suggests that appraisal criteria for digital records should constitute checking for administrative, evidential, fiscal, informational, intrinsic and legal values. Other value criteria to be used include aesthetic, associational and exhibition values (Note 2020:28).

Harvey and Thompson (2010:316) and Note (2020:27) identify two forms of appraisal namely technical appraisal and intellectual appraisal. The authors expound that technical appraisal evaluates the format of an object and the technical capability to maintain it (the ability of the archive to be used in future), while intellectual appraisal evaluates the digital object's content in terms of intrinsic value and provenance (authenticity and reliability of the archive). Harvey and Thompson (2010:317) point out that technical and intellectual appraisal are inextricably tied to the collection policy of an archive, but are of the view that technical appraisal is more important to the maintenance of digital archives. However, the researcher's view is that both criteria are equally important to the archival collection and should be given equal treatment as they both have an impact on access and use of digital archives.

In the traditional context, Jenkinson and Schellenberg envisaged a micro-appraisal approach based upon a bottom-up methodology in 1937 as reported by Shepherd and Yeo, 2003:149-150. In this approach, records are appraised based on their values by using either a file by file or folio by folio method. The approach advocated for the view that:

Authenticity of records derives in part from their interrelationships and that any artificial selection adversely... [affects]...their impartiality as evidence...the record is [therefore] seen as unique in its context and equal value" (Shepherd and Yeo, 2003:149-150).

However, this approach was found to apply to small organizations that were operating in a manual environment. This led to the advancement of a modern approach to appraisal known as macro-appraisal approach, developed by Terry Cook in the 1990s was more suited to the digital environment and large organizations because records were analysed based on organizational purposes, systems, structures and functions (Shepherd and Yeo, 2003:151).

In digital environments, appraisal is not a one-off process occurring once at the pre-ingest stage of records lifecycle; rather it is an ongoing process taking place when circumstances require (Harvey and Thompson 2010:317). This brings up the concept of re-appraisal, defined as the process of identifying materials that no longer merit inclusion in an archive and that are candidates for de-accessioning (Society of American Archivists' Dictionary of Archives Terminology 2020b). The circumstances that could trigger re-appraisal of digital archives in universities include:

- i. Technology watch - This is the process of monitoring for signs that media, format or rendering applications will become obsolescent - These alerts when identified become triggers for some form of preservation interventions.
- ii. Change in designated community - This happens when the archival context changes, for example when a university drops a course.
- iii. Change in legislation - The introduction of new laws and regulations that impact upon digital records will merit re-appraisal (Harvey and Thompson 2010:316-7).

The question of impartiality during appraisal processes is a bone of contention in archival repositories and institutions and is recognized by Craig (2015:17) as a key theme in appraisal. Dan (2013) in Garaba (2018:146) brings to light the bias of university Archives in Australia where priority was placed on collecting materials of famous personalities in comparison to the lesser-known individuals. Such cases add weight to Ngoepe and Nkwe's (2018:17) concerns as to who has the responsibility of making appraisal decisions: the archivist, the creator or both? Ghosh (2011:15) interjects that objective selection and appraisal of digital records for permanent preservation as archives necessitates adherence to the principles of archival management which comprise provenance and *respect des fonds* (original order). The principle of provenance means that records created by a particular family, individual or organization must not be combined with materials created separately by another organization (Ghosh 2011:16). This implies that both the archivist and the creator must collaborate to reach mutually acceptable appraisal decisions.

To undertake appraisal of digital records successfully, Cushing (2010:308) advises that archivists should adopt strategies of documentation and functional analysis developed by Helen Samuels in 1992, to guide the acquisition process. These methods

support the notion of laying down a plan or strategy for collection development which involves selecting materials on the basis of a designed method that prioritizes a specific topic, event or field. A functional analysis approach is then used to select and acquire archival records for the Archives. Netshakhuma (2020:2051) avers that the appraisal methodologies applied in universities comprise the functional analysis (macro-appraisal) and value-based approach. Nevertheless, there is no single accepted method for appraising records, neither is there an interoperable and common set of taxonomy or definitions for performing appraisal (Cushing 2010:309).

The acquisition of digital assets for archival repositories gives rise to pertinent issues, most importantly the volume of the records to be acquired (Johnson, Ranade and Thomas 2014:227). Archivists are experiencing difficulties deciding on how to select and appraise materials for admission into their repositories as a result of the increased volume of records arising from advances in technology. Scholars have observed that archivists have challenges in selecting appropriate appraisal methods (Klett 2018; Eastwood 2017; Klareld 2015b). Commenting on the challenges of appraisal in the modern day, Johnson, Ranade and Thomas (2014:226) mused: “in the digital world, we create and keep more, and we cannot select as finely”. This brings to attention the issue of records accumulation singled out by Cushing (2010:308) as one of the overarching aims of appraisal. Cushing (2010:308) explains that in the manual environment, the keeping of paper records was limited by space provisions, which impacted on the quantity of records to be selected during appraisal. Today however, the problems arising from collection accumulation have extended into the digital environment, albeit with a contrasting implication on space, not so much the lack of it, but rather the availability of a lot of digital storage space. The inference is that with so much space available, archivists must be cautious in making value decisions during appraisal to avoid a scenario where there is ‘digital clutter’ in their collections.

Clearly, appraisal remains a challenge bedeviling archivists in most African countries today with regards to the appropriate processes, approaches and methods that should be used (Netshakhuma 2020; Ngoepe and Nkwe 2017; Adu and Ngulube 2016; Garaba 2013; Asogwa 2013; Cox 2011). For example, Cox (2011:8-21) opines that appraisal is a core activity for archival repositories in the emerging digital era, and suggests that archivists need to re-focus on the arising appraisal implications by

becoming more technically proficient, enhancing other knowledge and skill areas and re-thinking appraisal as a continuous rather than a one-time process. Additionally, Garaba (2013:261) highlights five models on appraisal methodology from the literature (black box, sampling, the Schellenbergian model, re-appraisal and macro-appraisal models) which scholars criticized for being unaccountable, labor-intensive and ineffective. Further, Garaba (2013:261) proposed adoption of the hybridization as a sixth model which integrates appraisal and preservation practices, thereby taking advantage of new technologies to address space and storage concerns. The present study holds that another possible solution to the problems of appraisal is for archival repositories to develop appraisal policies that indicate the records that merit permanent preservation and those that should be destroyed at the lapse of specified retention periods (ICA 2013).

3.6.1.3 Accessioning of Archives

Accessioning is the backbone of subsequent archival activities since the process enables archivists to inspect, stabilize and record all materials received in the repository before they can be integrated into the existing collection (Note 2020:31). Citing Millar (1990), Garaba (2010:98) states that accessioning encompasses the activities undertaken by repositories to gain physical, legal, administrative and intellectual control over materials newly ingested into the archive. The process of accessioning constitutes assigning an identifier linking it to an archival collection, and thereafter entering the relevant administrative information into the collection's management system or inventory (Note 2020:31). Note (2020:32) further posits that the goals of accessioning are to:

- i. Document knowledge about collections by describing formats, content and context, and maintaining records of interventions;
- ii. Stabilize archival materials by detecting and addressing preservation threats;
- iii. Facilitate access and enhance archival processing; and
- iv. Establish administrative control over archival collections.

The National Archives (United Kingdom [UK] website (2020) described the accessioning process by explaining the occurrences in manual and electronic environments. For paper records, accessioning involves:

- i. Confirming that all records received were the listed ones;

- ii. Confirming the preparation and cataloguing standards;
- iii. Making the descriptions available in the institutional catalogue;
- iv. Moving the files to The National Archives' repositories; and
- v. Making the record available to be viewed by the public if it was transferred 'open' (that is, available for public access on an unconditional basis) (The National Archives United Kingdom 2020).

On the other hand, accessioning of digital records involves:

- i. Checking that the d-files, metadata and closure form sent with the records conform to the archival repository's technical checks;
- ii. Sending official communication confirming safe custody of the records; and
- iii. Ingesting the digital records into the digital records infrastructure system for long-term preservation (The National Archives United Kingdom 2020).

Contrary to the assumption that technology brings efficiency to the archivist's table, the accessioning process in a digital environment is not without hiccups. Faulder (2016:182) alluded to this by stating that the actual accessioning of digital records is 'often messy'. A case study of Getty Institutional Records and Archives in Los Angeles, California revealed that the archive which had received a donation of oral history interviews, faced challenges that included incomplete submissions, clarification of rights and speedy online access expectations by users. These were compounded by absence of policies, procedures and technical infrastructure (Shein 2014:12). Archival repositories around the world are facing similar problems when processing newly ingested d-records into their collections, hence the need for collaborative approaches.

3.6.1.4 Arrangement and description of archives

Properly organized records in manual and digital environments enhance records discoverability (Asogwa 2013:792). According to (Foster, Benford and Price 2013:775), archivists in the digital era are faced with the task of designing facilities that aid users to search or browse an archival collection once the materials have been selected and appraised. This entails understanding the subject matter of the materials and administering bibliographic control over the digital archives collection (Foster, Benford and Price 2013:775). To this effect, arrangement and description are essential

in establishing physical and intellectual control over archival holdings. As acknowledged by Garaba (2010:100), the tasks of arrangement and description are essential in unlocking the contents of archival repositories. The guiding framework for archivists in the arrangement and description of archival records for over a century has been the archival principles of “respect des fonds” which require that archival records must be arranged and described in the same manner as they were when they were received by the Archives, to maintain the contextual meaning of the records (Ghosh 2011:15). Bailey (2013) agrees that “respect des fonds” which comprises provenance and original order is the archival principle that groups records by the individual, organization, administration or creating body in which they originated. Erez et al. (2020 Nd) support that the principle of “respect des fonds” demands that records must be organized and arranged according to provenance, that is, the creating agency. Thus, the archival materials of a particular organisation, family or individual should be managed, arranged and described as a whole and should not be mixed with records created by another entity. Ghosh (2011:15) further advises that description should proceed from the general to the specific, starting with the fonds, and progressing through the series, sub-series, files, and to the individual items. Ideally, the arrangement should conform to the sequence below:

FONDS → SERIES → SUB SERIES → FILES → ITEMS

When archival records are arranged in conformity to the principle of provenance, the classification system previously used by record creators is maintained, thereby eliminating the risk of misplacement of records while also giving a reflection of the business activities of the creating agency (Garaba 2010:101).

According to Jimerson (2002:125), description is the process of analyzing, organizing and recording information that is useful in identifying, managing and locating archival holdings, their contexts and the recordkeeping systems that generated them. The task of description is intellectual and requires knowledge and skills to accomplish as alluded to by Foster, Benford and Price (2013) in their reference to the observation made by Svenonius (2000):

It would seem that the most colossal labor of all involved in organizing information is that of having to construct an unambiguous language of description – a language that imposes system and method on natural language

and at the same time allows users to find what they want by the names they know (Foster, Benford and Price (2013:775).

The complexity of description has been magnified by digital technologies and the multiplicity of record formats that archivists have to deal with, thereby increasing the need for standards. Nero (2015:290) identifies standards that have been in use since the 1980s in USA and the UK which have been adequate in producing collection-level descriptions for enhancing access by users. They include the data structure standard *MARC for Archival and Manuscript Control* and descriptive standards: the *British Manual for Archival Description* and *Rules for Archival Description* in Canada and *Archives, Personal Papers, and Manuscripts* for the USA. The International Council on archives developed a standard for international use in the 1990s known as the *General International Standard Description* (ISAD) (G) which is in use to date.

Descriptive tools used to capture and convey descriptive information are known as finding aids (for example, inventories, guides, calendars, indexes, catalogues, among others). Nero (2015:290) explains that archival finding aids comprise of two parts, that is the arrangement of the collection (content lists with box and folder numbers) and contextual or descriptive information pertaining to the collection (provenance, biographical/administrative history, abstract and scope notes). Archival repositories must actively engage in the preparation of good quality finding aids to enhance discoverability and access to archival collections.

3.6.1.5 Storage and preservation of digital archives

“Nothing has been preserved, there are only things being preserved [...] The work is never finished” (Owens 2017:7).

Digital preservation refers to the overall continuous activities focused upon maintaining the semantic meaning of materials that are digitally born and documents created using recording and imaging technologies, and ensuring their long-term storage, access and use by future generations (Adu and Ngulube 2016:749; Decman and Vintar 2013:408; Ross 2012:45; Groenewald and Breytenbach 2011:242). The summarized definition from literature is a confirmation that preservation of information materials in all formats is not a singular event but an ongoing process throughout the lifespan of the materials (Lischer-Katz 2020:254). In the same vein,

Owens (2017:7) emphasized that the work (of preservation) is never finished; hence reference can only be made to what we *are* preserving, not what *has been* preserved. Consequently, the concept of digital preservation continues to generate a lot of interest in public sector organisations, in Africa and around the globe (Adu and Ngulube 2016:748).

In practice, the storage function in archival repositories precedes preservation but the latter determines the continued accessibility of the stored data. According to Phiri (2016:83), digital records can be stored in a number of ways which include the following:

- i. Online storage on an agency's server, on hosted storage such as the cloud;
- ii. Offline enabling quick retrieval via a near-line storage system, then accessed online;
- iii. Removable media for example, CDs, magnetic tapes, DVDs, USB sticks and memory cards. However, these devices have a limited lifespan and are usually not accessible directly.
- iv. Outsourced storage where an organization's financial capability, storage capacity and ICT resources are limited.

Universities should preserve archival materials to ensure they meet legal compliance requirements and remain accountable to their stakeholders (Calhoun 2014:78). This boils down to safeguarding records in all formats against agents of deterioration and threats to information. Deterioration refers to changes that take place in the state of an object or material, causing a deviation from its original form as a result of the effect of agents of destruction (Bankole 2010:415). In essence therefore, all materials including cultural and heritage resources are prone to deterioration, prompting the need for digital preservation. For many decades, information and recordkeeping professionals have been concerned with paper degradation and deterioration because this has been the primary recording medium for mankind over a long period of time. According to Bankole (2010), paper mainly comprises of cellulose and other constituents like hemicellulose, pectins, proteins, lignin, tannins, waxes, among others, which give it a high tendency for biodegradation. Thus, preservation of paper records remains a key concern in archival sciences since most of the past records are

on paper (Bankole 2010:415), forcing archivists to operate in hybrid environments, especially in developing countries.

Rapid technological developments experienced in recent years have transformed the field of archival science (Adu 2018:650), corroborating the sentiment of Tripathi (2018:8) that the task of information preservation has increased in complexity in the present era of technology. Consequently, recordkeeping professionals must be well prepared and equipped to preserve and provide access to digital records (International Council on Archives 2016). Adu (2018:650-651) reiterates that twenty first century archivists must keep pace with the constantly changing technologies and adopt strategies that will enable optimal management of memory resources for the benefit of generations to come. The propensity to destroy digital records is quite high, with some social media records being destroyed immediately after being accessed by the public (Council of Canadian Academies 2015). Messaging applications such as Hash, Snapchat, Wickr and Confide allow images and messages on devices to self-destruct after they have been accessed (Crook 2013 in Adu 2015:228). Unlike the analogue records such as paper, sculptures and photographs which have lengthy life spans going beyond decades and even centuries, digital records must be carefully preserved for them to weather through the technological terrain and remain accessible long into the future (Bhat 2018 in Adjei, Mensah and Amoafu 2019:82). Adu (2015:70-9) and Li and Banach (2011:1) highlight some of the problems that necessitate digital records preservation including the large volume of data, the hardware and software obsolescence, deterioration of storage media, technological obsolescence, lack of awareness, security and privacy issues, copyright issues and legal deposits, lack of effective policies, amongst others. Other factors include e-governance, legislative compliance and open government data requirements as additional contributory factors for digital preservation (Adu 2015:61-7). These issues and occurrences in the digital world impose upon organizations the need to adopt digital preservation strategies to preserve and secure archival resources long into the future.

Digital records must be rendered before they can be viewed by the human eye. However, software and hardware obsolescence threaten renderability of digital records and require interventions such as refreshing, emulation and migration (Adam 2010:597). Asogwa (2012:206) observed that in Africa, digital media deterioration

has been identified as the major cause for the inaccessibility and loss of digital records. This is attributed to media decay which occurs within five years after digital records creation or capture, owing to harsh environmental conditions in Sub-Saharan Africa which hasten digital equipment degradation. Other factors include loss of digital media during virus attacks or lack of or inadequate programmes and plans for digital records management (Asogwa 2012:206). Consequently, storage and preservation of digital records and archives must be followed up with enforcement of security measures to safeguard records authenticity, integrity and reliability because digital records can quite easily and quickly be changed, deleted, updated, copied and moved (National Archives of Australia 2015). The motivation for digital preservation therefore stems from the importance of maintaining the ability to retrieve, display and use d-records in the face of disruptive technologies and institutional infrastructures (Kalusopa 2018:168).

Groenewald and Breytenbach (2011:237) posit that digital archives should be preserved in their formats of creation without adding any restrictions to their access or other conditions whatsoever. However, scholarship notes that archival institutions in developing countries continue to face challenges in storing and preserving the content in their collections for provision of long-term access to users (Adjei, Mensah and Amoafu 2019; Adu 2015; Adu and Ngulube 2016). The IRMT carried out a study in five countries in East Africa (Kenya, Burundi Tanzania, Rwanda and Uganda) and established that recordkeeping issues in the government sector were not sufficiently addressed, resulting in poorly organized records (International Records Management Trust 2011). The recommendation of the study was that governments and organizations should adopt digital preservation programmes, considering the rapidly changing technological landscape which accelerates deterioration of digital records. The International Records Management Trust and the International Council on Archives have stressed the necessity for recordkeeping professionals in the African region to be provided with the required support to deal with digital preservation challenges (International Council on Archives 2016). Nevertheless, archivists should shift away from reactive approaches where swift action is taken to save damaged and threatened materials, and instead embrace a proactive approach of preserving digital records (Li and Banach 2011:1) by instigating digital asset management practices throughout the lifecycle of digital records. In this regard, global digital preservation

efforts embraced by archivists in organizations today have encompassed best practices, advocacy, collaborations and training of staff (Adu 2018:661). The OAIS Reference model is one of such initiative geared towards providing guidance for digital archives preservation. Recordkeeping professionals in Africa should similarly embrace best practice in digital preservation and archiving. da Silva and Borges (2017:318) advise that information repositories including archives should develop preservation programmes and policies to provide the formal mandate for all functions relating to digital preservation. For example, in USA the Library of Congress was granted the mandate to lead a nationwide campaign for the long-term preservation of digital content, following the enactment of the National Digital Information Infrastructure and Preservation Program legislation by Congress in December 2000 (Adu and Ngulube 2016:749). In 2002, similar efforts were made on the African continent when 40 representatives from 25 countries converged in Addis Ababa to discuss the prevailing dangers for digital records which included technological obsolescence, insufficient funding, lack of top management support and skills gap, among others. Practical proposals were put forth regarding the development of policies, standards and techniques for digital preservation, though these have never been implemented satisfactorily (Adu and Ngulube 2016:749).

Despite ongoing global and regional initiatives in preservation, studies undertaken in Africa have highlighted challenges that organizations in Africa continue to face when it comes to preserving digital records and archives, which include:

- i. Poor technological infrastructure and inadequate resources to enable preservation practices;
- ii. Lack of policies, standards and procedures to regulate the creation, storage, retrieval and preservation of digital information resources;
- iii. Inadequate metadata;
- iv. Poor collaboration efforts and partnerships;
- v. Lack of trained staff or experienced professionals in the management and preservation of digital resources; and
- vi. Insufficient funding and lack of support from the management (Masenya and Ngulube 2019:2; Ngulube 2012:131-2).

The problems identified above are similarly faced by archival repositories in public sector organizations and universities while managing digital archival materials. Findings of the study by Kamatula and Kemoni (2018:81) indicated that government offices lacked long-term preservation strategies for digital records and archives. Similarly, Wamukoya and Lowry (2013:154) reported archival repositories in the East Africa region lacked formal digital archival management and preservation strategies. Today, many African countries are still struggling with the same problems arising from the integration of digital technologies in records and archives management, confirming the view that most of those recommendations are yet to be implemented. In South Africa for example, Katuu (2018:38) notes that digital preservation of records has not been a priority topic for professional discussion in the country, thereby contributing to the challenges faced in the long-term preservation of digital records. In Kenya, Ambira, Kemoni and Ngulube (2019:306) identified the inept management of digital records as a gap that should be addressed in all public ministries and organizations. Therefore, the present study zeroed in on the preservation challenges enshrouding digital archives in public universities in Kenya and presented best practice strategies to enhance their management. Some preservation strategies for digital archives identified in the literature include technology preservation, backup strategy, migration, refreshing, emulation, encapsulation, cloud computing and Linked Open Data (LOD) (Anyao, Echedom and Baro 2019:44-5; Adu and Ngulube 2016:752-4).

3.6.1.6 Preserving digital archives in the cloud

Cloud computing is not a new term, the ‘cloud’ concept has been around since 1997 (Shave 2015:18). There is no single definition for the term “cloud computing”. Mell and Grance (2011:2) describe cloud computing as a model that permits global, on-demand and convenient access to a shared pool of configurable computing resources which include storage space, networks, servers, services and applications that can be tapped into with minimal restrictions or intervention by service providers. Askhoj, Sugimoto and Nagamori (2011:176) settled upon four characteristics that define cloud computing:

- i. Cloud computing is a scalable, abstracted platform for enabling service delivery;

- ii. The platform utilizes existing technologies that can be defined through a layered model;
- iii. The platform and services can be accessed on a pay-per-use basis over the internet, and;
- iv. The quality, number and availability of services are provided in accordance to cloud service provider agreements.

According to Shave (2015:20), there are four cloud models as depicted in Table 3.2.

Table 3.2: Cloud deployment models

Community cloud	This is a cloud infrastructure which supports a specific community or communities and is shared by a number of organisations.
Private cloud	This type of cloud is also referred to as a corporate or internal cloud. It is cloud infrastructure owned and operated by one single organization and is either managed by the organization or by a third-party, and is hosted externally or internally.
Public cloud	This type of cloud consists of a service provider offering resources, such as infrastructure and applications (operating system, server, storage, network connectivity, etc.) to individuals, an organization, a group of organizations, or the general public over the Internet.
Hybrid cloud	This cloud combines public and private clouds as well as on-premise solutions that are connected together to deliver the benefits of multiple deployment models.

There has been a marked increase in the use of cloud services in the African continent which is attributed to increased internet penetration in the region (Mosweu, Luthuli and Mosweu 2019:5). In the past decade, many business entities have become more reliant upon cloud storage technology as a means of providing outsourced software, storage and infrastructure (Duranti and Rogers 2012:523). The study by Gantz and Reinsel (2012:2) projected that by the year 2020 nearly 40 percent of digitally

generated content will be stored in the cloud. Hardly ten years down the line and with the ongoing COVID-19 pandemic, the creation, distribution and access of digital content in the cloud is undeniably today's universal "new normal". Many of these clouds are operated on the public internet by large companies such as Google and Amazon which have the advantage of according savings on costs through shared storage space by creating agencies and archival institutions or repositories, thereby eliminating unnecessary duplication (Guo, Fang, Pan and Li 2016:173; Askhoj, Sugimoto and Nagamori 2011:176).

Despite having the benefits of seemingly infinite storage, lower storage charges, real-time service provision, remote global access and sharability, as well as reduced pressure on an organisation's IT unit, the technical fundamentals of cloud computing cast doubts on the ability of cloud service providers to maintain the authenticity of records transferred to them for custody, and provide proof of the same (Duranti and Jansen 2013:161; Stuart and Bromage 2010:218-9). Mosweu, Luthuli and Mosweu (2019: 11-12) identify barriers to the successful implementation of cloud computing in Africa as including the digital divide, unpredictable nature of cloud services, data (in)security, non-compliance with legal requirements, interoperability and lack of open standards. The risks associated with custodial transfer (breaking the custodial chain of ownership) is the main reason behind the sluggish buy-in for cloud computing by a cross-section of recordkeeping professionals, especially archivists who hold the notion that digital records should be stored and maintained by their creators (Duranti and Rogers 2012:530; National Archives of Australia [NAA] 2004:17-18). In agreement with this sentiment, Duranti and Jansen (2013:51) caution that records and archives professionals should address specific issues in cloud computing which include but are not limited to data security and trust, custodial transfer, loss of jurisdictional control and legal compliance. Towards this end, Stuart and Bromage (2010:223) advise that organizations should carry out "due diligence" prior to making the decision of entrusting their archival records to third parties. Additionally, the post-custodial debate sparked off a new thinking whereby archivists are called upon to be "agenda setters" by playing a supervisory role over cloud providers, carrying out inspections, issuing suggestions and guidance in form of policies for the provision of cloud services to archival repositories and enforcing rules and regulations (Guo et al 2016:173; Duranti and Jansen 2013:164).

Despite the increases popularity of cloud computing globally, many countries and professions continue to view the technology suspiciously. Findings of a study by Pan (2019) in two Chinese enterprises indicated that there was little impact of cloud-based services on the recordkeeping function in the organizations. Citing ResearchICTafrica.net (2017), Mosweu, Luthuli and Mosweu (2019:5) reported that although a number of organizations in Kenya have adopted cloud computing, government support for this technology has been minimal. Consequently, this study took cognizance of cloud computing and other preservation technologies which archival repositories must choose from to guarantee the long-term storage and survival of their archival resources.

3.6.1.7 Preserving authenticity, integrity and reliability in digital archives

Records authenticity, integrity and reliability are fundamental to the digital preservation process and are very important in the archival world (Bhebhe 2015:107), because records can only be trusted where these attributes can be demonstrated, despite periodic migration across digital media, hardware and software (Ismail and Jamaludin 2009:137). E-records are normally fragile, and their integrity depends on the ever-changing hardware and software. Unless digital records are adequately protected, governments will fail to guarantee their authenticity, availability and usability over time (Lemiux 2016:5).

Since time immemorial, archival theory and practice have rested on the foundational concept that archives are home to reliable, authentic and trustworthy records (Guo et al. 2016:171). However, (Duranti 2010:79) expressed concern that the prime challenge for digital recordkeeping systems is creating and maintaining reliable records and preserving their authenticity over time. Duranti (2010:83) distinguished between the preservation of digital and analogue records by explaining that the authenticity of the latter is achieved by maintaining them in the exact state and form that they were in at creation or receipt, while digital records authenticity is maintained through continuous refreshing and periodic migration. The concept of migration was clearly explained by the Commission on preservation and access and the Research Libraries Group (1996:6) as follows:

Migration is a set of organized tasks designed to achieve the periodic transfer of digital materials from one hardware/software configuration to another, or from one generation of computer technology to a subsequent generation. The purpose of migration is to retain the ability to display, retrieve, manipulate and use digital information in the face of constantly changing technology. Migration includes refreshing as a means of digital preservation but differs from it in the sense that it is not always possible to make an exact copy or replica of a database or other information object as hardware and software change and still maintain the compatibility of the object with the new generation of technology.

Although migration is commonly used in digital archiving, the process results in some degree of loss and changes in the structure and content, thereby affecting the reliability, authenticity and integrity of digital records (Asogwa 2012:206). Similarly, the process of creation for some digital record formats can reduce their authenticity. For example, as e-mail messages are replied to, copied, forwarded, they may be altered or edited, thereby compromising their authenticity and integrity as records (Asogwa 2012:206). In addition, Jansen (2015:48) points out that when a record is removed from the system where it was originally created, for example through conversion or migration, the authenticity of the record becomes compromised. Therefore, the fixity of digital records is not guaranteed (Bhebhe 2015:116), calling for the implementation of digital preservation strategies to ensure continued access and trust for the retrieved records.

Lemieux et al. (2019:5) speculate that today's business arena is bedeviled by a crisis of trust. The InterPARES project defines trust as the "confidence of one party in another, based on alignment of value systems with respect to specific actions or benefits, and involving a relationship of voluntary vulnerability, dependence, and reliance, based on risk assessment" (InterPARES 2015). In the recordkeeping context, this definition presupposes the existence of records in an environment of threats, which must be conquered for the records to survive. Records therefore acquire the quality of trustworthiness by virtue of its accuracy, reliability and authenticity. The results of InterPARES 2 Project affirmed that accuracy relates to the extent to which records are truthful, precise, correct and pertinent to the subject matter. Hence,

records authenticity is inextricably linked to the quality of integrity, which is the proof that a record is free from tampering (InterPARES 2015). The integrity of a record is therefore judged from the manner in which records are handled and maintained over time, commonly referred to as the chain of preservation or custody (Lemieux 2016:112). Notably, the fast pace at which technology keeps changing has increased the importance of ensuring records authenticity for societal, legal and research purposes (Jansen 2015:46).

Duranti and Rogers (2012:525) equate reliability to trustworthiness of a record as a factual statement grounded on its authorship, process of creation and overall completeness. The authors suggest that the quality of reliability can be assured by introducing and enforcing the following requirements for controlling digital records:

- i. Compiling records using standard templates and formats;
- ii. Authenticating records by use of specific conventional methods;
- iii. Embedding access privileges by assigning rights to system users based on specified competencies, the permission to retrieve, read, annotate, compile, classify, transfer, or destroy specific records;
- iv. Embedding workflow rules in the e-records system defining the individual(s) authorized to perform each action for each specific group of records;
- v. Controlling access to the system and specific records using magnetic cards, passwords, fingerprints, among other technologies; and
- vi. Designing audit trails so that all access to the system and changes thereof can be documented in real-time (Duranti and Rogers 2012:525).

Considering the above aspects, it is clear that archivists are also engaged in digital forensics which for a long time has been associated with criminology and intelligence units. Digital forensics provides an emerging source of approaches and tools for facilitating long-term preservation by detecting forgery and manipulation as well as generally protecting archival evidence (Digital Preservation Coalition 2015:33).

In retrospect, digital archives repositories have the responsibility of preserving and availing records possessing all three aspects of trustworthiness (that is, authenticity, integrity and reliability). This is a tall order in the present-day cyberspace (in)security dispensation where digital systems and the internet are the kingpins driving the wheel of information management in organizations and academic institutions. Archivists and

records managers must confront and deal with the myriad of information security threats occurring in cyberspace, commonly referred to as cyberspace crimes which affect the trustworthiness of digital records and archives. In this respect, the InterPARES Trust Project recognized that blockchain and distributed ledger technologies (DLTs) can be applied to records management and digital archiving to secure digital records from tampering and manipulation (Bralic, Stancic and Stengard 2020). Though there is no universally agreed definition of blockchain, the term can be described as a form of open-source technology which supports reliable, authentic records of business transactions stored and preserved in automated accessible ledgers which are devolved and distributed (Lemieux et al. 2019:6), a technology that is mainly applied in financial, land and health records. However, research is still underway regarding the use of blockchain technology in digital records and archives authentication.

3.6.1.8 Access to digital archives

An archival repository is not only as good as the size of its collection, but also the utility or usability of the archival records that make up its collection. Access is a key function of Archives and archivists. Saurombe and Ngulube (2016:25) warn that archival institutions risk being rendered meaningless to society if the materials in their collections are not accessed and used. This view is supported by Greene (2010:190) who points out that meeting user needs is the *sine qua non* of archives management, hence meticulously prepared finding aids should be provided by archival repositories to promote access and use of archival records. Pearce-Moses (2005) defines the concept of access as the process of making records available for consultation, guided by finding aids and in conformance with the existing legal requirements. From this definition, the Archive is perceived as a “powerhouse” where the archival staff engage in the continuous business of enticing potential users to access and utilize the “goodies” in their keeping. Therefore, access entails availing archival records held by the Archives for reference when required by users.

Garaba (2012:22) ponders that Africa has a rich archival heritage resulting from the century-long struggle for independence from its colonial masters, which should be properly preserved and passed on to future generations for posterity. This is made possible through the implementation of rigorous access programmes by archival

repositories. According to Bacon (2014), access to government records encourages citizen participation, promotes democracy, transparency and accountability, while secrecy and dishonoring citizen's privacy are tenets of dictatorship regimes. In the same vein, Chaterera (2017:3) posits that access and use of archives contributes towards the political, social and economic development of citizenry. Further, Thurston (2015:704) and Murambiwa and Ngulube (2011:92) concur that access to public archives promotes transparency, accountability and good governance and accords people the opportunity to exercise their rights as citizens in a country. Matangira and Lowry (2013:78) share similar sentiments and concur that citizens can be inclined to vouch for their government's integrity and honesty if they are allowed access to public records.

In view of the societal significance of archival materials, preservation is recognized as a key concern for archivists in ensuring the continued survival and access of archives, otherwise known as digital continuity. An et al (2017:22) define digital continuity as the maintenance of digital information in a way that ensures the information is readily available when required and the surety that the information remains continuously accessible, usable and trustworthy for the required length of time. Therefore, digital continuity constitutes a rounded approach that aims to ensure trustworthiness, traceability and findability of digital archives in support of digital identity, e-discovery, online culture and prolonged digital life of the archival resources.

Open data and LOD are the current technological trends in the access of archival materials. In a study examining the extent to which social media platforms provide new opportunities for promoting access to archives, Garaba (2012:27) expressed the need to ensure survival and increased accessibility of archives by the public, especially in the present Millennial era where the generation of records is predominantly on social media platforms. Bacon (2014) cautioned that just as preservation is affirmed by one's ability to access a record, accessibility can be measured by whether a record can be retrieved, comprehended and used for a specific purpose. Therefore, the two functions of preservation and access are intertwined in a continuum of related archival activities.

Saurombe and Ngulube (2016), Onyancha, Mokwatlo and Saurombe (2013), Ngoepe and Ngulube (2011) voiced the need for archival institutions to strengthen their public image and improve on their accessibility and visibility. In agreement with these sentiments, Garaba (2012:26) alluded to the long-held perception of archives having an image problem and postulated that the onus was upon archivists to create a web presence by developing strategies to sensitize and educate potential users about the materials in their digital archival repositories. To this effect, Chaterera (2017:70) reiterates that digital technologies have unique offerings and opportunities for archivists to leverage in boosting the accessibility and use of resources in archival institutions and repositories.

Presently, archival repositories are increasingly engaging in outreach and advocacy programmes to enhance access to their resources and increase their reach, for example by digitizing their collections and creatively utilizing the new technologies which enable remote web access (Garaba 2012:22). Some commonly used technologies for outreach and advocacy include mobile devices, social media (Facebook, blogs, twitter, Wikipedia, among others), multimedia, online applications and cloud computing (Chaterera 2017:10; Garaba 2012:27-8). This new trend has been lauded by a number of scholars who have carried out studies on the opportunities presented by social media as a tool for promoting accessibility of archives (Mukwevho and Ngoepe 2019; Garaba 2012; Kallberg 2012). Besides outreach and advocacy activities, public programming has also been encouraged by scholars as a strategy for promoting access and use of archival materials (Saurombe 2016; Saurombe and Ngulube 2016; Kamatula 2010; Ngoepe and Ngulube 2011). Nevertheless, archivists need to equip themselves with relevant skills to keep pace with the changing technologies in order to persist and continue in the quest to ensure discoverability, findability, accessibility and usability of digital archives by future generations.

Privacy and security issues are intricate concerns for digital archives in universities because of the varied needs for confidentiality and privacy (Brantley 2010:9). Just like for paper records, archivists must develop access policies to protect the confidentiality of digital archives and to define any existing restrictions to safeguard the privacy of the records. In this regard, metadata is essential in affirming the authenticity of digital archives, maintaining their contextual value and enabling their

efficient retrieval, access and use (Brantley 2010:10). Additionally, system security should be enforced at all levels (that is, system log-in, folder and file levels) by making use of technologies such as passwords, encryption and digital signatures to protect records while on transit across networks, more so in this era of de-perimeterisation or open interconnected environments (Cherdantseva and Hilton 2013:2-5). The choice of security strategies to be adopted is dependent on the format of digital archives, as well as the ICT architecture in use (Ambira 2016:90).

Last but not least, the process of records access must be guided by legal and regulatory requirements at national and organizational levels. Bacon (2014) advises that greater legal freedom to access records should be encouraged by enacting national laws that are permissive to access. Kallberg (2012) carried out a study on the role of archivists in the digital (Web 2.0) era and disclosed that archivists need skills in interpreting and applying archival legislation to guide them in making decisions on retrieval and access of archives for public use (Kallberg 2012:101). Therefore, archivists should possess knowledge and skills in legal interpretation to guide them in making decisions on access of archives. The issues revolving around records access in the age of digital technologies resonated well with the focus of this study and constituted an essential segment of this research in the context of higher learning institutions.

Efficient and effective digital archiving is a consequence of systematic and intentional records management from the point of creation to disposal. The researcher has provided a preview of continuum management activities for records in the preceding section. The records continuum model is the predominant universal framework for the management of records and is the basis for ISO 15489-2016, which is globally accepted as the best practice standard for the life-cycle management of records in all formats (Colwell 2020:24). Therefore, the present research paid attention to all recordkeeping requirements in the RC model throughout the study.

Metadata and digital archiving

Metadata focuses on aiding in the discovery of information resources and is simply defined as *data about data*. Recordkeeping professionals must concern themselves with collecting as much ‘data’ about ‘data’ as possible right from creation

(Plozszajski 2017:16). According to ISO 15489:2001 Standard (section 3.12), metadata is data describing the content, context and structure of records as well as their management through time, which includes security issues, conditions of use, relationships and linkages to other records, and to records creators and business processes. Citing Beagrie and Jones (2008), Laughton (2011:51) defined metadata as information describing essential elements of a resource. A more befitting definition adopted for this study is provided by Robertson and Cunningham (2013:191). They define metadata as structured, descriptive information that enables archivists to locate, understand, manage, control and preserve d-records over time. This definition is supported by the UNESCO/PERSIST Content Task Force (2016:12) in their declaration that the five basic functional requirements for d-records metadata include enabling identification, location, description, readability and rights management.

There are six distinct types of metadata identified in the literature namely:

- i. Structural metadata (gives information about how digital objects in a record group relate to each other);
- ii. Descriptive metadata (provides information about digital objects to ensure their identification and retrieval);
- iii. Administrative metadata (gives information about provenance, format types and rights);
- iv. Preservation metadata (a subset of administrative metadata, preservation metadata documents the provenance of digital objects and the maintenance actions applied to them over time);
- v. Provenance metadata (useful for evaluating the trustworthiness and authenticity of d-records); and
- vi. Rights metadata (useful for controlling access to digital records and their content) (Note 2020:38; Plozszajski 2017:16).

Groenewald and Breytenbach (2010:241) reiterate that for digital objects to have any meaning to users, the content must be described with structural, technical and descriptive metadata at creation. Therefore, metadata is important in enhancing the accessibility and use of archival records, especially in digital and hybrid environments. Baron and Thurston (2016:212) opine that computer systems should be designed to systematically capture records along with metadata that describe their

context, content, structure and management; otherwise the captured information will lack legal value because it will not be possible to demonstrate that it is authentic. The authors further advised that recordkeeping systems should be designed to automatically and systematically capture records together with metadata describing their content, context and structure and accompanying management activities, for purposes of maintaining their authenticity and subsequent legal value as evidence of business transactions (Baron and Thurston 2016:212).

Robertson and Cunningham (2013:195) summarized the purposes of recordkeeping metadata as constituting documentation of metadata attribution; documenting the history of recordkeeping events; establishing connections between related entities; identifying all entities at all levels of aggregation; sustaining record structure, content and accessibility through time; administering or resolving recordkeeping business, including terms and conditions of access, use and disposal; and; facilitating discovery, understanding, retrieval and delivery of records.

Whereas documents may be stored in document management systems or word-processing systems for example, metadata is stored in different systems such as workflow management systems, e-mail systems or registry systems. In a nutshell therefore, to ensure effective preservation of digital archives, the metadata captured should include provenance, authenticity, preservation activities, technical environment, and rights management issues (Oehlerts and Lui 2013:89). The longevity of metadata about metadata (or meta-metadata) is therefore crucial in maintaining metadata over a long period in a usable and understandable state (Adu 2015:86). The success of digital archiving practices is determined by the importance accorded to the task of metadata harvesting, an aspect that the present study did not to ignore.

3.6.1.9 The archivist's role in digital archiving

Archival repositories exist as the institutional memory in universities by playing the important role of collecting, receiving, organizing, managing and providing access to the universities' information resources in all formats and media (Netshakhuma 2019b:66). By executing these processes, archival and records practitioners meet and satisfy the information needs of their users. The archival community comprises of

archival academics, policy makers, manuscript curators and practicing archivists who are responsible for promoting the social use of records and can select, take care of, and enable access to archival heritage irrespective of their format. Hence, archivists' competencies include repository management, policy development, appraisal, ownership, donor relations, creation, intellectual property trustworthiness, use and reuse contexts, access and use restrictions, authenticity, provenance, metadata cyberinfrastructure and permanence (Akmon et al. 2011:331).

The challenge for archivists to respond to social and political issues from a historical perspective supplements the archivist's role of acquiring, organizing and preserving archival material (Lindsay 2011:36). This requires archivists to be knowledgeable on past and current issues. A study by Vassilakaki and Papaconstantinou (2017) established that educating researchers, faculty members and students in the management and use of archives is an important role for archival professionals in academic institutions. Other roles identified by the authors included those of a digital data curator, researcher, collection manager, recordkeeper and the dual archivist/librarian role (Vassilakaki and Papaconstantinou (2017:114-19).

Asogwa (2012:202) pointed out that archivists and records managers lacked fundamental competencies and skills for digital recordkeeping. Subsequently, Garaba (2015:217) voiced concern over the inadequacies in technical capabilities of archival custodians in the ESARBICA region and lamented that a select number of archivists are unwilling to embrace modern practices and systems and conform to new organisational cultures meant to transform archival practice and secure digital archives. Chigariro and Khumalo (2018:161) advised that the time is ripe for strategies in ERM to be developed and implemented in ESARBICA region which should constitute digital training aspects for archivists so that they are well prepared to undertake their roles and responsibilities towards society. This study endeavored to address this gap by establishing the competencies, knowledge and skills requirements of archivists in universities.

3.7 Legal and regulatory frameworks governing digital archives

Digital archives and records are exceedingly vulnerable and easily prone to rapid diminishing of their value as evidence from the time of their creation, unless clearly

defined legal and regulatory framework are enacted to protect them (Baron and Thurston 2016:212). National archival legislation is the basis for archives and records management programmes in a country (Mosweu and Simon 2018:70), and is a key tool for ensuring proper management, preservation and access of records in universities (Pereira 2018:221). Consequently, properly formulated legal and regulatory frameworks are a prerequisite for the effective and efficient management of digital archives in universities and state-owned organizations. This is because recordkeeping legislation determines the environment and infrastructure for records management in a country.

Sound management of digital records requires well-articulated legal and regulatory frameworks in the form of policies, laws, best practices and standards (ISO 15489 – 1: 2016:8; Okello-Obura 2011:6). The ISO 15489-1 2001 Records Management Standard identifies five levels in the regulatory environment: community expectations; voluntary codes of best practice; statutes and governmental regulations; voluntary codes of conduct and ethics, and; mandatory standards of practice. Kabata (2019:109) identifies acts, best practice standards, ethical codes and codes of conduct as constituting the legal and regulatory environment for recordkeeping and reiterates that these instruments are key in providing procedures for carrying out recordkeeping activities including archives management. In the context of the current study, legal and regulatory framework for digital archiving will comprise recordkeeping legislations, policies and programs, standards, best practices, codes of conduct and ethics.

Governments around the world have developed legislations to give guidance on management of records and archives in their countries. Kabata (2019:124) avers that well formulated recordkeeping legislation clearly articulates the lifecycle management process for records which guarantees their effective management. As noted by Ngoepe and Saurombe (2016:24), recordkeeping legislation which in most countries is in the form of national archives act, impacts upon the way records (including digital archives) are managed. Further, the authors explain that recordkeeping legislation provides a clear mandate for records management by specifying practices and procedures to be followed throughout the life-cycle of records (Ngoepe and Saurombe 2016:24). For example, archives and records management in South African

universities is governed by the National Archives and Records Service Act of 1996, Protection of Personal Information Act (Act No. 4 of 2013) (POPIA) and PAIA Act No. 2 of 2002. Two additional legislations were promulgated in 2002 to address digital records, that is, the Electronic Communications and Transactions (ECT) Act and the Regulation of Interception of Communications Act (RICA) (Katuu and Ngoepe 2015:3). In Tanzania, the main instruments guiding archives and records management are the Records and Archives Management Act of 2002 and the Tanzania Electronic Transactions Act of 2015 (Kamatula and Kemoni 2018:78).

According to An, Deng and Zhang (2014:148), existing recordkeeping legislation in China is not in tandem with the rapid changes in technology. The authors additionally report that there has been growing attention to the development of a legal and regulatory environment for the management and use of national archival resources. Similarly, many countries in Africa have legal frameworks for records and archives management (Netshakhuma 2019a; Okello–Obura 2011), but in practice they are not effective, especially in the current digital dispensation. Notably, existing archival legislations for recordkeeping in the region have not kept in stride with digital technologies, with most of these laws being inclined towards paper records, thereby impacting negatively on ARM programmes in universities (Asogwa 2012:206-7). As alluded by Kalusopa (2011:118), the reason for this mishap could be that there has been no proper input and guidance to planners and policymakers from records managers, information managers and archivists in the ESARBICA region. Specifically, Asogwa (2012:207) highlights a number of legislation problems in Africa which include absence of legal definition for electronic records, absence of laws that allow for legal admissibility of electronic records in court, laws that define the role of Archives as a strictly custodial one, among others.

A study undertaken by Kamatula and Kemoni (2018:78) revealed that the management of public records in Tanzania is governed by the Records and Archives Management Act of 2002 which was seemingly ineffective and inadequate, especially in addressing e-government initiatives and digital records management. The law lacks provisions for regulatory requirements to guide government institutions and organizations to effectively manage digital records. Additionally, the study also found that even though the Tanzania Electronic Transactions Act of 2015 grants legal

admissibility to digital records, it falls short of providing specific guidance on digital records management (Kamatula and Kemoni 2018:78). In most Southern African countries, archival legislations are obsolete and need to be reviewed, especially because they do not adequately cater for digital archives and records management (Katuu and Ngoepe 2015:12). Luyombya (2010:157) lauded the decision by some African countries to update and renew their archival legislations and encouraged that the former legislations should be reviewed to incorporate key issues such as digital preservation, authenticity and general management procedures.

In Kenya, management of all public records is administrated by Public Archives and Documentation Service Act, Cap 19 of the Laws of Kenya. The Act generally defines public records as records created by any government department, ministry, commission, local authority, or any other body established under or by an Act of Parliament (Kenya 1991). However, the shortcomings of the Public Archives and Documentation Service Act have been highlighted by various scholars, specifically on the failure to define and address digital records and archives issues. Highlighting findings of the study by Ambira (2016:178), Kabata (2019:111) noted that the Public Archives Act Cap 19 did not explicitly address digital records management. This corroborated with findings of the study by IRMT (2011) which found that the Act did not define digital records, neither did it give guidance on their management. The two studies recommended a review of the Act to integrate definitions of digital records and archives and to comprehensively address digital recordkeeping procedures (Kabata 2019:111; IRMT 2011). The present study established that the process of reviewing Cap 19 was in progress with a draft policy already submitted to the Attorney General and awaiting approval. Among other newly integrated issues, the proposed Act gives absolute recognition to digital records and their management.

3.7.1 Access to information laws

Access to information (ATI) laws are enacted for the sole purpose of providing a formal mechanism for citizens to access state-held information which public bodies are required to avail to citizens for access (Odote 2015:1). ATI laws define the process for submitting a request for information, releasing or denying a request for information and the subsequent appeal process in the event of denied requests (Kabata 2019:1). Access to information is an important and basic human right recognized

internationally, regionally and nationally as the cornerstone of all freedom rights of citizens since it takes the centre stage in the attainment of all other democratic privileges and rights (Odote 2015:5). At the international level, access to information (ATI) otherwise known as right to information (RTI) has its origins in the first session of United Nations General Assembly (UNGA) held in 1946 where it was resolved that:

Freedom of information is a fundamental human right and ... the touchstone of all the freedoms to which the UN is consecrated (United Nations General Assembly [UNGA] 1946: 95).

This statement was adopted and confirmed as Article 19 of the Universal Declaration of Human Rights (UDHR) on 10 December 1948 by the UN. It states in part as follows:

Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers (Universal Declaration of Human Rights [UDHR] 1948 cited in Odote 2015:5).

Article 19 gained official recognition in December 1966 through the adoption of the International Covenant on Civil and People's Rights (ICCPR) of the United Nations (UN) General Assembly resolution 2200A.

In Africa, the African Charter on Human and People's Rights' (ACHPR) was adopted by the African Union in 1981 and came into effect in 1986. 'Article 9' of the charter states that: every individual shall have the right to receive information; and; every individual shall have the right to express and disseminate his opinions within the law (African Union [AU] 1986: 4). Later, in 2002, African countries adopted a Declaration of Principles on Freedom of Expression in Africa, during an ordinary Session of the African Commission on Human and Peoples Rights (ACHPR) in Banjul, Gambia. It states that:

Public bodies hold information not for themselves but as custodians of the public good and everyone has a right to access this information, subject only to clearly defined rules established by law (African Union [AU] 2002:3).

South Africa was the first to pass the Promotion of Access to Information Act (PAIA) in 2000 and it went into effect in March 2001. The Act was intended to “foster a culture of transparency and accountability in public and private bodies by giving effect to the right of access to information and to actively promote a society in which the people of South Africa have effective access to information to enable them to fully exercise and protect all of their rights” (Botha 2018:5).

In Kenya, Article 35 of the constitution provides for the right of access to public information by citizens (Odote 2015:9), which guides citizens in making informed decisions, and holding their leaders to account. Article 35 stipulates thus:

- 35(1) Every citizen has the right of access to-
 - (a) information held by the state; and
 - (b) information held by another person and required for the exercise or protection of any right or fundamental freedom.
- (2) Every Person has the right to the correction or deletion of untrue or misleading information that affects the person.
- (3) The state shall publish and publicize any important information that affects the person (Odote 2015:9-10).

According to Kabata (2019:66), Kenya has constituted legal instruments that facilitate the implementation of the ATI Act 2016. However, Kenya’s statutes contain outdated laws that are hostile to the openness agenda. Added to this, the delayed review of secrecy laws in the country, which are a further hindrance to openness points to lack of political will for effective implementation of RTI.

3.7.2 Privacy laws

Privacy laws such as the UK Data Protection Act of 1998 provide for the sound management of personal data captured in records, regardless of format (Luyombya 2010:62). Luyombya 2010:62) further submitted that the UK Data Protection Act contains seven principles which state that data must be:

- i. Kept secure;
- ii. Kept for no longer than necessary;
- iii. Obtained and used only for specified lawful purposes;

- iv. Processed fairly and lawfully;
- v. Processed in accordance with individuals' rights;
- vi. Adequate, relevant and not excessive in relation to the purpose(s) for which they are processed; and
- vii. Accurate and where necessary kept up to date.

The implementation of these principles embedded in the UK Data Protection Act implies that organizations should design effective systems that have recordkeeping functionalities. (Luyombya 2010:62-63).

3.7.3 Policies

Records in all formats need to be managed within a recordkeeping framework driven by procedures and policies throughout the records life cycle (Marutha and Ngoepe 2018:188-9; Ngoepe, 2017:35; Marutha, 2016:28). A records policy is a formal document outlining principles, procedures and practices for records management within an organisation or government organ in a country (Ismail and Jamaludin 2009). The purpose of a records or archives policy is to ensure evidence of all business transactions is captured and can be retrieved when required. The policy also aids in establishing contextual information regarding the records, that is the creator, specific business process for which it was created and the relationship to other records (Ismail and Jamaludin 2009:137). ISO 15489-1:2016 standard on records management recommends that countries and organizations should develop comprehensive records management policies, procedures and guidelines which will facilitate the creation and management of reliable, trustworthy, and usable records that can support business transactions for as long as they are required (ISO 15489 2001).

Developed countries seem to appreciate the importance and role of recordkeeping policies. In America for example, the government Archivist in response to a presidential directive issued a directive labeled "Managing Government Records Directive" (2012) which contained a comprehensive e-recordkeeping policy directing Federal agencies to manage all digital archives (Baron and Thurston 2016:208). Recently, a follow-up directive of December 31st 2019 required government agencies to meet that target by ensuring that all digital archives are managed to the fullest extent possible (Baron and Thurston 2016:208). In sharp contrast to this, most African countries lack records management policies while in some countries where such

policies are in place, they are inadequate and do not address digital records management. As observed by Mutula (2014:370), universities in Eastern Africa have a growing body of digital content including emails, but adequate legislations and policies for their management are lacking. Similarly, the study by IRMT (2011:12) investigating the alignment of ICT with recordkeeping in East Africa indicated that even though some of the countries like Kenya had policies governing the management of records, those policies did not address digital recordkeeping issues. A study carried out by Coetzer (2012:98) at the University of Zululand revealed that the institution did not have a records management policy, therefore digital records and archives were not formerly managed. In Tanzania, Kamatula and Kemoni (2018:78) found that the existing National Records and Archives Management Policy (NRAMP) of 2011 fell short of addressing digital records and archives management and therefore the policy did not provide the necessary guidance for digital recordkeeping. Additionally, no single public office in the country had an operational policy governing the management of digital records (Kamatula and Kemoni 2018: 78).

In Kenya, the government developed a draft national policy on records management in 2009 (Ambira 2016:114). Other policies related to digital records management in the country were identified, such as the E-Government Strategy of 2011 and the National ICT Master Plan which though recognizing the generation of digital records as byproducts of business processes, do not give due consideration and guidance on their management.

3.7.4 Standards and best practices

Adjei, Mensah and Amoafu (2019:84) posit that best practice in digital archives management and sustainable digital archives preservation is pegged upon compliance with the legal and regulatory environment which constitutes conformity to standards and statutes. Generally, the purposes of standardization are to describe the basics, core functions, activities, characteristics and attributes of a product or service (Smit 2013:63-3). Standardization enables professionals to counter existing and potential challenges by establishing common repetitive actions for best practices in any given context (Nascimento, Cabero and Valentim 2018:306). Therefore, the adoption of standards in any field of professional work leads to best practice in that field. In

Archival Science and records management, standards are important because of the following reasons:

- i. They provide guidelines, specifications and requirements;
- ii. They (should) present a current discussion of the field of practice reflecting on principles, foundations and working methods entailed in the management of records from creation to disposal;
- iii. They facilitate greater diffusion of the recordkeeping profession within the organization while also enhancing coordination with other professionals; and
- iv. They provide guidance on capacity building based on the embedded requirements (Nascimento, Cabero and Valentim 2018:317).

Ambira (2016:94) reports on the various global attempts by a number of international bodies to develop best practices and standards for DRM. They include the National Archives of UK (2006), International Council of Archives (2008), IRMT (2009), International Standards Organisation-ISO (2011) and National Archives of Australia (2011). Organizations such as the ICA and IRMT involved recordkeeping professionals from Africa and incorporated their contributions, hence the suitability of such standards to digital archiving in the African continent. Of these agencies, ISO 15489:2001 is the most cited and used technical standard by archivists and records managers globally, mainly because of its applicability to the continuum approach to recordkeeping. The standard contains two parts, that is, Part: 1 Records management (Concepts and Principles) – and the second part aimed at regulating guidelines (15489:2) (Nascimento, Cabero and Valentim 2018:311). There are however many other standards which are inclined towards archives, for example standards addressing description of archives, preservation strategies such as migration and digitization, metadata, functional and technical requirements, and so on.

One such standard for digital archives management is the OAIS which is a universally accepted functional model that doubles as a generic standard outlining the principles of long-term preservation of digital records irrespective of format (Laughton 2011:52). It was designed as a reference model that describes the steps and processes to be followed in the management of digital information, and was accepted in 2003 as an international standard (ISO 14721:2003) for long-term preservation of digital content (Laughton 2011:52). Unfortunately, its adoption and implementation in

African countries including Kenya has not been widespread, probably as a result of the slow development of digital archiving in the continent.

In view of the foregoing, the glaring question for our continent is how can Africa leapfrog and catch up with the rest of the world in matters digital archiving? Perhaps the answer lies in buttressing the legal and regulatory frameworks for digital archiving in individual countries, Kenya included, as well as conformance to standards and best practice models for digital records and archives management. This study agrees with Ambira (2016:28) that the legal and regulatory frameworks within which records are managed in Kenya do not adequately address the management of digital records and archives. This therefore calls for the development of an elaborate and comprehensive framework to ensure the adequate management of all digital records in Kenya. In this regard the current research investigated the legal and regulatory instruments that govern the management of digital archives in public universities, focusing on the OAIS and RC models as best practice model benchmarks.

3.8 Risk factors for digital archives in universities

Archival repositories face external and internal risks that impact on their set objectives. The *Australian New Zealand and International Standard for Risk Management (AS/NZS ISO 31000:2009)* defined risk as the possibility of something happening that will impact on objectives while risk management is defined as a step-by-step procedure for the evaluation of risk levels in organisations (ISO 31000: 2018). Jeurgens (2014:7) associated risk with the activities aimed at controlling damage and potential threats to records quality as a result of poor management. The author defined risk management as activities geared towards managing and controlling risks in order to achieve laid-down goals and aims. Therefore, in the context of digital archiving, risk is viewed as a negative occurrence which should be mitigated in anticipation of its occurrence.

Without proper standards for digital records creation, management and preservation, archival records will be prone to risks (Chigariro and Khumalo 2018:161). Lack of clear framework for digital records and archives management is in itself a source of risk to the stability, sustainability and quality of service delivery in public organisations including universities (Ambira, Kemoni and Ngulube 2019:306). Memory institutions such as archives, museums and libraries have to deal with risks

arising from the use of new technologies in the management of information resources, such as technological obsolescence, access control, among others, which have an impact on digital records (Council of Canadian Academies 2015:xii). Specifically, digital records face threats ranging from the effects of nature, technology, forces of time, human-related threats, amongst others, requiring organizations to formulate and document best practices for digital recordkeeping and long-term preservation (Tripathi 2018:8; Dolan-Mescal et al. 2014:79; Mulauzi et al. 2012:5). McLeod and Childs (2013:3) referred to these threats generally as constituting a “wicked problem” with deep running impacts for the conception, design and implementation digital recordkeeping initiatives in organisations.

Organizations including higher education institutions keep struggling with management of the constant accumulation of digital volumes and the diversity of formats generated by information creators (Svard 2017:276). According to McHugh (2016:4), social, organizational, legal, financial and technological issues work collectively and in isolation to pose risks to the access and use of digital collections in organizations. This is affirmed by Eusch (2016:2-3) who wrote that the risks associated with university records can be categorized into the following four types:

- i. Legal and regulatory risks: There arise from an institution failing to meet its obligations to maintain records in accordance with required laws (State and Federal) and for litigation readiness. When there is the potential for litigation or ongoing litigation, the related records schedule should be suspended, and the associated records held. This process should be completed through a records’ hold process to properly identify records related to the suit or request to prevent spoliation. Paper and electronic records should be organised and easily accessible or retrievable and demonstrate a chain of custody or the university could potentially lose the suit or damage the institutional reputation;
- ii. Records technology risks: There are many technology risks which may impact the management of records to meet university obligations to ensure that records are accessible, retrievable and in a readable format. An example of this risk would be each time data is handled when a system is decommissioned, or data migration takes place to new software or with software integration. There is always the risk of data loss or the loss of data integrity and retention

schedules not being met. There is also risk to information in systems where records are stored long-term (more than 10 years), and the associated risks of not deleting records in the normal course of business which also ties back to legal risk to the university;

- iii. Records control risks: There is a potential risk of the loss of information when files are not properly classified and named. There are many repositories for records in both electronic and paper formats with little or no records management principles applied. This would tend to lead to an increased risk to the university in not being able identify, document or have systematic controls in place. There is also a very high risk of losing historically significant records which document the decision making on campus and should be transferred to the University Archives. This risk also ties back up into to the legal risk and not being able to produce records in a suit or litigation; and
- iv. Administrative risks: Administrative risk is posed though the inability to reach all campus communities to provide for regular and consistent institutional communication and training for employees on their responsibility for the records that they create, manage, store and dispose of. There is also administrative risk that departments/units have not adequately identified institutionally vital records for disaster recovery and business continuity to ensure business resumption after a disaster. Considering the decentralized nature of public university campuses in Kenya, recordkeeping professionals should design uniform file plans across all departments/units in their institutions to achieve efficiency in the management of records in a continuum.

Additionally, Phiri (2016) carried out research to establish the relationship between recordkeeping, governance, audit and risk. The study proposed a governance recordkeeping model incorporating risk as an element of the governance function. Erima (2013) and Ambira (2011) carried out separate studies to establish risks facing organisations as a result of poor recordkeeping at Moi University and Kenya Commercial Bank respectively. Both studies proposed records-risk management models for the case study areas. These studies clearly indicate that archival repositories in need to be ready to deal with records-related risks, which are more pronounced in digital and hybrid environments. Research should therefore be

undertaken to establish risk exposures for public universities in Kenya emanating from weak archival systems and recommend possible strategies for mitigating the risks.

The DCC and Digital Preservation of Europe (DPE) created a toolkit for auditing of digital repositories known as DRAMBORA. DRAMBORA was developed to help information professionals identify the risks faced by their repositories by understanding their potential impact and probability of occurrence. An analysis of the identified risks is then made by mapping the risks to the repositories' objectives to determine the severity of the risks faced. This methodology though paper-based, provides a quantifiable insight of the extent of risks that a repository is facing and gives a report of the same (Digital Preservation Coalition [DCC] 2015:48).

The ARMA Records Management Maturity Model has become increasingly popular as a framework for assessing the state of recordkeeping in organizations and archival repositories. During assessment, the organization or archive is categorized at a given level (1 to 5) based on its recordkeeping characteristics, which subsequently informs risk management decisions. According to McHugh (2016:3), infrastructural development and preservation planning are comparable to risk management. Hence, when recordkeeping professionals identify risks to information materials and manage them accordingly, the danger to or loss of information is eliminated. The level of risk is determined by multiplying the probability of the event occurring (likelihood) times the level of impact (consequences) the event would have on the organisation if it did occur, that is:

$$\text{Level of Risk} = \text{Probability} \times \text{Impact} \text{ (Franks 2013:235).}$$

McHugh (2016:11-2) further advised that it is important for records professionals to understand the value of the information materials under their care and be aware of the risks faced, risk appetite of the organisation and the most appropriate preservation approaches to be adopted.

3.9 Sustainable digital archiving

Makori, Njiraine and Talam (2020:611) consider information as a strategic resource which should be appropriately created, preserved and efficiently shared and disseminated for public access. Notably though, with increased ICTs integration,

archival resources are being stored in different systems of isolated archival repositories, which makes it difficult to know where exactly to look for a specific archival resource (An et al. 2017:19). Song and An (2016:48) argue that it is a challenge to bring together such systems in order to improve service delivery for the benefit of archival users, since the systems are operated along different administrative guidelines and rules making it difficult to realize optimal utilization of archival resources. In respect to this existing scenario, Adu and Ngulube (2016:752) advocated for the concept of trusted d-repositories which was born out of the numerous risks and threats faced by digital repositories including archival repositories. They explained that the risks posed a danger to the accessibility of digital records and resulted in failure of organizations to perform as expected.

Following the wide acceptance of the concept of trusted digital repositories, archival repositories are increasingly embracing the OAIS model approach proposed by IRMT (2009:23) where a number of similar digital archival repositories come together by combining and sharing their resources with the common goal of managing and providing access to their individual digital archives from a central point (trusted digital Archive). For such a venture to be successful however, it must be guided by proper legal and regulatory framework including laws, guidelines, policies and standards (Adu and Ngulube 2016:752). The integration of archival resources is supported by various scholars in the literature for its importance in taking advantage of the worth of archives as institutional memory, identity and evidence while encouraging access to information by the public, accountability, transparency, open data, open government and utilization of big data for enhanced service delivery and joint innovation (An et al 2017:19). Notably, lack of studies on the development of suitable frameworks in support of integration of archival repositories for the optimal utilization of archival resources has been underlined as a gap in the literature (An et al 2017:20; Li and Zhang 2014). Using the OAIS model as a point of reference, the present study sought to address this concern by developing a framework that proposed to converge together archival repositories in public universities on a common platform.

3.10 Gaps in scholarship: empirical, theoretical and methodological shortcomings

In doctoral research, reference to related empirical studies is essential to avoid duplication, inform on the theory and methodology used by researchers investigating similar phenomena, maximize on innovation and attain professional standards in research (Maggio, Sewell and Artino 2016:298). The researcher examined previous studies in order to identify gaps in existing literature and situate the present study in the context of extant works. This section presents a critical discussion of related empirical studies from a global, regional and local viewpoint. Selection of the studies was pegged on their relevance to the research themes as outlined in the literature review map, with the purpose of identifying empirical, theoretical and methodological shortcomings.

Globally, Klett (2019) undertook a study titled “*Creating value in archives: overcoming obstacles to digital records appraisal*”. Based on the premise that the purposes and methods of appraisal required to be reviewed, the study sought to answer the question - how can digital records appraisal strategies guarantee sustainable selection of d-records that create value in d-archives and comply with usability requirements? The study applied a mixed methods approach with a qualitative methods priority. Data was collected using document review, face-to-face interviews and focus group discussions. The study population constituted archivists and IT staff (number of respondents was not specified). The key findings of the study pointed to the existence of risks from a number of avenues including haphazard and archaic appraisal practices; lack of a strategy by archives to keep in step with technological changes including big data and digitalization; risk of misunderstanding due to lack of knowledge of core terms in appraisal context; and risks of loss of accountability control and values in d-archiving resulting from lack of competences in appraisal processes. Among other recommendations, the study proposed a model to mitigate the risks by supporting creation of archival value through d-records appraisal and usability requirements. Methodological similarities are evident in Klett’s (2019) study and the present study based on similar paradigmatic inclinations, research methodology design (though not in entirety), the risk element in d-records management, and in the design of models to enhance digital archival practices as key outputs in both studies. However, the appraisal process is only but one element in

archival practice, hence the glaring difference in scope and subject coverage compared to this study.

McHugh's (2016) study titled "*An ontology for risk management of digital collections*" majorly explored the possibility for the conception of an ontology for risk management of digital collections. Among other objectives, the study sought to survey contexts wherein preservation was successfully undertaken; and to demonstrate a range of tools utilizing the study findings. The study used a mixed methodology to investigate risks relating to digital materials using interviews, survey method and extensive content analysis as data collection techniques. Key finding of the study indicated that the digital preservation community faced challenges manifested in the scale of data growth and lack of skilled staff for long-term digital preservation work. The study recommended the use of DRAMBORA, a risk-based approach, to be used as a collaborative online tool applicable in a wide range of digital preservation scenarios. Of particular relevance to the present study is the fact that DRAMBORA requires users to describe their preservation tasks from the perspective of resources, activities, objectives and risks, and to give evidence of procedures followed in ensuring sustainable digital preservation. This is in tandem with the present study which investigates risks to digital archives as an important segment of the study. Notably, the present study incorporated findings under the risks theme to develop a framework which is however not wholly risk-oriented.

A study carried out by Kallberg (2013) titled "*The emperor's new clothes: recordkeeping in a new context*" aimed to capture and analyze e-government development as an ongoing change in society and its impact on recordkeeping. The research was undertaken in the context of government municipalities in Sweden. The study explored the importance of recordkeeping legislation in e-government functions within public organizations; the link between recordkeeping legislation awareness and documentation practices within a new context of information capture; and the positions and role of recordkeeping professionals in public sector organizations. The records continuum model was applied as the theoretical lens for the study and a qualitative methodology inclined towards an interpretivist philosophy was used. Multiple case study design was adopted, where 9 municipalities were selected to participate in the study. Data was collected using documentary review, face-to-face

interviews and literature review. The study established that there was lack of recordkeeping awareness within the municipalities examined; recordkeeping as a practice and recordkeeping skills were not highlighted as essential in the e-strategies of most of the municipalities; resource allocation for archival work was insufficient; there was lack of awareness of recordkeeping legislation amongst staff; and archivists did not hold positions at strategic levels. The study therefore proposed a recordkeeping awareness model to compliment the RC model in depicting the inter-relationship between the political, legal and work place arenas with respect to recordkeeping. The similarities between Kallberg's (2013) study and the present study lie partially in the use of multiple case designs. Additionally, both studies proposed frameworks to enhance recordkeeping and in particular archival practices in public sector organizations. However, the two studies differ in the application of philosophical orientations and subsequent methodological approaches. In addition, the present study zeros in on public universities, whereas Kallberg's (2013) study looks at government departments in the municipalities.

In Africa, Phiri (2016) explored the significance of recordkeeping in an organisation's strategy in a study titled *"Managing university records and documents in the world of governance, audit and risk: case studies from South Africa and Malawi."* Being a collective case study (as with the present study), multiple cases (six universities) were studied to critically explore the nexus between recordkeeping and governance. Though Phiri's study failed to specify the population size and sample, the study population was described as comprising of deputy vice-chancellors (academic), university registrars, finance directors, procurement managers, professors, faculty managers/secretaries, records managers, auditor generals and the directors of higher education. Data was collected using face-to-face interviews, observations and review of institutional documents. On the overall, the study can be described as being by default a comparative study of universities in South Africa and those in Malawi, depicting two extremes on matters records management: the 'good' (South Africa) and the 'bad' (Malawi). Key findings revealed that: some institutions operated without adequate strategies, policies, legal and regulatory requirements for digital records management; lack of effective recordkeeping infrastructure (that is, tools and practices, skilled and competent human resources, policies as well as standards); duplicative practices in the management of emails; lack of disposal and retention

schedules; absence of records management units; lack of top management support, among other issues. These findings led the study to conclude that governance and recordkeeping were closely related. The study therefore proposed a governance recordkeeping model as an approach for managing documents and records in the world of governance, risk and audit. The study compares with the present study in aspects of theoretical coverage and methodological approaches, but differs in the treatment given to digital records as opposed to archives.

Adu's (2015) study titled "*Framework for digital preservation of electronic government in Ghana*" investigated digital preservation of e-government in Ghana, the purpose being to develop a framework for practitioners, policy makers and researchers in the country. The study drew on a multi-method design, combining quantitative and qualitative methods. In a similar fashion with the present study, interviews, questionnaires, observations and document reviews were triangulated to collect data from 182 respondents, comprising of 155 records managers and IT heads in the public agencies, and 27 record managers and ICT heads across 24 ministries. The key findings of the study indicated that: the wide range of digital materials created across the agencies and ministries required to be preserved; constitutional mandate, statutory requirements and policies were required to enforce digital records preservation; there was lack of awareness on the various international standards for digital preservation; and insufficient funding for digital preservation programmes was a key barrier to d-records preservation. The importance of embracing collaborative opportunities for digital preservation was also highly cited. Similar issues have been given coverage in the current study, with long-term preservation occupying a pivotal position in both studies. From the research and knowledge amassed from the study, Adu (2015) proposed a digital preservation framework for public sector organisations in Ghana, which incorporated aspects of the integrated management framework, the OAIS model, and the model developed by the panel of experts on memory institutions from Canada which informed the study's theoretical framework. Similarly, the present study proposed a digital archiving framework for public universities which borrowed from the OAIS, the RC and the ARMA Records Management models. However, Adu's study focused on the concept of digital preservation of e-government records in the agencies and ministries in Ghana, in contrast to the present study which focused on the management of digital archives in institutions of higher learning.

Laughton (2011) undertook a study titled “*Open Archival Information System (OAIS) as a data curation standard in the World Data Centre*”. The purpose of the study was to establish how data can be curated in the World Data Centre (WDC) using the OAIS functional model as a benchmark. Mixed methods research design was adopted and data was collected using online survey, literature review and online interviews. Mixed methods research was used and multiple case study approach was adopted, whereby maximum variation sampling technique was utilized to select four cases from which data was collected on data curation practices at WDC. Findings of the study revealed that only four functions of the OAIS functional model (ingest, archival storage, preservation planning and access) were represented in all the four cases; only two of the four cases had a perfect *Pre-Ingest* function; of the four cases, only case 1 did not split up any of the OAIS functional model functions into separate analogue and digital functions. Based on the findings, the overall recommendation of the study was that the WDS should develop a data curation framework for its member data centres to ensure standards are maintained and to act as a guideline. Laughton’s (2011) study is similar to the present study in the methodological approach used. In addition, the OAIS Reference model is a point of reference in both studies. However, the present study gave modest attention to data curation and instead concentrated on digital archiving.

In a study titled “*Developing an e-records readiness framework for labour organisations in Botswana*” Kalusopa (2011) examined the readiness of labour organisations for e-records with a view to developing an integrated e-records readiness framework. The study was anchored upon the technology acceptance model, diffusion of innovation theory, RC model, RLC model and the integrated records management model. The study drew upon both quantitative and qualitative methods whereby questionnaires, interviews, observations and documentary review were used as data collection instruments. The target population constituted 50 registered labour organizations, justifying the use of sampling by census. From the study findings, readiness for e-records was evident in the case study areas, though growing at a low pace. However, records management practices did not conform to established standards. Additionally, there was no clear framework for examining and understanding e-records readiness in Botswana labour organizations. The study

therefore proposed such a framework for implementation by labour organisations in the country. The aspect of e-readiness featured prominently in Kalusopa's study as well as in the present study, the outstanding difference being that the study by Kalusopa was confined to d-records as opposed to d-archives in the current study.

In the East African region, Luyombya's (2010) study titled *"Framework for effective public digital records management in Uganda"* sought to establish whether Uganda had a framework for the effective management of digital records in the Public Service of Uganda (UPS). The researcher utilized the RC model to develop the conceptual framework that guided the study. A mixed methods approach was used wherein the researcher alternated qualitative and quantitative methods to examine the management of digital records in the UPS. A case study approach was adopted and data was collected through in-depth interviews (40 respondents) and self-administered questionnaires (75) from 23 ministries in the UPS. The study population comprised of senior and middle managers, records managers and ICT managers. The findings of the study revealed that DRM problems emanated from absence of ICT systems with recordkeeping functionality; lack of clear guidelines, policies, and procedures, and; inadequate implementation and enforcement of the Uganda Records and Archives legislation. Additionally, insufficient funds, inadequate skilled staff and lack of a reliable power supply contributed to the DRM problems. Amongst other suggestions, Luyombya (2010) proposed for the development of a robust DRM infrastructure, recruitment of skilled manpower, enactment of a formal legal infrastructure; and establishment of national archives with appropriate procedures policies and guidelines. The issues addressed resonated well with the present research, the main difference being that Luyombya's study was skewed towards digital records. The study provided insights into the methodology and understanding of the depth of records management in the public sector in Uganda. It however failed to provide insight into the best practices for the management of digital archives.

In Kenya, Odhiambo's (2019) study titled *"Institutional readiness for digital archives management at United States International University-Africa"* assessed the readiness of USIU-A for digital archives management with a view to proposing strategies for enhancing the management of digital archives in the institution. The study was underpinned by the RC, OAIS and DCC Lifecycle models, and adopted a mixed

methods approach following a single case study design, with the archive staff and users making up the study population. Using systematic random sampling and purposive sampling, a sample size of 120 respondents was selected out of the total population of 6937. Questionnaires and in-depth interviews were used as data collection instruments, supplemented by observation and documentary review. The study findings painted a dual picture of success stories and challenges in digital archiving (see section 3.5). Some recommendations of the study were that: the institution should purchase a DAM software that has digital archiving functionality; recruitment of skilled recordkeeping staff; institutional participation and collaboration in DAM approaches and initiatives locally and globally; and top management support for digital archiving programmes. Although Odhiambo's study was done at a Master's degree level, the study found a place in the present research since the phenomenon under investigation in both studies is similar and within the same geographical context (Kenya). However, the studies differ in scope since the former is a case study of a single private university while the current research is a multiple case study of six public universities.

Musembe (2019) carried out a study titled "*E-records security management at Moi University, Kenya.*" The study aimed to investigate security issues surrounding e-records management at Moi University. To achieve this, the study was underpinned by the RC and the Parkerian Hexad models. Consistent with the pragmatic paradigm, the study used a mixed methods design to undertake the single case study research at Moi University. Census technique was used to select 145 respondents from the top management, directors and deans of schools, ICT staff and administrators (comprising of records managers, records staff and action officers). Data was collected using semi-structured interviews and self-administered questionnaires. Key findings of the study indicated that there was absence of policies, standards and guidelines on e-records management and security; e-records security threats existed at Moi University (emanating from lack of a formal ERM programme, policies and procedures, absence of a regulatory framework for the ERM, unauthorized use and sharing of e-records; and cyber-attacks); the institution was applying logical and physical controls to secure e-records; ethical values of confidentiality, authenticity, integrity, possession/control, utility and availability were being practiced to some extent; and there were adequate personnel dedicated to ERM but not all were trained in records

and archives management. The study put forth recommendations which included: adoption of electronic-based service provision to clients, development and implementation of a functional ERM programme, implementing and cascading regulatory frameworks, policies, procedures and standards into an operational programme for e-records management; increased budgetary allocation for ERM, developing a records classification procedure and guidelines, among others. Musembe's (2019) study compares well with the present study since Moi University is the single case study site in the study, and is one of the six study sites in the present study. Also, both studies made use of the records continuum model and focus on digital records management practices in a university setting. In addition, the key issues addressed in both studies are similar. However, Musembe's (2019) study does not extend the investigation on security of d-records to address the end-part of the records continuum. In contrast, the present study focuses on the entirety of digital archives management practices in both the pre and post-ingest stages of the RC.

Ambira (2016) carried out a study titled *"A framework for management of electronic records in support of e-government in Kenya"*. The study sought to establish how the existing state of digital records in Kenya inhibits or enables the implementation of e-governance, with the purpose of developing a best practice framework for ERM in support of e-government in government ministries and agencies. The MoReq model and the UN 5-stage model were the models of choice for the study. As opposed to the current study, a qualitative methodological approach based on constructivist perspective was used and a phenomenological research design was adopted. Some key findings of the study included: lack of policy and regulatory framework on management of electronic records (MER) in all ministries; lack of systems in place to manage e-records; lack of standards for MER to help in harmonizing the management of electronic records across ministries; and inadequate skills and expertise in MER across government ministries. A key output of the study was a framework for MER in support of e-government. The study by Ambira (2016) relates with the present study in that both studies examined digital recordkeeping in public sector organisations and came up with best practice frameworks to enhance digital recordkeeping. Interestingly too, Ambira (2016:329) addressed DAM issues and recommended that KNADS should develop and provide guidelines for the capture of d-archives into archival

repositories. However, the two studies used different methodological approaches based on divergent philosophical viewpoints to achieve their objectives.

Last but not least, a study by Maseh (2015) titled “*Records management readiness for open government in the Kenyan judiciary*” investigated records management practices in the judiciary in Kenya in order to promote transformation and open government for the effective and efficient achievement of justice. To realize this aim, the study sought to determine the state of records management in the Kenyan judiciary, establish the nexus between open government and records management and assess the Kenyan judiciary’s readiness for e-records. The theoretical underpinnings of the study comprised the E-records Readiness Tool, the Records Continuum Model and the Open Government Implementation Model (OGIM). In line with the pragmatic paradigm, the study embraced the mixed methods research approach, using the embedded case study strategy. The high courts and magistrates’ courts in two of the counties in Kenya (Nairobi and Uasin Gishu) were examined. Census technique was used to select the study sample comprising of staff from both the technical units (judicial staff, court registrars and deputy registrars) and administrative units (executive officers, records officers and registry assistants) of the judiciary. Questionnaires, in-depth interviews and observation were employed to collect the required data. The findings of the study revealed a generally poor state of records management in the judiciary, indicating that the judiciary was ill-prepared for e-records management. This led to the general conclusion that the implementation of open government in the Kenyan judiciary was still at the initial stages. Among other important suggestions, the study recommended formulation of a general records management policy addressing e-records; development of an appraisal and disposal programme, development of a preservation programme, provision of appropriate storage environment and media for records, and capacity building for records management. Maseh’s (2015) research resonates with the present study in that both followed a similar methodological design to investigate digital recordkeeping in public sector organizations. However, the context and scope of the studies differed in that whilst Maseh’s (2015) study was a single embedded case study, the present research constitutes multiple cases. The focus on digital records and digital archives is another important point of departure in the two studies.

3.11 Summary

This chapter provided a descriptive and empirical review of extant literature, with a glimpse into previous related works in the area of digital archives management from a global, regional and local perspective. A discussion of the role and significance of literature review was deemed necessary at the onset to provide an understanding of the subject area and familiarize the reader with prevailing theoretical discourses in the subject area. The study used a literature review map which acted as a conduit, linking the theoretical constructs in the conceptual framework to the objective and research questions, and related studies. The literature was then organized along themes identified from the literature review map, synthesized and summarized into key issues pertinent to the current study. Literature about the readiness of universities for digital archiving revealed a state of unpreparedness as a result of the prevailing poor ICT infrastructure in African countries including Kenya. An in-depth scrutiny of the literature pointed to additional problems of inadequate resources in terms of staff skills and financial capacity. From the literature, digital records readiness seemed to have elicited much interest in Africa as evidenced by extant related research published as articles and thesis studies both published and unpublished (Odhiambo 2019; Kamatula and Kemoni 2018; Hamid 2018; Kamatula and Kemoni 2018; Person and Plumb (2017) Nkala, Ngulube and Mangena 2012; Abuzawayda, Yusof and Aziz 2013; Lowry 2013; Mulauzi et al. 2012; Luyombya 2010). Notably though, with the exception of Odhiambo's (2019) study, the identified sources in literature did not focus on institutional readiness for digital archiving, but rather generally focused upon digital records (management) readiness.

A discussion of the key digital archiving practices entailing the life-cycle management of d-records and archives was provided. The transformational changes introduced by the integration of ICTs in digital records and archives management practices took a pivotal role throughout the chapter. The archivists' role in the new technological dispensation formed an important part of the discussion. It was clear from the literature that African countries including Kenya were struggling with digital archiving practices due to the impact of new technologies which required archivists to acquire skills and competencies through rigorous training and re-training programmes.

The literature review provided evidence of the importance and impact of legal and regulatory environment on digital records and archives. It was clear from the literature that supportive legislations, guidelines, standards, policies and best practices in digital recordkeeping were instrumental in governing the lifecycle management process for digital records, thereby supporting all the digital archiving practices (Kabata 2019:372; Baron and Thurston 2016:212). Sound national archival legislation was specifically identified as being significant and a determinant of efficient management of digital archives in a country (Mosweu and Simon 2018:70; Pereira 2018:222; ISO 15489 – 1: 2016; Ngoepe and Saurombe 2016:24; Okello-Obura 2011:6). The problem of weak archival legislations in Africa (Kenya included) was highlighted, with the literature showing that review programmes were underway in some countries.

Risks encountered in the management of archives were enumerated in the chapter, which included lack of a clear framework for digital archiving. Particularly, the risks faced by universities in relation to digital archiving were identified as legal and regulatory risk, records technology risk, records control risk and administrative risks (Eusch 2016: 2-3). The chapter provided a discourse on sustainable digital archiving which took into cognizance the OAIS Reference model approach for developing a shared digital Archive. Previous related studies were discussed with the intention of identifying theoretical, methodological and empirical shortcomings which the present study sought to address. A major gap emerging from the reviewed literature was absence of a framework to mitigate records-related risks faced by public universities in a digital environment. In a nutshell therefore, the previous literature did not exhaustively discuss the phenomenon at hand; neither did they incorporate different perspectives on the problem. Instead, most of the studies mainly focused on one aspect, (for example ‘readiness’), as opposed to the present study which strove to incorporate various pertinent issues in digital archiving. Additionally, these studies fell short of utilizing ‘extensive’ (mixed) methodologies that yield findings with wider degrees of generalization as demanded by the present study. This study therefore seeks to address these gaps by developing a digital archiving framework based on the empirical findings that will generate new knowledge on the subject of digital archiving. In this regard, the subsequent chapter articulates the research approach, design and methodological techniques applied in this quest.

CHAPTER FOUR

RESEARCH METHODOLOGY

The craft of scientific inquiry requires carefully thinking through the available options and meticulously selecting the suitable order of methods that will solve the research problem at hand (Alford 1998:25).

4.1 Introduction

Solid scientific research is grounded upon the methodology and methods employed in undertaking research. Over the years, there has been confusion in the scope and meaning of research techniques, methods, design and methodologies (Kallberg 2013:54). Research methodology and methods have been used interchangeably by researchers in the literature while some scholars have distinguished the two terms. Creswell (2014:34) and Kothari and Garg (2011:7) defined research methodology or approach as the overall strategy employed to solve a research problem systematically, which constitutes the philosophical position, research design and methods used to carry out a study. Neuman (2014:2) viewed research methodology as the whole process of research (contextual setting, ethical principles, philosophical assumptions and the impact of the research). Kallberg (2013:54) aptly defined research methodology as the ontologies, normative assumptions and epistemological paradigms which shape a researcher's approach towards 'knowing' and exploring their world.

On the other hand, research methods are the techniques that researchers use to collect data, which include selection of samples, collection and refinement of data and data analysis, as well as reporting the findings (Neuman (2014:2; Bryman 2012:46). These techniques may be designed qualitatively, quantitatively or according to a mixed strategy (Mavodza 2020:3). Quoting Kothari (2004), Mavodza (2020:3) further differentiates between research methods and research design by explaining that the latter is a procedure or plan of investigation, involving one or more methods to address the research problem, while research method is a strategy (quantitative, qualitative or mixed) used to implement the procedure or plan. Thus, research method is a part of research methodology which constitutes the guiding approach that a researcher lays down at the initial stage of the research process.

The importance of research methodology cannot be overemphasized - the findings, conclusions and recommendations put forth by a study must be critically assessed against the methodology employed before being accepted into the existing body of knowledge (Ngulube 2015:125; Garaba 2010:147). As alluded by Bartlett (1937:416), the beauty of research is not in the 'finished product' but rather in the research process, which gives proof of the soundness of the research. Thus, researchers should carefully consider the available methodological options and select the most suitable strategies that will lead to solving the research problem under investigation (Alford 1998:25). The main purpose of the present study was to investigate digital archiving practices in institutional archive repositories of selected public universities in Kenya. Guided by the research methodology map hereunder (Figure 4.1), this chapter presents a discussion of the research philosophy and methodology adopted in carrying out this study.

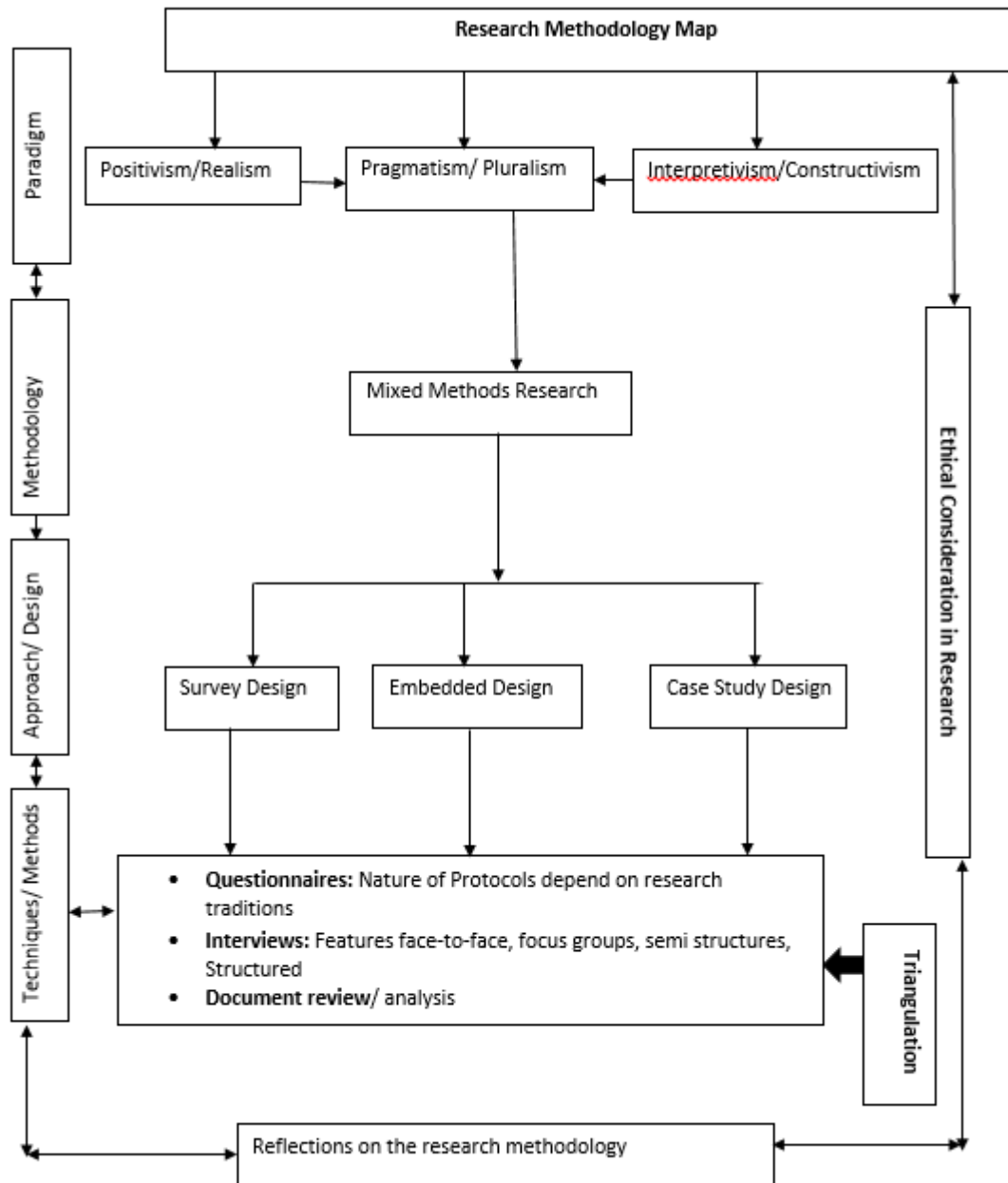


Figure 4.1: Research methodology map (Adapted from Ngulube 2015:128)

4.2 Research paradigms

‘Research philosophy’ refers to a system of assumptions and beliefs about knowledge development (Saunders, Lewis and Thornhill 2019:130). The process of research involves researchers making decisions on paradigms, worldviews or assumptions informing their research methodology (Creswell 2014:35). The term paradigm was first introduced by Kuhn in 1970 (Kuhn 1970:10). Kuhn defined a paradigm as “an integrated cluster of substantive concepts, variables and problems attached with corresponding methodological approaches and tools (Kuhn 1970:10). Johnson and

Christensen (2014:79) defined research paradigm as a perspective or worldview held by a community of researchers about research, founded on common assumptions, values, practices and concepts. Putting the picture into a broader perspective, Morgan (2007:50-51) proposed the following fourfold views to explain the paradigm concept as construed in the social sciences:

- i. Paradigms as world views (all-encompassing perspectives on the world);
- ii. Paradigms as epistemological stances (ontology, epistemology and methodology from the philosophy of knowledge);
- iii. Paradigms as shared beliefs among members of a specialty area (pertaining to the nature of questions and answers in a field of research; and
- iv. Paradigms as model examples of research (depend on existing typical examples of best solutions to problems).

The paradigmatic position of research is normally represented in ontological, epistemological, methodological and axiological terms as described below:

- i. *Ontology* defined by Saunders, Lewis and Thornhill (2019:133) as researchers' assumptions about the nature of social reality. The present study conformed to an interactive ontology which used the mind dependent constructionist perspective to understand existing digital archiving practices and challenges experienced, and thereafter develop a framework to enhance the management of digital archives in public universities.
- ii. *Epistemology* defined by Saunders, Lewis and Thornhill (2019:133) as knowledge assumptions, what makes up acceptable, legitimate and legal knowledge, and how this knowledge can be communicated to others. The epistemology for the present study derived from an interpretivist approach whereby the principles entrenched in the theoretical framework for the study were realistically mapped and adopted into the study scenario to develop a framework.
- iii. *Methodology* referring to how we find out that reality (Johnson and Christensen 2014:81). Qualitative and quantitative methodologies were applied in line with the pragmatic paradigm.
- iv. *Axiology* defined as the ethical values upheld during the process of inquiry, that is, the role of ethics and values (Saunders, Lewis and Thornhill

(2019:134; Guba 1990 in Johnson and Christensen 2014:81). The study was undertaken in conformance to ethical requirements stipulated by the UKZN.

All scientific inquiries conform to particular world views with specific philosophical assumptions which underpin the research and determine the study's credibility (Gringeri, Barusch and Cambron 2013a:762; Farquhar 2012:88). Therefore, acknowledging the foundations of our beliefs and appreciating the beliefs held by others lends credibility to research (Johnston 2014:23). Babbie (2010:33) buttressed that when researchers acknowledge that they are operating in a particular paradigm, they are able to benefit from stepping outside the precincts of their own paradigm to better understand the seemingly weird opinions and activities of others operating in a different paradigm. Matter-of-factly, there's no specific or right paradigm for a given type of research study. The choice of research paradigms remains a thorny issue, and the least common among social scientists is the issue of model examples of research (Hall 2020:21), as there is no consensus on what constitutes model research, but that which works best for a particular study.

A good number of paradigms have been developed by scholars, all of which have predominantly been grouped into two main categories namely positivist and constructive/interpretivist paradigms. Scholars such as Romm and Ngulube (2015:159) proposed a third paradigm which borrows from the two, known as the pragmatic paradigm. The differing epistemological and ontological perspectives of researchers lead researchers to choose dissimilar methodological research approaches while investigating the same research problem, though most research studies are anchored against a background of non-critical paradigms, that is, constructive or positivist paradigms (Asghar 2013:3121). In support of this assertion, Hesse-Biber and Leavy (2011:38) argued that there are no defined paradigms for studies, noting that "paradigms or worldviews are neither right nor wrong; one way of seeing is another way of not seeing..." Nevertheless, researchers should select a paradigm with assumptions that will be supported most appropriately by the phenomenon under study (Kawulich 2012:2) as illustrated in Figure 4.2. This notwithstanding, researchers should clearly discuss their research paradigms to enable readers gain understanding of the assumptions and philosophical foundations framing their research (Gringeri, Barusch and Cambron 2013b:57).

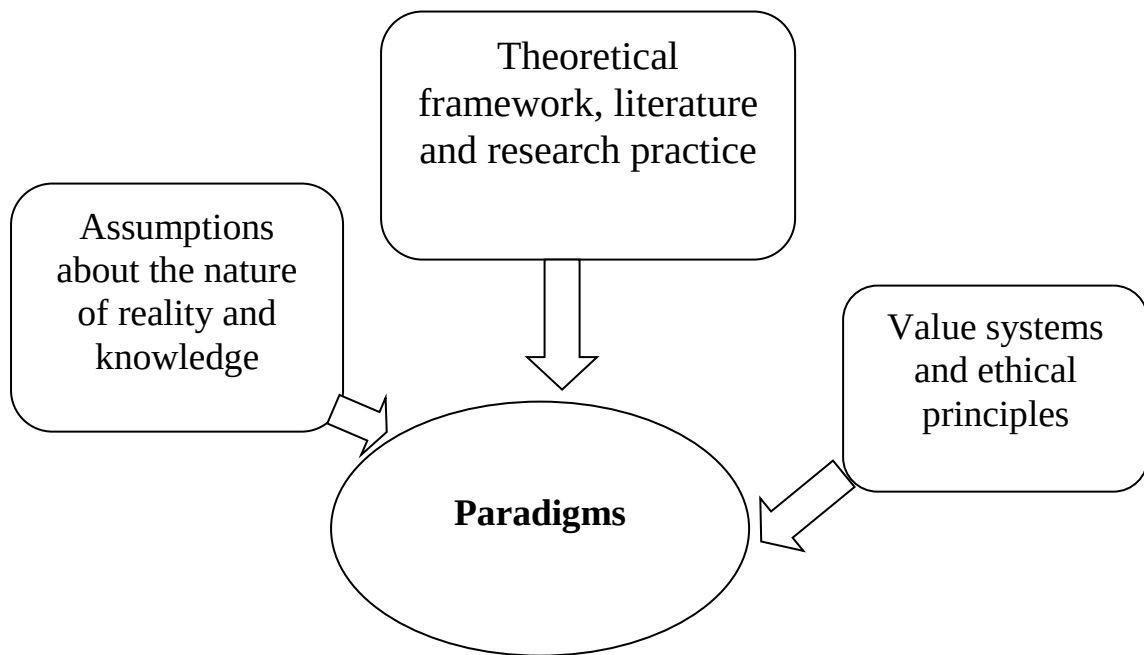


Figure 4.2 Considerations when choosing research paradigms (Source: Kawulich 2012:3)

Positivism paradigm was propounded by French philosopher Auguste Comte, who submitted that behavior can be understood through observation and reason (Shah and Al-Bargi 2013:254), hence the only way to establish truth and objective reality is through the scientific method. The paradigm holds that the procedures, techniques and methods used in the natural sciences provide the most appropriate approach for investigating the social world (Pickard 2013:20). Researchers conforming to this paradigm adopt scientific methods applied in natural sciences to objectively study social phenomena (Shah and Al-Bargi 2013:254). Thus, positivists make use of numerical and empirical languages (quantitative methodologies) unlike interpretivists who utilize descriptive language (qualitative methodologies) in describing their studies (Asghar 2013:3122). Positivistic thinking takes a realism ontological stance which assumes that reality is out there awaiting discovery by researchers using conventional and scientific methodologies (Shah and Al-Bargi 2013:254).

In contrast to the positivist paradigm is the interpretivist or constructivist paradigm (also referred to as the anti-positivist, naturalistic or humanistic paradigm), which features commonly in psychology, anthropology and sociology studies (Shah and Al-

Bargi 2013:256). The interpretivists believe that “reality is constructed” and so people socially and symbolically construct and sustain their own realities (Shah and Al-Bargi 2013:256). Hence, social scientists will understand social life only if they study how people go about constructing social reality (Klenke, Martin and Wallace 2015:105). The interpretivist paradigm concerns itself with individual meanings, understandings and interpretations of the social phenomenon and focuses on using qualitative methodologies to develop perceptions concerning the cases observed (Shah and Al-Bargi 2013:257). Additionally, interpretivism takes on a relativist ontology, which unlike the positivism approach does not believe that reality is “out there” but rather that individuals construct their own meaning of social realities as they interact with objects, hence the adoption of multiple realities in qualitative researches. Therefore, social reality is something that exists only as long as people keep creating and recreating it through their words, actions and beliefs. Therefore, the interpretivists’ view contrasts with that of the positivist realists who see the world as a single objective social reality.

The third research paradigm is pragmatism (or methodological pluralism) which was coined out of an attempt to bridge the gap between positivist and interpretivist paradigms (Ngulube 2015:127). Pragmatic researchers believe that ideally, researchers should use both qualitative and quantitative methodologies in their search for truth (Kivunja and Kuyini 2017:35). The philosophical foundation of the pragmatic paradigm is that both the interpretivist and positivist paradigms can be used in the same study to give a more effective, robust, reliable and valid understanding of a phenomenon (Romm and Ngulube 2015:159). Pragmatism approach affords researchers the freedom to subscribe to ontological and epistemological philosophies of their choice. It is a relatively new paradigm that has gained rapid recognition in the Social Science research domain, and uses both quantitative and qualitative methodological approaches, hence the term Mixed Methods Research (MMR), or methodological pluralism (Baskarada and Koronios 2018:3). Creswell (2009:8) provided the following summary of the philosophical underpinning for research provided by the pragmatic paradigm:

- i. Researchers have a freedom of choice on the methods, procedures and techniques of research suited to their studies;

- ii. Pragmatists look at the *how and what* to research based on the purposes of the research, hence they give justification for mixing qualitative and quantitative data;
- iii. Pragmatism is not inclined towards a specific system of reality and philosophy, hence both quantitative and qualitative assumptions are used freely during research;
- iv. Pragmatists concur that research occurs in political, social and historical contexts;
- v. Pragmatists do not see the world as an absolute unit but rather, they utilize many approaches for data collection and analysis;
- vi. Pragmatism paradigm holds that truth is what works at any particular time. Therefore, researchers employ both qualitative and quantitative data to achieve the best understanding of a research problem;
- vii. Pragmatism opens the door to different worldviews, different assumptions, multiple methods and different data collection and analysis techniques; and
- viii. Though pragmatists believe in an external world independent of the mind as well as that lodged in the mind, they also believe that reality and the laws of nature should not be questioned.

The present research is a multi-paradigmatic study which borrowed from the positivist and interpretivist/constructivist paradigms. The researcher opted for this paradigm mainly due to its methodological flexibility and ability to down-play the weaknesses of one philosophy by capitalizing on the respective strengths of the other. The researcher's choice of a pragmatic paradigm made it possible to look at the "what" and "how" of the research problem and comprehensively answer the research questions posed by the study. Additionally, besides the observable phenomena, pragmatism considers reality as including hypothetical or abstract objects. The pragmatic paradigm enabled the present research to go beyond focusing on observation only, to considering the personal experiences, perceptions and understanding of the social phenomenon under investigation, thus enriching the contextual coverage of the study. Consequently, the researcher's choice of pragmatic research paradigm led to the adoption of both qualitative and quantitative research approaches to investigate digital archiving practices in selected public universities, affirming the generally accepted view that the choice of a research paradigm

subsequently informs the methodological process adopted for a study (Ngulube, Mathipa and Gumbo 2015:53; Kawulich 2012:3).

4.3 Research methods

Bryman (2008:160) defined research methods as the *modus operandi* employed by researchers in practicing their craft, which includes the approach and tools for collection and collation of data. It involves use of specific research instruments such as survey questionnaire, structured interview schedule, observation schedule and document review (analysis) to collect data. Ngulube (2020:18) aptly remarked that researchers in the field of Information Sciences should ensure their research is methodologically and conceptually strong to increase the likelihood of such studies making positive contributions to the existing knowledge base and the discipline as a whole. Therefore, describing the methods used in a study is essential because it enables researchers to test the methods used (Ngulube 2015:125) and to replicate the study in a different setting(s). In line with this thinking, literature prevalently identifies three research methods which include quantitative, qualitative and mixed methods (Ngulube and Ngulube 2015:1; Creswell (2014:152; Johnson 2014:7; Ngulube 2013:10-11).

Creswell (2014:152) distinguished the three research methods by defining them as follows:

- i. Qualitative method is where the researcher presents facts founded on interpretivist perspectives. Different strategies of inquiry are used by qualitative researchers such as grounded theory, narratives, ethnographies, phenomenologies or case studies to collect open-ended data with the intent of developing themes from the data;
- ii. Quantitative method is where the researcher uses positivist claims to employ strategies of inquiry such as experiments and surveys, develop knowledge, and collect data on pre-conceived instruments that yield statistical data; and
- iii. Mixed method is one in which the researcher tends to base knowledge claims on pragmatic grounds by employing strategies of inquiry that involve collecting qualitative and quantitative data either concurrently or sequentially to best understand the research problem.

Qualitative research studies are often carried out to address social change (Fusch, Fusch and Ness 2018:20). They emphasise a natural search for relativeness in meaning, diverse interpretations, accuracy, flexibility and detail in studying a phenomenon or its aspect(s) which a researcher has placed his/her focus on (Jwan and Ong'ondo 2011:3). In addition, qualitative research seeks to define and interpret phenomena using non-numerical methods of measurement, specifically focusing on meaning and insight (Jwan and Ong'ondo:2011:4; Kakabadse and Steane 2010:352). Such studies are therefore not informed by predetermined variables but instead the researcher investigates phenomenon with an open mind, formulating theory and drawing conclusions based on the feedback and views of respondents which can be objective, subjective or both (Dube and Ngulube 2012:70-75). Thus, the qualitative approach situates the researcher in the literature and the social world of the phenomenon being studied (Cibangu 2013:198).

In contrast, quantitative methodologies are used to investigate correlations between phenomena, hence they are employed when researchers seek to determine cause-effect (causal) relationships by establishing how a given phenomenon influences another (Bryman 2012:175). Quantitative approaches to social research involve making efforts to quantify some aspects of the social world and representing them numerically (Clough and Nutbrown 2012:15). Such studies are driven by related variables with one variable influencing the other, hence the concepts of dependent and independent variables (Ambira 2016:131). Data collection is undertaken using structured research instruments, the intention being to predict, describe or test a theory (Babbie 2010:115).

In a nutshell therefore, quantitative research approach is dependent on the collection of numerical data (quantitative data); qualitative approach is distinguished by the collection of non-numerical data such as words and pictures (qualitative data), while mixed research comprises mixing of qualitative and quantitative research approaches, methods, or other paradigmatic characteristics (Johnson and Christensen 2014:82; Babbie 2010:23). The exclusive use of either a qualitative or quantitative research approach is commonly referred to as a *monomethod* research study (Johnson and Christensen (2014:657). The main differences between qualitative and quantitative data are summarized in Table 4.1.

Table 4.1: Differences between quantitative and qualitative research approaches

	Quantitative	Qualitative
General framework	Use highly structured methods like surveys, structured observation and questionnaires	Use semi-structured methods like participant observation, focus groups and in-depth interviews
	Seek to verify or falsify a relationship or hypothesis about phenomenon	Seek to explore phenomenon
	Instruments use more rigid style of prompting and classifying feedback to questions	Instruments use more flexible and iterative style of prompting and responding to questions in a more presentable manner
Paradigmatic orientation	Rely more on positivist principles	Rely more on the principles from interpretive or critical social science
Analytical objectives	To describe causal relationships	To describe and explain relationships
	To quantify variation	To describe variation
	To describe population characteristics and focus on an outcome or effect found across numerous cases.	To describe individual/case experiences and group norms
Question format	Close-ended	Open-ended
Data format	<i>Hard data</i> (in the form of numbers) obtained by assigning numerical values to responses	<i>Soft data</i> (that is, words, sentences, photos, symbols) obtained from audiotapes, videotapes, cameras, mobile devices and field notes
Flexibility in study design	Study design is subject to statistical conditions and assumptions	Study design is iterative (research questions and data collection are adjusted according to what is learnt)
	Participant responses do not influence or determine how and which questions researchers ask next	Participant responses affect how, and which questions researchers ask next
	Employ a logic that is systematic and follows a linear research path from beginning to end	The logic arises from ongoing practice and research follows a nonlinear research path, for example, addition or exclusion of particular interview questions

Derived from Neuman (2014:168/9)

4.3.1 Mixed methods research

Although qualitative and quantitative research approaches are still occupying large spaces in research, Mixed Methods Research (MMR) and multimethod approaches have emerged from the necessity to effectively analyze important and complex behavioral and social phenomena (Green et al. 2015:510). Researchers should focus on being ‘methodological connoisseurs’, defined as people who “‘knowledgeably (often intuitively) select the best techniques available to answer research questions that frequently evolve as a study unfolds” (Teddie and Tashakkori 2010:8). Baskarada and Koronios (2018:3) further opined that combining quantitative and qualitative methods in a single study helps to overcome underlying limitations in either of the methods, enhances data accuracy and contributes to a more comprehensive and holistic viewpoint of knowledge. In social sciences research, participants’ and researchers’ prejudices are indisputably present, whether unintentionally or by design, hence applying triangulation (multiple data sources) boosts trustworthiness of the findings and aids in reaching data saturation (Fusch, Fusch and Ness 2018:21).

There has been misunderstanding and confusion about the definition and meaning of ‘mixed methods’ and ‘multi-method’ researches. Ngulube (2010:254) submits that MMR includes gathering, evaluating, assimilating and construing quantitative and qualitative data sequentially or concurrently in the same study or a number of studies investigating a given problem, regardless of which research methodology is given priority, in order to take advantage of the benefits to be gained from merging them and to boost the validity of the findings. In a similar manner, Johnson and Christensen (2014:648) defined mixed research as a study wherein a researcher combines or mixes qualitative and quantitative research techniques and approaches in the same study. Johnson and Onwuegbuzie (2004) in Clark and Ivankova (2016:59) defined *mixed research* as the combination of at least one qualitative and one quantitative method or approach.

On the other hand, the term *multi-method* research is defined as the process of research where researchers integrate multiple quantitative approaches, multiple qualitative approaches, or multiple qualitative and quantitative approaches (Clark and Ivankova 2016:59). The common aspect in the definitions of the two terms is that they both point to the blending of quantitative and qualitative approaches in one study.

Creswell (2015:2-3) explains the difference between mixed method and multimethod in the following statement:

Mixed method is not simply the collection of multiple forms of qualitative data (for example interviews and observations), nor the collection of multiple types of quantitative data (for example survey data, experimental data). It involves the collection, analysis and integration of *both* quantitative and qualitative data. In this way, the value of the different approaches to research (for example the trends as well as the stories and personal experiences) can contribute more to understanding a research problem than one form of data collection (quantitative or qualitative) could not on its own. When multiple forms of qualitative data (or multiple forms of quantitative data) are collected, the term used for the study is ‘multimethod’ (Creswell 2015:2–3).

Creswell (2014:44) identified the following three typologies of mixed methods designs:

- i. *Exploratory sequential mixed methods* – This is where the research process begins with a qualitative phase during which the views of participants’ are explored, followed by a quantitative research phase which constitutes data analysis;
- ii. *Explanatory sequential mixed methods* – In this approach, the researcher starts by collecting data using a quantitative approach then analyzes and expounds on the findings qualitatively (hence the use of explanatory). The use of ‘sequential’ is because the first phase (quantitative phase) is followed by the qualitative phase; and
- iii. *Embedded (convergent parallel) mixed methods* – In this type of MMR, the researcher converges or merges qualitative and quantitative data to provide a complete analysis of the research problem. Both data forms are collected simultaneously and findings are combined and interpreted to compile the overall findings.

Scholars have advocated the “mixing” of qualitative and quantitative methods in different styles. For example, Leech and Onwuegbuzie (2009:273) suggested that qualitative and quantitative approaches can be blended in single or multi-phased studies by using the following four styles: parallel or sequential design, dominant-less

dominant or equivalent design, or a multilevel approach where different techniques are applied at different stages of data aggregation. However, exactly how qualitative and quantitative methods may best be integrated is not clearly defined (Baskarada and Koronios 2018:4) and has been a hot subject of debate amongst scholars and researchers. The precise mix deemed appropriate is dependent on the practical and situational issues facing the researcher, the research problem and research questions of the study (Johnson and Christensen 2014:648).

Mixed methods research can be classified as being either a partially mixed methods design or fully mixed methods design. Fully mixed methods design represents mixing of both research designs and their associated characteristics throughout the study, whereas partially mixed methods design demands that both quantitative and qualitative be undertaken separately in a sequential or concurrent manner, before being mixed during data interpretation and subsequent analysis (Laughton 2011:111). In this respect, Johnson and Christensen (2014:856) advised that when choosing to use MMR, researchers should place into perspective the *fundamental principle of mixed research* requiring researchers to strategically and thoughtfully combine or mix quantitative and qualitative research approaches, methods, concepts, procedures and other paradigmatic characteristics in a manner that yields an overall design with complementary and multiple (convergent and divergent) strengths and non-overlapping weaknesses.

The present study adopted the embedded (convergent parallel) mixed method research design in adherence to the pragmatic philosophy. The weighting for the methods was partial wherein a dominant-less-dominant design was applied, with aspects of quantitative and qualitative approaches being combined and used simultaneously during data collection and analysis, albeit with a qualitative methods priority (QUAL + quan). The rationale for using MMR in the present study was that neither one of the methods could be used in isolation to comprehensively capture the phenomenon (Gobo 2015:330) and exhaustively address the research problem. Quantitative methods were useful to get numeric and statistical data depicting the attitudes, opinions and characteristics captured in questionnaires that were administered to ICT staff, records officers and administrative staff. Qualitative methods were used to capture participants' expressions of their perception, meaning or phenomenological

experiences during face-to-face interviews with DVCs, Heads of ICT departments, FOs, archivists and records managers. Documentary review was also used to collect historical and other qualitative data about the case study sites. As averred by Bekhet (2012:40), methodological triangulation in the present study resulted in the collection of more comprehensive data, more enhanced understanding of the phenomenon under investigation and greater validity and reliability of the findings. The mixing decisions in the study are shown in Figure 4.3.

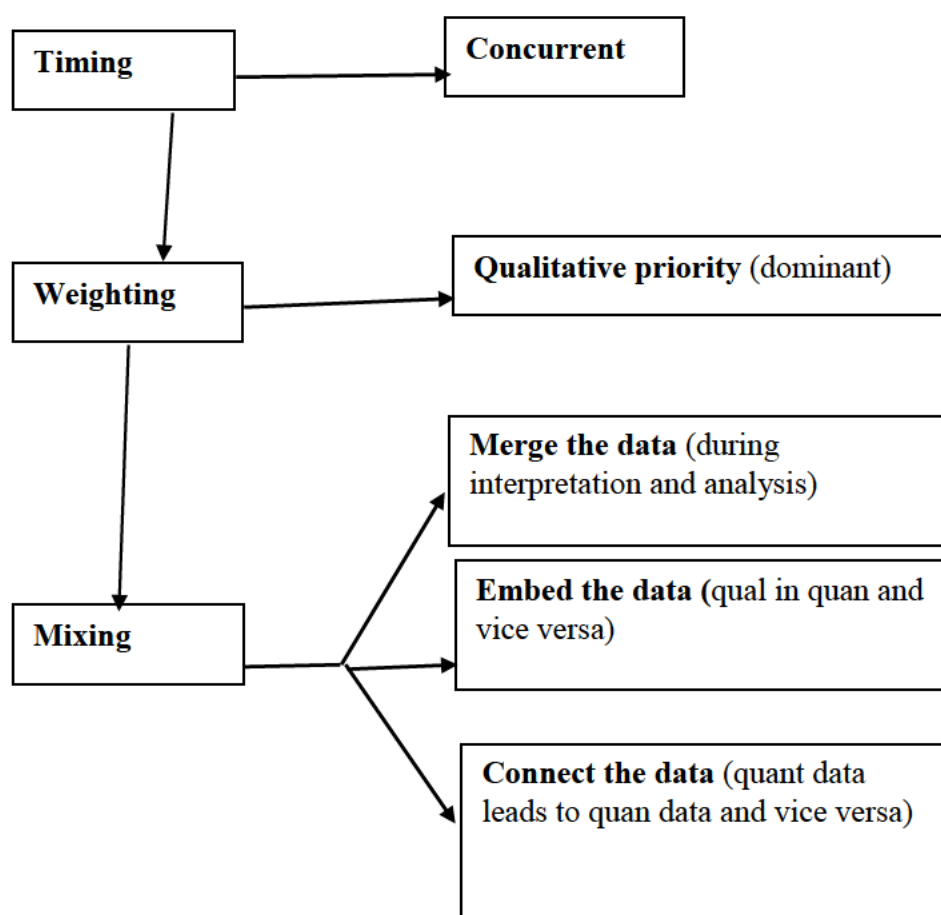


Figure 4.3: Mixing of quantitative and qualitative methods (Synthesized by the researcher)

Onwuegbuzie, Johnson and Collins (2011:1261) advised that mixed methods researchers should efficiently assimilate the philosophical assumptions within positivism and interpretivism paradigms. However, Pierre (2014:9) cautioned that “confusion and contradiction are not uncommon in mixed methods when a researcher claims to enact positivist and interpretive social science methods at the same time in

the same study”. To avoid such a scenario, the present study used mixed methods triangulation design procedures, using a multilevel research variant where the qualitative and quantitative methods were used to address different levels within the case studies (Tashakkori and Teddlie 1998:48). As preempted in the previous chapter, a considerable number of scholars in records and archives management have used the MMR to address related research problems successfully such as Kabata 2019; Musembe 2019; Marutha 2016; Maseh 2015; Laughton 2011; Kalusopa 2011; Garaba 2010 and Luyombya 2010. On the flipside however, mixed methods research is relatively new and clouded in controversy as this is an evolving methodology. The development of really integrated qualitative/quantitative methods remains a problem to be solved and universally accepted suggestions for how to integrate both approaches in one method are still awaited (Flick 2018:74).

4.4 Research design

Creswell (2014:295) views research design as research inquiries within quantitative, qualitative and mixed methods approaches that define the procedures undertaken throughout a research study. This constitutes the whole process of research from conceptualization of a problem to writing of research questions, collection of data, analysis, interpretation and the final report writing (Creswell 2014:295). Bryman (2012:46) conceptualized research design as a “framework for the collection and analysis of data”. In view of the various definitions put forth in the literature, it can be concluded that research design is a logically construed structure of inquiry, which has to be laid down at the onset of any research study.

There are different research designs which relate to philosophical assumptions and research methods, for instance: the research designs associated with positivism paradigm use quantitative methods, and include descriptive, correlation, experiment, survey and comparative designs. Similarly, research designs associated with social constructivism paradigm bring into play qualitative methods and entail ethnographic, phenomenological, grounded theory, case studies and narrative designs. Finally, as earlier mentioned, the research designs associated with pragmatic paradigm invoke mixed methods research approach, and include concurrent parallel design, explanatory sequential design, exploratory sequential design and embedded design

(Creswell and Clark 2017:184-195). In view of these, researchers should assess their proposed research design to determine its suitability before going into the field for data collection. The present study adopted the multiple case study research design.

4.4.1 Case study design

According to Rose, Spinks and Canhoto (2014:102), the word ‘case’ in research means ‘an instance of’. Therefore, case study research design can be described as an investigation of one or more ‘instances of’ something that constitutes the case(s) in a given study. A broader definition is provided by Creswell (2013:97) who defines case study method as an exploration of “a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed in-depth data collection involving multiple sources of information”. Bryman (2012:66) defined case studies as methodological approaches involving intensive, detailed and in-depth exploration of specific ‘bounded’ systems, using numerous data collection procedures to gather information systematically on how the systems function or operate. In retrospect, a case can be as simple as an individual or group, or as complex as an organization, neighborhood or culture, or it may be something more abstract like a programme, an event or activity (Rose, Spinks and Canhoto 2014:102). Focusing on the context or site of a given practice is particularly applicable to practice theory (Miles 2015:311), which in the context of this research entails digital archiving practices in universities. Thus, case studies provide contextual knowledge and participants’ versions of practice that are drawn together from their interactions, actions, voices and practices in the study site (Miles 2015:311).

Yin (2009:46) categorized case studies as exploratory, explanatory or descriptive in nature and distinguished the following four types of case study designs:

- 1) Single case (holistic) designs – where a single unit of analysis is selected to represent a unique or critical case. One can also select a single case as a representative or typical case or one which has not been considered before;
- 2) Single-case (embedded) designs – this involves more than one unit of analysis within a single case. The sub-units have been found to add significant opportunities for extensive analysis, enhancing the insights into the single case;
- 3) Multiple-case (holistic) designs – where a study contains more than one case; and

- 4) Multiple-case (embedded) designs – involves several units of analysis within the multiple cases.

McKemmish and Gilliland (2013:94-5) opine that in-depth single case or multiple case studies are appropriate for exploring current recordkeeping practices. This study adopted a multiple case (embedded) design described as case study research, comprising several instrumental bounded cases, carefully selected to develop a more in-depth, better understanding of the phenomenon than can be provided by a single-case study (Encyclopedia of Case Study Research 2010:584). Data was collected from various units within six different universities namely: University of Nairobi (UoN) located along University Way in Nairobi central business district; Moi University (MU) located in Kesses, 35 kilometres from Eldoret town; Kenyatta University (KU) located in Kahawa, about 20 kilometres from Nairobi's city centre; Maseno University (MSU) based in Maseno, near Kisumu city; Jomo Kenyatta University of Agriculture and Technology (JKUAT) located in Juja, along the Nairobi-Thika highway, and; Egerton University (EU) located in Njoro, near Nakuru town. The choice of a multiple-case research design was appropriate since it enabled the researcher to capture a more holistic and contextual view of digital archives management in the units under study. This particular design was also selected with lateral replication in mind, whereby the cases selected were similar and the predicted results were also similar. The data thus collected provided adequate guidance towards developing a framework for digital archiving applicable for use in public universities in Kenya.

The case study sites were purposively selected based on the criteria that they were among the 23 government accredited public universities in Kenya. They were also selected in the order of their years of establishment (that is, the six earliest universities) as follows: University of Nairobi (UoN) (established in 1970), Moi University (MU) (established in 1984), Kenyatta University (KU) (established in 1985), Egerton University (EU) (established in 1987), Jomo Kenyatta University of Agriculture and Technology (JKUAT) (established in 1994) and Maseno University (MSU) (established in 2001). The researcher found it necessary to select universities that had been in existence for the longest period because they were more likely to have large accumulations of archives in various formats. They were also presumed to be more advanced in ICT adoption and implementation, hence having more digital

records generated, and by extension, digital archives. This selection was done bearing in mind that not all the chosen units had fully functional archival repositories dedicated to the management of non-current records. In multiple case studies, Berg-Schlosser and Meur (2009:114) advised that even though cases should be chosen based on the outcome, cases with both positive and negative outcomes should be selected to enable comparison.

4.4.2 Survey design

Neuman (2014:316) reiterates that the survey design is the most widely used data gathering technique in social science. According to Tella (2015:589), surveys are used in LIS research to gather self-reported data from study respondents. Administering the survey encompasses gathering information ordinarily from fairly big groups of respondents, using questionnaires or structured interview techniques. It sometimes focuses on collecting views of the survey respondents or gathering factual information about the individuals (Tella 2015:589). In the literature, the survey design is lauded for the following reasons:

- i. It allows researchers the leeway to collect large amounts of data in relatively short periods of time;
- ii. It is a less expensive method of conducting research;
- iii. It is easier and faster to administer; and
- iv. It can be used to collect information on a wide range of issues (Tella 2015:589).

Nevertheless, Tella (2015:589) pointed out the following shortcomings of surveys:

- i. Designing of surveys and their administration can weaken other well-constructed studies;
- ii. The respondents' views and feelings may not be accurately reflected by the alternatives/choices provided as answers in a survey; and
- iii. The findings of a survey may be contradicted by the response rate.

There are two main types of survey research design namely the cross-sectional survey and longitudinal survey designs. Cross-sectional design involves collecting quantifiable data relating to two or more variables on more than one case at a single point in time, then analyzing the data to pinpoint patterns of association (Bryman

2012:58). In longitudinal design however, samples are surveyed and (re)surveyed again on at least one additional occasion to assess or describe development or change over time (Bryman 2012:63; Cohen, Manion and Morrison 2007:213).

For the present study to be effectively undertaken in the six study sites, the researcher used the survey design. Cross-sectional survey design was applied within the multiple-case (embedded) research design to enable the researcher collect data on a wide range of recordkeeping issues within a shorter period of time, in order to measure and describe the existing digital archiving practices. The survey was carried out by determining the study population, designing, pre-testing and administering questionnaires, carrying out documentary review, conducting interviews and analyzing the collected data. The records and archives management field is not short of success stories on the application of cross-sectional survey designs in MMR such as Laughton (2011), Kalusopa (2011), Luyombya (2010) and Garaba (2010), to mention but a few.

4.5 Study population

A study population is a unit, set of objects or persons possessing some similar characteristics which a researcher wants to generalize to, and from which a sample is selected (Nieswiadomy 2012:146). The term ‘unit’ does not necessarily refer to people but may refer to a sample from firms, cities, countries, regions, among others. Wiid and Diggins (2013:186) defined a population as the total group of *people* or *entities* from whom information is required. Notably, the entities being considered for study must conform to a pre-determined criterion drawn by the researcher, which is determined by the purpose of the study and overall size of the population.

This study’s population encompassed the 23 fully accredited public universities in Kenya but was limited to six public universities in the country as earlier explained. Public universities were chosen because they are funded by the government and are therefore of public interest, making them more amenable to research. The criterion for their selection was based on the fact that they are the oldest chartered universities and hence they met the standards of excellence set by the Commission for University Education (CUE), Kenya. The 6 universities were presumed to have larger collections of digital archives in comparison to their 17 counterparts. These universities included:

University of Nairobi (UoN), Moi University (MU), Kenyatta University (KU), Egerton University (EU), Jomo Kenyatta University of Agriculture and Technology (JKUAT) and Maseno University (MSU). Selection of the cases was not based on a sampling logic, but rather on a replicative logic that enabled making of analytical generalisations as opposed to statistical generalisations.

Within the six universities, the population comprised of six categories of staff cutting across the senior and middle level cadres as follows: the top management comprising of Deputy-vice chancellors in charge of administration and planning, finance officers, legal officers and ICT directors; middle level staff comprising of the university archivists, records managers, records officers, ICT staff and administrative (admin) staff in schools (faculties). Table 4.2 shows the target population for the study which was 451 as well as the relative sizes of the population in each of the case study sites.

Table 4.2: Population distribution of respondents in the six study sites

Name of university	Top management	Archivists	Records manager	Records officers	ICT staff	Admin staff	Total
UoN	7	1	1	28	20	34	91
MU	6	1	1	25	15	30	78
KU	7	1	1	28	15	28	80
EU	5	1	1	18	12	20	57
MSU	6	1	1	15	10	28	61
JKUAT	6	1	1	20	16	40	84
Total	37	6	6	134	88	180	451

Source: UoN (2019), MU (2019), KU (2019), EU (2019), MSU (2019) and JKUAT (2019)

The above statistics were obtained through telephone communication with relevant officers in the human resource departments of the selected universities between 25 February and 12 March 2019. Due to financial and time constraints, it was not feasible to include the entire population in the study, hence the need for sampling. Below is a brief profile of each of the respondents, outlining their relevance to the present study:

Top management - The top management in Kenyan public universities constitute the senior-most staff who hold grade 14 positions and above. The present study chose to include the following 4 top management categories of staff:

- i. Deputy vice-chancellor (Finance and planning or equivalent) – S/he heads the financial function in the university on behalf of the Vice-chancellor and responded to questions regarding funding for digital records and archives management, risk management and implementation of a digital archiving framework;
- ii. Finance officer – S/he heads the finance department and answers directly to the DVC, finance. The FO was in a position to respond to questions related to funding for digital recordkeeping in the university;
- iii. Legal officer – S/he is responsible for all legal matters concerning the university and reports directly to the VC. The legal officers responded to questions on the current state of digital archiving, readiness and risks facing digital archives; and
- iv. ICT director – S/he is responsible for technology-related issues in the university and reports directly to the VC. The ICT director responded to all the research questions of this study.

Archivists - The university archivists head the archives departments in the institutions and are responsible for decision making concerning the management of archives and policy related issues. The university archivist responded to all research questions of the study. It is important to note that although the present study focused on archives management, not all universities had an archive and a university archivist.

Records managers - Records managers in universities are charged with the responsibility of overseeing the general recordkeeping function in the universities, including the administration of the registry departments and records units in departments. Their selection for inclusion in the study was because they were believed to be information-rich respondents by virtue of their professional and practical recordkeeping orientation. They responded to all the research questions for this study.

Records officers - Records officers (including records clerks) were selected because of their recordkeeping role and training in records and archives management at bachelors, diploma or certificate levels. They were engaged in the lifecycle management of records from creation to disposition. They were therefore able to

respond to questions relating to the practical aspects of recordkeeping in the context of universities.

ICT staff - The category of ICT staff included in this study comprised of database administrators, mainly because they are engaged in the installation, upgrading and general management of database applications. It was assumed that they were directly engaged in the creation, management and disposition of digital records, hence able to inform on key issues surrounding digital archiving in universities.

Administrators - These are administrative staff in universities, specifically senior administrators attached to schools/faculties. They were selected to participate in the study because they are involved in decision making concerning records creation, management and disposal at school/faculty levels. They were therefore key determinants as to the digital archives that were ingested into the archival repositories and were therefore information-rich respondents.

4.6 Sampling procedure

A sample is a segment or subset of the whole group representing the population, which will have all the characteristics of the population and which is selected for observation and analysis (Trochim, Donnelly and Arora 2016:283). Therefore, sampling is done mainly to get a sample representative of the larger population that can be studied, and findings generalized to the larger group. Studies that have a relatively small population of 200 and below require researchers to take a complete enumeration of the population (census), rather than to collect data from a sample of units of that population in order to eliminate possible sample error (Israel 1992:2). In contrast, large populations require sampling procedures to be followed. Saunders, Lewis and Thornhill (2012b:145) reiterated that sampling provides a valid alternative when it is impractical to survey the entire population owing to budgetary and time constraints. Thus, selecting subjects from whom data will be collected and the data collection methods to be used should be done judiciously to avoid dealing with improperly collected data.

The methods of selection or sampling may be based on probability or non-probability sampling approaches (Bryman 2012:187). Probability sampling is

where a sample is selected randomly so that each unit of the population has an equal chance of selection, thereby yielding a representative sample (Bryman 2012:187). Non-probability sampling is where random sampling has not been used to select the sample, but instead some units in the population stand a higher likelihood of selection than others (Bryman 2012:187). Probability sampling consists of stratified, simple, systematic, cluster (area) and multi-stage sampling; while non-probability sampling consists of convenience, purposive, quota and snowball sampling (Trochim, Donnelly and Arora 2016:284).

In this study, non-probability purposive sampling was used to select the 6 study sites and the study respondents. The study made use of the Krejcie and Morgan (1970) model to determine the sample size, tolerating a marginal error of .05% (See Appendix 2). The study population was 451, which according to Krejcie and Morgan's table for determining sample size, falls between 440 and 460, requiring a sample of 205 for it to be representative. The following formula was used to determine the sample size:

$$\frac{N \times S}{TP} = SP$$

TP

Where,

N = Number (population from each university)

S = Sample (total sample size)

TP = Total Population

SP = Sample Population

Therefore:

$$\text{UoN: } \frac{91 \times 205}{451} = 41.36 \text{ (41)}$$

$$\text{MU: } \frac{78 \times 205}{451} = 35.5 \text{ (36)}$$

$$\text{KU: } \frac{80 \times 205}{451} = 36.3 \text{ (36)}$$

$$\text{EU: } \frac{57 \times 205}{451} = 25.9 \text{ (26)}$$

$$\text{MSU: } \frac{61 \times 205}{451} = 27.7 \text{ (28)}$$

$$\text{JKUAT: } \frac{84 \times 205}{451} = 38.1 \text{ (38)}$$

$$\text{Total Sample Size: } 41 + 36 + 36 + 26 + 28 + 38 = 205$$

Stratified and purposive sampling methods were used thereafter to select respondents from 6 categories (stratas) to participate in the study. The researcher drew motivation for this approach from Patton (2002:106) who asserted that the power and logic of purposeful sampling lies in selecting cases that hold the highest probability of providing the information required in an in-depth study, also known as information-rich cases. For the present study, the explicit inclusion/exclusion criterion was applied as follows:

- i. For the top management in each university, one deputy vice chancellor (Finance), FO, legal officer and ICT director were selected;
- ii. Archivists, records managers and records officers should be working at main campuses;
- iii. ICT staff should be working at main campuses of the selected institutions; they must have diploma certificates and above in IT or the equivalent; and
- iv. Administrative staff should be working at the main campuses; in every school/faculty, only one (senior most) administrator should be selected for participation; they must have a bachelor's degree and above.

The above criteria were necessary to confine the study within manageable margins while also ensuring that information-rich cases were selected. Table 4.3 shows the sample size selected from the study population.

Table 4.3: Sample size

Respondents	UoN	MU	KU	EU	MSU	JKUAT	Total
Top management	4	4	4	4	4	4	24
University Archivists	1	1	1	1	1	1	6
University Records Managers	1	1	1	1	1	1	6
Records Officers	6	5	6	4	4	5	30
ICT Staff	12	10	11	6	8	7	54
Administrators	17	15	13	10	10	20	85
Total	41	36	36	26	28	38	205

4.7 Data collection methods

Data collection is an important stage in research because it determines the outcome of the study. The term is used to refer to the process of systematically collecting and

measuring information relating to variables of interest in order to answer the stated research questions, test hypotheses and analyze and evaluate study outcomes (The Open University Nd:202). Devices used to collect data are known as research tools or instruments, and are used to enable observation and measurement of relevant variables (Nieswiadomy 2012:167). The ultimate goal of data collection is to amass quality evidence which transforms into a rich data analysis and eventually provides plausible answers to the research questions posed by the study (The Open University Nd:202). Therefore, the choice of a data collection instrument impacts upon the type, quantity and quality of data to be collected and the method of data analysis to be used in a study.

Qualitative research studies mainly involve collecting, analysing, and interpreting naturally occurring nonnumeric data from either one or more of the following data sources:

- i. Talk – data is obtained directly from one or more participants, for example through interviews and focus groups;
- ii. Observations - systematically perceiving or watching occurrences, events, nonverbal communication, or interactions with the purpose of understanding or addressing one or more research questions;
- iii. Images - moving or still visual data that are perceived or observed (for example videos, drawings and photographs);
- iv. Documents - collection of text that is in print or digital format (Weinbaum and Onwuegbuzi 2016:249).

Over the past two decades, Library and Information Science (LIS) researchers have commonly undertaken data collection using paper-based methods (Tella 2015:588). However, the ICT revolution has led to the birth of the Internet, causing researchers to view the net as a strong research tool. The use of electronic or web-based data collection tools became an inevitable reality at the close of 2019 moving forward as an after-effect of the COVID-19 global pandemic, forcing many a researcher to migrate to virtual platforms in compliance with the laid-down regulations for “flattening the curve”. In view of the fact that this is a mixed study in the COVID-19 era, data collection procedures were triangulated across and between methods. The data collection instruments used included questionnaires (online and paper-based),

semi-structured interviews (virtual and physical) and documentary review (analysis) which are discussed hereunder.

4.7.1 Questionnaire

Burke and Christensen (2014:274) define a questionnaire as a self-report data collection tool filled by research participants as part of the study. Also referred to as self-completion or self-administered questionnaires, they are a key instrument for data collection in social survey design studies (Bryman 2012:232). According to Rowley (2014:308), questionnaires are amongst the most widely used means of data collection in Social Sciences research. They are used by researchers to measure diverse characteristics such as feelings, perceptions, thoughts, beliefs, attitudes, values, behavior, and personality of the participants (Burke and Christensen 2014:274). In the literature, the use of the questionnaire by scholars in the field of LIS and in the present study is attributed to the following factors:

- i. It is considered the most flexible tool in collecting both quantitative and qualitative data;
- ii. It is relatively easy to plan, design and administer and does not require a lot of knowledge and skill;
- iii. Compared to other methods, the questionnaire is considered the best method when the sample is spread over large territories, hence it is best suited for studies of national and international magnitudes;
- iv. It is the most economical method of collecting information both for the researcher and respondents in terms of costs, time and effort;
- v. It provides the advantage of anonymity to respondents and provides them with assurance that they will not be identified for giving particular opinions and views;
- vi. It reduces variation by giving respondents the opportunity to provide uniform answers when responding to similar questions;
- vii. It eliminates biases that may arise during interviews by ensuring that the answers given by respondents are available in their own language and version, thereby enhancing validity;

- viii. It imposes less pressure upon respondents by allowing them to answer the questions at their own leisure, as opposed to interviews and observation methods which demand specific situational and time fixation; and
- ix. Can be used as a preliminary tool for conducting an in-depth study at a later date using a different method (Adu 2015:136; Bernard 2013:222; Leedy and Ormrod 2013:191).

However, use of the questionnaire is not without shortcomings, which include the following:

- i. Its applicability is limited to respondents who have the ability to read and write, hence cannot be administered to illiterate and semi-literate persons;
- ii. The researcher does not have personal contact with respondents, which becomes a problem when they are unable to comprehend some of the technical terms;
- iii. As a result of (ii) above, reliability and validity of information collected through questionnaires can be compromised;
- iv. Illegibility of respondents' handwriting, incomplete entries and manipulated entries create problems for researchers when reading and interpreting the questionnaires;
- v. It yields low response rates as a result of lengthiness of the questionnaire, layout, respondents chosen, among other factors; and
- vi. The researcher is not present to supervise the completion of the questionnaire, hence respondents can easily avoid filling out the form and return partially filled questionnaires to the researcher (Marutha 2016:127-131; Adu 2015:135-7; Bernard 2013:222; Leedy and Ormrod 2013:191).

The distribution of questionnaires may be as an online questionnaire, via e-mail, post, or face-to-face by hand (Rowley 2014:308). Further, questionnaires may have closed-ended questions, open-ended questions or both. Open-ended questions are useful when it's important to hear the views and opinions of respondents verbatim and require unstructured, free responses, whereas closed-ended questions are more commonly used and require standardized, structured and fixed responses (Neuman 2014:331; Cummings and Hulley 2007:242).

The present study administered online, email and physical (face-to-face) questionnaires to different respondents depending on the prevailing circumstances. For instance, virtual interviews and emails were preferred when distance was a challenge, whereas physical administration of questionnaires was done when access to respondents was possible. The questionnaires had both open and closed ended questions which were used to obtain qualitative and quantitative data respectively from 169 respondents. The open-ended questions sought to obtain qualitative data which represented the views, opinions and attitudes of ICT and administrative staff on digital records creation, management and use, and subsequent disposal practices. The closed ended questions sought to obtain quantitative data on digital records management, for example the number of records created, deleted or archived on a given day or period, give measurements on the types of risks digital records and archives were exposed to as well as the legal and regulatory framework governing digital archives management.

4.7.2 Interview

The interview is universally used as a research genre across disciplines (Leavy 2017: 139). According to Burke and Christensen (2014:317), interview is a technique of data collection wherein an interviewer (or research assistant) asks questions of an interviewee in relation to a research study. They comprise face-to-face, telephone, focus group and email/internet interviews, which involve asking of open-ended questions to engage respondents and stimulate feedback on a given subject (Creswell 2014:239). Jwan and Ong'ondo (2011:65) posit that interviews strive to explore and get a glimpse into the thinking of a research participant, their attitudes and reasons for carrying particular attitudes and perceptions, and for thinking in a certain way.

Three fundamental types of interviews are identified in the literature namely structured (formal), semi-structured (in-depth) and unstructured interviews (Bernard 2006:210). Structured interviews which are predominantly used in quantitative studies are highly formal and standardized, and are extremely rigid, allowing very little or no room for prompting participants to obtain and analyze results. In contrast, semi-structured interviews involve the researcher having a list of themes and areas to be covered with standardized questions, which may be “edited” depending on the

situation at hand and the flow of the conversation. Lastly, unstructured interviews, also known as in-depth interviews, are more like a normal conversation held with a set purpose in mind, which is to collect data on a specific subject (Burke and Christensen 2014:461; Bryman 2012:209-211; Bernard 2006:210).

Interviews are generally useful in overcoming the pitfalls of questionnaires in data collection. However, the method has the following limitations which researchers strive to overcome:

- i. A lot of effort, cost and time are demanded of researchers to undertake interviews;
- ii. Researcher biases are a high possibility since s/he can ask questions that may influence or prompt particular responses from informants; and
- iii. For the interviews to be effective, researchers must be trained and possess skills in interviewing (Bernard 2006:257).

In this study, semi-structured interview schedules were used to collect data from 36 respondents, comprising top management staff, records managers and archivists. A major strength of interviews in the present study is that they allowed for deeper exploration of responses by participants through probing for clarity and additional information and exploring new dimensions that were previously not considered by the researcher (Burke and Christensen 2014:317; Jwan and Ong'ondo (2011:67). Other merits of the interview as a data collection tool for this study included:

- i. The interviews yielded a higher response rate compared to questionnaires;
- ii. The researcher remained in control of the entire interview process;
- iii. During the interview the researcher was able to observe the non-verbal behavior of respondents and gain further insight into their responses; and
- iv. Inaccuracies and irrelevant or vague answers were cleared up by the researcher during the interviews by explaining the questions to the interviewees (Burke and Christensen 2014:317; Jwan and Ong'ondo 2011:67).

4.7.3 Document review

Throughout literature, documents have been recognized as a powerful source of research data, besides their use during other stages of research such as putting together background information on a topic, building the literature review and developing the conceptual framework for a study (Jwan and Ong'ondo 2011:67). Stressing the significance of carrying out document review during case study research, Yin (2003:85) advised that documents are valuable in corroborating data amassed from other sources.

According to Jwan and Ong'ondo (2011:99), documents have the major advantage of enhancing a study's credibility and trustworthiness because they contain exact references, names and details of events. They can also be reviewed repeatedly at no significant cost as opposed to repeat interviews. However, a major drawback of documentary review is that their retrievability can be also be low and the content may reflect reporting (author) bias which may be misleading to researchers. It is therefore advisable that document review should be used alongside other primary techniques of data collection such as observation and interviews (Jwan and Ong'ondo 2011:94).

Consequently therefore, between (across) method triangulation was applied to collect data using semi-structured interviews and document review. Bryman (2012:543) suggested that document review should ideally include materials that are relevant to the research, can be read (including photographs, have not undergone any sort of processing or analysis, and; have not been produced specifically for purposes of social research. In this study, legislative instruments, policies, mission statements, memoranda and reports, government pronouncements and proceedings, among other documents were analyzed guided by a document review guide to supplement the information gathered through interviews and questionnaires. The three data collection instruments were triangulated to achieve complementarity, convergence and robustness in the study's results. Table 4.4 depicts a mapping of the data collection instruments to the corresponding research questions for which data was collected.

Table 4.4: Mapping research questions to sources of data

Research question	Source of data
What is the state of digital archiving readiness of public universities in Kenya?	Interview/observation/document review
How are digital archives identified and administered in Kenyan public universities	Questionnaire/interview/observation/document review
Which legal and regulatory frameworks govern the management of digital archives in Kenyan public universities?	Interview/observation/document review
Which risk factors are digital archives exposed to in these universities?	Interview/questionnaire/observation
What possible solutions can be adopted to mitigate the identified risks and support sustainable digital archiving implementations in Kenyan public universities?	Interview/questionnaire

4.8 Pilot study

A frequent problem with the questionnaire and interview schedule is that research participants often misconstrue questions resulting in generation of wrong data. Therefore, it is advisable that whenever possible, a pilot study should be conducted prior to administering structured interview schedules and self-completion questionnaires (Bryman 2012:263). Nieswiadomy (2012:168) defines a pilot study as a small-scale trial run of the actual research project, designed to pre-test a newly designed data collection tool. When carrying out a pilot study, individuals having similar features with the proposed subjects of the study are tested under the same conditions as those that will prevail during the actual study (Nieswiadomy 2012:168).

Pre-testing of data collections instruments for this study was proposed to be carried out at University of Eldoret (UoE) from 25 to 29 January 2021 but this was not realized. The researcher made efforts to secure official permission from the relevant office in the institution. However, feedback to the request was not positive, despite the researcher explaining to the relevant office that the data collection exercise was a pilot-study, not the actual study (See Appendix 21). To overcome this challenge, the researcher informally sought the assistance of fellow scholars and practitioners in the field of Information Science working in public universities in Kenya and requested

them to scrutinize and critique the data collection tools in order to correct any anomalies and enhance their degree of effectiveness (see Section 4.12).

4.9 Reliability and validity

The ultimate aim for all researchers, whether epidemiologists or social researchers, is to provide findings that are reliable, valid, unbiased, sensitive and complete. The twin components of reliability and validity are essential considerations in research as they determine the substance of a study's results. Burke and Christensen (2014:383-4) stated that reliability is deemed present in research when there is surety that matching results will be obtained in the event that the study were to be replicated; and validity in research refers to the truthfulness or correctness of the inferences made from the study findings. Therefore, reliability of a data collection instrument refers to its consistency and stability over time, whereas validity of a research instrument refers its ability to gather the intended data (Nieswiadomy 2012:169-171). Hence, research reliability and validity are determined by the choice of the data collection instruments used in a study, the quality of their design and professionalism employed in administering the instruments and analyzing the data gathered.

Validity and reliability are easily measured in quantitative studies because the research is anchored upon causal (cause/effect) relationships or aspects of a relationship that can be measured. In qualitative research studies, validity and reliability refers to trustworthiness which encompasses four dimensions namely confirmability, credibility (whether findings are believable), dependability (ability of a research instrument to yield similar results when a study is replicated under similar conditions) and transferability (degree to which findings are applicable or transferable) (Koonin 2014:257). In the present study, validity and reliability was ensured through the following ways:

- i. The researcher elicited the professional skills of colleagues from other non-participating public universities to read through the data collection instruments and sharpen them in readiness for the data collection process;
- ii. In order to ensure trustworthiness or credibility of research findings, the researcher spent adequate time (three months) in the field with the participants

in order to understand them well and gain insight into their lives and work experiences;

- iii. Methods triangulation was used to ensure dependability and reliability of the data collected, by cross-checking information collected by different data collection techniques (See Section 4.7); and
- iv. To attain confirmability and objectivity, informant feedback (respondent validation technique) was used to test initial results with the participants to confirm data authenticity while also improving on the credibility, accuracy and transferability of the study findings.

4.10 Data analysis and presentation

Data analysis encompasses collating the data, carrying out a preliminary read-through the interview and questionnaire responses, coding and organizing themes, representing and interpreting the data (Creswell 2013:182-188). In the words of Bryman and Bell (2003:380), data analysis is concerned with trimming the bulky information gathered by the researcher so that it makes sense. As rightly postulated by Ngulube (2015:133), qualitative studies particularly generate large amounts of data even when few sources are consulted. Therefore, mixed methods researchers require skill to efficiently analyze the bulk of qualitative data as well as the quantitative data. Techniques that can be used for data analysis include explanation building, pattern matching, time-series analysis, logic models, cross-case synthesis and linking data to propositions (Yin 2003:116-136).

In the present study, the processes of data collection and analysis occurred concurrently, guided by the research questions. Qualitative data was analyzed thematically by content analysis, whereas quantitative data was analyzed using SPSS to generate inferential and descriptive statistics. Interview and questionnaire data were independently analyzed and thereafter the quantitative results were interrelated with the qualitative results in a final discussion (Tashakkori and Teddlie 1998:153).

4.11 Ethical considerations

The Economic and Social Research Council (ESRC) (2015) cited in Jwan and Ong'ondo (2011:147) defined research ethics as “the moral principles that guide research from its inception through to its completion and publication of results”.

Putting this definition in a broader perspective, Saunders, Lewis and Thornhill (2003:131) highlighted the following ethical issues that should be considered during research:

- i. The voluntary nature of participation;
- ii. The rights of privacy of individuals;
- iii. Consent and possible deception of participants;
- iv. Reactions of participants to the ways in which researchers seek to collect data;
- v. Anonymity of participants and confidentiality of the data provided;
- vi. Appropriate behaviour and objectivity of the researcher; and
- vii. The impact of data analysis and reporting on the participants.

Similarly, Jwan and Ong'ondo (2011:148-9) summarized the factors that compel researchers to pay attention to ethical considerations when conducting research as follows:

- i. The need for democracy (assuring participants of their freedom to provide the requested information, and the right to be made aware of what the researcher has reported about them), respect for truth (guaranteeing that the entire research process is devoid of any sort of deception) and respect for persons (respecting the privacy and dignity of participants throughout the study); and
- ii. Balancing between the demands placed upon researchers as professional scientists in their quest for truth on the one hand, and the rights and values of participants potentially threatened by the research on the other.

This research study complied with ethical standards of informed consent, confidentiality and anonymity as stipulated by the UKZN Research Ethics Policy (University of KwaZulu-Natal research ethics policy 2014). Among other requirements for cluster level research proposal defense, the researcher submitted a Turn-It-In report reflecting not more than 15% similarity index as a safeguard against plagiarism and other research irregularities. The researcher obtained ethical clearance from the Humanities and Social Sciences Research Ethics Committee. Official authorization was also sought by the researcher from the National Council of Science and Technology Institute (NACOSTI) to carry out research in Kenya, and from the

offices of the DVCs in charge of research in all six universities. Prior to the actual data collection process, informed consent of the respondents was sought from five of the universities before they could take part in the study. The researcher being an employee of Moi University was not required to seek for this second approval. Respondents were requested to sign consent forms indicating that they understood the nature of the research and were willing to participate in it. The respondents were assured that their privacy and confidentiality would be protected by treating their responses with highest levels of confidentiality and anonymity. They were additionally informed that they were free to participate in the study voluntarily and withdraw from participation any time at their own volition.

4.12 Evaluation of research methods

This study takes in stride the solemn observation posited by Deming (1950:24) in Ngulube (2005:139), that the notion of a ‘perfect survey’ is impossible to attain. In support of this sentiment, Ngoepe (2012:115) aptly remarked that it is important to evaluate the procedures used to collect and analyze data, observing that every research method has its fair share of shortcomings which must be acknowledged to avoid casting doubts on the study’s outcomes. In view of this, the present study holds that no single scientific research can boast of perfection in the methodological ideology and approach used. Therefore, any PhD study worth its salt should include an objective evaluation of the methods and methodology used by the researcher, which subsequently informs the reader about the strengths and weaknesses of the overall research design. This serves to explicate the difficulties, errors and biases which would otherwise impact upon the gathering of data as well as its analysis (Ngulube 2005:139-40)

The present study examined digital archives management practices in six state-owned universities in Kenya using a mixed methods research approach based upon the pragmatic worldview. The adoption of MMR allowed for methodological flexibility, making it possible for the researcher to audaciously blend quantitative and qualitative research methods in a QUAL+ quan fashion. Further, the multi-case approach used within a survey design permitted an in-depth study of the phenomenon, which was instrumental in solving the research problem under investigation. Purposive sampling

technique enabled selection of an information-rich sample from a large and diverse population within the case study areas, which provided the required data at minimal costs and within the time schedule slotted for the collection of data for the study.

As earlier mentioned, pre-testing of the interview schedules and questionnaires was not conducted during a pilot study as was initially planned due to unavoidable circumstances. Alternative arrangements were made by the researcher to ensure the research tools yielded the required data for the study. The researcher approached colleagues working at Technical University of Kenya and Kisii Universities and explained the purpose of the study to them. They were requested to read through the interview schedules and questionnaires and give their feedback on the areas that needed editing. The feedback given was useful in polishing the instruments and improving them to the required standard before data collection.

A number of problems were experienced during data collection. To begin with, the study sites were geographically dispersed across the country, requiring the researcher to traverse between several counties to distribute the questionnaires and conduct interviews. Secondly, getting the subjects who were willing to sign the consent forms and participate in the study was a problem, mainly because most staff were working remotely due to the COVID-19 pandemic. Added to these, a good number of questionnaires were not fully completed, with many of the questions left blank. To mitigate these challenges, the researcher took advantage of available technologies at the convenience of the respondents on a case-by-case basis. Follow-up telephone calls were made to the questionnaire respondents and further clarity given where necessary to get the required feedback from them, which eventually led to a fruitful conclusion of the data collection process. Overall therefore, the successful completion of this study was attributed to the judicious selection of MMR as the research approach which allowed for theoretical and methodological triangulation. The study therefore strongly recommends the choice of a blended methodological approach in undertaking similar studies in the field of recordkeeping and information studies at large.

4.13 Summary

Undertaking research entails a continuous process of critical self-reflection and important decision-making during each stage of the research project (Clough and Nutbrown 2012:39). This chapter focused on the methodological triangulation procedures adopted to investigate digital archives management practices and eventually develop a framework for digital archiving. The starting point was an illustrative mapping of the research methodology which served as a summarized outline of the methodological decisions made by the researcher throughout the study. The chapter proceeded to discuss three research paradigms prevalently identified in research methods literature in the social sciences. Sufficient justification was presented for the choice of the pragmatic paradigm against the positivist and interpretivist paradigms. This consequently informed the decision to adopt a mixed methods research approach for the study vis-a-vis exclusively qualitative or quantitative methodologies. The chapter gave insight into the research design for the study and provided the rationale for the choice of a cross-sectional survey design within a multiple-case design, and choosing the six study sites from a variety of other public universities in Kenya with similar characteristics as the physical location for the investigation into digital archives management. The chapter expounded on the target population, sampling procedure and the techniques used to collect data from the study participants. A discourse on the conduct of a pilot study to pre-test the data collection instruments prior to the actual study was also offered. The need and assurance for reliability and validity were sufficiently addressed in the context of the present study, highlighting the ways in which this was achieved. The chapter proceeded to shed light on the techniques used to independently analyze the two sets of qualitative and quantitative data and thereafter merge them into one single final report. The chapter also highlighted the importance of adherence to research ethics in any kind of study and disclosed the ethical considerations upheld throughout this study. Lastly but of equal significance, the chapter did not shy away from presenting an impartial evaluation of the strengths and weaknesses of the methodology used in this study. Sufficient justification and explanation of the decisions made during the important stages of the research journey were provided. The next chapter presents the study findings emanating from the data collected using questionnaires, interviews and document review processes. The data was triangulated during analysis and presented in the form of tables, graphs and explanatory or textual descriptions.

CHAPTER FIVE

DATA ANALYSIS AND PRESENTATION OF FINDINGS

Mixed Methods data analysis consists of analytical techniques applied to both the quantitative and the qualitative data as well as the integration of the two forms of data (Creswell and Plano Clark 2018: 219).

5.1 Introduction

The previous chapter described the rationale, purpose and procedure followed in applying mixed methods research to address the research objective and questions pertinent to this study. This chapter presents the raw data gathered through quantitative and qualitative methods from the target population in six public universities in Kenya using questionnaires, interviews and document review, and analyses the findings thereof. Questionnaires were administered to records officers (Appendix 7), ICT staff (Appendix 8) and administrative staff (Appendix 9). Interview schedules were used during interviews with Deputy vice chancellors (Appendix 1), Finance officers (Appendix 2), ICT Directors/Head of departments (Appendix 3), Legal officers (Appendix 4), Archivists (Appendix 5) and records managers (Appendix 6) in each of the six institutions. Analysis of documents was carried out to supplement the data collected through questionnaires and interviews. In such empirical studies, data analysis is undertaken primarily to showcase findings as an antecedent to answering research questions of the study (Garaba 2010:186). Hence, the focus of this chapter was to present the study findings duly analysed in a comprehensible and interpretable form so as to identify relations and trends in response to the research questions so as to meet the study objective.

The objective of the study was to investigate digital archiving practices in archival repositories of selected public universities in Kenya in order to develop a framework for sustainable maintenance of digital archives in the institutions. Lawrence and Tar (2013:31) aver that in such an empirical study, presentation of data in its raw state is a basic step towards realizing the objective of developing a framework or model. Further, Annesley (2010) likens writing of the results section in research to playing a poker game. According to the author, how a poker player presents his/her cards affects how their competitors gain understanding of the value of the cards. Similarly, a researcher's key findings will be appropriately understood if presented in a certain sequence (Annesley 2010:1066).

In this study, data analysis and presentation have been undertaken in accordance to themes derived from the study's research questions which are as follows:

1. What is the state of digital archiving readiness of public universities in Kenya?
2. How are digital archives identified and administered in Kenyan public universities?
3. Which legal and regulatory frameworks govern digital archives management in Kenyan public universities?
4. Which risk factors are digital archives exposed to in these universities?
5. What possible solutions can be adopted to mitigate the identified risks and support sustainable digital archiving implementations in Kenyan public universities?

Data analysis process is a precursor to the presentation of raw data for the readership (Lawrence and Tar 2013:31). De Vos, Strydom, Fouche and Delport (2011:249) accentuated the importance of data analysis and presentation of findings as being fundamental in research, explaining that the processes enable researchers to condense data to a comprehensible and interpretable form that aids in studying and testing of the variables in a research problem, and subsequently drawing conclusions.

The organization of this chapter is two-fold, structured along themes from the research questions. In no pre-determined order, the research findings were first presented as an analysis of the qualitative data obtained from semi-structured interviews with Deputy Vice Chancellors, legal officers, finance officers, ICT Directors, records managers and archivists was presented and analysed. This was followed by the presentation and analysis of quantitative data obtained from questionnaires filled by administrators, ICT staff and records officers. Qualitative data is presented in the form of a descriptive narrative using texts appearing as phrases and direct quotes from respondents while quantitative data is presented using frequencies, percentages, tables, cross tabulations, pie charts and bar graphs. Document analysis played a confirmatory and complementary role during the study.

5.1.1 Mixed methods research data presentation and analysis

The Special Programme for Research and Training in Tropical Diseases (TDR) (2014: 127) reiterates the necessity of according careful consideration to the processes of

data presentation and analysis to circumvent possible misinterpretations that would result into wrong responses and/or conclusions. Mixed methods data analysis is particularly challenging because of the inclusion of dual datasets in one study, necessitating preparation and organization of both sets of data (Leavy 2017:- 181). The process calls for the amalgamation and application of analytical techniques upon of the two data sets (Creswell and Plano Clark 2018:219). Quantitative data is entered into a statistical software programme or a spreadsheet by the researcher. For qualitative data, transcription, scanning, sorting and organizing the data into a repository may need to be done, after which the data is fed into a Computer-Assisted Qualitative Data Analysis Software (CAQDAS). In the current study, SPSS and NVivo software packages were used to feed and analyse quantitative and qualitative datasets respectively.

Teddlie and Tashakkori (2009:269) highlighted the following two typologies of MMR analyses:

1. Parallel-tracks analysis – Data analyses for the quantitative and qualitative strands is carried out separately, with respect to the norms of practice until conclusions are reached, following which the findings are “mixed” or brought together.
2. Crossover-tracks analysis - results from quantitative and qualitative methodological strands are interlinked in such a manner that they inform one another during the study (Teddlie and Tashakkori 2009:269).

For this study, crossover-tracks analysis was adopted, following a complementary framework to achieve integration whereby qualitative and quantitative findings were juxtaposed with the aim of achieving complementarity and producing a broader understanding of the phenomenon under investigation (Leavy 2017:- 181). Following the advice from Leedy and Ormrod (2015:352), the researcher chose to think like a spectator rather than a presenter to mitigate the risk of bias. However, to enhance the readers’ understanding of the findings, the researcher made reference to adopted theories and literature where necessary when analyzing and presenting data in this chapter.

5.2 Response rate and respondents' profile

Response rate reflects the degree to which an investigator succeeds in getting the required cooperation from all prospective respondents included in a research sample. It is therefore defined as the proportion of the total number of sample members eligible to take part in a survey from whom a usable and complete set of data is collected (Kviz 1977:265). Therefore, response rate is calculated by dividing the total responses gotten with the total number of eligible sample members (Saunders, Lewis and Thornhill 2012), which is then expressed as a percentage.

According to Groves and Peytcheva (2008:183), researchers ought to focus on reducing the risk of non-response bias by working towards achieving high response rates in order to ensure the sample is representative. Giunaliu and Rada (2021:32) further advise that the use of mixed models in research introduces the advantage of significantly reducing error margins for non-responses. Taking these views into stride, the present study aimed to cover six public universities in Kenya, the unit of analysis being 205 respondents, where 41 were from UoN, 36 from MU, 36 from KU, 26 from EU, 28 from MSU and 38 from JKUAT. All six institutions granted the researcher permission to carry out the study as evidenced by the letters of authorization (appendices 2-7), translating to 100% response rate for the study sites as shown in Table 5.1. The universities' names have been coded for anonymity to protect the identity of the respondents.

Table 5.1: Number of respondents in the Universities (N=205)

Name of university	Number of respondents	Percentage
UoN (University A)	41	20
MU (University B)	36	18
KU (University C)	36	18
EU (University D)	26	13
MSU (University E)	28	14
JKUAT (University F)	38	19
Total	205	100

The study targeted 169 respondents in the six universities for the questionnaires, constituting 85 (50%) administrative staff, 54 (32%) ICT staff and 30 (18%) records officers. Out of this number, 108 respondents comprising of 55 administrative staff

(33%), 20 records officers (12%) and 33 ICT staff (20%) completed and submitted the questionnaires, giving a response rate of 64% for quantitative data as shown in Table 5.2.

Table 5.2: Response rate for questionnaires (n=169)

Target group	Targeted number	Actual No. of respondents	Response rate (%)
Administrative Officers	85	55	51
ICT staff	54	33	31
Records Officers	30	20	19
Total	169	108	64

The total number of interviews targeted by the study was 36, constituting interviews with six DVCs, six FOs, six ICT Directors, six LOs, six archivists and six RMs from the six universities. As revealed in Table 5.3, 22 interviews were successfully conducted, giving a response rate of 61% for the qualitative data. The non-responses were as a result of COVID-19 implications which led to closure of all public sector organizations in Kenya, making it difficult to reach participants directly.

Table 5.3: Response rate for interviews (n=36)

Target group	Targeted number	Actual No. of respondents	Response rate (%)
DVCs	6	2	33
FOs	6	2	33
ICT Directors	6	6	100
Legal officers	6	3	50
Archivists	6	3	50
Records managers	6	6	83
Total	36	22	61

Babbie (2016) rated response rates as 50% being adequate, 60% good and 70% as very good. In support of this view, Bryman (2012:235) advocated a response rate of 60-69% and cautioned against analyzing study findings with a 50% response rate. The researcher therefore considers the response rate for this study to be good and thus favorable enough as to enable successful analysis of findings leading to accurate conclusions. Table 5.4 presents the response rate for the entire study.

Table 5.4: Response rate for the study (N=205)

Target group	Targeted number	Actual No. of respondents	Response rate (%)
Qualitative data	36	22	61
Quantitative data	169	108	64
Total	205	130	63

An examination of mixed methods doctoral researches in the RAM domain in Kenya during the last decade by the researcher revealed that studies undertaken to successful conclusion had a response rate of 65% and above. Maseh (2015) achieved a response rate of 75% for the interviews and 52% for the questionnaires in a study that investigated recordkeeping practices in Kenya's judiciary with a view to promoting transformation and open government for effectiveness and efficiency in the execution of justice. Kamau (2017) achieved 100% response rate for questionnaires and interviews in a study that assessed the performance of public record centres (Records Management division of KNADS) in facilitating sound record management practices in the public sector in Kenya. Musembe (2019) achieved a response rate of 91.3% for interviews and 96.7% for questionnaires in a study that investigated security issues surrounding e-records management at Moi University. Yet another study by Kabata (2019) assessing the preparedness of public bodies for the implementation of Access to Information (ATI) Act, (2016) in Kenya achieved a response rate of 100% for interviews and 84% for questionnaires.

Nevertheless, not all studies will have a response rate to report about. For example, qualitative researches that utilize grounded theory focus more on the aspect of transferability of research findings rather than generalization as is the case in quantitative and mixed methods researches. Such is the case with Chaterera (2017) who used the grounded theory to develop a framework for access and use of the documentary heritage at the National Archive of Zimbabwe. The researcher had little concern for the number of respondents and instead focused more on the concepts relevant to the study (Chaterera 2017:149).

5.3 Demographic characteristics of respondents

Demographic data provides information regarding the study participants which is important for determining whether the selected sample for the study amply represent's the target population and is appropriate for generalization of findings. Some examples of demographic characteristics are gender, age, ethnicity, race, educational background, marital status, religion and job designation. In the present study, demographic characteristics recorded included gender, age, academic qualifications and working experience, discussed hereunder.

5.3.1 Respondents' gender

The study sought to establish respondents' gender in order to demonstrate gender parity and representation in the study. From the data that was collected, it was found that there were an almost equal number of respondents. Female respondents were 50 representing 38% of the total sample, while male was 80 respondents representing 62% of the total sample. This finding is illustrated in Table 5.5.

Table 5.5: Respondents per gender (n=130)

Gender	Number	Percentage (%)
Male	80	61.5
Female	50	38.5
Total	130	100

5.3.2 Respondents' age group

The respondents were also asked to indicate their age on predetermined scales with aim of ascertaining the respondents' age groups. The findings for the respondents were as follows: 25 (19%) respondents were aged between 20 and 29 years, 35 (27%) were between 30 to 39 years, 47 (36%) were 40 to 49 years and 23 (18%) were above 50 years. The respondents' age groups are illustrated in Table 5.6.

Table 5.6: Respondents per age group (n=130)

Age groups	Frequency	Percentage
20 – 29	25	19
30 – 39	35	27
40 – 49	47	36
50 +	23	18
Total	130	100

5.3.3 Respondents' academic qualifications

The study sought to establish the highest academic qualifications of each respondent, in order to determine their suitability for their job designations. As illustrated in Table 5.7, findings indicated that majority of the respondents had diploma certificates (47, 36%) and first degree certificate holders (40, 31%), an indication that they were mainly middle cadre staff.

Table 5.7: Highest academic qualifications of respondents (n=130)

Respondent's qualification	Frequency	Percentage (%)
PhD	2	1.5
Masters	10	8
Bachelor's degree	40	31
Diploma	47	36
Certificate	24	18
A Level	2	1.5
O Level	5	4
Total	130	100

5.3.4 Respondents' working experience

The study sought to establish the respondents' working experience for the administrators, ICT staff and records officers (130). As indicated in Table 5.8, 26 (20%) respondents had worked in the same position for 10 years and above, 50 (39%) had worked for 6 to 10 years, 42 (32%) had worked for 2 to 5 years, and 12 (9%) had worked 2 years and below.

Table 5.8: Respondents' working experience (n=130)

Period of tenure (years)	Frequency	Percentage
Below 2	12	9
2 – 5	42	32
6 – 10	50	39
Above 10	26	20
Total	130	100

Based on the respondents' skills, competencies and working experience, the researcher was confident that the information they provided would yield rich data that would be useful in answering the study's research questions.

5.4 Data presentation

The next sections present collated data from interviews and questionnaires based on the themes of the research questions aligned to the objective of the study.

5.4.1 The state of digital archiving readiness in public universities in Kenya

The first research question of the study was to ascertain the state of digital archiving readiness in public universities in Kenya. As alluded in Chapter Two, the eight GARP principles entrenched in the ARMA Records Management model are useful in determining the state of recordkeeping in organizations. In the present study, the GARP principles were applied to determine the state of d-archiving in the six universities under the following sub-themes:

- Stand-alone archival repositories;
- Available technologies for digital archiving;
- Staff capacity for d-archiving;
- Digital archiving skills and competencies;
- Education and training;
- Budgetary allocations for d-archiving; and
- Readiness for digital archiving.

5.4.1.1 Stand-alone archival repositories

The study investigated whether each of the universities had an archival repository for the storage of inactive records. Study findings revealed that only three institutions (50%) had archival repositories as illustrated in Table 5.9.

Table 5.9: Existence of archival repositories in the universities

Name of university	Yes	No
University A	√	
University B	√	
University C		×
University D	√	
University E		×
University F		×

Interviews with records managers and archivists in the universities revealed that Universities A, B and D had archival repositories. However, in universities B and D, archival repositories were not operational. The archivist in university B gave the following response:

There is an archive situated in the basement of the main library but it has been dormant for over ten years now and doubles as storage space for inactive records which have not even been subjected to appraisal.

During interviews with archivists and/or records managers in the institutions with archival repositories, respondents were asked whether the archives were stand-alone buildings. The findings revealed that in all three institutions, the archival repositories were units under larger departments (Human Resource (HR) department, administration department and the library).

In contrast, during interviews with records managers and/or librarians in the universities without archival repositories, one of the respondents had this to say:

We do not have a university archive at the moment but we appreciate the fact that there is definitely need for one in our institution. The records management unit has been engaging the top management on this issue and currently plans are underway for the university library to house an archive which will serve the readership and university population at large.

5.4.1.2 Available technologies for digital archiving

ICT Infrastructure is a key enabler for digital archiving and an important indicator showing how ready an organization is for the d-archiving function. In view of this, respondents were asked whether technologies for digital archiving were available in their institutions. The ICT Directors, archivists, records managers, ICT staff, administrators and records officers were required to comment on the status of software, hardware and internet connectivity as enablers for digital archiving in their universities. Respondents for questionnaires were presented with a multi-response list of ICT devices and technologies considered as essential for d-archiving and asked to tick against those that were available in their institutions. As illustrated in Table 5.10, majority of the institutions had the necessary infrastructure including and not limited to computers, mobile phones, printers and scanners which were the major infrastructure mentioned across all the six universities. Notably, 108 (100%) respondents had computers, 102 (79%) had mobile phone, 108 (100%) had computer accessories such as printers, scanners, photocopiers and laminators, 105 (97%) had external storage devices, 108 (100%) had internet connectivity and 98 (91%) had email technology.

Table 5.10: Digital archiving technologies (n=123)

Technologies	Frequency	Percentage
Mobile phones	102	94
Facsimile	15	14
Computers	108	100
CD-ROM, CD, VCD, Flash Discs, DVD	105	97
Printers, scanners, photocopiers, laminators	108	100
Digital cameras	25	23
Tapes and cassette recorders	10	9
Internet connectivity	108	100
Emails	98	91
Microfilm	6	6
Electronic Document Records Management System (EDRMS)	6	6
Archives Management System (AMS)	0	0

***Multiple responses were possible**

Findings revealed that all six universities were sufficiently automated. One of the ICT Directors had this to say:

ICT was acknowledged as a crucial enabler to the realization of the aspirations and goals of Vision 2030 blueprint launched by retired President Mwai Kibaki in June 2008. A directive was issued by the government for the automation of all business processes and services in government-funded organizations in Kenya, which was accompanied by roll-out of funds to facilitate computerization projects in the organizations. As a result, the question for public sector organizations is not whether they are automated, rather to what extent is the automation in individual organizations.

Nevertheless, ICT Directors in the universities were asked to rate the extent of ICT adoption for digital archiving in their universities. The results shown in Table 5.11 revealed some differences in the ratings, with universities A and B having minimal ICT infrastructure adoption while the other 4 universities (C, D, E and F) had almost equal levels.

Table 5.11: Extent of ICT adoption of digital archiving

Extent of ICT adoption	Poor	Fair	Good	Very good
University A		X		
University B		X		
University C			X	
University D				X
University E				X
University F				X

None of the institutions had attained the optimum level of ICT adoption for d-archiving. The study affirmed that all the institutions had modern, state-of-the art computers but few in number, hence they had to be shared among staff in some universities. During the interviews with ICT Directors, this discrepancy was attributed to low government funding allocations for public universities in the country, a problem that affected the two largest universities (A and B) to a greater extent.

Although all the institutions had EDRMS, the systems did not incorporate all recordkeeping functionalities and were therefore not beneficial to the d-archiving agenda. Interviews with archivists in the three universities having archival repositories confirmed that the archives did not have full-featured archiving systems that could provide recordkeeping capabilities for digital records such as storage, search, management and retrieval. Further, the two archivists in the universities with functional archival repositories clarified that they relied on host departments for some of the identified technologies since they did not have their own.

The study assessed Internet availability by examining the fixed and mobile broadband. Fixed broadband included cable modems, fixed wireless, fibre in the offices, satellite and copper lines, while mobile broadband constituted modems and phones. Findings indicated all six universities had Internet on their premises which comprised mobile and fixed broadband. However, as shown in Table 5.12, the levels of connectivity differed, with universities D, E and F falling in the high level, C in the medium level, and universities A and B falling in the low level. These findings corresponded with the findings on the level of ICT adoption in the universities.

Table 5.12: Levels of Internet connectivity

Level of internet connectivity	Low	Medium	High
University A	X		
University B	X		
University C		X	
University D			X
University E			X
University F			X

During interviews with ICT Directors in all six universities, it became clear that the universities had shared the same Internet service provider called Kenya Education Network Trust (KENET) which provided research solutions and education technology services to all universities in the country. Universities D, E and F pointed out that their Internet connectivity was very good, whereas those in university C indicated that it was good though not to the required level. The participants in universities A and B however admitted they had weak and fluctuating Internet connectivity. The ICT Director in one of the two universities with comparatively poor internet connectivity gave the following remarks:

Even though government universities receive services from the same Internet provider (KENET), the quality of connectivity in individual universities differs depending on the size of the university. Larger universities like ours which have many campuses across the country have to buy internet bundles and share amongst the campuses, which compromises quality of our Internet.

5.4.1.3 Staff capacity for d-archiving

Digital recordkeeping requires information professionals to be equipped with new competencies and skills through training and re-training to be able to manage d-records effectively in the face of constantly changing technologies. Against this backdrop therefore, the researcher sought to establish the number of dedicated staff handling d-records on the front and back end of the continuum in the six universities. During interviews, the question was directed at five participants (two archivists and three records managers) in the three universities with archival repositories (A, B and D). In university A, the records manager doubled as the university archivist and had three support staff with no specialized training in records and archives management.

The archives department in university B had a single archives assistant who performed library duties. University D had one archivist and 2 support staff who held certificates in other unrelated fields. The data presented in Table 5.13 depicts the overall number of recordkeeping staff in the universities derived from both the interview and questionnaire data.

Table 5.13: Number of recordkeeping staff in each university (n=28)

University	No. of recordkeeping staff	Percentage
University A	7	24
University B	6	21
University C	4	14
University D	5	17
University E	4	14
University F	3	10
Total	28	100

The researcher further sought to determine the (in)adequacy of recordkeeping staff in order to identify shortage (or adequacy) for d-archiving functions. Findings from interviews with nine archivists and records managers in the universities revealed that the staff in records management units were adequate. However, the three archival repositories did not have adequate skilled staff.

5.4.1.4 Digital archiving skills and competencies

Additionally, the researcher sought to ascertain skills and competencies of ICT and recordkeeping personnel in the institutions from 53 respondents (ICT staff and records officers) regarding management of d-records and archives. As illustrated in Figure 5.1, 10 respondents (19%) said that they had ICT skills and competencies only, 15 (28%) had knowledge in ICT and recordkeeping, 21(40%) had skills and competencies in recordkeeping including d-archiving, five (9%) indicated that they had training in different fields other than ICT, records and archives management, while two (4%) respondents never underwent any post-secondary training and therefore lacked skills to enable them carry out digital archiving effectively.

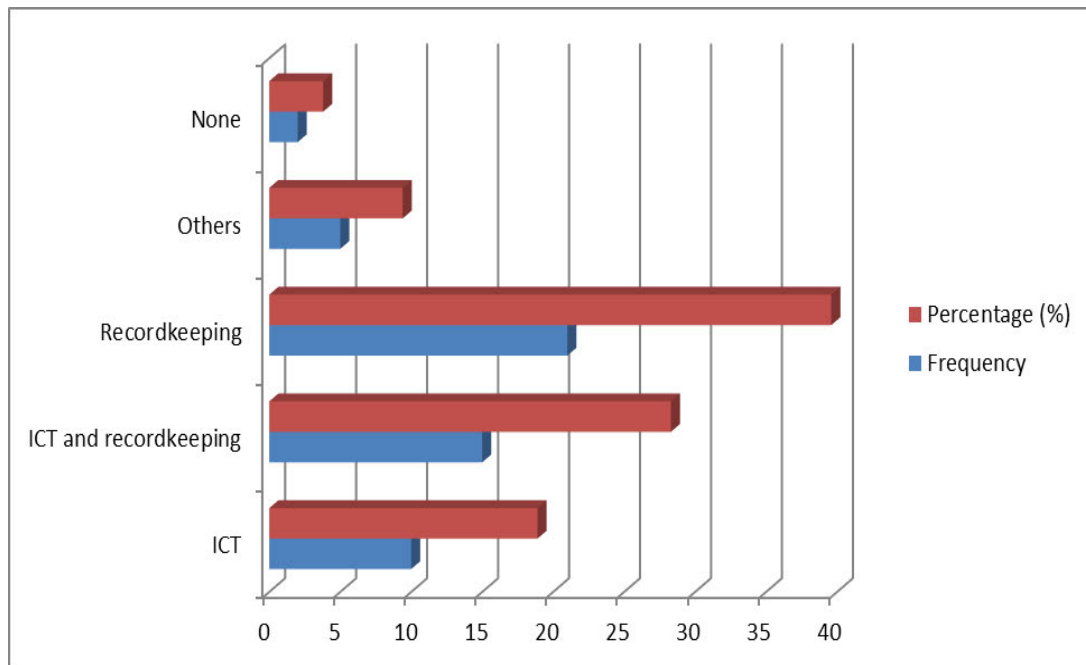


Figure 5.1: Respondents' skills and competencies (n=53)

Interviews with ICT Directors and Records managers revealed that the ICT staff who had skills and competencies in digital recordkeeping had undergone Information Science-related programmes, while some of the records officers had training in different fields of practice such as Business Management/Administration, Human Resource Management and basic computer application certificate programmes. They were therefore not well-versed with emergent technological issues in the management of d-records and archives. Generally, the following competencies were cited by ICT respondents when asked to specify what skills and competencies they possessed as far as d-recordkeeping was concerned:

- *Database management (Oracle and Maeskel);*
- *System development;*
- *Information systems management;*
- *Information and knowledge management;*
- *Web design;*
- *Microsoft and CISCO certification;*
- *Systems security; and*
- *Networking.*

Recordkeeping staff cited the following skills and competencies when asked to specify their areas of training relevant to recordkeeping:

- *Archives and records management;*
- *Information Science/studies;*
- *Information Technology;*
- *Knowledge management;*
- *Library studies; and*
- *Other unrelated fields such as human resource management, business studies and secretarial studies.*

5.4.1.5 Education and training

With the realization that d-archiving is an intricate and constantly developing field that demands understanding and knowledge on every new aspect, 29 respondents undertaking records-related roles were asked how frequently they have undergone training in recordkeeping. As shown in Figure 5.2, majority of the respondents (20, 70%) indicated that they rarely underwent any training; six (21%) respondents said that they underwent training once annually; while three (10%) respondents indicated they underwent training bi-annually with the exception of the year 2020 during which formal activities in most organizations globally were halted because of COVID-19. Annual and bi-annual responses were majorly cited by archivists, records managers and records officers who attended KARMA trainings through their own initiatives.

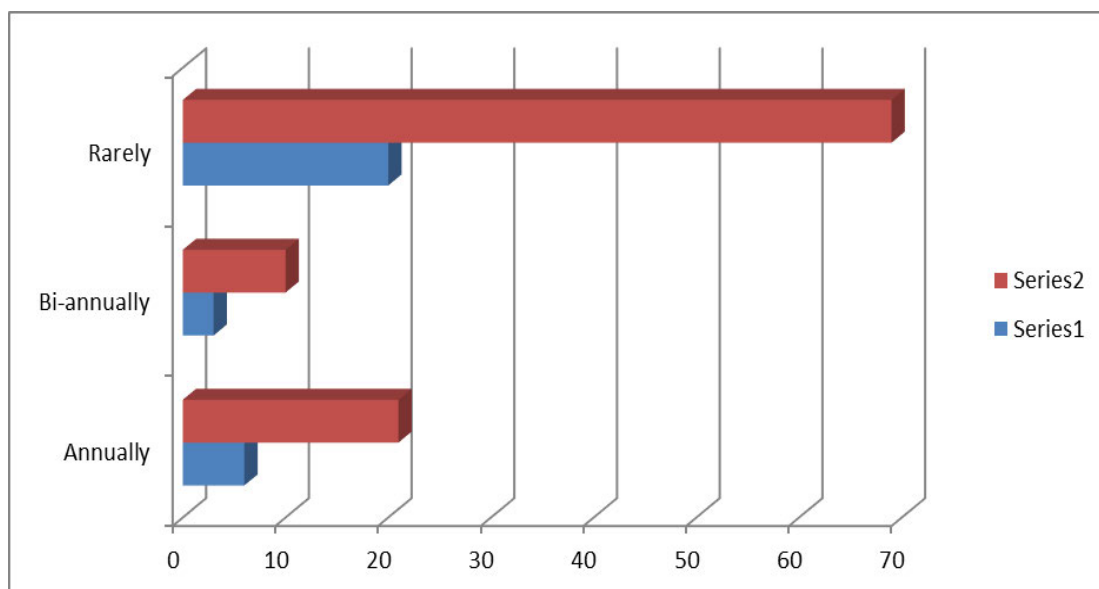


Figure 5.2: Training attendance by recordkeeping staff (n=29)

Follow up interviews with records managers and archivists in the six universities confirmed that the participants did not receive support for training and consequently they did not attend relevant training as often as they should. These sentiments were echoed by respondents in the following statements when they were asked how often they attended trainings funded by their institutions in digital recordkeeping:

Training opportunities for records staff in our institution are far from regular and come after several years. The last training I attended with staff in my unit was organized in-house and facilitated by lecturers from the School of Information Sciences in 2015.

Training for recordkeeping staff in our institution is unheard of! The last training I attended was way back in 1999. Since then, I've had to occasionally pay from my pocket to attend relevant trainings identified through my own initiative.

Trainings for our recordkeeping staff do not take place often enough. The last one we had was a workshop that took place in 2018.

Not often since our recordkeeping staff have to dig into their own pockets in order to meet the costs that come with trainings organized by professional associations such as KARMA.

Further, respondents from the ICT and records categories were asked what their training needs were with regards to d-archiving and their responses are summarized in Table 5.14.

Table 5.14: Respondents’ training needs (n=53)

Training needs	Frequency	Percentage
Digital records and archives management	53	100
D-records appraisal	14	26
D-records classification	18	34
Management of records in a hybrid environment	38	72
Digital records preservation	45	85
Retention and disposal scheduling for d-records	16	30
D-records security	51	96
Recordkeeping metadata	40	75
Standards and best practices	40	75
Records-risk management	35	66
Legal and regulatory requirements for records and archives	20	38

During interviews with Archivists, one of the participants had this to say:

Every financial year university staff are required to indicate their training needs on staff appraisal forms. We do so faithfully but our requests have never been actualized – which begs the question: “does the management appreciate the importance of records to the attainment of our overall mandate as an institution?”

Asked how management could support staff training needs, the same participant answered:

The university management can support recordkeeping staff by financing them to attend external and in-house training programmes such as workshops, conferences, seminars and refresher courses.

5.4.1.6 Budgetary allocations for recordkeeping

The successful implementation of any business project is determined by the amount of funding allocated to it (Taiwo 2019:26). Subsequently, d-archiving projects in

institutions of higher learning will survive to see the light of day, only if the budgets allocated for such projects are sufficient. With this understanding, respondents were asked whether the records and archives management function in their institutions was allocated an annual budget to fulfill its mandate. This question was directed at 18 participants (FOs, archivists and records managers). Only 11 (61%) were successfully interviewed and all gave a negative response. The following comments from the participants were noted:

No, currently the archive get's its allocation from Library vote.

No, our department does not have a dedicated budget because we are under the HR department.

No, the registry system is decentralized, with departmental registries thriving on budgets allocated to their parent departments.

Funding for public universities in Kenya has been inadequate for a long time and this problem impacts negatively upon all our operations including records and archives management functions.

Participants were asked to clarify the sources of funds for recordkeeping activities in their institutions. All (100%) indicated that the archives and records units were placed under other departments such as Human Resource and Central Services departments, and their source of funding was therefore drawn from the vote heads of the main departments.

5.4.1.7 Readiness for digital archiving

All the respondents (130) were asked to give an overall evaluation of their institutions' readiness for digital archiving. They were asked to indicate "yes" or "no" in response to whether their institutions were ready for d-archiving. Majority (115, 88%) expressed that their institutions were not ready, while only 15 respondents (12%) said their institutions were ready for d-archiving as shown in Figure 5.3. The answers were however varied, even amongst respondents from the same institution.

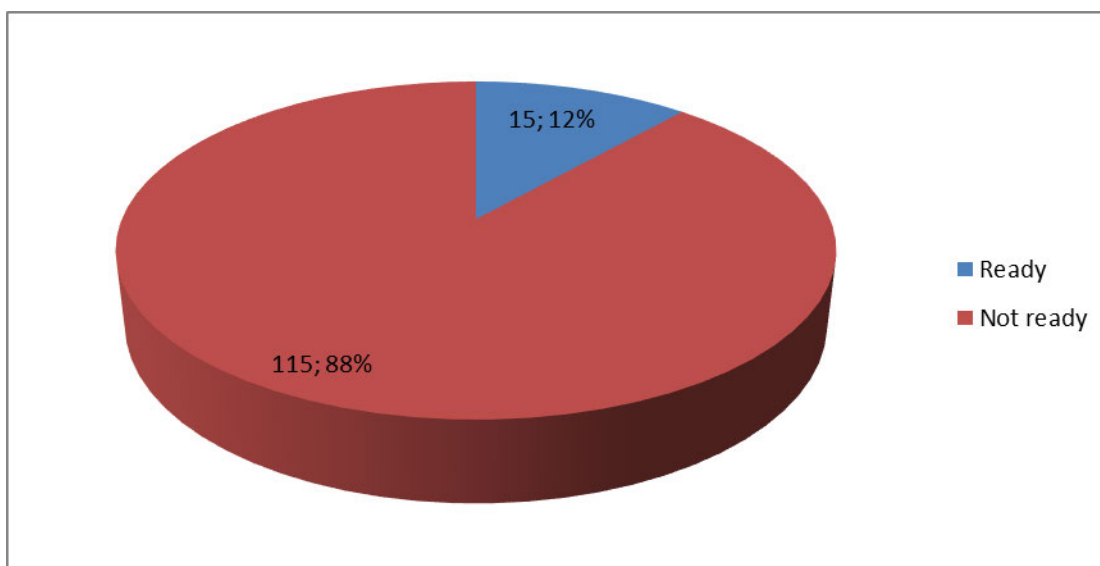


Figure 5.3: Institutional readiness for digital archiving (n=130)

The above findings are a clear indicator that the universities were not adequately prepared for d-archiving as illustrated by the preceding findings on the institutional infrastructure.

5.4.2 Digital archives identification and administration

The records continuum (RC) model which is one of the underpinning models for this study provides an articulate and consistent regime for managing records in all formats, from creation to disposal including their permanent preservation as archives. Section 3.6, in Chapter Three of this study discussed digital archiving practices including creation, acquisition, accessioning, arrangement and description, storage and preservation as well as access provision. Guided by the RC model, the present study investigated how digital archives were identified and administered in the selected public universities in Kenya, from the point of their identification while still in use as active records, through to their preservation and use. The research question was addressed in the questionnaires and interview schedules for all the respondents except for the DVCs and FOs in the following sections: questions 6-40 of the interview schedule for archivists (Appendix 5), questions 7-9 of the interview schedule for ICT Directors (Appendix 3), question 7-10 of the interview schedule for LOs (Appendix 4), questions 6-23 of the interview schedule for records managers (Appendix 6), questions 9-21 of the questionnaires for ICT staff (Appendix 8), questions 9-26 of the questionnaires for administrators (Appendix 9) and questions 9-

16 of the questionnaires for records officers (Appendix 7). The themes under this research question included the following:

- Creation and capture;
- Selection and appraisal;
- Arrangement and description;
- Storage and preservation;
- Access and use; and
- Recordkeeping metadata for d-records and archives.

5.4.2.1 Creation and capture of d-records

Archives emanate from records which are generated as byproducts of business transactions. ICTs have been phenomenal in increasing the volume of records being generated in organizations today, leading to a corresponding increase in the quantity of archival records being identified for permanent preservation in these organizations. Majority of business enterprises have had to face the reality of managing records in hybrid environments as more records are generated by the use of ICTs. The records continuum model recognizes creation or capture as a priority process for the maintenance of reliable evidence of transactions and decisions made in the course of business processes in manual and electronic environments. Subsequently, the study sought to find out the business processes in universities that led to the creation and capture of d-records.

Deputy-vice chancellors, administrators, ICT staff and records officers (114) were asked to indicate business activities in their institutions and the digital records generated by these activities. Numerous responses were provided, revolving around the key functions of universities which included teaching, research, extension and outreach as depicted in Table 5.15.

Table 5.15: Business processes and records generated

Business Processes	Records created
Teaching	Course outlines, syllabus, course descriptions, quality assurance records and audit reports
Research	Theses, dissertations, projects, research papers and academic presentations
Extension and outreach	Records on donations, marketing programmes, exhibitions, student exchange programmes, and community outreach programmes

Other records cited by respondents included proceedings of meetings, minutes of meetings, staff/personnel records, correspondence, contracts, lease agreements, policy documents, legal documents, memoranda, financial records, asset inventories, routine communication, rare books in libraries, maintenance and warranty records, requests for rights, software development records, administrative records, consultancy records, reports, among others. In this study, 77 (68%) respondents were in agreement that most (80%) of the records generated had the potential of being selected for permanent preservation as archives. The other respondents (37, 33%) were unable to estimate the percentage of records with archival value.

Further, the study sought to establish from the respondents the formats in which the records existed. The findings revealed that the records in the six institutions were predominantly paper records. Archivists, records managers and records officers (29) were asked to specify formats of paper records that they handled in their departments and their responses indicated that they were mainly files (29, 100%) and loose documents in folders (29, 100%) as illustrated in Figure 5.4.

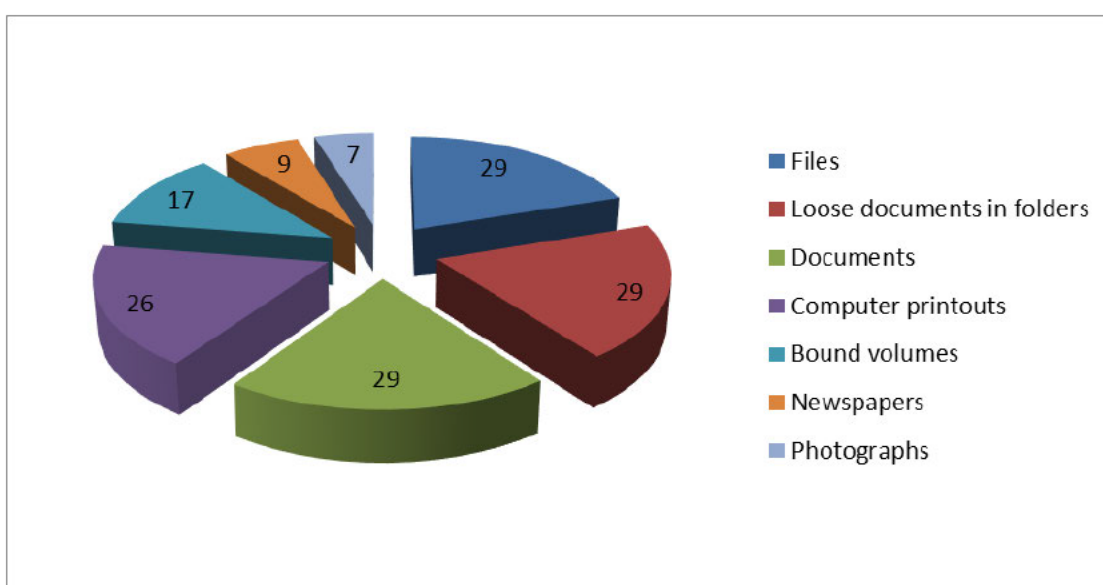


Figure 5.4: Formats of paper records (n=29)

ICT staff, administrators and records officers (108) were asked to describe the types and formats of digital records they handled in the course of their work. Emails (102, 94%); databases (100, 93%); word processed documents (108, 100%); audio visual records (97, 90%); websites (105, 97%) and digital publications (85, 79%) were highly cited, with MS Word documents taking the lead. Other formats cited included research data, e-journals, e-books and software as shown in Table 5.16.

Table 5.16: Types and formats of digital Records (n=108)

File type	Frequency	Percentage (%)
MS Word files	108	100
Audio-visual files	95	88
Websites	57	52.8
D-publications	20	18.5
Emails	88	81.5
Databases	35	32.4
Others	15	13.9

***Multiple responses were possible**

The researcher asked archivists and records managers whether they had any control over the formats of d-records created in their institutions. Only three (33%) indicated they constantly held advisory sessions with content creators and influenced the

formats of d-records and archives generated in their institutions. However, six (67%) informed that they had little or no control over the formats created in their institutions and gaining entry into archival repositories.

Digital records are either born-digital or converted into digital format (made-digital) from analogue formats such as paper and microfilm. In view of this, the respondents were asked whether they handled born-digital, made-digital or both categories of digital records. Majority of the respondents (75, 70%) said they handled both groups of d-records, 25 (23%) handled born-digital only while eight (7%) handled converted (made-digital) formats as shown in Figure 5.5.

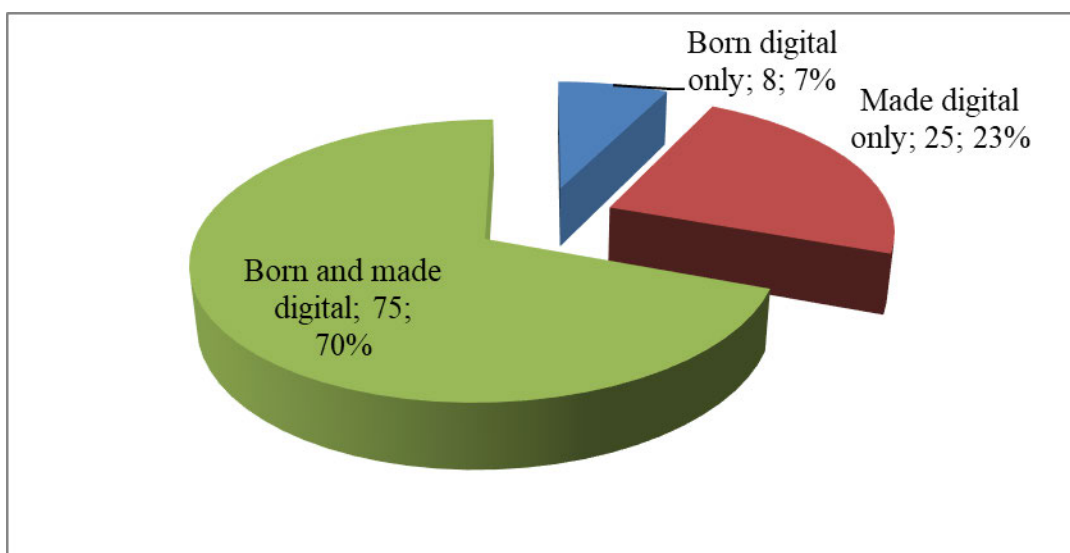


Figure 5.5: Digital records handled by respondents (n=108)

5.4.2.2 Selection and appraisal of d-archives

Archival repositories develop their collections bearing in mind their audience. In institutions of higher learning, acquisition of archival resources should conform to acquisition policies bearing stipulated guidelines that determine the type of archives to be acquired by the repository. Records managers and archivists in the six institutions were asked whether their universities had acquisition policies for archival and records management units. The findings revealed that two universities (Universities A and D) had policies requiring departments to deposit their inactive records into the archival repositories. The other institutions did not have acquisition policies to determine the type of records to be acquired.

Regarding records appraisal, the findings revealed that three universities (A, C and D) had carried out the exercise for their paper records only. Participants in universities B and E indicated that they have never carried out records appraisal but have been conducting records inventories for paper records only. In university F, the participant had this to say:

Records appraisal has never been conducted but we carry out annual records audits for the manual records only.

Follow-up interviews with participants with regard to digital records yielded the following feedbacks:

We have no formal method of identifying records that have permanent value from the voluminous body of d-records existing on numerous computers and systems across the university.

We are yet to undertake an inventory to identify the d-records of our institution, let alone carrying out a selection process for d-archival records.

Our institution relies on records creators to notify the registry and archival repository of the existence of d-records and d-archives respectively. When the time is right, arrangements are made for transfer of custody.

5.4.2.3 Arrangement and description of archives

Arrangement and description processes are crucial responsibilities attributed to recordkeeping staff in archival repositories, mainly because they determine the discoverability of archival objects. Quoting ISO 15489 – 1 Section 9.5, Kalusopa (2011:180) opined that organizations should decide on the level of classification control required for their business processes. The present study established that classification schemes existed for paper records in all the institutions. Records officers were asked whether they had numeric or alpha-numeric classification schemes for their paper records. All the respondents (20, 100%) said they were using alpha-

numeric classification schemes. During interviews with records managers, one respondent informed that alpha-numeric classification scheme was preferred over numeric classification scheme because:

alpha-numeric classification eliminates confusion resulting from similarities in file naming, has the advantage of expandability and allows for quick reference.

Using alpha-numeric classification makes our work easier as recordkeeping professionals because we are able to arrange records in accordance to the organizational functions and group them further under more specific activities using both the alphabet and numeral values.

Archivists, records managers and records officers were asked how they organized d-records in their units for ease of retrieval. In all the six universities however, no logical organization of d-records was reported. One of the participants gave the following feedback which was echoed by respondents across all the institutions:

Management of digital records is a relatively new practice that we are endeavoring to embrace as an institution. As for arrangement and description of digital archives, we are far from it since we are still working on organizing our manual archives first, after which we can start thinking of organizing the d-records and archives.

5.4.2.4 Storage and preservation

Archival repositories must ensure long-term preservation of their archival records by being accountable, transparent, ensuring trustworthiness, reliability and accuracy of the records (Adu 2015:81). This calls for proper storage and preservation techniques, taking into account the nature of the materials and environment in which they exist. The present study focused upon archival records in a hybrid context which complicated the aspects of storage and preservation since both manual and digital storage facilities and preservation techniques had to be considered. Thus, records officers were asked to shed light on how paper records were stored in their institutions. Survey findings revealed that records were mainly stored in ordinary steel

cabinets (18, 90%), while in a few instances paper records were stored on floors (4, 20%) as shown in Table 5.17.

Table 5.17: Storage of records in RM units and archival repositories (n=20)

Storage of paper records in archival repositories	Frequency	Percentage
Floor	7	35
Wooden shelves	15	75
Adjustable steel shelves	6	30
Non-adjustable steel shelves	4	20
Ordinary steel cabinets	18	90
Lockable steel cabinets	10	50

A spot check during the interviews revealed a picture of poor storage conditions in most of the institutions, with files being stored on floors and haphazardly piled on top of shelves owing to shortage of storage equipment and limited storage space.

Regarding the d-records and archives, administrators, ICT staff and records officers were asked to indicate how they were kept in their institutions. The respondents were asked whether they transferred such d-records to secondary storage or to the archive, or whether the d-records were stored on computers. Majority of the respondents (79, 73%) indicated that all d-records, including those with continuing value were stored on the creators' computers and external storage devices. The other respondents (29, 27%) were unaware of what happened to d-records as shown in Table 5.18.

Table 5.18: Storage of d-records with enduring value (n=108)

Storage of d-records	Frequency	Percentage
Computer hard discs, cloud and external storage devices	79	73
Don't know	29	27
Total	108	100

The findings indicated that the storage of digital archival records was not prioritized in all six institutions. Additionally, the study sought to establish how records were managed after serving purposes for which they were originally created. As illustrated in Figure 5.6, all the respondents (108, 100%) indicated that they deleted the ephemeral records from the computers and permanently saved those records deemed

to have continuing value on a variety of external storage devices. Additionally, 96 (89%) respondents opted to reformat storage devices in order to completely erase unwanted data, 20 (19%) respondents preferred overwriting the storage devices while 35 (32%) respondents saved important records on computer hard discs.

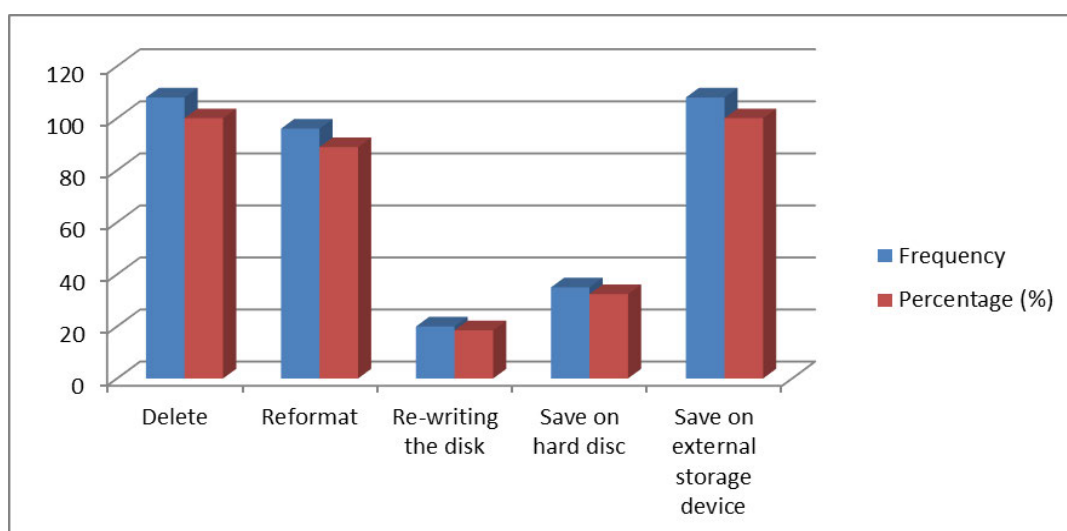


Figure 5.6: Management of digital records (n=108)

records managers and archivists were asked if there were mechanisms for archiving d-records in their institutions. Responses provided indicated that there was no form of digital archives management taking place in all the institutions. Feedback from the respondents in each university were sampled and generalized as reflected in Table 5.19.

Table 5.19: Mechanisms for digital archiving

Respondent	Response
University A	<i>No, d- records are managed by records creators, not records officers</i>
University B	<i>D-records remain in the custody of the individuals who create them. We have no control over their management.</i>
University C	<i>We have not begun digital records management in our institution.</i>
University D	<i>Our responsibility as the records management unit has been more of an advisory role to records creators on how to create and store records correctly, rather than a custodial one.</i>
University E	<i>The ICT department has been working with staff throughout the university to ensure d-records are properly managed.</i>
University F	<i>We are working on streamlining our manual records system first after which we shall embark on the d-recordkeeping system.</i>

Records managers and archivists were further asked whether their institutions had preservation programmes and policies for digital records and archives. No institution had such documents that specifically addressed records and archives. However, during interviews, respondents made reference to other documents that had some implication upon the preservation of d-records and archives. Table 5.20 provides a summary of the status of digital archiving in the six universities as noted by respondents.

Table 5.20: Existence of preservation programmes and policies

Institution	Response
University A	<i>There is no preservation policy but we have a data recovery policy which governs how we keep our backups. We also have a record and information management policy, Open Access policy (2012) and a Research policy (2013).</i>
University B	<i>There is a draft preservation policy for library information materials awaiting formal approval. Presently we are using an Intellectual Property policy (2008).</i>
University C	<i>No but we have an Information Repository policy (2014).</i>
University D	<i>However, we have a research policy (2021) and a communication policy and strategy (2007) which are relevant to preservation issues.</i>
University E	<i>We only have an institutional repository policy (2018).</i>
University F	<i>There's no preservation policy in our institution but we have an information security policy (2010), communication policy (2011) and an ICT automation policy and strategy (2011).</i>

Regarding the level of awareness concerning d-archives management standards and models, 108 respondents in the six universities asked whether they were familiar with the records continuum model, ISO 15489 standard, OAIS reference model. As shown in Figure 5.7, 30 respondents were familiar with the RC model and ISO 15489 standard while 78 respondents did not have an understanding of the model and standard. With respect to the OAIS reference model, 21 respondents had an understanding of the model while 87 respondents were unaware of it.

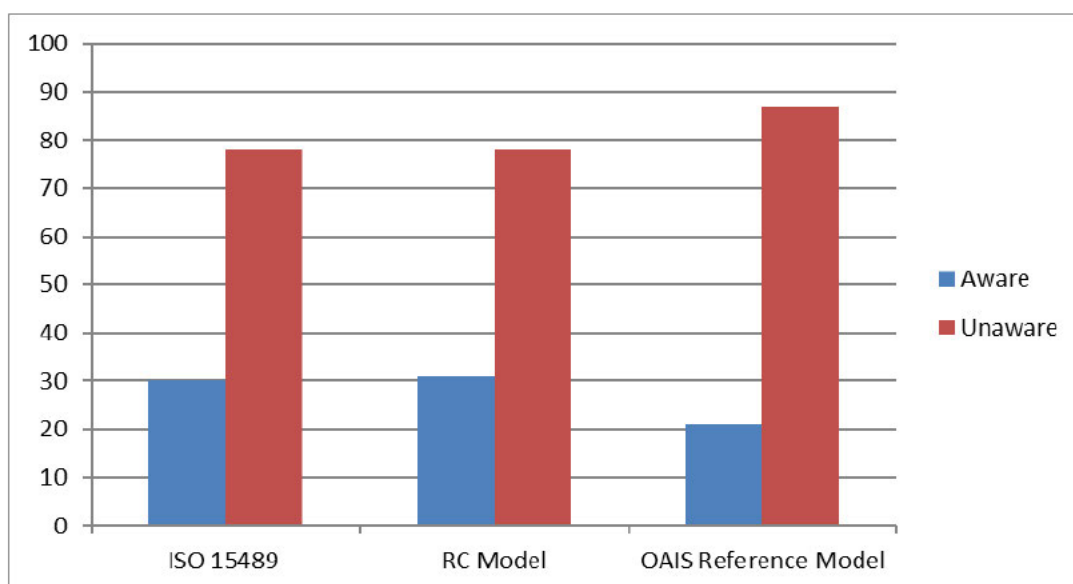


Figure 5.7: Knowledge of digital archiving standard and models (n=108)

Further, administrative staff, ICT staff, records officers, archivists and records managers were asked to specify the d-preservation strategies for digital records and archives that their institutions engaged in. Respondents ticked against listed strategies as follows: cloud computing (110, 94%); bit preservation (25, 21%); migration (50, 43%); refreshing (105, 90%); emulation (10, 9%); Data backup (30, 26%); metadata (20, 17%); locally developed d-preservation solutions (6, 5%) as shown in Table 5.21.

Table 5.21: Digital preservation strategies (n=117)

Digital preservation strategies	Frequency	Percentage (%)
Bit preservation	25	21
Migration	50	43
Refreshing	105	90
Emulation	10	0
Data backup	30	26
Locally developed strategies	6	5
Metadata	20	17
Cloud computing	110	94

Cloud computing featured prominently as a digital preservation strategy being implemented in the six institutions because all public universities in Kenya were registered with KENET which provided cloud services to member organizations. KENET is a type of networked trusted digital repository described by IRMT (2009) as a platform where a number of similar institutions like archival repositories put

together resources and share the responsibility of managing their digital content. Similarly, refreshing was also largely cited by respondents because the strategy did not require a lot of technical know-how to undertake unlike the other d-preservation strategies.

During interviews with records managers, archivists and ICT Directors in the institutions, respondents were asked if their universities had off-site backup locations for their d-records as a safeguard against systems redundancy. All respondents affirmed that their universities were registered with KENET which provided cloud backup for their digital content, specifically emails and websites. The participants expressed satisfaction with the current arrangement and were all optimistic that KENET offered future opportunities for collaborative ventures to public universities for the storage and preservation of digital archives.

5.4.2.5 Access and use

Access and use are a prime concern to records custodians irrespective of the format of records stored. As pointed out by Kalusopa (2011:182), the principles that govern access rights, restrictions and conditions of access to digital records in a recordkeeping system are determined by the regulatory environment within which the organization operates. As earlier observed, records in all six study sites were generated in a hybrid environment. Archivists, administrators, ICT staff and records officers were asked how they provided access to d-records and archives in their keeping. From the study findings as illustrated in Table 5.22, majority of the respondents (110, 97%) sent or received d-records via email, 75 respondents (66%) printed digital records and distributed the copies for access to users, 65 respondents (57%) had the tendency of downloading the d-records on to their computers, while 30 (26%) accessed the records online. Some of the respondents indicated that electronic mail technology was readily available to almost all employees in the institutions and was therefore preferred as a quick and relatively medium of transmission. In contrast, online access was cited by the least number of respondents, who gave the reason that most users did not have time to spend searching online for d-records on their own.

Table 5.22: Provision of access to digital records (n=114)

Methods of access	Frequency	Percentage (%)
Distribution of printed copies	75	66
E-mail	110	97
Online access	30	26
Downloading to or from a host machine	65	57

Considering that some records required restrictions to access and use due to the nature of their content, archivists and records managers were asked how they ensured privacy and confidentiality of d-records and archives. The question elicited open-ended responses, some of which were recorded as below:

It is the responsibility of records creators to safeguard records in their custody and ensure they are accessed by authorized persons only;

ICT staff have the responsibility of enabling the use of passwords and user names by staff in the university to restrict access and use of systems;

We use logical controls such as PINS and digital signatures to restrict access to records;

Firewalls provide sufficient protection against network intrusion which safeguards the privacy and confidentiality of our d-records and archives;

Regular checking of access logs on our systems helps to alert us of any unauthorized entry into our systems which alerts us before records can be wrongfully accessed;

We have put in place physical measures to ensure all hardware are secured against theft, disasters, loss and any other form of damage arising from unauthorized access.

Further, 117 (90%) respondents were asked what security controls were in place to protect their d-records. Through the questionnaires, 98 (84%) respondents informed that all departments in the institutions were manned by security guards 24/7 hence the

ICT hardware were well secured. Other security controls mentioned included burglar proof doors and window grills (95, 81%), controlled access to offices (56, 48%), marking of all hardware devices (72, 62%), installation of CCTV cameras (35, 30%), alarms and sirens (45, 39%) as illustrated in Table 5.23.

Table 5.23: Physical security controls for d-records (n=117)

Security control	Frequency	Percentage
Security guards	98	84
Burglar proof doors and window grills	95	81
Controlled access to offices	56	48
Marked devices	72	62
CCTV cameras	35	30
Alarms and sirens	45	39

Despite having the above controls in place, cases of theft were reported in some of the institutions. For example, a respondent in university B had this to say:

R: As an institution we have put in place measures to restrict the access and use of d-records to authorized personnel only by ensuring every building is manned by security guards 24/7. Nevertheless, cases of theft and burglary continue to be reported in various departments in the university resulting in the loss of desktop and laptop computers, the latest incident having occurred early 2021 in one of the faculties.

Follow-up interviews with respondents in the universities where cases of theft of computers were rampant revealed that these institutions had not installed CCTV cameras. Respondents agreed that the installation of CCTVs may reduce and ultimately stop such occurrences in the institutions.

Regarding the intellectual control over digital records, archivists, records managers and ICT directors were asked if internal controls have been integrated to ensure the reliability, authenticity, integrity, and usability of agency digital records maintained in the existing electronic information systems. All 15 participants affirmed that the following strategies were in use in their institutions:

- a) Use of passwords to prevent alteration and deletion of records;
- b) Regularly tracking and verifying changes made to digital records;
- c) Regular performance audits of the IT system;
- d) Standard procedures for reporting systems failure; and
- e) Training of staff.

Regarding policies for access and dissemination of d-archives, 86 (80%) respondents indicated their institutions did not have such policies, while 10 (9%) indicated that they had access policies for records. The remaining 12 respondents (11%) did not know if such policies existed in their institutions as shown in Figure 5.8. Interviews however revealed that only one university (University A) had an access policy for all their records, although the policy did not specifically address the access of d-archives.

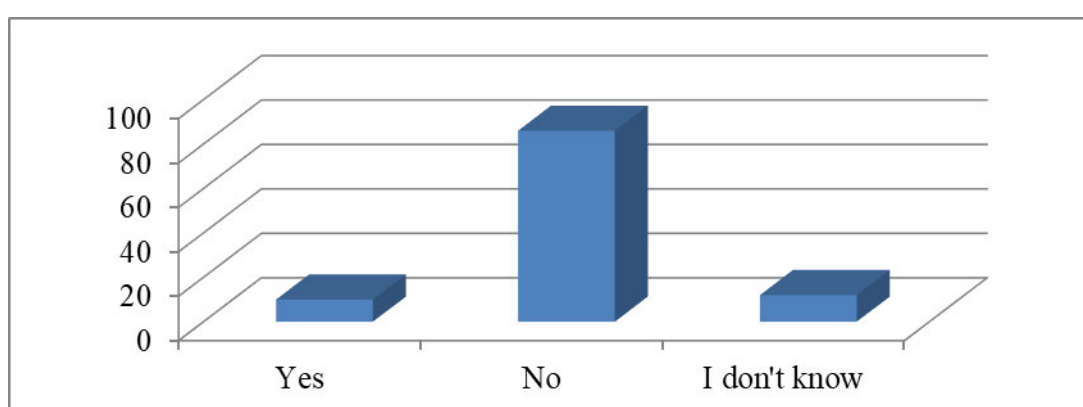


Figure 5.8: existence of digital archives access and dissemination policy (n=108)

5.4.2.6 Recordkeeping metadata for d-records and archives

According to the Tasmanian Archive and Heritage Office (TAHO) (n.d.), the purpose of recordkeeping metadata is identifying, authenticating and contextualizing records and records creators, systems and processes that create, use and manage them. Additionally, recordkeeping metadata is useful in developing system upgrades and preservation strategies such as migration, for long-term sustainability of digital records.

Respondents were asked to rate their understanding of recordkeeping metadata by stating whether they had 'little understanding', 'no understanding', 'good understanding' or 'very good understanding' of the concept. This question was

directed at 68 respondents (52%) who included records officers, ICT staff, ICT Directors, archivists and records managers. Majority of the respondents (46, 68%) indicated that they had little understanding of the meaning of recordkeeping metadata, 12 (18%) indicated they had good understanding while 10 (15%) confessed they had no understanding at all about recordkeeping metadata as is shown in Figure 5.9. None of the respondents indicated having very good understanding of recordkeeping metadata.

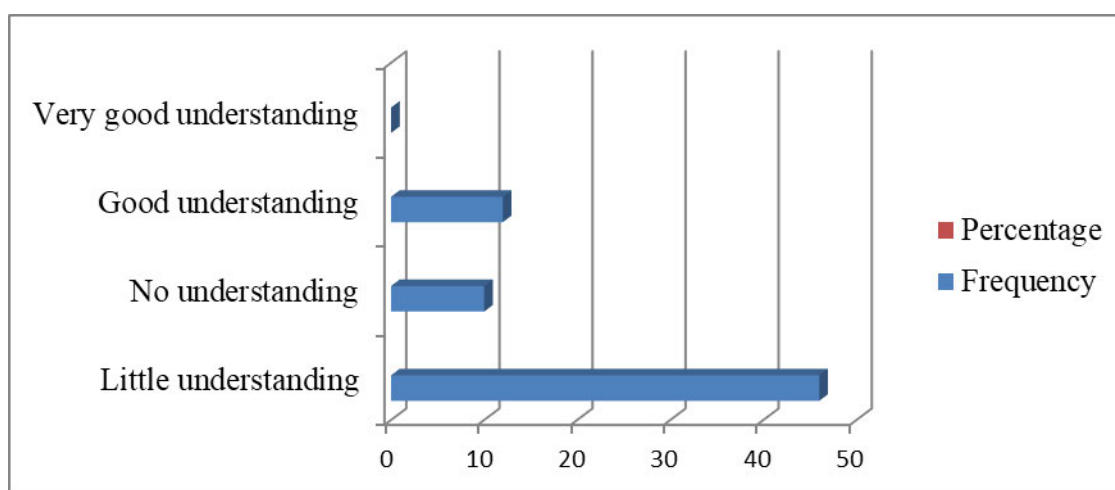


Figure 5.9: Knowledge of recordkeeping metadata (n=68)

Archivists, records managers and records officers (29, 22%) were asked whether they captured the following metadata for their d-records and archives:

- Record identifier (ID);
- Title/name;
- Date of creation;
- Business purpose/process/activity; and
- Creating software application.

All the respondents (100) affirmed that the above metadata were mandatory and were captured at the point of creation of all d-records. However, during interviews some of the participants reluctantly admitted that although the above metadata were captured at the point of creation, chances were high that some respondents did it as a routine, without quite understanding the significance of the metadata captured. One participant had this to say:

This whole issue of metadata is very important in recordkeeping and d-archives management in particular. However, most of our staff do not quite comprehend this concept and its implication upon d-records. They capture the required data as a routine without grasping the technicalities and importance of their actions.

Archivists, records managers and ICT staff were further asked whether their institutions had procedures that supported migration of records and their associated metadata to new formats or storage media so that records remain retrievable and usable for posterity. In all six universities, the participants indicated that such procedures were in place. According to one respondent:

this is the responsibility of the ICT directorate and therefore the ICT staff ensure that all the relevant metadata is linked to d-records, including during and after system migrations.

Another participant informed that the formal training in recordkeeping attended some years back *“gave me the requisite understanding of metadata, hence I do not have to rely on ICT staff for capture and harvesting of relevant metadata during d-records migration since I ‘am an expert’”*. It was therefore apparent that both ICT and recordkeeping staff were actively involved records migration and metadata preservation.

5.4.3 Legal and regulatory frameworks governing digital archives

The third research question sought to establish the legal and regulatory frameworks governing DAM in Kenyan public universities. The findings for this research question were derived from questionnaires and interview sessions with all the respondents in the following sections: questions 13-17 of the interview schedule for DVCs (Appendix 1), questions 54-64 of the interview schedule for archivists (Appendix 5), questions 24-31 of the interview schedule for ICT Directors (Appendix 3), question 14-17 of the interview schedule for FOs (Appendix 2), question 11-15 of the interview schedule for LOs (Appendix 4), questions 32-41 of the interview schedule for records managers (Appendix 6), questions 25-31 of the questionnaires for ICT

staff (Appendix 8), and questions 22-31 of the questionnaires for records officers (Appendix 7). The themes under this research question included the following:

- Relevant legislative and regulatory framework for archives in Kenya;
- Awareness of legislative and regulatory frameworks for d-archives; and
- Effectiveness of the legislative and regulatory frameworks for d-archives.

5.4.3.1 Relevant legislative and regulatory framework for digital archives

The ARMA Records Management Maturity Model (2017) incorporates five levels of organizational information governance. Level three of the model is useful in assessing the presence or absence of key requirements for meeting legal and regulatory requirements for records. In the context of this study, legal and regulatory frameworks constituted records and archives management legislations, standards, policies and procedures. Therefore, the study sought to find out from respondents whether there were legislations governing management of records and archives in public universities. The question was posed to ICT Directors, legal officers, finance officers, records managers, archivists and records officers in the universities. All 47 (36%) respondents affirmed that *The Public Archives and Documentation Services Act (CAP 19) of the Laws of Kenya (2012)* was the major law guiding the management of public sector records in Kenya. Respondents additionally mentioned other Acts, Executive circulars, regulations and subsidiary rules which the researcher made an effort to access and internalize from the respective libraries and websites. They are hereunder listed as follows:

1. Article 35 and Article 232 (1) (f) of the Constitution of Kenya 2010 - *Article 35 under Access to information states that every citizen has a right of access to information held by the state or to information held by another person. Chapter Thirteen on the Public Service Article 232 (1) (f) under Values and Principles of the Public Service provides for transparency in the provision of timely and accurate information to the public.*
2. Access to Information Act, 2016 - *The purpose and objective and of this Act are to: a) provide a framework for public entities and private bodies to proactively disclose information that they hold and to provide information on request in line*

- with the constitutional principles; b) give effect to the right of access to information by citizens as provided under Article 35 of the constitution.*
3. *The Records Disposal Act, Cap 14, Revised edition 2015 (1962) - provides for the disposal of records in the custody of the High Court and the Registrar-General. The statute establishes the procedures and authorities for the disposal of records covered in the Act. Further, the statute defines the 169 offices under the office of the Attorney-General, and provides a records retention schedule of the records covered in the Act, and the procedures for their disposal;*
 4. *The County Government Act, 2012 - Part VIII on Citizen Participation in County Governments shall be based upon; - Section 87 (a) the principle of timely access to data, information, documents and other information relevant or related to policy formulation and implementation. Section 87 (c) protection and promotion of the rights and interests of minorities, marginalized groups and communities and their access to relevant information;*
 5. *Public Procurement and Disposal Act, 2015 - This Act establishes procedures for efficient public procurement and disposal of unserviceable, obsolete and surplus stores, assets and equipment by public entities. The Act spells out the legal requirements for creation of records, disclosure and confidentiality of procurement documents and their retention periods. It also highlights the need to have a clear link between procurement and expenditure records.*
 6. *Public Finance Management Act, 2015 - This Act deals with the administration of Government finances in relation to the consolidated fund, including the supply services. It defines the term “accountable documents” and further outlines the categories of documents, their retention periods, and circumstances under which the documents may be preserved or destroyed. The authority for the destruction of accountable documents is vested with the accounting officers.*
 7. *Kenya Information and Communications Act, Revised edition 2013 (1998) - The Act provides for legal recognition of digital records and specifies requirements for their retention. It provides for integrity and security of digital information. It further gives the Cabinet Secretary responsible for communication the power to make regulations for the manner and format in which digital records in State offices shall be created, filed and used.*

8. Leadership and Integrity Act, No. 19 of 2012 - *This is an Act of Parliament that gives effect to, and establishes procedures and mechanisms for the effective administration of Chapter Six of the Constitution. Under Part II (General Leadership and Integrity Code) of this Act, state officers when performing their duties shall to the best of their ability: 10 (b) carry out duties in a transparent and accountable manner; 10 (c) keep accurate records and documents relating to the functions of the office; and 13 (1) for purposes of Articles 99 (1) (b) and 193 (1) (b) of the constitution, a person shall observe and maintain the following ethical and moral requirements – 13(1) (c) accurately and honestly represent information to the public; 13 (1) (g) not falsify any records; 30. A state officer shall not falsify any records or misrepresent information to the public.*

Over the years, the Government has issued several circulars on management of public records to compliment the above Acts, which include:

1. Office of the president circular reference No. OP.40/1/1A of 6th June 2003 on improvement of records management for good governance.
2. Office of the President circular reference OP/CAB 39/ 2A Vol. IV (52) of 8th February 2005 on the establishment of libraries and documentation centres in ministries and departments.
3. Office of the President circular No. OP.39/2A of 14th November 1999 on cases of missing and lost files and documents in the public service.
4. Personnel General Letter No. 7 of 29th August 1991 from Office of the President on destruction of personnel records.
5. Office of the President circular OP. 1/48A/11/10 of 7th July 1989 on depositing of reports and other generally circulated documents in the Kenya National Archives.
6. District Focus circular No. 1/86 from the Chief Secretary, Office of the President on the establishment and use of district information and documentation centres.
7. District Focus circular No. 1/85 of 28th August, 1985 from the Chief Secretary, Office of the President on District Focus for Rural Development.
8. Office of President circular OP.1/48A/66 of 28th November, 1985 on destruction of non – current government records.
9. Circular reference no. KNA/16/16 of 11th November 1985 from the chief archivist on disposal of old closed files and documents.

10. Archives Circular No. 2 of 12th January, 1965 from the Office of the Vice – President on archives regulations.

5.4.3.2 Awareness of legislative and regulatory frameworks for d-archives

Public sector officials including recordkeeping personnel in public organizations should be aware of the laws and regulations pertaining to their work so that they can demonstrate compliance in their business functions (Mampe and Kalusopa 2013:4). Having identified the relevant legal and regulatory framework for digital archives, it was necessary to find out whether the respondents were well-versed with their contents. To begin with, the study sought to find out whether respondents understood provisions of Cap.19 which is the main statute governing management of public sector records in Kenya. The question was posed to archivists, records managers and records officers in the six institutions (29). Although all (100%) participants were aware of the existence of the Act, only 12 (41%) understood the contents of the statute as shown in Figure 5.10.

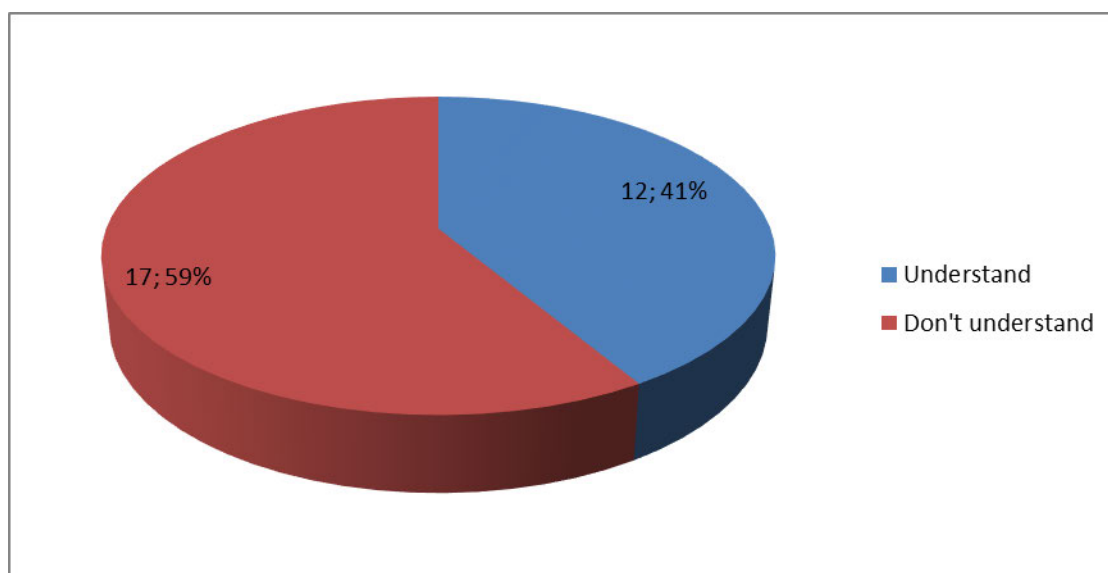


Figure 5.10: Respondents' understanding of Cap 19 (n=29)

Interestingly, many of the participants (17) admitted they were not sufficiently conversant with the provisions of most of the other identified legal and regulatory frameworks and rarely applied them in their work.

5.4.3.3 Legislative and regulatory frameworks for d-archives

The study sought to establish the effectiveness of the identified legislative and regulatory frameworks in the management of d-archives. Archivists, records managers and records officers (29) asked to indicate whether or not Cap 19 was effective in this regard. While only five (17%) of the participants felt the Act was effective, 24 (83%) of the participants discredited the effectiveness of the law in addressing the life-cycle management of d-records. Some of their responses given during interviews are provided below:

The Public Archives and Documentation Service Act in its present form is outdated and ineffective in managing records and archives, especially in view of the technological changes that continue to disrupt the processes of information dissemination, storage and general management.

The Act is skewed towards preservation of traditional record formats, yet we are in a digital dispensation.

The common adage in the business world today is that we are moving towards a paper free office driven by the technological revolution. This spells a big challenge to recordkeeping especially in the issues of digital records preservation, an aspect that is absent in the Act.

Cap 19 does not specifically address management of digital records and archives. Hopefully the reviewed Act which we are eagerly awaiting shall have clearly stipulated guidelines on life-cycle management of d-records.

With regard to other identified statutes, 17 (58%) of the participants reiterated that they were not familiar with the provisions of the Acts and regulations for records and archives management in Kenya and were therefore unable to comment on their effectiveness. However, 12 (41%) of the participants were of the view that other laws and regulations were ineffective as far as the management of digital records was concerned.

Archivists and records managers in the universities were asked whether their institutions had in-house procedures and guidelines for records and archives management. All the participants (9, 7%) affirmed that the documents had been developed and were operational. One participant's view reflected the general views of all the other respondents:

Since adoption of ISO quality assurance standards by public universities, institutional-wide audits have become the norm for us. One of the requirements for ISO audits is the availability of documentation such as manuals, guidelines and procedures for every business process including records management functions.

The participants' views implied that although formal procedures and guidelines for records management existed, the purpose was mainly to conform with ISO audit directives.

Archivists, records managers and records officers were asked whether their institutions had developed record-keeping policies and programmes. Out of 29 participants, 7 (24%) affirmed having formerly approved RM programme and policy documents, available on the university intranet. The researcher established that all seven participants were from one institution (University A). With official permission therefore, the researcher accessed the records management programme and policy documents for university A and confirmed that the documents adequately addressed the management of d-records and archives. The other participants (22, 76%) reported that their institutions did not have formerly approved recordkeeping programmes and policies. However, all of them indicated that the documents were in draft form. In University F, one participant had this to say:

We don't have a formally approved policy or programme for records or archives management in our university. Nevertheless, a records management policy was developed in 2015 and has been forwarded for top management endorsement.

The researcher affirmed through document review that there was a national policy for records management in Kenya which clearly stipulated requirements for records care for all formats. The researcher sought to establish from respondents in the institutions that had a formerly approved and draft RM policies, whether the policies were aligned to the national RM policy. All the participants (15, 100%) indicated that their policies (including those in draft form) did not make reference to a national RM policy. The general responses provided by all the records managers in the six institutions made it clear that there was no national RM policy in Kenya. One participant's answer was as follows:

We had a difficult time developing a RM policy for our institution because none exists at national level in Kenya. What is there is a draft RM policy dated April 2009.

Absence of a national RM policy in Kenya was found to be a major contributory factor to the inadequacies experienced in digital records and archives management in the universities.

Additionally, the study also sought to establish whether the six institutions had ICT policies. All the ICT Directors and ICT staff (39) affirmed that their institutions had formerly approved ICT policies. Further, the respondents were asked whether the ICT policies were relevant to and addressed the management of digital archives. The findings in Figure 5.11 show that majority of the respondents (23, 59%) were of the view that their ICT policies were relevant and addressed d-archives since they made reference to 'digital content' and 'digital information'. However, 11 respondents (28%) felt the policies were not relevant to d-records and archives management while five (13%) indicated that they did not know the answer to this question. An in-depth scrutiny of the ICT policies during document review led the researcher to conclude that recordkeeping professionals were not brought to the table when ICT policies were being formulated in the universities, hence the lack of detail in addressing digital records as opposed to digital content. Consequently, mention of digital archiving was present but only from an IT perspective as opposed to a recordkeeping perspective.

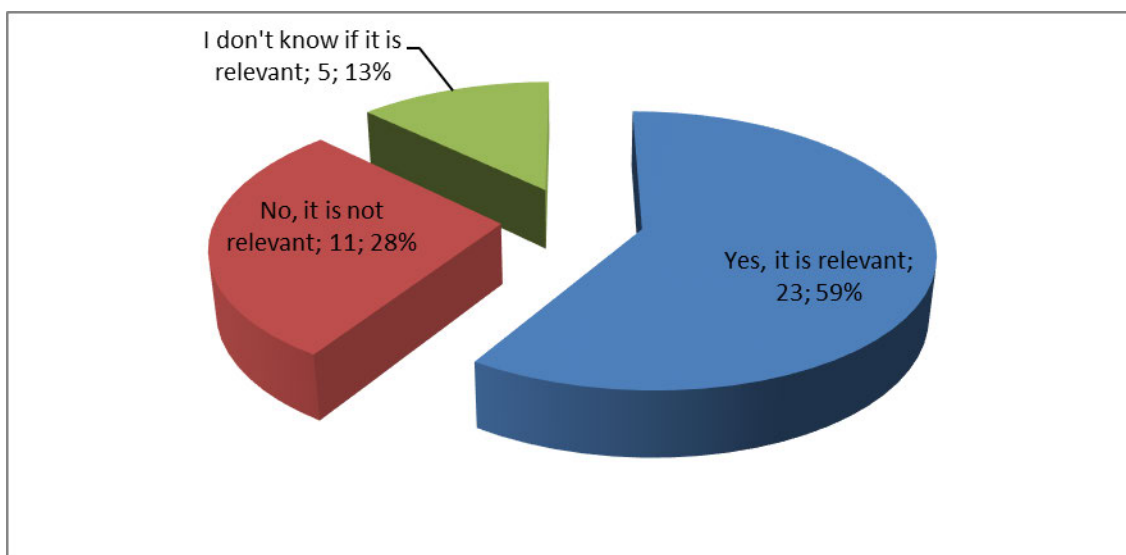


Figure 5.11: Relevance of ICT policies to digital archiving (n=39)

Archivists, records managers and records officers were required to comment on the level of their institutions' compliance with regard to the legal and regulatory requirements for records and archives management. The assessment was made against the ARMA Records Management Maturity Model levels. Participants in universities A and D (25, 19%) indicated their institutions were at Level 3 since they had formal records management policies and programmes and were adequately prepared for digital archiving. Majority (105, 81%) respondents in universities B, C, E and F indicated their institutions were at level 2, where no recordkeeping programmes were in place, but they had draft policies awaiting endorsement by senior management. None of the universities fitted into level 4 and 5 because there was no evidence of the inclusion of digital recordkeeping processes in their organizational strategic plans.

5.4.4 Risk factors for digital archives in universities

It is almost impossible for an organisation to operate without risks (Ebaid 2011:109). However, conformance to legislative and regulatory requirements for recordkeeping has increased the need to adopt risk management regimes in businesses today (Franks 2018:44; 258-266; Hay-Gibson 2009:152). One significant area of risk exposure in organisations is the life-cycle management and use of digital records (commonly referred to as records-risks), especially in public organisations (National Archives and Records Administration 2011). In this study, the ARMA Records Management Model

was adopted to guide the process of assessing risk exposures for d-archives in the study areas.

Consequently, the present study sought to answer the question investigating risk factors for d-archives in the six public universities in Kenya. The findings of this research question were derived from questionnaires and interview sessions with all the respondents in the following sections: questions 18-20 of the interview schedule for DVCs (Appendix 1), questions 65-67 of the interview schedule for archivists (Appendix 5), questions 44-46 of the interview schedule for ICT Directors (Appendix 3), question 18-20 of the interview schedule for FOs (Appendix 2), question 16-20 of the interview schedule for LOs (Appendix 4), questions 45 - 46 of the interview schedule for records managers (Appendix 6), questions 32-36 of the questionnaires for ICT staff (Appendix 8), questions 31-34 of the questionnaires for administrative staff (Appendix 9) and questions 35 - 36 of the questionnaires for records officers (Appendix 7). The themes under this research question included the following:

- Sources of risks for digital archives;
- Risk exposures for d-archives; and
- Risk assessment for d-archives.

5.4.4.1 Sources of risks for digital archives

To effectively explore the risk exposures for d-archives in the six public universities in Kenya, the researcher enquired if the respondents adequately understood the risk concept. A total of 68 participants comprising six ICT Directors, three archivists, six records managers, 33 ICT staff and 20 records officers were required to respond to the question. More than half of the respondents 38 (56%) indicated they understood, 12 (18%) indicated they did not understand while 18 (27%) were not sure. Follow-up probing during interviews ignited the following general responses in line with the above findings:

There's a high possibility that many of our staff do not know the difference between risks, threats and challenges and are therefore not sure how to respond to this question.

The general understanding of the term ‘risk’ in an organizational context including ours denotes a negative occurrence, which is wrong since risk also has a positive implication.

Bearing in mind that all the six universities had both manual and digital record formats, respondents were asked to indicate particular stages in the records life-cycle when records were exposed to risks, referred to as “moments of risk” by Bearman (2006). The creation and capture stage was mentioned by 48 (71%) respondents, maintenance (active) stage was mentioned by the highest number of respondents (65, 96%), ingestion (archival) stage by 35 (52%), access (use) by 60 (88%), disposal stage by 32 (47%) while long-term preservation was mentioned by 45 (66%) respondents as shown in Figure 5.12.

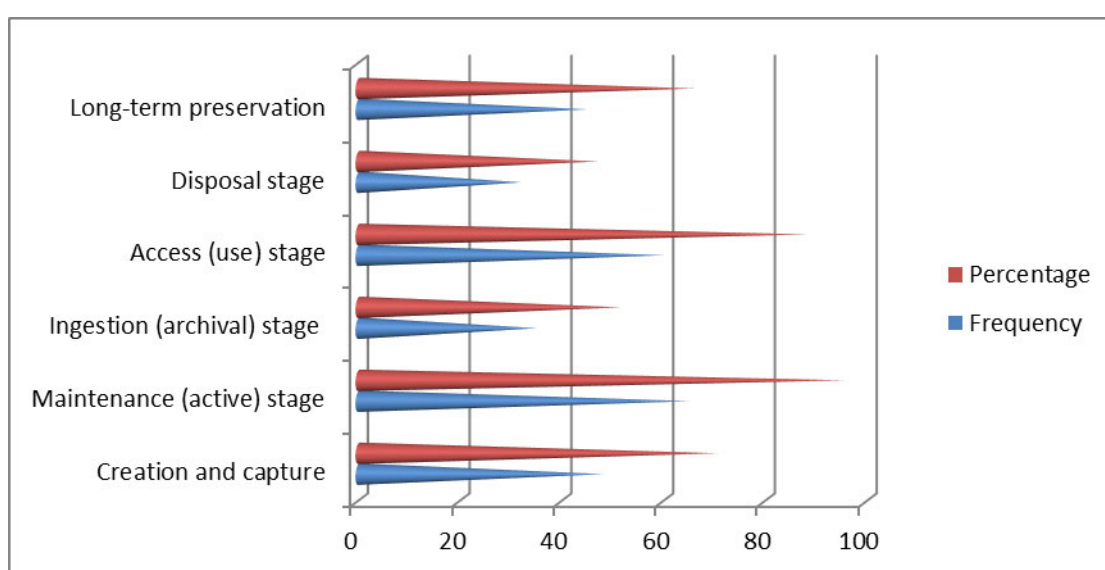


Figure 5.12: Moments of risk for digital archives (n=68)

Further, respondents in all the institutions affirmed that management of manual and digital record systems concurrently was a big challenge. One participant had this to say during an interview session:

In my view, the major source of risks to d-records is our reluctance to move-with-the times by implementing digital records and archives management to the latter. We are instead operating manual and digital recordkeeping systems concurrently but as two independent systems instead of having one hybrid recordkeeping system.

Similar sentiments were voiced across the institutions, giving the impression that there was a lot of duplication being done, not to mention wastage of resources and staff time towards managing records in a supposedly ‘hybrid environment’.

5.4.4.2 Risk exposures for digital archives

Further, respondents were asked to specify the overall risks exposures for d-records and archives in their universities, as a result of the current state of digital recordkeeping. They were asked to tick against potential risk exposures in a risk assessment table, indicating whether the identified risk was severe (56-65), major (46-55), moderate (36-45), low (26-35) or trivial (0-25), based on the projected impact of the risk. The responses were sampled and the overall findings were as presented in Table 5.24. Lack of formal strategies for managing d-records was heavily cited by respondents (65, 96%) followed closely by virus attacks (62, 91%). The least cited risk exposures were accidental/malicious deletion and modification (30, 44%) and the risk of data loss during transfer.

Table 5.24: Risk exposures for digital archives (n=68)

RISK TYPE	RISK IMPACT	FREQUENCY	PERCENTAGE (%)
Environmental hazards	Major	50	74
Rodents	Major	47	69
Rapid technological advancements	Severe	54	79
Hardware and software obsolescence	Moderate	44	95
Unauthorized access	Severe	56	82
Accidental/malicious deletion and modification	Low	30	44
File naming defects	Moderate	40	59
Viruses	Severe	62	91
Data loss during transfer	Moderate	38	56
Manmade disasters	Moderate	42	62
Lack of formal strategies	Severe	65	96

Other risk exposures mentioned by respondents during interviews included server breakdowns, hacking (for example incidents where students hack into systems to print exam cards and interfere with exam marks), system congestion, slow networks due to

low bandwidth and power failures as well as system errors occurring when the system is not given adequate instructions.

During interviews, 21 participants (legal officers, records managers, archivists and ICT Directors) were asked if their institutions faced cases of litigation resulting from or requiring the use of d-records as evidence. Majority of the participants (12, 57%) answered yes, five (24%) answered no, while four (19%) respondents said they were not aware as shown in Figure 5.14.

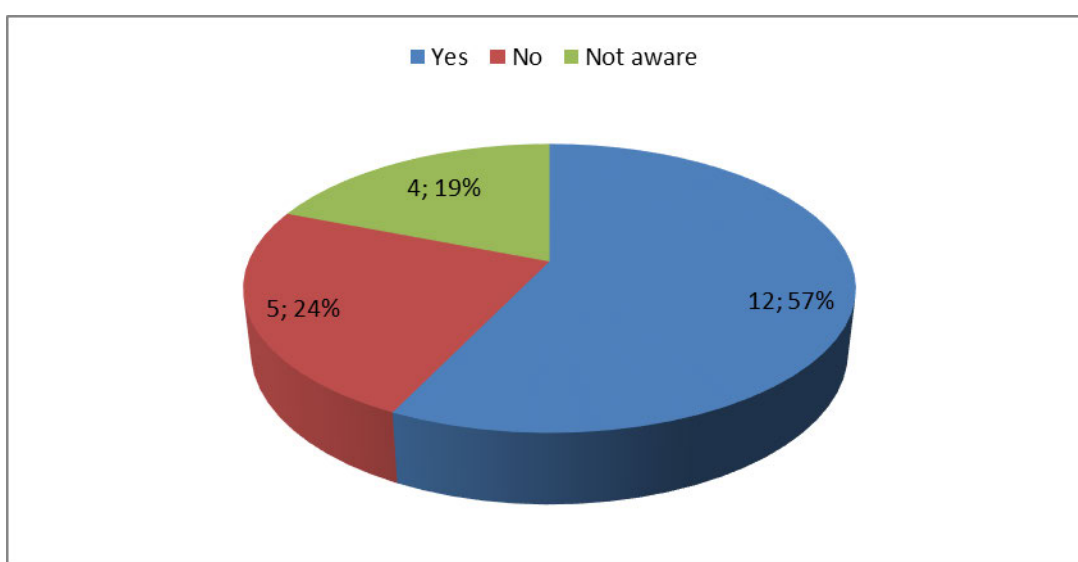


Figure 5.14: Use of digital archives as evidence during litigation (n=21)

During interviews, one participant gave the following response which was echoed by majority of respondents in the other institutions:

There have been cases of fraud in our institution for example, students falsifying fee statements to collect certificates of completion, fake grades scandals, among others. During these occurrences, d-records were useful in enabling querying of the system to establish unauthorized actions and changes in the original records. The d-records were later used as evidence in courts of law against the perpetrators.

The fraudulent occurrences mentioned in the above statement were found to be common-place in the six public universities and were resolved using d-records. The

respondents were also asked whether the d-records in their institutions were exposed to legal and regulatory risks, records technology risks, records control risks and administrative risks. All 68 respondents selected all the four broad categories of risks, affirming that their institutions faced various types of risks which fell under these categories of records-related risks.

5.4.4.3 Risk assessments for d-archives

Additionally, the study sought to establish whether risk assessments for d-archives were a reality in the selected universities. Interviews with legal officers in all the six universities revealed that all the institutions had risk management departments as well as formerly approved risk management programmes. Therefore, 68 respondents were asked whether they had participated in risk assessments organized by the risk management units to identify the risk exposures for their digital records and archives. Majority of the respondents (45, 66%) said yes, 13 (19%) said no while 10 (15%) said they were not aware as shown in Figure 5.13.

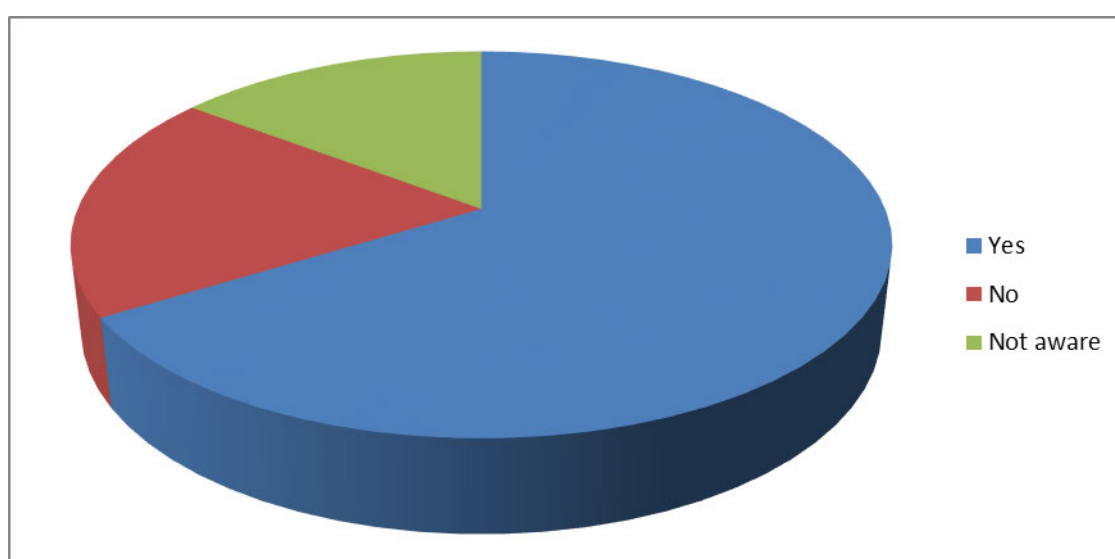


Figure 5.13: Risk assessments for digital archives (n=68)

5.4.5 Risk mitigation and sustainable digital archiving framework

The fifth research question sought to establish possible solutions that could be adopted to mitigate identified risks and support sustainable digital archiving

implementations in Kenyan public universities. In this regard, data was obtained from respondents on the risk mitigation approaches that were already underway in their institutions and suggestions that would be instrumental in coming up with overall recommendations for the study, including the development of a framework for d-archiving. Research findings for this research question were analyzed along the following themes:

- Mitigation of risks for d-archives;
- Risk management strategies for d-archives; and
- Recommendations by respondents.

5.4.5.1 Mitigation of risks for d-archives

The study sought to establish the approaches used to mitigate the identified risks and gather suggestions from respondents to enhance d-archiving practices in the six universities. ICT staff and recordkeeping staff (68) being the hands-on personnel who interacted with d-records at a technical level were asked to indicate the risk mitigation approaches they used to handle the negative risks by ticking against six possible approaches provided on a list where multiple options could be selected. Interestingly, prevention (65, 96%), avoidance (58, 85%) and reduction (45, 66%) were the highest cited options by respondents. In contrast, transfer (25, 37%), contingency planning (20, 29%) and acceptance (12, 18%) were the least cited approaches as illustrated in Table 5.25.

Table 5.25: Mitigation of risks for digital archives (n=68)

Risk mitigation approach	Frequency	Percentage (%)
Avoidance	58	85
Contingency planning	20	29
Prevention	65	96
Reduction	45	66
Transfer	25	37
Acceptance	12	18

The respondents (68) were further asked to indicate general challenges that their institutions faced in the management of d-archives. The respondents were required to

indicate on questionnaires and affirm during interviews whether specific listed challenges were prevalent in their institutions. Table 5.26 shows the feedback thereof.

Table 5.26: Digital archiving challenges in the universities (n=68)

Digital archiving challenges	Frequency	Percentage
Creation and capture of records possessing content, context and structure	45	66
Metadata generation and preservation	54	79
Changing technologies	60	88
Ensuring reliability, authenticity and integrity of digital records	62	91
Access control	67	99
Digital records preservation	55	81
Digital records security	47	69
Inadequate skills	63	93
Lack of standardised guidelines for DRM	58	85

Other challenges cited by respondents included insufficient ICT tools, unreliable power supply, low internet connection and lack of effective legal and regulatory frameworks for DRAM.

5.4.5.2 Risk management strategies for d-archives

The study found it necessary to first establish respondents' understanding of 'risk management' as a concept. Majority of respondents (85%) in the current study indicated they understood the meaning of risk management while 15% admitted that they did not understand its meaning, with some of the respondents equating it to disaster management. The study also sought to establish whether the selected universities had risk management strategies that addressed d-records and archives management. This question was posed to legal officers in the six institutions. All respondents affirmed that their institutions had formerly approved risk management policies since this was a requirement for all ISO certified institutions. As to whether the risk management policies were relevant to the management of digital archives, the general responses were as follows:

University B being an ISO certified institution is guided by the Institutional Risk Management Policy Framework policy which addresses general risks across all University processes and assets, including digital records.

There is a risk management policy for the entire institution but it does not specifically address d-records and archives.

The researcher sought authorization to access the risk management policy documents in all six universities and established that none of the documents made specific reference to digital records related risks.

The study further sought to establish the specific risk management strategies employed by the universities. The question was directed at administrators, ICT staff and records officers (108). The responses provided were subjected to qualitative analysis and the findings indicated that anti-virus protection, use of strong passwords, periodic migration to newer formats, regular backups, controlled access and use of firewalls were the most commonly implemented risk management strategies, albeit informally, in all the institutions. Offsite storage of d-records, provision of physical security such as 24/7 CCTV surveillance and construction of purpose-built archival repositories were cited by the lowest number of respondents as illustrated in Table 5.27. This is because majority of the institutions did not have ideal archival repositories where archival records were preserved, stored and managed.

Table 5.27: Risk management strategies (n=108)

Risk management strategy	Frequency	Percentage
Periodic migration	86	80
Passwords	97	90
Firewalls	54	50
Offsite storage	40	37
Regular backups	65	60
Anti-virus protection	100	93
Controlled access	75	69
Purpose-built facilities	25	23
Provision of physical security	38	35

5.4.5.3 Respondents' recommendations

Data on respondents' recommendations was obtained from six categories of respondents and merged into the following groups to minimize redundancy:

- Top management (DVCs, FOs, LOs and ICT Directors);

- Archivists and records managers;
- Administrative staff;
- ICT staff; and
- Records officers.

5.4.5.3.1 Recommendations from top management

Data on the recommendations provided by the top management respondents was obtained from questions 19 and 20 for the DVCs, questions 20 for the finance officers and legal officers and question 33 for the ICT Directors' interview schedules. The respondents proposed the following:

- i. Enhance the ICT infrastructure;
- ii. Allocate sufficient budgets for DRAM;
- iii. Include risk management in the strategic plan;
- iv. Develop and implement relevant policies on risk management for d-records;
- v. Capacity building for d-archives management; and
- vi. Embark on joint collaborative ventures for d-archiving with other public universities.

5.4.5.3.2 Recommendations from archivists and records managers

Archivists and records managers were asked to give their suggestion to aid in the mitigation of identified risks and enhancing d-archiving practices in their institutions under questions 72 and 49 respectively. The participants proposed the following recommendations:

- i. Top management support for digital archiving should be provided;
- ii. Speed up the review process for Cap 19;
- iii. Develop and implement policies and programmes for digital archiving;
- iv. Enhance the ICT infrastructure;
- v. Adopt appropriate standards for DRAM;
- vi. Purchase of good d-archiving software;
- vii. Ensure dormant archives become fully functional;
- viii. Adoption of sound d-preservation strategies for records and archives;
- ix. Construction of purpose-built archival repositories;

- x. Allocate sufficient budgets for d-archiving;
- xi. Training and retraining of recordkeeping staff;
- xii. Recruitment of skilled and competent RAM personnel;
- xiii. Creation of awareness among the top management;
- xiv. Organisational staff sensitization on matters digital archiving; and
- xv. Regular institutional oversight from the KNADS.

5.4.5.3.3 Recommendations from administrative staff

Question 35 on the questionnaire for administrators sought their recommendations to mitigate risks facing d-archives and enhance digital archives management practices in their institutions. The respondents gave the following recommendations:

- i. Facilitate staff training in DRAM;
- ii. Standardization of digital recordkeeping processes across the institution;
- iii. Purchase of appropriate software for d-records and archives management; and
- iv. Regular follow-up and advisory services from the registry and archival repositories.

5.4.5.3.4 Recommendations from ICT staff

Under question 41 of the questionnaire for ICT staff, respondents were asked to give suggestions on how risk exposures for d-archives can be mitigated in their institutions and how d-archives management can be realized. The respondents gave the following recommendations:

- i. Development of policies, programmes, standards and best practices for life-cycle management of d-records and archives across the institutions;
- ii. Internal and external collaboration on DRAM;
- iii. Allocation of sufficient budgets for d-recordkeeping;
- iv. Enhance the ICT infrastructure;
- v. Training and re-training of ICT staff to equip them with skills for DRAM;
- vi. Regular cooperation between ICT and recordkeeping departments; and
- vii. Step-up organization-wide sensitization and awareness programmes for DRAM.

5.4.5.3.5 Recommendations from records officers

Question 38 of the questionnaire for records officers required them to propose recommendations on how the identified risk exposures for d-archives could be mitigated in order to enhance d-archiving practices in the universities. Respondents gave the following recommendations:

- i. Streamlining of the manual recordkeeping system to enable smooth transition to e-recordkeeping systems;
- ii. Adequate budgetary allocations;
- iii. Purchase of state-of-the-art hardware and software for DRAM;
- iv. Develop comprehensive policies and procedures for DRAM;
- v. Training and retraining of staff in-recordkeeping;
- vi. Recruitment of skilled and competent staff to undertake d-archiving tasks;
- vii. Employment and proper placement of archival staff in the institutions;
- viii. Enhance the ICT infrastructure in the institutions;
- ix. Encourage collaboration between ICT and recordkeeping staff in public universities on matters DRAM.

5.4.6 Summary

This chapter analyzed and presented findings of research on the development of a digital archiving framework for archival repositories of selected public universities in Kenya. The relevant data were obtained through methodological triangulation where interviews, questionnaires and document review were used to collect the required data. Analysis and presentation of data was done in a logical sequence based on the research questions, with the focus of ultimately attaining the objective of the study. Quantitative and qualitative methodologies were combined in analysing and presenting the data. Quantitative data was presented using tables and percentages, whereas qualitative data was presented in prose with the direct quotes from respondents being indented.

Findings revealed that the state of digital archiving readiness in the six universities was below bar. To begin with, all the institutions lacked purpose-built archival repositories, with only three universities having make-shift offices functioning as archives. Although the findings indicated that the level of ICT infrastructure adoption

and implementation was fairly good in most of the institutions, other indicators for readiness such as staffing, budgetary allocation, training and skills left a lot to be desired. Consequently, the processes of digital archives identification and administration were not sufficiently pronounced in all the six universities. This was evidenced by absence of formal mechanisms for the acquisition, arrangement and description, appraisal, preservation, access and use, and disposal of digital records in the institutions.

As revealed by the findings, digital archiving functions in Kenyan public universities were anchored upon the Public Archives and Documentation Services Act, Cap 19 of the Laws of Kenya (2012). Other supportive legislations were identified by the study, although it was established that very few respondents were conversant with the provisions of these laws and could therefore not implement them effectively. The study findings also revealed most of the universities lacked recordkeeping programmes and policies that addressed digital records, contributing to laxity in d-records management in the institutions. As a result, the findings indicated that d-records in the universities were exposed to a myriad of risks which threatened their permanent survival as archives. Some of the identified risks included environmental hazards, manmade disasters, rapid technological changes, unauthorized access and lack of formal strategies for d-archives management.

Respondents' suggestions of possible solutions that could be adopted to mitigate the identified risks and support sustainable digital archiving implementations in Kenyan public universities were subsequently captured in the findings. Generally, the respondents recommended enhancement of the ICT infrastructure in the institutions, recruitment of skilled archival staff, increasing the budgetary allocation for DRAM, top management support for the d-archiving agenda, organization-wide awareness programmes and encouraging collaboration among public universities on matters d-archiving. The next chapter (Six) provides a detailed discourse and interpretation of the study results while making reference to literature review and underpinning theories of the study.

CHAPTER SIX

INTERPRETATION AND DISCUSSION OF FINDINGS

Interpretation is the device through which factors that seem to explain what has been observed by the researcher in the course of a study can be better understood and it also provides a theoretical conception which can serve as a guide for further researches (Kothari 2004:344).

6.1 Introduction

The process of interpretation refers to assigning coherent or significant meaning to research results (Neuman 2011:177). This chapter constitutes the interpretation and discussion of the research results presented and analysed in Chapter Five. In view of the mixed methods orientation adopted by this study, data was derived from questionnaires, interviews and document review. Interpreting and discussing findings generated from the data collection tools was necessary to enhance the reader's understanding of the pertinent issues that emanated from the research.

The major task of writing a research report involves working out how to effectively and efficiently outline contextually grounded theoretical constructs viewed as important contributions by the relevant readership (Golden-Biddle and Locke 1997:20). In this regard, the researcher endeavored to form a plausible narrative by contextualizing the study findings and relating them to the relevant theories, thereby making a contribution to the existing body of research. In keeping with the advice of renowned research scholars, the researcher carefully and objectively reflected on the data and interpreted it by forming larger meaning regarding the phenomenon within the right theoretical and empirical perspectives (Kothari 2004:345; Creswell 2014:155).

Interpretation involves making sense out of analysed data and explaining it (Mugenda and Mugenda 2003:161), while discussion entails review and interpretation of the analysed data, and integrating them with previous research (Stangor 2015:312). In this study, interpretation and discussion considered the literature review in Chapter Three and the analysed results presented in Chapter Four, and ultimately coined a theoretical

conception that will serve as guidance for auxiliary researches (Kothari 2004:- 344). The whole process was anchored upon the overall objective of this study which was to investigate digital archiving practices in archival repositories of six government universities in Kenya with a view to developing a framework for sustainable digital archiving in the institutions. Further, the interpretation and discussion of findings were logically arranged in consonance with research questions of the study which are as follows:

1. What is the state of digital archiving readiness of public universities in Kenya?
2. How are digital archives identified and administered in Kenyan public universities?
3. Which legal and regulatory frameworks govern digital archives management in Kenyan public universities?
4. Which risk factors are digital archives exposed to in these universities?
5. What possible solutions can be adopted to mitigate the identified risks and support sustainable digital archiving implementations in Kenyan public universities?

The findings for each research question are thematically discussed and interpreted in subsequent sections in adherence to the pragmatic ontological world view, synonymous with mixed methods research approach adopted by this study.

6.2 The state of digital archiving readiness in public universities in Kenya

D-archiving readiness refers to an organisation's preparedness by having the appropriate infrastructure and resources for the successful implementation of DAM programmes. The current study settled on records continuum as the choice model to guide in answering the first research question which required respondents to expound on the readiness of their institutions for DAM under the following sub-themes:

- Stand-alone archival repositories;
- Available technologies for digital archiving;
- Staff capacity for d-archiving;
- Digital archiving skills and competencies;
- Education and training;
- Budgetary allocations for d-archiving; and

- Readiness for digital archiving.

6.2.1 Stand-alone archival repositories

Institutional archives are home to crucial resources that are essential for business process performance, realization of business objectives and ensuring organisational transparency and accountability (Bussel 2017:18). Williams (2006:205) pointed out that archival repositories exist to effect the fundamental archival purposes of selection, long-term preservation and continued access to archival materials. Today, university archives have become an integral part of academic institutions, mainly because they play the role of storing and preserving the organisations' records of historical importance (Sommer 2014:1). They (archival repositories) may be purpose-built facilities, converted buildings, shared facilities (for example with a museum or library) or one or more room provisions for archival use (Williams 2006:205).

Despite the importance of archival resources and archival repositories in institutions of higher learning, their significance has not been duly appreciated as evidenced by the poor state of archives management (Bussel 2017:18) and general lack of readiness for digital archiving in many universities around the globe. The present research found that three of the six universities in the study lacked archival repositories. Among the three universities with archival repositories, only one institution (University A) had a functional archive. The archives in the three institutions were part of larger departments such as Human Resource (HR), administration and library departments. In the institutions that lacked archival repositories, the researcher observed that paper records with archival value were stored in the same space with current and semi-current records. This was similarly observed by Kalusopa (2011:276) who reported that semi-active records were stored together with active ones in Botswana labour organisations, causing mix-ups. The current study's results confirm Asogwa's (2013:803) supposition that managing archives in a university without an archival repository or archivist is an indicator of low prioritization of the archival function on the part of the institution's top management. The results also support the view fronted by Zachs and Peri (2010:112) that low recognition of the records and archives management profession is more pronounced where archival repositories exist under other departments such as libraries, as opposed to existing as stand-alone units with separate reporting channels.

6.2.2 Available technologies for digital archiving

The adoption and use of ICTs has revolutionized the manner in which business is conducted in organisations today, increased generation of digital records and enhanced processes of accessing these records (Adu 2015:227; Asogwa 2012:200; Keakopa 2008:3). Nevertheless, management of digital records in the African region remains the weakest point in archival practice, with recordkeeping practitioners struggling to handle the new formats (Wamukoya 2015:17). This study sought to ascertain the state of ICT infrastructure in the six universities as an indicator for d-archiving readiness. According to Fanning (2013:8), the basic IT components that must be in place for a successful ICT infrastructure include but are not limited to laptop, desktop, tablet and Smartphone; computer network (Internet, LAN, SAN and firewalls); data centre or server; cloud storage; and capabilities (processing capabilities; resources such as skills, hardware and software assets). In the current study, respondents indicated that their institutions had technologies such as mobile phones, facsimile, computers, CD-ROM, CD, VCD, Flash Discs, DVD, printers, scanners, photocopiers, laminators, digital cameras, tapes, cassette recorders, Internet connectivity, emails, microfilm and EDRMSs. Therefore, the presumption of the study was that the six institutions were adequately automated with majority of them having the above ICT infrastructure for supporting the large body of d-records generated.

However, although all the institutions had modern computers, the number of computers in the universities was not uniformly distributed as reflected in Table 5.10 of Chapter 5. In addition, the six institutions had EDRMs but none had recordkeeping functionalities and were therefore not suited for DRAM. Similar findings were noted by Maseh (2015:135) who observed that most of the registries at the judiciary did not have ERM systems, as indicated by 87% of the respondents which led to lack of transparency and poor service delivery. The finding also reflected the sentiments of Wamukoya (2015:17) that:

Often, most people including government officials tend to assume that business systems also known as workflows are sufficient to protect digital

information even though these systems were not designed to manage records or archives.

Further, the respondents were required to rate their institutions' extent of ICT adoption for d-archiving. The findings showed inconsistencies, with three universities being rated by respondents as having very good ICT infrastructure adoption, one university was rated as good and two universities were rated as having fair ICT infrastructure adoption. Similar results were recorded when an assessment of internet connectivity was carried out in the six universities despite the institutions having one shared Internet service provider (KENET). The findings affirmed that all the institutions had not reached the optimal echelon of ICT adoption for d-archiving. The findings were in contrast to the study's expectations since it was assumed that the oldest universities which were also largest in size would be having very good connectivity in comparison to the smaller ones. The findings were not in line with the advice put forth by the International Records Management Trust (2004:3) that organisations should have strong infrastructure for managing digital records in order to reap maximum benefit from the ICT technologies. Luyombya (2010:133) reiterated that ICTs play a major role in providing an enabling infrastructure for DRAM. This is because a good ICT infrastructure is required to ensure perpetual preservation, access to digital records and enhanced service delivery in organisations (Adu 2018:651).

The results in this study concur with those of Kamatula (2018:167) who established that the technological infrastructure was not uniform in the public offices under investigation, with some having more ICT facilities than others. The present study also agrees with the findings of Ambira (2016:284-5), that infrastructure for DRM is no longer an issue in Kenya today following the government support as a result of the Big-4 agenda. Rather, the challenge in public sector departments is how best the new technologies for DRAM can be harnessed. The present study noted that there was a general consensus among respondents in all the institutions that the available technologies had not been sufficiently utilized for digital archiving purposes.

6.2.3 Staff capacity for d-archiving

Successful digital records and archives management cannot be realized without a team of qualified and competent recordkeeping staff (Asogwa 2012:203; IRMT

2004:11). The field of archival science has been rapidly transformed by technologies such as digitization, digital preservation, diverse preservation software tools and database applications which demand for a suitably skilled workforce of records and archives professionals (Adu 2018:650). Wamukoya (2015:18) placed emphasis on the skills aspect by making reference to the study by UNESCO in 1983 which sought to establish hindrances to information access from archival institutions. Absence of qualified staff was identified as one of the obstacles to information access in the countries involved, which according to the author persists to date. Asogwa (2012:202) opined that very few countries (if any) in Sub Saharan Africa had recordkeeping staff who possessed all requisite competencies and skills for d-records management. Unfortunately, the staffing element for DRAM remains a problem in Africa for the 21st century archivist, with the issues of capacity building, training and staff retention requiring urgent attention to facilitate the continued access and sustainable management of digital records for future generations (Adu 2018:651: Keakopa 2008:7).

Taking into perspective the importance of skilled personnel for the recordkeeping function, this study collected data to determine (in)adequacy of the number of dedicated staff managing records at the front and back ends of the continuum in the six universities. With regard to ICT and recordkeeping staff who were targeted by the study (96), the findings revealed that the training qualifications held by majority of them was PhD (2%), masters (8%), bachelor's degree (31%), diploma (36%), certificate (18%), Advanced (A) Level (2%), Ordinary (O) Level (4%). Additionally, 39% of the respondents had been in service for a period of six to ten years and were therefore quite competent in executing their duties. The respondents interviewed pointed out that the universities had an adequate staff capacity for ICT and records management. However, the study established that recordkeeping units in the six universities had adequate records personnel as opposed to the archival repositories which had skeleton staff. This was interpreted to mean that the level of recognition for recordkeeping in public universities and the public sector in general had risen in comparison to previous years, but university management remain relatively oblivious to the importance of archives management and digital archiving. The results corroborated those of Musembe (2019:187), who reported that Moi University which is one of the institutions included in the current study had adequate recordkeeping

personnel. Nevertheless, recordkeeping personnel in the institutions were lowly placed and therefore lacked the authority to influence policies and make important decisions. Chweya (2020:178) reported that recordkeeping staff in Kenyan ministries were placed too low in the government hierarchy and lacked the necessary authority to adequately influence, address and implement records and archives management programmes.

In Africa, Matangira (2016:202) reported that human resources (among other resources) at the National Archives of Zimbabwe (NAZ) were grossly insufficient, hindering the institution from carrying out its mandate efficiently. Ngoepe and Keakopa (2011:150) established that Botswana National Archives and Records Service had limited staff capacity. In Kenya, a number of studies reported on inadequacy of skills and competencies in digital records and archives management. Chweya (2020:199) found that the staff capacity in the ministries was inadequate with only 586 (51.6%) positions in the establishment for recordkeeping occupied. Odhiambo (2019:348) established that very few staff were engaged in digital archives management while Ambira (2016:275) reported that technical skills and professional knowledge on digital recordkeeping issues and systems were inadequate in KNADS and ICT Authority. Similarly, Maseh (2015:179) established that the staff at the Kenyan judiciary were not specifically trained on the management of digital records. Erima and Wamukoya (2012:31) established that the management of Moi University did not place much weight on recruitment and training of recordkeeping personnel, resulting in shortage of competent and skilled records professionals. A study by Nasieku, Kemoni and Otike (2011:190) revealed that 89.4% of the study respondents did not have training in recordkeeping while only 10.6% had the relevant knowledge and skills.

6.2.4 Digital archiving skills and competencies

The increased production of digital records has propelled the need to equip recordkeeping professionals with skills for records life-cycle management in digital environments (Svard 2014:6). Therefore, archivists and records managers should acquire recordkeeping related skills and competencies (Ismail and Jamaludin 2009:140). Archivists engaging in digital archiving should have a variety of core competencies such as being able to communicate about digital archives requirements,

ability to formulate strategies required to efficiently arrange, organise and preserve them, ability harness tools, technologies, media and software in the existing processes for capturing, appraising, preserving and provision of access to the digital resources (Mulauzi et al. 2012:7). As noted by various scholars in previous literature, recordkeeping professionals in African countries lacked basic skills and competencies to efficiently manage records and archives, exacerbated by the digital recordkeeping landscape (Nengomasha 2013:2-4; Asogwa 2012:202; Groenewald and Breytenbach 2011:237). Recent archival related studies in Kenyan universities singled out lack of adequate skills and competencies as a key inhibiting factor to the proper management of digital records (Odhiambo 2019:348; Osebe, Oraya and Muthoka 2018:730; Moseti 2016:).

The study sought to ascertain the skills and competencies of ICT and recordkeeping staff in the institutions from 53 respondents as an indicator of institutional readiness for d-archiving. The results revealed that 20% of respondents had ICT skills and competencies only, which included areas such as database management, system development, information systems, information management, knowledge management and web design. Additionally, 40% of respondents had competencies and skills in RAM, Information Science/studies, IT, knowledge management, library studies and other related fields. Overall, only 40% of the respondents had skills and competencies in ICTs records and archives management, including d-archiving. This is an indication that only a small percentage of staff handling them have the requisite all-round competencies and skills to manage records in line with RC theory which assimilates a systems approach in all phases of the model. This further reinforced the presumption that records and archives management were not priority areas for the management in the six universities. However as earlier noted, the present study's findings implied an upward surge in numbers of recordkeeping staff in public sector organisations in Kenya. Nevertheless, a mismatch exists between the voluminous body of d-records generated, vis-à-vis the available skilled workforce charged with the responsibility of managing records in the universities.

6.2.5 Education and training

Digital heritage professionals should gain knowledge and skills through continuous training to keep abreast with new knowledge and strategies for long-term preservation

Moseti (2016:208). In the present study, 29 respondents were asked how often they underwent training in recordkeeping. Twenty (70%) said rarely underwent training while 21% of the respondents said that they underwent training once annually. The low statistics on training attendance by respondents was attributed to lack of financial support and facilitation by their employers, making it difficult and impossible to attend such trainings because of the financial implications involved. The findings affirmed that continuous training for recordkeeping professionals was a low priority area for the top management in the institutions. The observation made by Garaba (2015:217) that the model of archival education in ESARBICA region has majorly been on-the-job training or in-service programmes, seemingly still holds water in the Kenyan context as informed by the survey results.

In order to effectively manage d-records, ICT and records respondents informed that they required training in d-archiving related areas such as DRAM, appraisal, classification, management of records in hybrid environments, d-preservation, information security and computer forensics, recordkeeping metadata, standards and best practices, legal and regulatory requirements for records, records risk management, among others. Management support through availing funding for external training forums such as conferences, workshops, seminars, refresher courses and other relevant programmes, as well as facilitation of in-house training programmes for recordkeeping and ICT staff are options to be explored by public universities.

6.2.6 Budgetary allocations for d-archiving

Funding is a prerequisite to the formulation and implementation of successful records and archives management services (Ndenje-Sichalwe, Ngulube and Stilwell 2011:268). Literally speaking, money remains the ultimate game-changer in any business undertakings so-to-speak. Without a strong financial base, properly laid-down plans in organisations remain unimplemented. Recordkeeping activities that require finances include development and implementation of recordkeeping programmes, policies and guidelines; staff capacity building and training; preservation and conservation; and environmental monitoring and control (Kemoni 2007:291). Unfortunately, financial constraint is common place in many organisations when it comes records and archives management (Saurombe 2016:247), especially in

Africa. The functions and activities of memory institutions in the current technological dispensation are driven by finances, without which it becomes impossible to keep pace with hardware and software changes, data configuration and migration to newer formats (Council of Canadian Academies 2015:40; Adu 2015:240).

Results of the present empirical study revealed that the six institutions did not have exclusive budget allocations for RAM. It was apparent from the findings that public universities in Kenya were experiencing financial constraints due to lack of dedicated budgets, more so in the face of reduced financial capitation for public universities reported by respondents. It was clear from the findings that the needs for the recordkeeping functions in all the institutions exceeded the funds that were allocated annually. Further as earlier reported, the records units and archival repositories existed under parent departments, and they therefore received funding for their activities from the departmental vote heads. Netshakhuma (2019:62) warned against such scenarios where archival units were placed within other departments such as libraries in universities, as this led to lack of recognition for the archival function, resulting into the problem of limited finances for archives management. Therefore, the absence of dedicated budgets for RAM in the institutions could be attributed to lack of prioritization of the recordkeeping function, which is also demonstrated by failure to have stand-alone archival and records units.

The problem of limited funding for records and archives management was prevalently identified by other scholars in Kenya in the last decade such as Musembe (2019:149-150), Odhiambo (2019:347), Ambira (2016:253), Kamau 2017:115; Maseh (2015:156). As demonstrated in each of these studies, the funding factor was a commonly cited by respondents because recordkeeping services were placed under other departments. The same narrative is witnessed in other African countries such as Ghana where Adu (2015:174) singled out the problem of funding as a big hindrance to the digital preservation agenda because of its “rippling effects and impact on the other barriers to digital preservation” across the ministries and agencies studied. Ndenje-Sichalwe’s (2010:265) revealed that 85% of the respondents who were senior ministerial officers informed that the registries which fell under administration did not have dedicated budget allocations. In contrast however, developed countries like

Australia have recorded success stories where funding was availed for archival functions (Asogwa 2012:205), affirming that successful implementation of d-archiving programmes in academic institutions is dependent upon adequate financial budget allocations.

6.2.7 Readiness for digital archiving

The overall focus of the first research question was to establish the state of readiness for digital archiving in six government universities in Kenya. In this regard, all 130 respondents were asked to give an overall evaluation of their institutions' preparedness for digital archiving by considering whether the institutions had archival repositories; available technologies for digital archiving; staff capacity for d-archiving; digital archiving skills and competencies of the staff; education and training qualifications; and budgetary allocations for d-archiving. In response to this question, 88% of the respondents indicated that their institutions were not ready and 12% said their institutions were ready. The respondents' views matched the data collected, indicating that the state of readiness for digital archiving in the public universities was low and archives management is not adequately recognized as an important organisational function in the institutions. In a related study, Odhiambo (2019) found that United States International University-Africa (USIU-A) which is a private university in Kenya, was not ready for d-archiving. Although the institution had an archival repository, absence of top management support for the archival function gave rise to challenges which derailed d-archiving activities in the university. Phiri (2015:244) similarly established that strategies for effective management of digital records in the six universities investigated (four in South Africa and two in Malawi) were at different levels, with some institutions being on track while others lacked clear strategies for the management of this unique body of records.

6.3 Digital archives identification and administration

Records continuum model helps envisage recordkeeping processes, not only from the point of records creation, but also before (during designing of recordkeeping systems) and afterwards (during storage, management and preservation as records and ultimately as archives). As earlier discussed in chapter 2, the model has four dimensions identified by Upward, which Flynn (2001:83) restated as follows:

- i. Dimension 1 (create) - documents are created or received in the organisation;

- ii. Dimension 2 (capture) - documents/records are added to the filing of the organisation;
- iii. Dimension 3 (organise) - the records are scheduled for permanent preservation as part of the organisational memory; and
- iv. Dimension 4 (pluralize) - the records having been scheduled for permanent preservation are available for internal and external access.

The model also has four ‘axial elements’ namely ‘transactionality’, ‘identity’, ‘evidentiality’ and ‘recordkeeping containers. In the context of this study, the recordkeeping functions are discussed under the four dimensions (D1, D2, D3 and D4), which holistically describe the broad process of archives identification and administration.

6.3.1 Records creation and capture

Creating and capturing records are essential for promotion of accountability, protection of rights and assets, and ensuring that organisations meet financial, legal and regulatory requirements (Ndenje-Sichalwe, Ngulube and Stilwell 2011:265). The RC model advocates for creation and capture of evidence of transactions as part of business processes in organisations. In the RC theory, D1 denotes the starting point when information is initially recorded as a document and later leads to the creation of a record (Karabinos 2015:11). Reed (2005:19) speculated that the create dimension in the RC model represented “the lotus of all action” where all business actions occur, including documentation of the actions.

The findings from 114 respondents (88%) in the six institutions indicated that a large volume of digital records and archives were created and captured as a result of three broad business activities namely teaching, research and extension and outreach. The results of the survey revealed that business activities led to creation and capture of business records such as course outlines, syllabus, course descriptions, quality assurance records, audit reports, theses, dissertations, projects, research papers and academic presentations, records on donations, marketing programmes, exhibitions, student exchange programmes, and community outreach programmes. This finding affirms the element of transactionality in the RC model where records are seen to be byproducts of business activities. Emphasizing the importance of the records creation action, Wamukoya (2015:18) posited that creation and capture of records and archives

are important activities which enable citizens and general public in present day society and future generations to view and perceive the operations of government (transparency), their response and actions during particular circumstances and occurrences (responsiveness and accountability). This view is in agreement with Shepherd (2009:179), who opined that individuals and organisations create and capture records during their business activities for administrative, cultural and accountability purposes, and to meet societal needs for preserving collective memory, history and identity. Surveys such as that conducted by Ambira (2016), Maseh (2015), Tsabedze (2018) similarly showed that a lot of records were generated by ICTs as in the present study.

As alluded earlier, the speed at which d-records are created in the event of business processes keeps increasing as technological advancements occur. The survey results in this study established from 108 respondents that the types and formats of these digital documents generated were mainly emails (94%), databases (93%), word processed documents (100%), audio visual records (90%), websites (97%) and digital publications (79%) were highly cited, with MS Word documents taking the lead. Other formats cited (14%) included research data, e-journals, e-books and software. Kamatula's (2018:16) study investigating whether ERM promoted or undermined e-government implementation in Tanzania found that the public offices generated large volumes of digital records which included text files, emails, databases, image files, websites, audio and video recordings. Other survey studies such as Ambira (2016), Maseh (2015) and Tsabedze (2018) among others similarly revealed that a variety of d-records were generated by ICTs. The diverse variety of d-record formats affirmed the view presented by Groenwald (2010:17) that digital collections may constitute different formats and types, depending on the data/information type and the collections' composition.

Additionally, results from interviews with 29 respondents however affirmed that a large number of documents which transited to records status in the six universities were manual and included formats such as files, loose documents in folders, documents, computer printouts, bound volumes, newspapers and photographs. A study of ESARBICA countries done over two decades ago found that records were predominantly created and maintained in paper format (Wamukoya 2000:28).

Kamatula's (2018:161) study which was recently done in Tanzania which is an ESARBICA member-country upheld the supremacy of paper as the major format for records despite the increased generation of digital records. The study revealed that even though some public offices in Tanzania had gone digital, others remained manual and therefore a lot of manual records were still being generated (Kamatula 2018:161).

The second dimension (D2) marks the stage when digital documents deemed to possess the 'elements required for robustness' transit beyond the locus of creation (Reed 2005:19) and are captured into the organisational DRM, maintained and accessible as reliable and authentic evidence of decisions made and actions undertaken thereof (Kalusopa 2011:176). According to An (2003:24), this is achieved by use of email management systems, EDMS or other software applications. At this stage, the records are added to the records series or office filing system. Therefore, 108 respondents were asked to specify whether they captured born-digital, made-digital or both categories of digital records into the systems. Majority of the respondents (70%) said they handled both groups of d-records, 23% handled born-digital only while 7% handled converted (made-digital) formats only. The latter category of respondents was confirmed to be records staff attached to management offices in the institutions.

Archivists and records managers were asked whether they had any control over the formats of d-records created in their institutions. Only three indicated they constantly held advisory sessions with content creators and influenced the formats of digital records generated in their institutions. However, six informed they had little or no control over d-record formats generated in their institutions. Similarly, Kamatula's (2018:161) study established that the records staff in all public offices except for Tanzania Communication Regulation Authority were not involved directly in DRM and therefore had no control over the formats of d-records generated in their sections.

6.3.2 Selection and appraisal

The third dimension (D3) in the RC is *organise* wherein an organisation is linked to its functions and processes that make up those functions (Flynn 2001:83). D3 is also known as the dimension of the *archive* or the *fonds* and involves integrating the

records captured in the recordkeeping system into the larger whole, making them a part of the organisational memory (Karabinos 2015:12; Reed 2005:19). This is commonly referred to as the collection development function of an archival repository. Groenwald (2010:16) describes collection development as entailing the processes of identifying, selecting, acquiring, evaluating and sustaining information resources such as archives. Groenwald (2010) further explains that this is achieved by putting into consideration factors such as the core functions of the archival repository, methods of access, relevance, usefulness, available space provisions, user needs and financial capability. Clearly, selection and appraisal are crucial activities for archivists because they define an archival repository by determining what records become part of the collection thereof (Karabinos 2015:132). It is through appraisal that records are carefully examined at their inactive stage to determine those that warrant permanent preservation (Kashaija 2019:29). Ngoepe and Nkwe (2018:130-1) classically likened the concept of records appraisal to two biblical scriptures - Luke 3:17 and Mathew 3:12 - where Jesus Christ is the appraiser who carries out the appraisal process by using his *winnowing fork* to select records of enduring value (wheat) and ingest them into the archival repository for permanent storage, while the ephemeral records (chaff) are destroyed by burning them with *unquenchable fire*. The justification for records appraisal lies in the fact that records no matter their format cannot *all* be retained indefinitely but must be weighed against important considerations such as maintenance costs, storage costs and access implications because of the large volumes (Kalusopa 2011:237).

When carrying out appraisal, recordkeeping professionals ought to be formally guided by provisions on what to select for storage as archives and what not to select (Ngoepe and Nkwe 2018:131). Such provisions are normally entrenched in appraisal policies which archival repositories should ideally have. This study sought to find out the institutions having acquisition policies or guidelines governing collection development processes for archival repositories. The results indicated that only university A and D had acquisition policies requiring departments to deposit their inactive records into the archival repositories. The policies clearly stipulated the nature of records that should be selected as archives. The other institutions did not have acquisition policies to determine the type of records that can be acquired as archives. None of the institutions had appraisal policies for records, formal guidelines

or instructions for appraisal. Interestingly however, respondents in universities A, C and D affirmed that appraisal was carried out for their manual records only. Respondents in universities B, E and F informed that they have never carried out records appraisal but have been conducting records inventories and audits for manual records only. None of the institutions had appraisal policies, guidelines or procedures for identifying d-records that have permanent value and appraisal had not been undertaken for this category of records in the universities. In all probability, it would appear that appraisal decisions for records were made by the recordkeeping professionals and creators of d-records at their own discretion. Section 8.3 of ISO 15489-1 (2016:14) requires organisations to have recordkeeping systems that can facilitate and implement retention-disposal decisions. This implies that records appraisal and disposal should be embraced as part of business processes in organisations and undertaken systematically. This study's findings contravened the RC theory requiring organisations to adopt and implement appraisal and disposal programmes for consistent, coherent and efficient approaches to acquisition of materials for archival repositories.

This study's findings are comparable to those of Musembe (2019:172) who established that Moi University did not have appraisal and disposal procedures, thereby creating loopholes for non-conformity in the institution's recordkeeping practices. Maseh's (2019) study similarly established that the Judiciary in Kenya lacked a formal programme for records appraisal, leaving appraisal and disposal decisions to the discretion of archivists (Maseh 2015:170). Chweya (2020:194) also reported absence of appraisal guidelines and policies in government ministries and national archives in Kenya, which was the reason for crisis-appraisals that were witnessed across the government departments to create space for office use. In Botswana, labour organisations did not have any clear procedures or policies for appraisal of paper and digital records, with the effect that record users and creators ended up creating, manipulating and deleting data at their own discretion with total disregard to the evidential value of the records (Kalusopa 2011:239).

6.3.3 Arrangement and description

Arrangement and description are two intertwined activities intended to render archives and records intellectually and physically available for access and use (IRMT

1999:24). As discussed in Chapter 3, besides recognizing the globally accepted principles of original order and *respect des fonds* (provenance) during arrangement of archives, organisations can also arrange their archival records according to levels of group, subgroup, series, file and item (IRMT 1999:24), which is known as classification. Citing Jenkinson and Schellenberg (1956:53), Garaba (2010:236) underscored the fact that the guiding principles of classification define and govern arrangement and description of archives. Thus, the records classification process aids in organising, describing and controlling information, enabling archival and records custodians to attain physical and intellectual control over their collections (Garaba 2010:236). As such, the process of arrangement and description is situated in Dimension 3 of the RC theory in that it helps to maintain records as evidence and place them in the context of individual or corporate archives so that they can be managed as frameworks, enabling them to function as a corporate, group or individual (McKemmish 2001:352).

Regarding the classification of d-records archives in this study, all (100%) respondents in the six universities reported that there was no logical organisation of digital records since all the institutions were still in the process of embracing DRM. The findings however revealed that records classification schemes were in use for paper records in all the universities. All the respondents reported that they were using alpha-numeric classification schemes for the manual records. Further, during interviews with records managers, it was reported that the alpha-numeric classification scheme was preferred over numeric classification scheme because it allowed for quick reference, had the advantage of expandability and eliminated confusion resulting from similarities in file naming. Preference for the alpha-numeric classification scheme was in tandem with the advice posed by Shepherd and Yeo (2003:73) that classification schemes ought to document the relationship between records and the activities leading to their generation, which is determined by analysis of business processes.

From survey findings, it was clear that although current and semi-current manual records were well organised in the institutions, arrangement and description of non-current archival records was not undertaken in five of the universities. This study's findings were in contrast to the study by Kalusopa (2011) where out of 45 labour

organisations that were investigated, 29 (64.4%) indicated that they had record classification schemes that were based on record series and business functions of the trade unions, while 29 (35.6%) indicated that they did not have classification schemes for their records. However, following analysis of the claims made by the respondents, the study found that classification schemes in the organisations were not sufficiently defined, which saw most of the trade union organisations resorting to “home grown” classification schemes for the paper and d-records (Kalusopa 2011:234). Similarly, the study by Garaba (2010) revealed that 75% of the institutions under study did not conform to the functional classification scheme, presumably because they held other records besides those from the former liberation movements (Garaba 2010:238). Other studies that reported lack of classification schemes were Kemoni (2007:296), Nengomasha (2009:212), Ramokate and Moatlhodi (2010:74), Tshotlo and Mnjama (2010:23).

6.3.4 Storage and preservation

Storage and preservation are inseparable activities in the archival domain as each exists because of the other, but both exist for the same purpose of ensuring continued access and use of records and archives. Chaterera (2017:205) rightly stated that “preservation is done to enable access while access serves to justify the need for preservation”. Once a record completes the cycle of processing, distribution, access and use, it must be stored appropriately for future purposes (Ndenje-Sichalwe 2010:171). Importantly, storage and preservation are essential activities within D3 of the records continuum theory, and should be conscientiously undertaken, bearing in mind the chemical and physical composition of records and archival materials. Section 9.6 of ISO 15489-1 (2016:17) directs that records should be stored on media that can guarantee their preservation, authenticity, usability and reliability during the period that they are required.

The present study established that the six universities had operational registries where records were stored. Three of the institutions had archival repositories but only one institution had an operational archival repository where manual archives were stored and preserved. For the institutions that had no archival repositories, the registries stored active, semi-active and inactive records in the same storage space. Regarding storage equipment, 80% of respondents reported using ordinary steel cabinets for the

records while 20% revealed that they stored some of their records on shelf tops and on floors in no particular order because of limited storage space and inadequate storage equipment. Such inappropriate storage conditions were similarly observed by Maseh (2015:174) who noted that records were kept on shelf tops, exposing them to ultra violet rays from fluorescent tubes, leaving the records bare to oxidation which weakened the information materials.

With regard to d-records, 73% of the respondents indicated that all d-records, including those with continuing value were stored on the creators' computers, KENET cloud and external storage devices. All 108 respondents reported that they deleted records deemed useless from their computers and saved those records that had continuing value on internal and external storage devices. Additionally, 89% respondents reported that they sometimes opted to completely erase unwanted data by reformatting some of the storage devices, with 19% of the respondents preferring to overwrite some of the storage devices, while 32% of the respondents saved important records on computer hard discs. All the respondents found these techniques to be easy to undertake. Interestingly however, 27% of the respondents indicated that they did not know what happened to d-records after their usage elapsed. This was a red flag suggesting that potential d-archives were at risk because some of the creators and users were not taking the necessary measures to preserve the records. The findings confirmed that no form of digital archives preservation was being carried out in all the institutions, exposing d-archives to the risk of loss and inaccessibility over time. Similar findings were reported by Odhiambo (2019:338) who informed that although digital records at USIU-A, Kenya were stored on servers, hard drives and portable hard discs, they were at risk because the server rooms were not well secured.

The current study found out that none of the universities had a preservation programme, policy or formal guidelines governing the preservation of digital records and archives. Some of the respondents however reported having related policies that had some impact on records preservation (See Table 5.20). Maseh (2015:172) similarly reported that the judiciary lacked a preservation policy as indicated by 100% of the respondents, and that 60% of the respondents saw no need for such a policy. Citing Mutiti (2002), Asogwa (2012:206) warned that many organisations in developing countries faced the risk of losing vital records due to hardware and

software obsolescence, because they did not have plausible plans for the proper maintenance and preservation of d-records.

With regards to preservation strategies, respondents reported engaging in some d-preservation strategies, albeit involuntarily, such as cloud computing (94%), bit preservation (21%), migration (43%), refreshing (90%), emulation (9%), data backup (26%), metadata (17%) and locally developed d-preservation solutions (5%). Regarding data backup solutions, all respondents affirmed that their universities were registered with KENET which provided cloud backup for their digital content, mainly emails and websites. This finding was aligned to Adu's (2015:189) view that having a backup plan for d-records was an essential preservation strategy for d-records, more so in the present era of data deluge. Nevertheless, Adu (2015:189) warned that backup was just but a single constituent of digital preservation and should not be viewed as a sustainable d-preservation strategy. The findings of this study revealed that there were no proactive approaches towards digital records and archives preservation in all the institutions.

Further, investigated whether respondents were adequately aware of the key models and standards for digital recordkeeping. The study focused on records continuum, ISO 15489 standard and OAIS reference model which in the researcher's view are the most commonly used in organisations globally. From the findings, 28% had an understanding of the RC model and ISO 15489 standard, 72% confessed having no understanding of the model and standard. In addition, 19% had an understanding of the OAIS reference model, while 81% had no understanding of the model. From the findings it was evident that the six institutions did not formerly conform to the RC model, OAIS model and ISO 15489 standard. The findings concurred with those of Ambira (2016:281) who found that none of the ministries in Kenya had adopted standards or models for managing electronic records. Subsequently, Ambira (2016:281) restated the importance of adopting standards to attain uniformity in the management of d-records in today's predominantly digital world, pointing out that standards provide guidelines for the management of d-records.

6.3.5 Access and use

The fourth dimension (4D), also known as pluralization, constitutes all the activities revolving around the organisation of a body of records (collective memory) belonging to an organisation so that the records can be readily available for access to users outside the recordkeeping organisation, for reference, research and historical purposes (Reed 2005:19). Thus, D4 entails the activities of maintenance and use which are largely enhanced by arrangement and description of archives.

In this regard, the study sought to establish from respondents how they provided access to d-records and archives in their keeping. Majority (97%) of the respondents indicated that email technology was readily available to almost all employees in the institutions and was therefore preferred as a quick and user-friendly medium of transmission. This confirmed that the public universities were still at the early stage of DRM implementation, with most of the users being comfortable with the email technology compared to other more sophisticated technologies. Contrastingly, online access was cited by the least number of respondents (26%), who gave the reason that most users did not have the time to spend searching online for d-records on their own. This further rubber-stamped the notion that users in public universities were at the initial stage of embracing technology, as opposed to technologically-mature organisations where users not only engage in creation and capture of records using many other technologies, but also readily access and utilize such records. Other modes of access identified included printing and distribution of copies of printed copies of digital records cited by 66% of respondents (which affirmed the solid trust of paper as opposed to digital records) and downloading the d-records to computers, cited by 57% of the respondents.

According to ISO 15489 8.4 (2016:15), it is important to develop and apply rules that specify access rights, restrictions and permissions applicable to records. Therefore, access control is an important activity for records management units and archival repositories that must be undertaken judiciously to safeguard the privacy and confidentiality of records. The study results revealed that various internal controls were being implemented to safeguard privacy and confidentiality of d-records and archives. They included users' personal responsibility; use of passwords and user names; use of PINS and digital signatures; firewalls; regular checking of access logs

on systems; and physical measures. Respondents additionally indicated that they were implementing strategies to uphold the reliability, authenticity, integrity and usability of digital records. They included using passwords to prevent alteration and deletion; tracking and verifying changes to digital records regularly; carrying out regular performance audits of the IT system; standard procedures for reporting systems failure; and training of staff. Physical controls that were in place to protect d-records included having security guards to watch over the ICT hardware (84%); burglar proof doors and window grills (81%), controlled access to offices (48%), marking of all hardware devices (62%), installation of CCTV cameras (30%), and installation and use of alarms and sirens (39%). However, cases of theft were reported in some of the institutions despite having these controls in place. The study found that these cases of theft were reported in four institutions that did not have CCTV cameras.

Additionally, the study results revealed the absence of policies governing access and dissemination of digital records and archives in five institutions. From these results, 80% of respondents indicated their institutions did not have such policies while only 9% indicated that they had access policies for records. However, 11% respondents were unaware if such policies existed in their institutions or not. Overall results of the study affirmed that only one university (University A) had an access policy for all their records, although the policy did not specifically address the access of d-archives.

6.3.6 Recordkeeping metadata for d-records and archives

Section 5.2.3 of ISO 15489-1 (2016:5) provides what should constitute recordkeeping metadata for records to be accepted as authoritative. They include: a description of the content of the record; the structure of the record (for example form, format and the relationships between the components comprising the record); the business context in which the record was created or received and used; relationships with other records and other metadata; identifiers and other information needed to retrieve and present the record, such as format or storage information, and; the business actions or events involving the record throughout its existence (including date and time of the actions, changes to the metadata and the agents undertaking the actions). Records and archives practitioners have the responsibility of ensuring that this information is captured right from the time a record is created or captured and throughout its lifecycle.

This study established that metadata capture was an on-going activity in the six institutions. Further, the results indicated that respondents from the ICT and recordkeeping categories were engaged in d-records migration activities which involved capture of the associated metadata. The respondents in the six universities affirmed that they captured the following metadata for their d-records and archives: record identifier (ID); title/name; date of creation; business purpose/process/activity, and; creating software application. Recordkeeping metadata regimes are essential in meeting the records management and archival requirements linked with the four dimensions of the RC (McKemmish 2001:351).

However, the level of understanding of recordkeeping metadata was lowly rated, with 68% of the respondents indicating that they had little understanding of the meaning of recordkeeping metadata. This finding seemed to contradict the revelation concerning metadata capture in the institutions. However, follow-up interviews revealed that majority of the respondents were capturing metadata as a routine and did not fully understand what records metadata should constitute, its significance and how it should be managed. Section 5.2.3 of ISO 15489 (2016:5) directs that recordkeeping metadata should itself be managed as a record, and should be safeguarded from unauthorized deletion or loss, and stored or disposed of accordingly after appraisal.

6.4 Legal and regulatory frameworks governing digital archives

Legal and regulatory frameworks are key considerations for successful records and archives management programmes since they form the environments within which records are created and used (Luyombya 2010:128). IRMT (2009:42) refuted the misconception that records oriented legislations are those that impact upon records creation and use – rather, virtually every government law has a recordkeeping implication. However, some legislations and regulations relate directly while others relate indirectly to recordkeeping (Phiri 2016:63).

Level 3 of the ARMA Records Management Maturity model describes key legal and regulatory requirements that an organisation must have in place so as to meet compliance requirements. Additionally, the third principle in this model states that the information management regime in an organisation shall be designed in conformance to the relevant laws, organisational policies and any other obligatory authorities

(ARMA 2017). The current study required respondents to identify the various legislations and regulations that governing recordkeeping in their universities. Respondents listed legislations, circulars and directives that related to public sector recordkeeping in Kenya (See Chapter 3 Section 5.4.3.1). All the respondents were in agreement that the Public Archives and Documentation Services Act (CAP 19) of the Laws of Kenya (2012) was the foremost legislation that governed public sector records management in the country. Findings of the study concurred with those of Chweya (2020:267), wherein the study affirmed the Public Archives and Documentation Services Act (Cap. 19) as the principal law governing public record management in Kenya. Chweya (2020:167-170) also identified other subsidiary rules, Acts, Executive circulars and regulations that were relevant to recordkeeping.

Awareness of the legal and regulatory frameworks was investigated and 41% of the respondents confidently affirmed that they understood the provisions of Cap 19 and the other identified laws and regulations. However, 59% respondents admitted being unfamiliar with the provisions of the laws and regulations and indicated they rarely applied the laws in their day-to-day work. Additionally, 17% felt that Cap 19 was effective in providing guidance for records care, whereas 83% of the respondents discredited effectiveness of the law in governing the life-cycle management of d-records, and opined that it should be reviewed. With regard to the other identified statutes, 58% of the respondents in this study abstained from giving their responses as to whether or not they were effective in the management of records in all formats while 41% felt the statutes did not effectively address digital records management. Chweya (2020:172) further revealed that Cap 19 was ineffective in maintaining and preserving digital records generated by ministries. The present study therefore concurs with Chweya (2010:210) and other previous scholars in the literature who opined that weak legislative and regulatory framework hinder efficient and effective management of d-records.

Regarding availability of in-house procedures and guidelines for recordkeeping, records managers and archivists in the institutions affirmed such documents existed and were operational. However, the study established that the procedures and guidelines that existed were mainly developed out of the obligation to comply with ISO requirements and not from a recordkeeping perspective, but were more skewed

towards document management. Seven respondents (24%) confirmed that their institution had a formerly approved policy and RM programme that addressed all record formats. However, 76% respondents reported absence of formal recordkeeping policies and programmes in their institutions, but indicated that the documents existed in draft form. This finding concurred with the study by Tsabedze (2018:159) which reported that government ministries in Eswatini did not refer to the national RM policy because none was in existence. The study by Kalusopa (2016:103) revealed absence of policies for managing records in all formats in the organisations. However, Phiri's (2015:226-7) comparative study which involved six state universities in Malawi and South Africa revealed that four universities had formerly approved policies for recordkeeping while their two counterpartss in Malawi did not have. Tshotlo and Mnjama (2010:30-32) reported similar findings during a records management audit in Botswana local government.

Additionally, 39 respondents affirmed that all six institutions had ICT policies that were aligned to the national ICT policy. Although 59% of the respondents indicated that the ICT policies in their institutions addressed DRAM, the study established that recordkeeping issues were only mentioned in passing in the policies, with the focus being on the management of documents from an IT perspective. The study attributed this shortcoming to 'side-lining' of recordkeeping staff during the drafting of ICT policies in the institutions, with the effect that the policies thus developed did not effectively address DRAM. This finding concurs with the study by Luyombya (2011:107) which reported that despite the existence of a national ICT policy, successful implementation of DRM was not realized in the government of Uganda. Further, Wamukoya (2015:17) lamented that the effective management of d-records is complicated by lack of sound legal framework, standards, policies and programmes.

With regard to compliance with legislative and regulatory requirements for recordkeeping, 81% of the respondents reported that their institutions (universities B, C, E and F) were at level 2 of the ARMA Records Management model where their institutions were still developing recognition for DRAM and had draft policies for records and archives management, while 19% reported that their institutions (universities A and D) were at level 3 of the model where they had operational policies and programmes that addressed d-archives and were operating in compliance

to laid-down laws and regulations. It could therefore be deduced that most of the public universities were not implementing formal guidance for DRAM. This finding concurred with the sentiments of Ambira (2016:287) that despite the increased usage of ICTs and subsequent increase in generation of digital records in government departments in Kenya, very few organisations had developed and implemented programmes for digital records management. Similarly, Kalusopa (2016:195) reported that there was absence of organisational policies, programmes and procedures to guide the management of both paper and e-records in labor organisations in Botswana. Other renowned scholars who agitated on the absence of (or weak) legal and regulatory frameworks for d-records management as well as absence (or non-implementation) of programmes and policies for d-records in public sector organisations included Kabata (2019:111), Kamatula and Kemoni (2018:78), Ambira (2016:178), Katuu and Ngoepe (2015:12), Asogwa (2012:206-7), Okello–Obura (2011:2) and Luyombya (2010:157).

6.5 Risk factors for digital archives in public universities

Research trends indicate that good digital records and archives management enhances e-governance services by supporting business process continuity, risk management, security, legal compliance, transparency and accountability, evidence-based decision making, good governance, public trust, performance and government capability building (An, Sun and Zhang 2011:1). The present study utilized ARMA Records Management Maturity model (2017) to answer the fourth research question which sought to explore and identify the risks that digital archives in Kenyan public universities are exposed to. Respondents' understanding of the risk concept was investigated and the findings revealed that 56% understood the meaning of risk, 18% did not understand and 27% of them indicated that they were not sure, meaning that they did not know. During interviews, it became evident that some of respondents wrongly assumed that the words 'risk', 'challenge' and 'threat' carried the same connotation. In addition, a good number of respondents wrongly assumed that the occurrence of risk meant a negative event or activity, when in real sense risk may also carry a positive connotation depending on the prevailing circumstances. According to Hay-Gibson (2011:198), the positive aspect to risk is related to the amount of profit or benefit linked to the risk, making it worth taking owing to the tangible benefit to be realized. Similar to the finding in the present study, Hay-Gibson (2011:243) reported

that all three cases under investigation spontaneously perceived risk negatively. Chweya (2020:213) similarly reported that all respondents in the study used a negative narrative of the word risk. Nevertheless, Kalusopa's government assessment of e-readiness using the IRMT e-readiness assessment tool revealed an increasing awareness of risk and the importance of d-records management amongst staff in government-owned organisations (Kalusopa's 2016:248).

Regarding risk sources for digital archives, all recordkeeping respondents in the universities lamented that the management of paper records alongside digital records was causing more problems than solutions as far as organisational resources and staff time were concerned. The challenges that accompany the implementation of parallel paper and digital recordkeeping systems were similarly reported in the public sectors of other countries such as Tanzania (Kamatula 2018), Zimbabwe (Matangira 2016), South Africa and Malawi (Phiri 2015), Ghana (Adu 2015), Namibia (Nengomasha 2013), Nigeria (Asogwa 2012), Botswana (Kalusopa 2011) and Uganda (Luyombya 2010). In Kenya the risks of operating hybrid recordkeeping systems were highlighted by scholars such as Chweya (2020), Kabata (2019) and Ambira (2016).

Ambira (2016:286) noted that inclusion of digital record features in ICT systems of government ministries in Kenya was not well harnessed, thereby exposing records to risks of inappropriate preservation and non-capture of important records and archives. Respondents in the current study were asked to identify stages when d-records were exposed to risks during their life-cycle. The creation and capture stage was mentioned by 71% of the respondents, maintenance (active) stage was mentioned by 96%, ingestion (archival) stage by 52%, access (use) by 88%, disposal stage by 47% while long-term preservation was mentioned by 66% respondents (See Figure 5.12). The findings indicated d-records were highly vulnerable to risks during their active and semi-active stages of their lifecycle, probably because they are more prone to manipulation and alteration during their usage. This confirmed Asogwa's (2012:202) observation that even though the onset of ICTs has been beneficial to organisations, it has introduced numerous risks such as added costs of information management, increased need for trained staff, data loss, risks to authenticity and reliability, loss of privacy and security, among others.

Risk exposures for digital information include lack of organisational policies, technological obsolescence, fragile storage media and insufficient resources (Adu 2015:2). Others include but not limited to software and failure, network service failure, natural disasters, internal and external attacks, communication and operator errors (Ngulube 2012:133). Respondents in this study were required to specify overall risks for d-archives as a result of the state of DRM in their institutions. The risks cited by respondents included absence of DRM strategies (96%), hardware and software obsolescence (95%), virus attacks (91%), unauthorized access (82%), rapid technological advancements (79%), environmental hazards (74%), file naming defects (59%), rodents (46%), accidental/malicious deletion and modification (44%), data loss during transfer (56%) and manmade disasters (52%), among others.

Respondents were required to inform on whether their universities have faced litigation cases which required presentation of d-records or archives as evidence during legal processes in court. From the results, 57% answered yes, 24% answered no, while 19% indicated that they were not aware as shown in Figure 5.14. Notably, cases of fraud arising from manipulation of digital records were prevalently reported in the institutions, which ultimately required the use of d-records as evidence. The findings indicated d-records were vulnerable to risks and threats which impacted negatively upon the institutions. All respondents (100%) affirmed their institutions were exposed to records technology risks, legal and regulatory risks, administrative risks and records control risks.

Ultimately, 68 respondents were required to state whether they had participated in organisation-wide risk assessment exercises to establish the prevalent risk exposures for digital records and archives. Majority (66%) of the respondents answered in the affirmative, 19% admitted that they had not participated whereas 15% stated that they were not aware, meaning that they had no understanding of what risk assessment entailed (See Figure 5.13). This finding affirmed that public universities in Kenya recognized the importance of risk management programmes and the need to implement risk mitigation strategies to safeguard organisational resources including d-archives. Nevertheless, respondents reported facing challenges in the management of d-archives that related to: records creation and capture; metadata capture and preservation; technological changes; upholding reliability, authenticity and integrity

of digital records; security and access control; d-preservation; inadequate skills and lack of standardized guidelines for DRM.

6.6 Risk mitigation and sustainable digital archiving framework

Digital archival repositories in public universities harvest archival records from different systems within the organisations, which presents risks for archivists since the systems run on different administrative guidelines (An et al. 2017:19; Song and An 2016:48). Moreover, preservation of this digital content has become increasingly complex with the advancements in technology, giving rise to a number of threats (Li and Banach 2011:1) that should be mitigated by archival repositories. The need for sustainable risk mitigation approaches in response to the increased volumes of data in organisations was reiterated by Adu (2018:652).

With guidance from the OAIS reference model and ARMA Records Management Maturity model, the study sought to find out approaches used to mitigate identified risks in the current study and gather suggestions from respondents to improve digital archiving practices in the six universities. The study found it necessary to first establish respondents' understanding of 'risk management' as a concept. Most respondents (85%) indicated they understood the meaning of the risk management concept while 15% admitted that they did not understand its meaning, with some of the respondents equating it to disaster management. Nevertheless, all respondents confirmed their institutions had formerly approved risk management policies which were a key requirement for ISO certified institutions. This was an indication that the top management in all the institutions recognized the importance of adopting and implementing risk management regimes. However, the study established that the risk management policies in all the institutions were general and failed to address digital recordkeeping issues.

With regard to risk mitigation, respondents in the current study reported that they were applying approaches that included prevention (96%), avoidance (85%), reduction (66%), transfer (37%), contingency planning (29%) and acceptance (18%) as shown in Table 5.25. The results indicated that respondents appreciated the need to protect digital records and archives against potential negative risks. Additionally, respondents affirmed that they were informally applying risk management strategies

such as periodic migration (80%), passwords (90%), firewalls (50%), offsite storage (37%), regular backups (60%), anti-virus protection (93%), controlled access (69%), construction of purpose-built facilities (23%) and provision of physical security (35%).

Subsequently, respondents were required to provide suggestions for enhancing d-archiving practices in the universities, which would also inform the development of a d-archiving framework for this study. The following general recommendations were recorded:

- i. Top management support for digital archiving should be provided;
- ii. Speed up the review process for Cap 19;
- iii. Development of policies, programmes and guidelines for lifecycle management of d-records and archives across the institutions;
- iv. Proper placement of archival staff in the institutional cadres;
- v. Adopt appropriate models, standards and best practices for DRAM;
- vi. Streamlining of the manual recordkeeping system to enable smooth transition to e-recordkeeping systems;
- vii. Standardization of digital recordkeeping processes across the institution;
- viii. Enhance the ICT infrastructure;
- ix. Purchase of good d-archiving software;
- x. Ensure dormant archives become fully functional;
- xi. Adoption of sound d-preservation strategies for records and archives;
- xii. Construction of purpose-built archival repositories;
- xiii. Allocate sufficient budgets for DRAM;
- xiv. Training and retraining of recordkeeping staff in DRAM;
- xv. Recruitment of skilled and competent RAM personnel;
- xvi. Creation of awareness among staff on d-archiving;
- xvii. Encourage continuous collaboration between ICT and recordkeeping staff in the institutions;
- xviii. Organisation-wide staff sensitization programmes on digital archiving;
- xix. Regular institutional oversight from the KNADS; and
- xx. Regular follow-up and advisory services from the registry and archival repositories.

Taking the above suggestions into consideration, the current study developed a digital archiving framework which is discussed in the subsequent and last chapter of this research study as a way-forward for sustainable digital archiving in Kenyan public universities.

6.7 Summary

This chapter presented an in-depth discourse and interpretation of the empirical data presented in Chapter Five. Interpretation and discussion were guided by a conceptual framework of the study which constituted the underpinning models namely the RC model, OAIS Reference model and ARMA Records Management Maturity model. In order to shade more light on the reported data and bring out its true meaning, the reader's attention was drawn to the literature review to provide comparisons by supporting or arguing against the study findings. Triangulation techniques were utilized throughout the chapter to demonstrate convergence and complementarity of the dual data results. The chapter was logically organised in accordance to the research questions in a relatively similar sequence with Chapter Four.

The study established that readiness for digital archiving was low in all the universities, with one institution having a stand-alone functional archival repository, while the others did not have functional archives. Inconsistencies in the extent of ICT adoption for digital archiving in the universities were deliberated. The discussion also focused on the staff capacity, skills and competencies for recordkeeping staff to successfully undertake d-archiving functions in universities. The issue of funding for DRAM featured prominently, with limited budget allocations featuring prominently as a prohibitive factor to proper management of d-records in all the institutions.

Digital archives identification and administration was also interpreted and discussed with reference to d-records life-cycle activities. The key business processes leading to creation and capture of digital records in universities were unveiled, revealing that large volumes of d-records and archives were generated in public universities alongside their manual counterparts. The processes of selection and appraisal, arrangement and description, storage and preservation, and access in the universities were discussed and found to be inadequate in all the universities. The findings underscored creation and preservation of quality metadata for d-records as an

important responsibility for recordkeeping staff throughout the records lifecycle. Subsequently, a discussion of the legal and regulatory framework for recordkeeping in Kenya pivoted CAP 19 to the spotlight as the key legislation governing the management of public records and archives in Kenya, though respondents maintained that it had some deficiencies. Low awareness of the legal and regulatory framework, lack of programmes and policies for recordkeeping were negated compromised d-archiving practices in the institutions and formed part of the discourse.

Risks to d-records were found to occur at all stages of their existence in the institutions. Organisation-wide risk assessment exercises revealed that universities faced numerous risk exposures in relation to d-records and archives management. They included absence of strategies for DRM, software and hardware obsolescence, unauthorized access, virus attacks, rapid technological advancements, accidental/malicious deletion and modification, data loss during transfer, file naming defects, rodents, environmental hazards and manmade disasters. Findings about risk mitigation approaches used in the universities were discussed and found to broadly include prevention, avoidance, reduction, transfer, contingency planning and acceptance were discussed. Consequently, specific risk management strategies applied by recordkeeping staff were discussed such as periodic migration, passwords, use of firewalls, offsite storage, regular backups, anti-virus protection, controlled access, construction of purpose-built facilities and provision of physical security. Challenges arising as the identified risks were discussed alongside respondents' suggestions regarding the way-forward to enhance digital archiving in the institutions.

The ensuing chapter (Seven) provides a detailed summary of the findings, conclusions and recommendations for public universities in Kenya on how d-archiving practices can be streamlined. It also proposes a d-archiving framework for archival repositories in the institutions.

CHAPTER SEVEN

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

“Writing up’ is an integral part of the research process. It is not something tagged on at the end. Nor is it a simple, straightforward task. Far from it, writing up is skillful. It involves a blend of interpretation, craft and convention aimed at producing a formal record of the research that can be evaluated by others (Denscombe 2010:308).

7.1 Introduction

This chapter presents a bird’s-eye perspective of the entire study by providing a summary of the findings, conclusions and recommendations that are anchored on the results presented and analyzed in Chapter Five, and on the subsequent interpretation and discussion in Chapter Six. Bless, Higson-Smith and Kagee (2006:168) posited that what should follow after interpretation and discussion of study findings is a comparison of the summarized results against the purpose of the study, and a conclusion drawn as to what extent and in which manner the laid-down goal(s) have been met. Therefore, the present chapter is comparable to a dressmaker’s daily work routine, where the seamster skillfully threads pieces of clothes together to make a designer dress for a client, cut and sewn to the desired specifications. In a similar manner, Denscombe (2010:308) and Leedy and Ormrod (2015:347) allude that the conclusion of a research process calls for dexterity and expertise in drawing together the loose and seemingly disparate threads of the research and shrewdly connecting them to produce a final thesis project worthy of evaluation by other scholars. Further, Denscombe (2010:315) recommends that the final chapter in research should be positive and constructive, and should include the following:

- i. A reflective assessment of the study as a whole and its contribution (summary);
- ii. Recommendations for improving codes of practice, the state of affairs or guidelines (way-forward); and
- iii. Suggestions of new, unexplored directions for additional research (suggestions for further research).

The objective of this study was to investigate digital archiving practices in archival repositories of selected public universities in Kenya in order to develop a framework for sustainable maintenance of digital archives in the institutions. To achieve this objective, the study sought to answer five research questions which were: what is the state of digital archiving readiness of public universities in Kenya? How are digital archives identified and administered in Kenyan public universities? Which legal and regulatory frameworks govern digital archives management in Kenyan public universities? Which risk factors are digital archives exposed to in these universities? What possible solutions can be adopted to mitigate the identified risks and support sustainable digital archiving implementations in Kenyan public universities?

In keeping with a pragmatic approach, qualitative and quantitative methodologies were used throughout the study, with a qualitative priority. Theoretical triangulation was embraced, with the RC model, OAIS Reference model and the ARMA Records Management Maturity model selected as the underpinning models that were triangulated to constitute the conceptual framework for the study. The population comprised of deputy vice-chancellors, FOs, ICT directors, legal officers, records managers, archivists, records officers, administrative staff and ICT staff. Questionnaires, interviews and document review were used to gather the required data which was subsequently analysed in line with the mixed methods design. Analysis of qualitative data was done thematically using narrative descriptions where necessary, whereas quantitative data was analysed using SPSS and presented using inferential and descriptive statistics.

The chapter presents a summary and conclusion of the study in alignment to the main thematic areas of the research questions, and will serve as a take-home for the reader with regard to the preceding chapters. The recommendations which include a proposed digital archiving model are discussed thereafter as a way-forward for enhancing digital archiving practices in the public universities. Implication on theory, policy and practice, and suggestions for further research emanating from the study are also presented in that order.

7.2 Summary of the Findings of the Study

This section presents a summary of the study findings which shall be discussed under the key theme headings of the research questions, in a similar logical structure as that in Chapters Five and Six. The data was gathered empirically, in line with pragmatic ideologies.

7.2.1 The state of digital archiving readiness in public universities in Kenya

The first research question investigated the state of digital archiving readiness in Kenyan public universities. The relevant data was gathered and organized along the following themes: stand-alone archival repositories; available technologies for digital archiving; staff capacity for d-archiving; digital archiving skills and competencies; education and training; budgetary allocations for d-archiving; and readiness for digital archiving. The summarized findings are as follows:

7.2.1.1 Stand-alone archival repositories

The literature review submits that archival repositories contain essential resources that determine optimal business performance and organizational efficiency. This study revealed that three out of six universities had archival repositories but only one (University A) was functional. The three archival repositories were housed under larger departments such as Human Resource (HR), administration and library departments. In the institutions that lacked archival repositories, non-current paper records with archival value were stored in the registries and other records offices.

7.2.1.2 Available technologies for digital archiving

Digital archiving is dependent upon a robust technology infrastructure to sustain the large volumes of d-records generated. This study established that the available technologies had not been sufficiently utilized for digital archiving purposes. The universities had a variety of d-archiving technologies which included mobile phones, facsimile, computers, CD-ROM, CD, VCD, Flash Discs, DVD, printers, scanners, photocopiers, laminators, digital cameras, tapes, cassette recorders, Internet connectivity, emails, microfilm and EDRMSs. They also had modern computers but these were not uniformly distributed, with some institutions having few computers. In addition, all the universities had EDRMs but none of the systems had recordkeeping functionalities and could therefore not support DRAM. Further, the extent of ICT

adoption for d-archiving was inconsistent in the institutions, with four universities having good ICT infrastructure adoption ratings while the two largest institutions had fair ICT infrastructure adoption ratings. Similar results were recorded when an assessment of internet connectivity was carried out in the six universities despite the institutions having a shared Internet provider known as KENET.

7.2.1.3 Staff capacity for d-archiving

According to the literature, digital records and archives management in the African region is derailed by lack of adequate skilled staff to handle this unique body of records in view of the rapidly changing technologies. The study revealed that the academic qualifications held by majority of ICT and recordkeeping staff ranged from PhD, masters, bachelor's degree, diploma and certificate, to Advanced (A) Level and Ordinary (O) Level secondary school qualifications. Further, it was evident from the findings that the universities had adequate staff capacity for ICT and records management, but archival repositories were under-staffed in comparison to the records units.

7.2.1.4 Digital archiving skills and competencies

Archivists and records managers require a broad range of recordkeeping and ICT-related competencies and skills to effectively care for records in an increasingly hybrid environment. An assessment of the skills and competencies of ICT and recordkeeping staff (53) in the institutions revealed the six universities lacked adequate skilled and competent personnel for d-archiving. Only 40% of the respondents had a combination of skills and competencies in ICTs, records and archives management, including d-archiving. Among the remaining staff, 19% had ICT skills and competencies only, which included areas such as database management, system development, information systems, web design, information and knowledge management. Additionally, 40% of the staff had competencies and skills in records and archives, Information Science/studies, IT, knowledge management, library studies and other related fields. Overall, 39% of the staff had working experience of six to ten years and were therefore sufficiently competent in executing their duties.

7.2.1.5 Education and training

Capacity building for recordkeeping staff was not given priority in the universities, with the findings revealing that majority of the recordkeeping staff (70%) were not taking part in relevant training programmes in any given year. This was attributed to lack of financial support and facilitation by the universities which made it difficult for the staff to attend because of the expenses involved. Some of the training needs identified by recordkeeping staff for effective d-archives management included areas such as DRAM, appraisal, classification, management of records in hybrid environments, d-preservation, information security and computer forensics, recordkeeping metadata, standards and best practices, legal and regulatory requirements for records, records risk management, among others.

7.2.1.6 Budgetary allocations for d-archiving

The findings of this research indicated that the six institutions did not have dedicated budgetary allocations for records and archives management functions. This led to inefficiencies because the needs for the recordkeeping functions far exceeded the funds that were allocated annually. It was the view of the study that placement of registries and archival repositories under other departments denied them the privilege to receive direct funding, leaving them at the mercy of the parent departments when it came to financial disbursements for their activities.

7.2.1.7 Readiness for digital archiving

The overall focus of the first research question was to find out whether the six universities were ready for digital archiving. The study revealed that these institutions were generally not ready for d-archiving, with only 12% of the respondents saying that their institutions were prepared.

7.2.2 Digital archives identification and administration

The second research question investigated the existing practices for digital archives identification and administration in the six public universities. The data required to answer the question was collected and collated under the following themes: creation and capture; selection and appraisal; arrangement and description; storage and preservation; access and use; and recordkeeping metadata for d-records and archives. The findings are summarized below.

7.2.2.1 Creation and capture of d-records

Public universities are engaged in three broad business activities namely teaching, research and extension and outreach. The findings revealed that large volumes of manual and digital records and archives were generated as a result of these business activities. The manual documents which transited to records status in the six universities included formats such as files, loose documents in folders, documents, computer printouts, bound volumes, newspapers and photographs. The d-records created and captured in the universities included course outlines, syllabus, course descriptions, quality assurance records, audit reports, theses, dissertations, projects, research papers and academic presentations, records on donations, marketing programmes, exhibitions, student exchange programmes, and community outreach programmes.

The types and formats of digital documents generated were mainly emails, databases, word processed documents, audio visual records, websites, d-publications, research data, e-journals, e-books and software records. Majority (70%) of the d-records were both born-digital and made-digital, 23% were born-digital only while 7% were converted (made-digital) formats only. The results confirmed that most of the made-digital records were handled by records staff attached to management offices in the institutions. Interestingly, most recordkeeping staff in the institutions had little or no control over the formats of d-records created in their institutions.

7.2.2.2 Selection and appraisal

The study results indicated that only two universities (A and D) had acquisition policies which required that departments deposit their inactive records in the archival repositories. Records appraisal policies, procedures, guidelines or instructions for appraisal were lacking in all the universities, although appraisal of manual records was carried out in some of the institutions. Apparently, appraisal decisions for these records were made by recordkeeping professionals and creators of records at their own discretion. Records inventories and audits for manual records were also conducted in some of the institutions.

7.2.2.3 Arrangement and description

The overall findings on arrangement and description of digital records revealed that there was no logical organisation of d-records since all the institutions were still in the process of embracing DRM. However, the alpha-numeric classification scheme was in use for paper records in all the universities because it allowed for quick reference, had the advantage of expandability and eliminated confusion resulting from similarities in file naming. Moreover, the survey findings established that although current and semi-current manual records were well organized under the alpha-numeric scheme in the institutions, arrangement and description of archival records in all formats was not undertaken in almost all the universities.

7.2.2.4 Storage and preservation

The study findings established that paper records were stored and preserved in registries in all the six universities. For the institutions that had no archival repositories, the registries stored active, semi-active and inactive records in the same space. Ordinary steel cabinets were used for records storage but in some of the institutions, records were kept on floors and shelf tops in no particular order because of inadequate storage equipment and limited storage space.

The findings also revealed that all d-records including potential archives were stored on the creators' computers, KENET cloud and external storage devices. However, records creators deleted useless records from their computers and saved those that had continuing value on internal and external storage devices. Other preferred d-preservation options included complete erasure of unwanted data by reformatting of storage devices, overwriting some of the storage devices and saving important records on computer hard discs. These techniques were preferred because they were easy to undertake. Interestingly, the study found that some of the staff did not know what happened to d-records after their usage elapsed. This meant that potential d-archives were at risk because some of the creators and users were not taking the necessary measures to preserve the records. This exposed d-records and archives to the risk of loss and inaccessibility over time.

The universities did not have preservation programmes, policies or formal guidelines governing the digital records and archives preservation, although some of the

institutions were having related policies that impacted on records preservation. The study also found that the institutions involuntarily engaged in d-preservation strategies such as cloud computing, bit preservation, migration, refreshing, emulation, data backup, metadata and locally developed d-preservation solutions. Moreover, all the universities were registered with KENET which provided cloud backup for their digital content, mainly emails and websites.

Findings on the level of awareness of key models and standards for digital recordkeeping revealed that ISO 15489 standard and OAIS reference model were the most commonly used in organisations globally. The study found that there was a pronounced lack of understanding of the RC model, ISO 15489 standard and OAIS reference model in the institutions. This finding was an indication that the institutions had not formerly adopted any of the models and standard.

7.2.2.5 Access and use

As earlier mentioned, the study findings revealed that the universities were at the early stage of DRM implementation, and most users were comfortable with the email technology compared to other more sophisticated technologies. This was because email was readily available, quick to use and was a user-friendly medium of transmission. In contrast, online access was least used because users were not willing to spend time searching online for d-records. Additionally, the study identified other modes of access which included printing and distribution of copies of digital records (affirming the supremacy of paper over digital records) and downloading the d-records to computers.

The study findings revealed lack of policies governing access and dissemination of d-records and archives in five institutions. Nonetheless, study results highlighted various internal controls that were being implemented to safeguard privacy and confidentiality of d-records and archives. They included users' personal responsibility; use of passwords and user names; use of PINS and digital signatures; firewalls; regular checking of access logs on systems; and physical measures. Moreover, the study findings revealed that the institutions were implementing strategies to maintain reliability, authenticity, integrity, and usability of agency d-records. They included using passwords to prevent alteration and deletion of records;

regular tracking and verification of changes to digital objects; regular performance audits of the IT system; standard procedures for reporting systems failure; and training of staff.

Physical controls that were in place to protect d-records included having security guards to watch over the ICT hardware; burglar proof doors and window grills, controlled access to offices, marking of all hardware devices, installation of CCTV cameras and installation and use of alarms and sirens. In spite of these measures being in place, cases of theft were reported in four institutions that did not have CCTV cameras.

7.2.2.6 Recordkeeping metadata for d-records and archives

The study results established that metadata capture was an on-going activity in the six institutions. Moreover, the results indicated that ICT and recordkeeping staff were engaged in d-records migration activities which involved capture of the associated metadata. The metadata captured for d-records and archives included record identifier (ID); title/name; date of creation; business purpose/process/activity; and creating software application. However, the findings revealed that staff had little understanding of the meaning of recordkeeping metadata, which seemed to contradict the finding that indicated metadata was being captured in the institutions. The study revealed that metadata capture was only done as a routine as most of the recordkeeping staff had little understanding of what records metadata should constitute, its significance and how it should be managed.

7.2.3 Legal and regulatory frameworks governing digital archives

Proper records and archives management is premised upon a sound legislative and regulatory framework. The third research question examined the legislations and regulations governing digital archives management in Kenyan public universities. The relevant data was collected and organized under three themes namely relevant legislative and regulatory framework for archives in Kenya; awareness of legislative and regulatory frameworks for d-archives; and efficacy of the legislative and regulatory frameworks. Findings are hereunder summarized.

7.2.3.1 Relevant legislative and regulatory framework for archives in Kenya

This study identified formal instruments impacting upon d-archives management such as legislations, circulars and directives that were specific to public records in Kenya (See Chapter 3 Section 5.4.3.1), as well as recordkeeping programmes and policies. The Public Archives and Documentation Services Act (CAP 19) of the Laws of Kenya (2012) was found to be the main legislation that governed public sector records management in the country hence in public universities.

In-house procedures and guidelines for the management of records and archives were operational in the universities, although they were mainly developed out of the need to comply with ISO regulations, and were skewed towards documents management from an IT perspective, rather than RAM. With regard to recordkeeping programmes and policies, only one institution had a formerly approved policy document and RM programme which addressed the management of records in all formats while in the other universities, these documents were in draft form.

7.2.3.2 Awareness of legislative and regulatory frameworks for d-archives

The findings revealed that most of the staff were not sufficiently aware of the provisions of Cap 19 and the other identified statutes and regulations and rarely applied them in their work. They further discredited the effectiveness of Cap 19 in managing d-records and opined that the law should be reviewed.

7.2.3.3 Effectiveness of the legislative and regulatory frameworks for d-archives

Although the six institutions had formerly approved ICT policies that were aligned to the Kenya national ICT policy, they lacked formal guidance for the management of digital archives because the policies did not address recordkeeping issues. The study ascertained that this problem resulted from the apparent exclusion of recordkeeping professionals during the designing of ICT policies in the institutions.

With regard to compliance with legal and regulatory requirements for RAM, the findings generally portrayed lack of implementation of formal guidance for DRAM. In reference to the ARMA Records Management model, four institutions (universities B, C, E and F) were at level 2 of the model where they were still developing recognition for DRAM and had draft policies for records and archives management,

while two institutions (universities A and D) were at level 3 of the model where they had operational policies and programmes that addressed d-archives and were operating in compliance to laid-down laws and regulations.

7.2.4 Risk factors for digital archives in universities

The fourth research question explored the risk exposures for digital archives in Kenyan public universities. Relevant data was gathered and collated under the following three themes: sources of risks for digital archives; risk exposures for d-archives; and risk assessment for d-archives. The findings are summarized below.

7.2.4.1 Sources of risks for digital archives

According to Phiri (2016:153-5), records-related risks are linked to poor records management, whereas proper records management is associated with the benefit of achieving economy, efficiency, accountability and transparency in business operations. The study findings established that the risk concept was not appropriately understood by most of the staff, with many likening it to challenges or threats not knowing that it could also have a positive implication. With this understanding, the management of paper records alongside digital records was found to be a key source of risks which occurred during the stages of creation and capture, maintenance (active stage), access, disposal and long-term or permanent preservation. Overall, the study findings revealed that d-records were highly vulnerable to risks during their current and semi-current stages of their lifecycle because of the many negative effects such as duplication, wastage of resources, staff time, among others.

7.2.4.2 Risk exposures for d-archives

The study found that the overall risks that d-archives and records were exposed to due to the state of DRM in the institutions included absence of DRM strategies, hardware and software obsolescence, virus attacks, unauthorized access, rapid technological advancements, environmental hazards, file naming defects, rodents, accidental/malicious deletion and modification, data loss during transfer and manmade disasters, among others. The study revealed that d-records were used as evidence by the institutions during legal proceedings in court. For example, cases of fraud arising from manipulation of digital records were rampant in the institutions, calling for the use of d-records as evidence. In a nut-shell, the institutions were

exposed to records technology risks, legal and regulatory risks, administrative risks and records control risks. As a result of these risks, the institutions faced challenges in the management of d-archives that related to records creation and capture; metadata capture and preservation; technological changes; reliability, integrity and authenticity of digital records; security and access control; d-preservation; inadequate skills and lack of standardized guidelines for DRM.

7.2.4.3 Risk assessment for d-archives

The findings showed that most of the staff had participated in organisation-wide risk assessment exercises to establish the prevalent risk exposures for digital records and archives, though some staff did not know what risk assessment entailed. This could be taken to mean that staff recognised the importance of risk management programmes and the need to implement risk mitigation strategies to safeguard d-archives.

7.2.5 Risk mitigation and sustainable digital archiving framework

The fifth and last research question examined the possible solutions towards mitigating identified risks and supporting sustainable digital archiving implementations in Kenyan public universities. Data required to answer this question was collected and collated under the following three themes: mitigation of risks for d-archives; risk management strategies for d-archives; and recommendations by respondents. The findings are summarized below.

7.2.5.1 Mitigation of risks for d-archives

The study found that staff in the six universities were applying various risk mitigation approaches that included prevention, avoidance, reduction, transfer, contingency planning and acceptance. They also appreciated the need to safeguard d-records and archives from potential negative risks.

7.2.5.2 Risk management strategies for d-archives

The study found most of the staff had good understanding of ‘risk management’ as a concept although there were those who equated it to disaster management. Moreover, all the six universities had formerly approved risk management policies but they were general and did not specifically address digital records. Nevertheless, existence of risk management policies signified top-managements’ support for the adoption and

implementation of risk management programmes. The study also established that various risk management strategies were being used across the institutions such as periodic migration, passwords, firewalls, offsite storage, regular backups, anti-virus protection, controlled access, construction of purpose-built facilities and provision of physical security.

7.2.5.3 Recommendations by respondents

Bearing in mind the importance of stakeholder feedback to mitigate the identified risks and overcome the challenges, all the respondents were required to give their views which would also be integrated in the proposed model for d-archiving. A generalized summary of respondents' recommendations is provided in Table 7.1.

Table 7.1 Recommendations from respondents

Source of feedback	Respondents' views
All respondents	• Top management support for digital archiving should be provided; • Speed up the review process for Cap 19; • Development of policies, programmes and guidelines for the life-cycle management of d-records and archives across the institutions; • Appropriate placement of archival staff in institutional cadres; • Adopt appropriate models, standards and best practices for DRAM; • Streamlining of the manual recordkeeping system to enable smooth transition to e-recordkeeping systems; • Standardization of digital recordkeeping processes across the institution; • Enhance the ICT infrastructure; • Purchase of good d-archiving software; • Construction of purpose-built archival repositories; • Ensure dormant archives become fully functional; • Adoption of sound d-preservation strategies for records and archives; • Allocate sufficient budgets for DRAM; • Training and retraining of recordkeeping staff in DRAM; • Recruitment of skilled and competent RAM personnel; • Organisation-wide sensitization and creation of awareness on d-archiving; • Encourage continuous collaboration between ICT and recordkeeping staff in the institutions; • Regular institutional oversight from the KNADS; and • Regular follow-up and advisory services from the registry and archival repositories.

7.3 Conclusions

Nieswiadomy (2012:251) noted that a study's conclusions portray a researcher's effort at generalizing the findings and show-casing the knowledge gained throughout the research journey. Therefore, the conclusions section reaffirms the thesis declaration and the pertinent issues discussed therein, and presents the final position of the study. This section provides conclusions on the findings of this study, in line with the research questions.

7.3.1 Conclusion on the state of digital archiving readiness in public universities in Kenya

The overall findings revealed that the state of d-archiving readiness in the universities was low because most of the institutions did not have archival repositories; supporting technologies for digital archiving were generally available but not adequately harnessed by the institutions; staff capacity for d-archiving was inadequate; skilled and competent staff for digital archiving were inadequate; there was low prioritization for the education and training of digital archiving staff; and budget allocations for d-archiving were low. The study therefore concluded that although public universities in Kenya are at the initial stages of implementing digital archiving initiatives, the institutions need to take stock of their d-archiving readiness indicators and instigate the necessary improvements.

7.3.2 Conclusion on digital archives identification and administration

The study findings revealed that public universities generate large volumes of digital records and archives but their management was found to be wanting. There were no formal processes governing d-records management from creation and capture, through selection and appraisal, arrangement and description, storage and preservation, access and use and the generation of relevant metadata. The conclusion made from this finding is that public universities in Kenya needed to prioritize DRAM by creating an permissive environment for identification and administration of d-records through their lifecycle.

7.3.3 Conclusion on legal and regulatory frameworks governing digital archives

The findings revealed that the Public Archives and Documentation Services Act (Cap 19) of the Laws of Kenya (2012) is the major legislation that governed the management of public sector records in the country but it was weak and ineffective. The study further revealed that in-house guidelines and procedures for recordkeeping in the six universities were ineffective because they focused more on document management than records. Additionally, most of the institutions could not meet compliance requirements because they lacked programmes and policies for records and archives management. Subsequently, the study concluded that the legislative and regulatory frameworks governing d-records and archives management in the institutions were deficient and required rigorous review, design and implementation, on a case-by-case basis.

7.3.4 Conclusion on risk factors for digital archives in public universities

The study revealed that management of records in a hybrid environment exposed them to risks at various stages of the lifecycle including creation and capture, maintenance (active) stage, ingestion (archival) stage, access and use, disposal and long-term preservation. The findings further revealed that the risks identified during risk assessment exercises included absence of DRM strategies, hardware and software obsolescence, virus attacks, unauthorized access, rapid technological advancements, environmental hazards, file naming defects, rodents, accidental/malicious deletion and modification, data loss during transfer and manmade disasters, among others. These risks are broadly categorized under records technology risks, legal and regulatory risks, administrative risks and records control risks. Further, the risks led to challenges for the institutions, which related to records creation and capture; metadata capture and preservation; technological changes; maintaining reliability, authenticity and integrity of d-records; security and access control; d-preservation; inadequate skills and lack of standardized guidelines for DRM. From these findings, the study concluded that public universities had a myriad of risk exposures arising from poor management of d-records and archives, which in turn presented many challenges to the institutions.

7.3.5 Conclusion on risk mitigation and sustainable digital archiving framework

The findings established that all six institutions had developed and implemented risk management policies but unfortunately the policies did not address the management of d-records and archives. Further, the study revealed that the universities had adopted risk mitigation approaches that included prevention, avoidance, reduction, transfer, contingency planning and acceptance. The respondents appreciated the need to safeguard digital records and archives in their institutions from potential negative risks. Moreover, there was evidence that the universities had adopted various risk management strategies such as periodic migration, passwords, firewalls, offsite storage, regular backups, anti-virus protection, controlled access, construction of purpose-built facilities and provision of physical security. Other strategies were suggested by respondents (See Table 7.1) and were helpful in coming up with recommendations for this study, including the proposed d-archiving framework. The conclusion drawn from these findings is that enhancing risk management strategies and development of a d-archiving framework are of essence in order to mitigate the risks facing d-archives in public universities in Kenya.

7.3.6 Overall conclusion on the research problem

The objective of this study was to investigate digital archiving practices in selected public universities in Kenya with a view to developing a d-archiving framework for sustainable maintenance of d-archives. Thus, the research problem drew attention to fact that the institutions were generally ill-prepared for d-archiving due to the absence of stand-alone archival repositories in five of the universities; inadequate utilization of the existing technologies for d-archiving; limited staff capacity for d-archiving; limited skilled and competent staff for d-archiving; low prioritization for the education and training of d-archiving staff; and lack of dedicated budgets for d-archiving. Lack of readiness for d-recordkeeping in organisations has been addressed in the literature by scholars such as Odhiambo (2019); Wanis (2018); Tomasek (2018); Magama (2017); Koopman and De Jager (2016); McHugh (2016); Boehmer (2016); Ambira (2015); Klareld (2015a); Peyronnin (2015); Amenta (2014); Boutard (2013); Kim (2013); Ravenwood (2013); Wangutusi (2013); Douglas (2013); Elves (2012); Asif (2011); Laughton (2011); McGovern (2009); Quisbert (2008); Quisbert (2006) and (Lee 2005), among others.

In addition to the identified shortfalls, this study illuminated existing complexities in the lifecycle management of digital records and archives in the six universities, which were precipitated by the absence of formalized processes for DRAM. The findings revealed that digital recordkeeping was not formerly integrated as part of the business processes in the universities, leading to the dysfunctional state of d-archives management processes. Literature sources that decried and attempted to address the struggles that African countries and organisations were undergoing in dealing with records-related issues as a result of the technological terrain included Chikomba, Rodrigues and Ngoepe (2020); Ngoepe (2018); Ambira (2016); Ngoepe and Saurombe (2016); Maseh (2015); Mulaudzi et al. (2012); Asogwa (2012); Munetsi (2011) and Kalusopa (2011), among others.

Weak and inadequate recordkeeping statutes and regulations, coupled with absence of RAM programmes and policies in Kenyan public universities have paved the way for non-compliance problems faced by the institutions. The current state of lack of readiness for d-archiving, existing against the backdrop of malpractices in DRAM have exposed the institutions to a host of risks such as technology risks, legal and regulatory risks, administrative risks and records control risks (Eusch 2016:2-3). These risks have culminated into many challenges which have further derailed efforts by the institutions towards effectively implementing d-archiving initiatives.

Although the institutions have instigated various approaches and strategies for mitigating identified risks and overcoming the challenges, more needs to be done to up-scale digital archiving activities in the universities. In this regard, the present study recommended possible ways of scaling up d-archiving practices at the institutions. These are discussed in the following section, the epitome being a proposed model for d-archiving.

7.4 Recommendations

Putting into consideration the foregoing findings, this study submits recommendations which are intended to enhance digital archiving practices in public universities in Kenya.

7.4.1 Recommendations on the state of digital archiving readiness of public universities in Kenya

This study found that the six public universities were at the initial stages of implementing digital archiving initiatives in view of the low state of d-archiving reported and observed in the institutions. The study therefore recommends the following:

- i. To begin with, all records should be housed and maintained in purposely constructed buildings in order to safeguard and secure the d-archives. Vice chancellors of the institutions that do not have stand-alone archival repositories should lobby for support from the Ministry of Sports, Culture and Heritage as well as the Ministry of Education, Science and Technology, to construct purpose-built archival repositories for the storage of manual and digital archives. The process should be initiated by archivists (or records managers) with the support of ICT Directors in these institutions through formal channels. As asserted by Sommer (2014:1), archival repositories are integral segments of academic institutions, and universities must therefore strive to have them for the preservation of their historical records.
- ii. Public universities need to invest in superior ICT infrastructure for d-archiving through purchase of state-of-the-art ICT hardware and software, installing security systems such as CCTV cameras, upgrading to higher bandwidths, among others. Therefore, this study recommends that the universities' top management officers should allocate sufficient budgets for all recordkeeping functions during annual and supplementary budgets. Records managers, archivists and ICT Directors should lobby for additional funding for digital recordkeeping programme requirements including purchase of the relevant technologies. Asogwa (2012:205) and Keakopa (2008:7) advised that digital records and archives management programmes require financial and other resources to be successful, hence ICT training, human capacity development and staff retention issues should be adequately funded to ensure continued accessibility and sustainability of d-archives.
- iii. For digital archiving to be well implemented in an organization, professional leadership is a prerequisite. Study findings revealed that skilled and competent archival staff were few in the universities in comparison to the records management staff in the registries. Thus, the universities' top managements

should prioritize capacity building for archives management through recruitment of university archivists and other support staff who should be deployed to take up d-archiving and related responsibilities in archival repositories. Preferably, university archivists should be PhD holders, assisted by other staff with Masters, Bachelors, diplomas and ordinary certificates. Facilitation for training and re-training of all the recordkeeping staff should be made possible by the university management at least once in every financial year. As pointed out by Chinyemba and Ngulube (2005), a skilled and competent workforce is key to realizing recordkeeping efficiency in organisations.

7.4.2 Recommendations on digital archives identification and administration in Kenyan public universities

The study established that routine practices were hampered by inadequacies during the lifecycle management of d-records and long-term preservation of d-archives, simply because the processes were not formalized. Ngoepe and Van der Walt (2009:117) advise that proper recordkeeping practices yield good archives. In contrast, dysfunctional records management systems weaken the capacity of agencies and governments to design and implement sustainable recordkeeping programmes (Wamukoya 2015:16). The study therefore recommends the following:

- i. Since recordkeeping systems in the public universities are largely hybrid, streamlining of the manual systems should be given priority to ensure a smooth transition of traditional format records to the digital systems. For example, paper records should be accorded the correct folio numbers, appropriately classified at document and file levels, arranged and described (for the archives), and so on. This should be spearheaded by archivists, records managers and ICT Directors, in consultation with all heads of departments in the institutions so that user needs are put into consideration during the process.
- ii. Public universities in Kenya should create enabling environments for identifying and administering d-records throughout their lifecycle, so that the deficiencies currently experienced can be overcome. The study therefore recommends that ICT Directors should work with the university records managers and archivists to obtain systems which have recordkeeping functionalities, integrated during system design stage as advised by

Wamukoya (2015:1). Such systems can: distinguish between records and non-records; recognize and implement retention-disposal instructions; carry out records disposition by destruction or archiving; identify whether a record is active, semi-active or inactive, and support the various formats of d-records (Ambira 2015:98). The recordkeeping systems should also be designed to systematically capture and maintain records alongside their metadata describing content, context and structure so that the accessibility and usability of the records is maintained (Adu and Ngulube 2016:758). The d-records and archives thus generated and maintained will be instrumental in curbing cases of fraud and other malpractices in the institutions by providing audit trails of the d-records and archives.

- iii. KNADS staff should take the lead in enhancing recordkeeping functions in public universities by continually playing an advisory role and providing oversight to records and archives personnel, thereby ensuring that d-archives survive for posterity. At institutional level, archivists and records managers in partnership with the ICT Directors should offer advisory services to all departments in the universities regarding lifecycle management of records d-records on a regular basis and on request.
- iv. Archivists and records managers should carry out awareness and sensitization programmes at least once every financial year, to educate and inform staff about DRM and digital archiving processes in universities. The starting point should be with the top management officers so that they own the process and support the pertinent activities. During such forums, archivists and records managers should advocate for collaboration between recordkeeping and ICT staff in the institutions so that there is synergy in their duties and responsibilities with regards to the management of d-records and archives.

7.4.3 Recommendations on legal and regulatory frameworks governing digital archives Management in Kenyan public universities

The study found that the legal and regulatory environment for d-records and archives management in Kenyan public universities was deficient and required rigorous review, design or implementation depending on individual cases. In this regard, Baron and Thurston (2016:2012) recommended that d-records and archives management

ought to be supported by clear and well defined legal and regulatory framework so that their evidential value is protected. This study recommends that:

- i. The Government of Kenya should fast-track facilitation of the review process for the Public Archives and Documentation Services Act (Cap 19), so that it clearly addresses the management of d-records throughout their lifecycle. This will provide the much-needed guidance from a national perspective and obligate public universities to formalise recordkeeping functions. A similar view was held by Chweya (2020:234) who added that the act should be revised so that it is aligned to other laws like the Access to Information Act No. 31 (2016) and the Kenya Communications Amendment act (2009).
- ii. For the institutions to achieve legislative and regulatory compliance, archivists, records managers and ICT Directors in the institutions should work together to develop records and archives management policies and programmes which provide guidance on the management of digital records and archives. Drafting of such instruments can be guided by making reference to template documents from other institutions that have such formerly approved documents. Additionally, procedures and guidelines for records developed in-house should be reviewed to ensure they reflect provisions of relevant records-related legislations in order to achieve standardization of recordkeeping activities across the institutions. Adoption of appropriate best practice models and standards for DRAM should also be done to bring uniformity in all recordkeeping practices and minimise problems of lack of version control, records being lost, altered, deleted, corrupted or fragmented.

7.4.4 Recommendation on the mitigation of risks that digital archives are exposed to

Despite the many benefits presented by ICTs, their adoption and use in recordkeeping comes with many risks and challenges (Phiri 2016:77). The study findings revealed that public universities had a myriad of risk exposures that arose from poor d-records and archives management, resulting into challenges that the institutions needed to overcome. Proper recordkeeping is in itself an effective risk management strategy in itself. The study therefore recommends that risk management committees comprising of archivists, records managers and ICT Directors should re-examine and review risk management policies to ensure d-

archiving aspects are clearly entrenched to minimise risk exposures for d-archives in the universities.

7.5 Proposed framework for sustainable digital archiving

Keakopa (2008:15) opined that African universities should establish cordial relationships among themselves and internally with institutes such as the Association of Commonwealth Universities (ACU) to share experiences and expertise. This study recommends that archivists and records managers in Kenyan public universities should forge collaborative ventures intended to achieve cost reduction in d-archiving through sharing of resources such as conservation workshops, archival databases, unpublished records, citation guidelines. The study therefore proposes a d-archiving framework for the sustainable management of d-archives in Kenyan government-owned universities. The framework depicted in Figure 7.1 is based on the literature review, conceptual framework, study findings and recommendations.

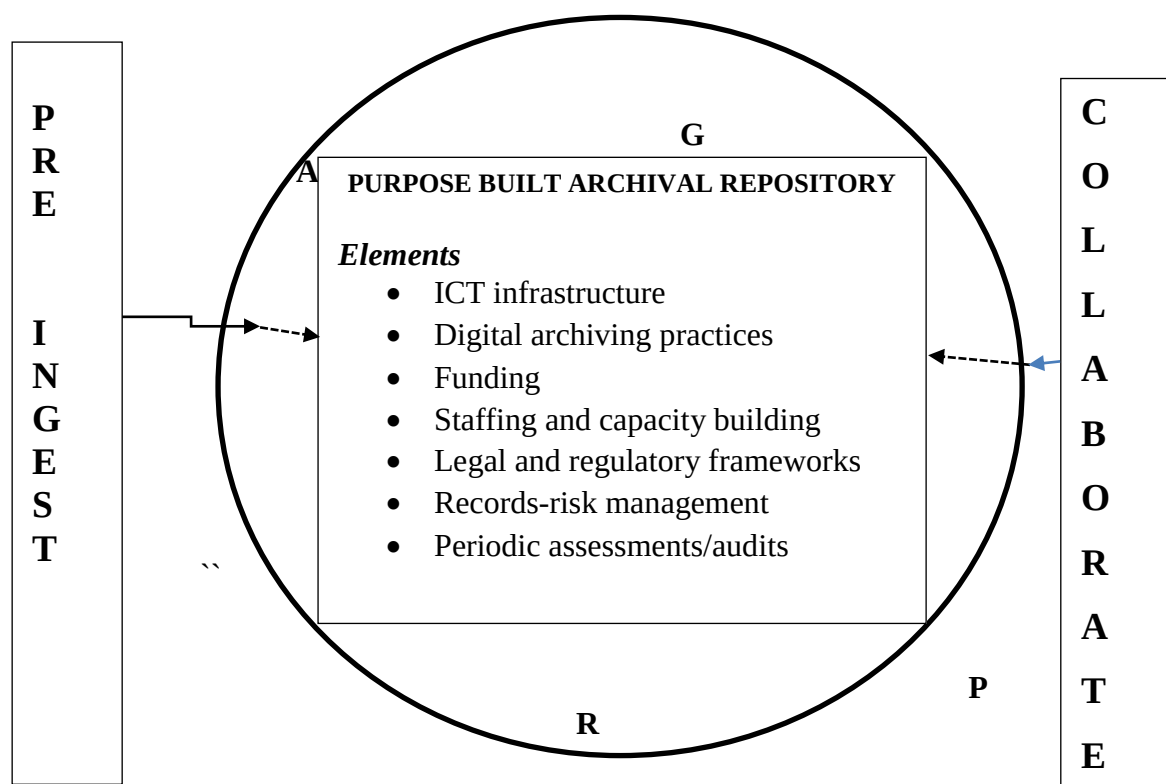


Figure 7.1 Proposed digital archiving framework for public universities

7.5.1 Explanation of the framework

This proposed framework places emphasis on the lifecycle management of records from creation stage to the final disposition (long-term preservation). Pre-natal or pre-

ingest phase is the period before a digital object is deposited into the archival repository. During this period, all current records are properly handled because they may possess continuing value. They are appropriately organised and maintained in adherence to records continuum theory specifications. After appraisal operations, d-archives selected for permanent preservation are ingested into archival repositories, processed and maintained in conformance with OAIS reference model elements such as data management and administration, preservation, storage and access provisions.

For all these activities to take place as required, records managers and archivists in the institutions must secure top management support. This will ensure the archives get the required funding for purchase of superior ICTs, employment of competent and skilled staff, as well as capacity-building through training and re-training of staff. Legislative and regulatory guidance for digital recordkeeping should be identified, developed, reviewed where necessary and enforced to the letter throughout the records lifecycle. In addition, archival materials should be selectively circulated to authorised individuals in the institutions (and member institutions) for access. The archives and records staff regularly scan and assess the environment for records-related risks and apply measures to minimise the impact of, and where possible, eliminate the risks identified. Further, archivists and records managers regularly conduct enterprise-wide sensitisation and education programmes for the various groups of staff to increase staff awareness of DRAM.

Meanwhile, recordkeeping staff carry out monitoring and evaluation exercises on a bi-annual basis through auditing of d-archiving practices and processes against the Generally Accepted Recordkeeping Principles (GARP) proposed by ARMA Records Management Maturity model. The purpose of the audit process is to ensure compliance to best practices for digital archiving and to assist in determining an organisation's current state of d-archiving. Taking cognisance of the fact that digital archives management is a considerably expensive venture, collaborative approaches present a lucrative option for government-owned universities in Kenya. Thus, recordkeeping staff in the universities need to constantly collaborate on processes and activities relating to the management of digital records.

7.6 Research implications for theory, policy and practice

All research studies are undertaken with the key reason of finding solutions to identified research problems by providing recommendations (Shibambu 2019:155). This study has highlighted fundamental issues regarding digital archival practices in public universities in Kenya, focus being on risk exposures and how they can be mitigated. The findings of this study resonated with those of Odhiambo (2018) and (2019); Chweya (2020); Ambira (2015); Maseh (2016), Musembe (2019) and Kabata (2019) to the extent that they all highlighted distinct problems pertaining to digital recordkeeping in the Kenyan context. Building on the demonstrated outcomes of these studies, the present research has made a contribution to literature on archival science and records management where empirical studies are considerably limited. Besides contributing to literature, the proposed recommendations and framework for digital archiving can be adopted by public and private universities and other relevant jurisdictions in Kenya to enhance digital archiving practices. The study hopes to inform and give guidance on formulation and implementation of policies at national and institutional levels, on logistics of designing, constructing and operationalising functional archival repositories which can keep abreast with the rapid technological advancements.

7.7 Suggestions for future research

It is a proven fact that whenever a research study is concluded, more queries are raised, even as answers regarding the current research problem are answered, hence the justification for the section providing suggestions for further research (Nieswiadomy 2012:253) in doctorate studies. The present study which applied mixed methods research in an investigation of digital archiving practices in public universities is a ground-breaking study of such scale to be carried out in Kenya. The findings brought to light the prevailing deficiencies in digital archiving practices in institutions of higher learning in Kenya, and the resulting risk exposures. However, no research can boast of being all-inclusive and complete. Hence, in view of the conclusions drawn by this study and the recommendations put forth, the study extends future research trajectories by submitting the following five suggestions for further investigation:

- i. The study findings illuminated digital archives management practices in government universities in Kenya. However, studies of similar magnitude

using the same research design and theoretical orientation could be replicated in other jurisdictions such as private universities and government ministries in the country.

- ii. The study investigated the research problem using a multiple-case study research design. Comparative investigations can be undertaken to investigate d-archiving practices in similar jurisdictions locally, regionally and internationally to gain insight into the arising similarities and differences with regard to the research themes.
- iii. The focus for archival studies in the past was largely on paper archives and their utilisation in physical archives. The present study deviated to the new formats of d-archives and the management issues surrounding them. Subsequent research could be done to investigate the utility of d-archives by carrying out user studies for d-archival resources in archival repositories.
- iv. Although much of the literature review and data collection for this study centred mainly on d-archiving practices and risks that emanated from current practices, d-preservation was undeniably a focal point in the study but it was not given sufficient coverage in the problem statement and the research as a whole. Further enquiry should be extended to examine the preservation practices for d-archives and development of a framework for d-archives preservation in public universities and other contexts.
- v. As has been emphasised by this study, rapid technological advancements have a great impact upon d-records and archives, requiring intermittent interventions to ensure that the integrity and authenticity of these resources are safeguarded. The present study was unable to carry out an indepth investigation into the security problems surrounding d-archives such as authenticity and integrity. The study therefore recommends further research into this area, taking the angle of digital forensics in the archival context.

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APPENDICES

Appendix 1: Interview Schedule for DVCs – Finance and planning

Dear respondent,

I am a PhD student at the University of KwaZulu–Natal, in the Information Studies Programme. I am carrying out research as part of the requirements for the award of a doctorate degree (Information Studies). The title of my research topic is “*The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya*”.

The purpose of this study is to investigate digital archiving practices in selected public universities in Kenya with a view to developing a framework for sustainable maintenance of digital archives in the institutions. A key output of this study will be a framework for digital archiving that could be adopted by your institution to enhance digital archives management. The study will also make other recommendations that your institution may find useful in streamlining organisation-wide digital archives management practices.

I wish to kindly request you to set aside some time for an interview which will enable me obtain data that will address the research questions. The information you will provide will be kept in confidence and used only for the current study.

Should you have questions about the research please contact me on 217082020@ukzn.ac.za or my supervisor on garaba@ukzn.ac.za.

Thanking you in advance for your time and cooperation.

Yours Faithfully

A black rectangular box redacting the signature of J. Erima.

J. Erima

Biographical Data

- 1) Name of the university_____
- 2) Date of the interview: _____
- 3) Gender_____
- 4) What is your highest academic qualification? _____
- 5) What is your age category? _____
- 6) How many years have you worked in the current position? _____

Digital archiving readiness

- 7) In the context of your organisation, what type of information can be categorised as archives?
- 8) Has your institution endorsed archives management activities? If so, please provide evidence.
- 9) Is there a senior executive (or person of comparable authority) with relevant qualifications overseeing the records and archives management function in the institution?
- 10) Is the records and archives management function adequately funded by the institution's annual budget? Please provide evidence.
- 11) Has your agency developed internal, staff-wide formal training, based on agency policies and directives, which helps agency employees and contractors fulfill their recordkeeping responsibilities?

Legal and regulatory framework for digital archiving

- 12) Does your institution have a records management directive(s)?
- 13) Does your institution evaluate, by conducting inspections/audits/reviews, its records management program to ensure that it is efficient, effective, and compliant with all applicable records management laws and regulations?

Challenges and recommendations

- 14) In your own opinion, what factors are contributing to ineffective and inefficient digital records and archives management in the institution?-----

- 15) What measures has your organisation put in place for the effective management of digital records?-----

- 16) What recommendations would you propose to improve management of digital records in support of corporate governance? -----

THANK YOU

Appendix 2: Interview Schedule for Finance Officers

Dear respondent,

I am a PhD student at the University of KwaZulu–Natal, in the Information Studies Programme. I am carrying out research as part of the requirements for the award of a doctorate degree (Information Studies). The title of my research topic is “*The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya*”.

The purpose of this study is to investigate digital archiving practices in selected public universities in Kenya with a view to developing a framework for sustainable maintenance of digital archives in the institutions. A key output of this study will be a framework for digital archiving that could be adopted by your institution to enhance digital archives management. The study will also make other recommendations that your institution may find useful in streamlining organisation-wide digital archives management practices.

I wish to kindly request you to set aside some time for an interview which will enable me obtain data that will address the research questions. The information you will provide will be kept in confidence and used only for the current study.

Should you have questions about the research please contact me on 217082020@ukzn.ac.za or my supervisor on garaba@ukzn.ac.za.

Thanking you in advance for your time and cooperation.

Yours Faithfully


J. Erima

Biographical Data

- 1) Name of the university _____
- 2) Date of the interview: _____
- 3) Gender _____
- 4) What is your highest academic qualification? _____
- 5) What is your age category? _____
- 6) How many years have you worked in the current position? _____

Digital archiving readiness

Infrastructure

- 7) What are the major sources of your university's finances? Please provide details of the vote allocations.
- 8) What is the annual budgetary allocation for the records and archives management functions?
- 9) Are the funds sufficient to run recordkeeping functions in the institution?
- 10) Do you have a dedicated system for the management of financial records? Please give details of the system.
- 11) If yes, does the system have recordkeeping functionalities? If not, do you find this a necessity? Please explain.
- 12) In your opinion, is your institution 'ready' for digital archiving?

Preservation

- 13) How do you manage and preserve digital records generated in the course of your department's transactions?
- 14) Do you have any digital records that you consider to have long term value and which you have kept as archives? If so, how long do you intend to keep them?
- 15) How do you dispose of digital records no longer required for day-to-day business transactions?

Legal and regulatory framework for digital archiving

- 16) Do you have documented procedures for managing financial records in the university? If yes, do they explicitly address digital records?
- 17) Are you aware of the Public Archives and Documentation Services Act, Cap 19? Do you find it relevant to the management of digital records in your department? Please explain.
- 18) Which other legal and regulatory instruments do you refer to for the management, use and disposal of digital financial records in the university?

Challenges and recommendations

- 19) Do you face any of the following challenges while managing digital records?
(Please tick all the applicable options)
 - ☐ Creation and capture of records possessing content, context and structure
 - ☐ Metadata generation and preservation
 - ☐ Changing technologies
 - ☐ Ensuring the reliability, authenticity and integrity of digital records
 - ☐ Access control
 - ☐ Digital records preservation

- ☐ Digital records security
- ☐ Inadequate skills
- ☐ Lack of standardised guidelines for DRM
- ☐ Other, please specify -----

20) In your own opinion, what factors are contributing to ineffective and inefficient digital records and archives management in the institution?-----

21) What measures has your organisation put in place for the effective management of digital records?-----

22) What recommendations would you propose to improve management of digital records in support of corporate governance? -----

THANK YOU

Appendix 3: Interview Schedule for ICT Director

Dear respondent,

I am a PhD student at the University of KwaZulu–Natal, in the Information Studies Programme. I am carrying out research as part of the requirements for the award of a doctorate degree (Information Studies). The title of my research topic is “*The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya*”.

The purpose of this study is to investigate digital archiving practices in selected public universities in Kenya with a view to developing a framework for sustainable maintenance of digital archives in the institutions. A key output of this study will be a framework for digital archiving that could be adopted by your institution to enhance digital archives management. The study will also make other recommendations that your institution may find useful in streamlining organisation-wide digital archives management practices.

I wish to kindly request you to set aside some time for an interview which will enable me obtain data that will address the research questions. The information you will provide will be kept in confidence and used only for the current study.

Should you have questions about the research please contact me on 217082020@ukzn.ac.za or my supervisor on garaba@ukzn.ac.za.

Thanking you in advance for your time and cooperation.

Yours Faithfully

A black rectangular box redacting the signature of J. Erima.

J. Erima

Biographical Data

- 1) Name of the university _____
- 2) Date of the interview _____
- 3) Gender _____
- 4) What is your highest academic qualification? _____
- 5) What is your age category? _____
- 6) How many years have you worked in the current position? _____

Digital archives identification, acquisition, arrangement and description, preservation, dissemination and access

- 7) What is the mandate of ICT Authority?
- 8) What is the current state of ICT application and integration in information governance in your institution?
- 9) Considering the large amount of digital information being produced by the university community, how would you describe your readiness as a department in managing this digital content in terms of the following:
 - a) ICT Infrastructure
 - b) Policy and regulatory framework
 - c) Human resources
- 10) Do you face any challenges in the life cycle management of digital records?
- 11) How do you cope with the challenges identified in vii above?
- 12) Is your institution currently exploring any digital records management initiatives? (training, awareness, tools and infrastructure, digitization).
- 13) Do you collaborate with Records management and Archives units on such initiatives?

Institutional readiness: Infrastructure

- 14) How would you rate the level of ICT adaptation for digital archiving in your institution?
 - ☐ Poor
 - ☐ Fair
 - ☐ Good
 - ☐ Very good
- 15) Have any of the following measures been adopted to maintain reliable electronic recordkeeping systems?
 - ☐ Regular performance audits of the recordkeeping system
 - ☐ Standard procedures for reporting systems failure
 - ☐ Regular testing of guidelines
 - ☐ Training of staff
 - ☐ Adequate security controls
 - ☐ Any other, please explain.
- 16) What provisions currently exist for the storage of digital records?
- 17) In your opinion, is your institution 'ready' for digital archiving?
 - ☐ Yes
 - ☐ No

Preservation

- 18) How are digital records maintained and preserved in the institution? Is there a standard strategy (for example, refreshing, migration, emulation, encapsulation, and so on)?
- 19) Does your department have a clearly written and approved disaster preparedness and recovery plan for digital records?
- 20) Do you have off-site backup of all preserved information in the institution, together with an offsite copy of the recovery plan? Please explain.

Staffing

- 21) What skills does your staff possess as far as the management of digital records is concerned?
- 22) What plans are in place for further skills improvement in digital records management?

Legal and regulatory requirements

- 23) Does your organisation/institution have an ICT Policy?
- 24) What features in your institution's ICT Policy address the management of digital records?
- 25) How is the management of digital records in your institution affected by the National ICT Policy?
- 26) Does your institution have formerly approved programmes, policies, standards or procedures in support of records and archives management? Do they address digital records and archives?
- 27) The Public Archives and Documentation Services Act, Cap 19 addresses the management of records and archives, do you find it relevant in management of digital records in your organisation? Please explain.
- 28) Are you familiar with any other legal or regulatory framework regarding the management of digital records and archives? Please explain.
- 29) What recommendations would you propose to ensure successful integration of management of digital records in support of corporate governance?

Challenges

- 30) Have you faced any of the following challenges in the management of digital records in your organisation?
 - a) Inadequate Financial Resources
 - b) Staffing (skills, numbers)
 - c) Electricity (Power failure)
 - d) Security – (Viruses, unwanted access)
 - e) Hardware availability
 - f) Software availability
 - g) Legal issues
 - h) Others

How have you addressed those challenges and problems?

- 31) What plans does your unit have regarding the effective management of digital records?

Risk exposure and mitigation

- 32) During which particular stages in the life-cycle are d-records exposed to risks?

- 33) What would you consider as the key risks facing digital records in your institution? Please tick against potential risk exposures in the risk assessment table below.

Risk type	Severe (56-65)	Major (46-55)	Moderate (36-45)	Low (26-35)	Trivial (0-25)
Environmental hazards					
Rodents					
Rapid technological advancements					
Hardware and software obsolescence					
Unauthorized access					
Accidental/malicious deletion and modification					
File naming defects					
Viruses					
Data loss during transfer					
Manmade disasters					
Lack of formal strategies					

- 34) Have you participated in a risk assessment involving digital records in your organization?
- 35) Which categories of risks would you say digital records in your institution are exposed to? (Legal and regulatory risks, records technology risks, records control risks and administrative risks).
- 36) What strategies do you use to manage these risks? (Contingency planning, avoidance, prevention, reduction, transfer, acceptance),
- 37) Please explain if you have a risk management committee, its composition.
- 38) Have you ever been required to avail records as evidence in any cases of litigation resulting from, or requiring the use of digital archives? Please give details.

Challenges and recommendations

- 39) Do you face any of the following challenges while managing digital records? (Please tick all the applicable options)
- ☐ Creation and capture of records possessing content, context and structure
 - ☐ Metadata generation and preservation
 - ☐ Changing technologies
 - ☐ Ensuring the reliability, authenticity and integrity of digital records
 - ☐ Access control
 - ☐ Digital records preservation
 - ☐ Digital records security
 - ☐ Inadequate skills
 - ☐ Lack of standardized guidelines for DRM
 - ☐ Other, please specify -----

-
- 40) In your own opinion, what factors are contributing to ineffective and inefficient digital records and archives management in the institution?
- 41) What measures has your organisation put in place for the effective management of digital records.

Digital archiving framework

- 42) What recommendations would you propose to improve management of digital archives in support of corporate governance?

THANK YOU

Appendix 4: Interview Schedule for Legal Officers

Dear respondent,

I am a PhD student at the University of KwaZulu–Natal, in the Information Studies Programme. I am carrying out research as part of the requirements for the award of a doctorate degree (Information Studies). The title of my research topic is “*The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya*”.

The purpose of this study is to investigate digital archiving practices in selected public universities in Kenya with a view to developing a framework for sustainable maintenance of digital archives in the institutions. A key output of this study will be a framework for digital archiving that could be adopted by your institution to enhance digital archives management. The study will also make other recommendations that your institution may find useful in streamlining organisation-wide digital archives management practices.

I wish to kindly request you to set aside some time for an interview which will enable me obtain data that will address the research questions. The information you will provide will be kept in confidence and used only for the current study.

Should you have questions about the research please contact me on 217082020@ukzn.ac.za or my supervisor on garaba@ukzn.ac.za.

Thanking you in advance for your time and cooperation.

Yours Faithfully

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J. Erima

Biographical Data

- 1) Name of the university _____
- 2) Date of the interview: _____
- 3) Gender _____
- 4) What is your highest academic qualification? _____
- 5) What is your age category? _____
- 6) How many years have you worked in the current position? _____

Legal and regulatory frameworks for digital archives management

- 7) Which laws govern the management of records in public organisations?
- 8) Are these laws adequate in addressing records in digital format?
- 9) As the legal advisor of the institution, do you collaborate with the records manager, archivist and ICT Director in ensuring that the institution maintains digital records that conform to the requirements for reliability, authenticity and integrity? Please explain.
- 10) In the current legal dispensation, are digital records admissible in a court of law in Kenya?
- 11) Have you represented the university in any cases of litigation resulting from, or requiring the use of digital archives? Please give details.
- 12) If yes, were the digital archives easily accessible or did you take a long time to locate the required records?
- 13) Does your institution have a legal risk management plan to mitigate against privacy, copyright and personal data protection? Please explain the implication of this on your institution.

Challenges and recommendations

- 14) Do you face any of the following challenges while managing digital records? (Please tick all the applicable options)
 - ☐ Creation and capture of records possessing content, context and structure
 - ☐ Metadata generation and preservation
 - ☐ Changing technologies
 - ☐ Ensuring the reliability, authenticity and integrity of digital records
 - ☐ Access control
 - ☐ Digital records preservation
 - ☐ Digital records security
 - ☐ Inadequate skills
 - ☐ Lack of standardised guidelines for DRM
 - ☐ Other, please specify -----
- 15) In your own opinion, what factors are contributing to ineffective and inefficient digital records and archives management in the institution?
- 16) What measures has your organisation put in place for the effective management of digital records?
- 17) What recommendations would you propose to improve management of digital records in support of corporate governance?

Risk exposure and mitigation

- 18) In your view, what consequences would the institution have to deal with because of poor management of digital archives?
- 19) What legal strategies would you recommend to manage these risks?
- 20) In your opinion, is your institution 'ready' for digital archiving?
- 21) What else could be done to improve the way records and documents are managed at your university?

THANK YOU

Appendix 5: Interview Schedule for University Archivists

Dear respondent,

I am a PhD student at the University of KwaZulu–Natal, in the Information Studies Programme. I am carrying out research as part of the requirements for the award of a doctorate degree (Information Studies). The title of my research topic is “*The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya*”.

The purpose of this study is to investigate digital archiving practices in the selected public universities in Kenya with a view to developing a framework for sustainable maintenance of digital archives in the institutions. A key output of this study will be a framework for digital archiving that could be adopted by your institution to enhance digital archives management. The study will also make other recommendations that your institution may find useful in streamlining organisation-wide digital archives management practices.

I wish to kindly request you to set aside some time for an interview which will enable me obtain data that will address the research questions. The information you will provide will be kept in confidence and used only for the current study.

Should you have questions about the research please contact me on 217082020@ukzn.ac.za or my supervisor on garaba@ukzn.ac.za.

Thanking you in advance for your time and cooperation.

Yours Faithfully

A black rectangular box redacting the signature of the sender.

J. Erima

Biographical Data

- 1) Name of the university _____
- 2) Gender _____
- 3) What is your highest academic qualification? _____
- 4) What is your age category? _____
- 5) How many years have you worked in the current position? _____

Digital archives identification and acquisition

- 6) Do you have a functional archival repository in your institution?
- 7) Which formats of paper records do you have in your department?
 - a) Files
 - b) Loose documents in folders
 - c) Documents
 - d) Computer printouts
 - e) Bound volumes
 - f) Newspapers
 - g) Photographs
- 8) Have you undertaken a records survey in your organization to gather information about existing records?
- 9) What appraisal criterion is used for manual and digital records?
- 10) How do digital archival resources gain entrance into your repository? Do you actively seek to identify archives or do departments transfer potential archives to the repository?
- 11) Besides the university, what are your other sources of digital archives?
- 12) What digital formats are you currently managing?
- 13) What technologies are you using to create digital content? (for example, digital camera, scanner, digital audio workstation).
- 14) Do you have control over the formats of d-records created in their institutions?
- 15) Do you encounter any challenges during the identification and acquisition of digital archives as compared to the traditional archival formats?
- 16) If yes, how do you address these challenges?

Arrangement and description of digital archives

- 17) Do you have any formal guidelines that determine how you make decisions about the processing of digital archives received into the repository?
- 18) How do you ensure the reliability, integrity and authenticity of the digital archives?
- 19) Are there any particular challenges experienced during arrangement and description of digital archives?
- 20) How do you address these challenges?

Metadata

- 21) What specific metadata information do you capture? (Record identifier, title/name, date of creation, business purpose/process/activity, creation software application).

- 22) How do you capture descriptive metadata and especially preservation-relevant information such as provenance, version history and creator history?

Access and dissemination of digital archives

- 23) How do you provide access to the digital archives in your repository? (for example: distribution of printed copies; via electronic mail; online access; downloading to or from a host machine). Please explain.
- 24) Are there restrictions on access to digital archives? If so, please explain how you these restrictions are applied.
- 25) How do you protect the privacy and confidentiality of digital archives? What laws and formal guidance do you refer to?
- 26) What security measures does the repository have in place to prevent unauthorized access and/or use of archived content?
- 27) Does the repository have a policy for access and dissemination? Please provide access policy if applicable.
- 28) Are there challenges experienced during arrangement and description of digital archives?
- 29) If yes, how do you address these challenges?

Preservation

- 30) Please explain whether your unit has incorporated/integrated the following internal controls to ensure the reliability, authenticity, integrity, and usability of agency digital records maintained in electronic information systems:
- a) Use of passwords to records to prevent alteration and deletion of records
 - b) Tracking and verifying changes of digital objects regularly
 - c) Regular performance audits of the IT system
 - d) Standard procedures for reporting systems failure
 - e) Training of staff
- 31) Do you have a preservation strategy in place for the management of digital archives? (Bit preservation; migration; refreshing; emulation; Data backup; locally developed digital preservation solution).
- 32) Does the repository have off-site backup locations as a safeguard measure against systems redundancy?
- 33) What additional backup provisions does the repository have against content loss or corruption?
- 34) Does your agency have procedures to enable the migration of records and associated metadata to new storage media or formats so that records are retrievable and usable as long as needed to conduct agency business?

Digital archiving readiness

Infrastructure

- 35) How did the digital archives repository in your institution come into being?
- 36) Were any standards and guidelines used when establishing this digital archive repository?
- 37) What type of hardware was purchased for the repository?
- 38) Do you have a full-featured archives management system for your repository?
- 39) On what aspects of digital archiving do you collaborate with the ICT Directorate?
- 40) In your opinion, is your institution 'ready' for digital archiving?

Staffing

- 41) Do you have staff dedicated to managing the digital archives collection? What are the roles of these individuals?
- 42) What training do you provide staff involved in digital archives management?
- 43) Does your university facilitate you to attend continuous training programmes such as conferences, workshops, seminars and short courses in line with digital archives management? Please explain.
- 44) Do you participate in any digital archiving collaborative ventures within your institution and outside? Please explain.

Finances

- 45) What are the primary sources of funding for digital archiving activities in your repository?
 - a) Institutional budget
 - b) Fees from products created through digital archives service provision
 - c) Donors
 - d) Grants
 - e) Friends of the Archive
 - f) Other (Please explain).
- 46) Are the funds adequate to efficiently carry out archival functions?

Legal and regulatory frameworks for digital archives

- 47) Is the management of digital records and archives incorporated into your strategic plan?
- 48) Have you created and implemented policies in the following areas for your digital archives?
 - a. Digital archives management
 - b. Disaster management and recovery plan
 - c. Preservation plan
 - d. Risk management plan.

Laws and regulations

- 49) Is there a legal and/or regulatory framework that guides management of digital records and archives in public universities? If yes, please explain.
- 50) Do the identified legal and regulatory frameworks adequately cater for management of digital archives? Please explain.
- 51) Are you well-versed with the provisions of the Public Archives and Documentation Services Act (CAP 19) of the Laws of Kenya (2012)?
- 52) To what extent is KNADS involved in the management of (digital) records and archives in your institution?
- 53) Does your institution have a formerly approved recordkeeping programme and policy?
- 54) If the answer to question 52 (above) is yes, please indicate whether these documents are aligned to the national recordkeeping programmes and/or policies.
- 55) With reference to the ARMA Records Management Maturity Model, kindly comment on the level of their institutions' compliance with regard to records and archives management programmes.
- 56) Have you ever been required to avail records as evidence in any cases of litigation resulting from, or requiring the use of digital archives? Please give details.

Risk exposure and risk mitigation

57) What is your understanding of the 'risk' concept?

58) Have you undertaken a risk assessment of your digital archives collection?

59) What would you consider as the key risks facing digital archives in your archival repository? Please tick against potential risk exposures in the risk assessment table below.

Risk type	Severe (56-65)	Major (46-55)	Moderate (36-45)	Low (26-35)	Trivial (0-25)
Environmental hazards					
Rodents					
Rapid technological advancements					
Hardware and software obsolescence					
Unauthorized access					
Accidental/malicious deletion and modification					
File naming defects					
Viruses					
Data loss during transfer					
Manmade disasters					
Lack of formal strategies					

60) Which categories of risks would you say digital records in your institution are exposed to? (Legal and regulatory risks, records technology risks, records control risks and administrative risks).

61) During which particular stages of the life-cycle are d-records exposed to risks? (Creation and capture, maintenance, ingestion (archival) stage, access (use), disposal and long-term preservation stage).

62) What strategies have you used to mitigate these risks? (Contingency planning, avoidance, prevention, reduction, transfer, acceptance). Please indicate any others.

Challenges and recommendations

63) Do you face any of the following challenges while managing digital records? (Please tick all the applicable options)

- ☐ Creation and capture of records possessing content, context and structure
- ☐ Metadata generation and preservation
- ☐ Changing technologies
- ☐ Ensuring the reliability, authenticity and integrity of digital records
- ☐ Access control
- ☐ Digital records preservation
- ☐ Digital records security
- ☐ Inadequate skills

[] Lack of standardized guidelines for DRM

[] Other, please specify -----

64) How are you overcoming these challenges?

65) What recommendations would you propose to improve management of digital records in support of corporate governance?

Digital archiving framework

66) What digital archiving framework is your digital repository designed upon?

67) In your opinion, how can public universities jointly collaborate in achieving sustainability in digital archives management?

THANK YOU

Appendix 6: Interview Schedule for Records Managers

Dear respondent,

I am a PhD student at the University of KwaZulu–Natal, in the Information Studies Programme. I am carrying out research as part of the requirements for the award of a doctorate degree (Information Studies). The title of my research topic is “*The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya*”.

The purpose of this study is to investigate digital archiving practices in selected public universities in Kenya with a view to developing a framework for sustainable maintenance of digital archives in the institutions. A key output of this study will be a framework for digital archiving that could be adopted by your institution to enhance digital archives management. The study will also make other recommendations that your institution may find useful in streamlining organisation-wide digital archives management practices.

I wish to kindly request you to set aside some time for an interview which will enable me obtain data that will address the research questions. The information you will provide will be kept in confidence and used only for the current study.

Should you have questions about the research please contact me on 217082020@ukzn.ac.za or my supervisor on garaba@ukzn.ac.za.

Thanking you in advance for your time and cooperation.

Yours Faithfully



J. Erima

Biographical Data

- 1) Name of the university _____
- 2) Gender _____
- 3) What is your highest academic qualification? _____
- 4) What is your age category? _____
- 5) How many years have you worked in the current position? _____

Digital archives identification and acquisition

- 6) What is the mandate/role of the records unit in the institution?
- 1) Which formats of paper records do you have in your department?
 - h) Files
 - i) Loose documents in folders
 - j) Documents
 - k) Computer printouts
 - l) Bound volumes
 - m) Newspapers
 - n) Photographs
- 7) Has your registry/section installed a records management system for managing digital records?
- 8) What metadata information do you capture during records creation? (Record identifier, title/name, date of creation, business purpose/process/activity, creation software application).
- 9) Have you conducted a survey and inventory of electronic records being created by your institution? Please give details.
- 10) Are departments required to deposit their digital records with your department? If so is this done at regular intervals?
- 11) Do you have control over the quality of digital records generated throughout the institution as evidence of business transactions? Please explain.
- 12) Do you offer advisory services to staff as regards digital records creation?
- 13) Do you get advice from the archives staff or KNADS concerning digital records creation and management?
- 14) Do you have a functional archival repository where the non-current records are transferred to?

Access and dissemination

- 15) What controls are in place for access and use of the electronic records?
- 16) What measures are in place to enhance security for the digital records during their storage, access and use?
- 17) Are there restrictions to access of digital records? Please explain.

Preservation

- 18) What preservation techniques do you employ for the records stored in your unit? (Bit preservation; migration; refreshing; emulation; Data backup; locally developed digital preservation solution).
- 19) Are there mechanisms for archiving digital records of enduring value and destroying the ephemeral ones? Please explain.
- 20) What security measures are in place to secure and protect digital records?

- 21) Please explain whether your unit has incorporated/integrated the following internal controls to ensure the reliability, authenticity, integrity, and usability of agency digital records maintained in electronic information systems:
 - f) Use of passwords to records to prevent alteration and deletion of records
 - g) Tracking and verifying changes of digital objects regularly
 - h) Regular performance audits of the IT system
 - i) Standard procedures for reporting systems failure
 - j) Training of staff
- 22) Do you know of, or are you using, any digital records preservation standards? If so which one(s)?
- 23) Does your agency have procedures to enable the migration of records and associated metadata to new storage media or formats so that records are retrievable and usable as long as needed to conduct agency business?
- 24) Do you work in collaboration with the archives repository staff in the management of digital records in the university?
- 25) Do you collaborate with your agency's ICT Directorate on digital records management issues?

The state of digital archiving readiness

Staffing

- 26) Is the number of records management staff in your unit adequate?
- 27) How often are records management staff afforded training on digital recordkeeping? Does your department have a training budget/ vote for DRM?
- 28) As the head of Records Management at your institution, are you adequately placed in terms of strategic authority positioning, as to be able to influence management decisions in line with recordkeeping?

Infrastructure

- 29) Do you participate in the design, development, and implementation of new electronic information systems? Please explain.
- 30) Are there organizational challenges (for example, management support, finances, etc.) that you face in managing electronic records in the university?
- 31) What proposals would you recommend for overcoming the challenges and improving the state of digital records infrastructure in the agency?

Financial

- 32) Does the records management function have a dedicated annual budget for its activities? If so, is it adequate?
- 33) How would you describe your institution's readiness/preparedness for digital archives implementation in terms of the following?
 - a) ICT Infrastructure
 - b) Policy and regulatory framework
 - c) Human resources
- 34) In your opinion, is your institution 'ready' for digital archiving?

Legal and regulatory requirements for digital records

- 35) Is there a strategic plan/framework that guides the implementation of digital archives in your institution? Please explain.

- 36) What national legal and regulatory framework govern the management of digital records at your institution?
- 37) Are you well-versed with the provisions of the Public Archives and Documentation Services Act (CAP 19) of the Laws of Kenya (2012)?
- 38) In your view, are these instruments effective in addressing digital records management issues in your organization?
- 39) Do you have a records management programme and policy in your organisation?
- 40) If recordkeeping programmes and policies exist, please indicate whether they are aligned to the national recordkeeping programmes and/or policies.
- 41) Have you adopted any standard or best practice models to guide the general management of digital records? Please explain.
- 42) Has your institution incorporated the ISO 15489 Standard, records continuum model and OAIS Reference model into its recordkeeping practices? Please explain.
- 43) If yes, are records management functions in the institution audited in line with any of these documents during organisation-wide ISO audits?
- 44) With reference to the ARMA Records Management Maturity Model, kindly comment on the level of their institutions' compliance with regard to records and archives management programmes.

Challenges and recommendations

- 45) In your own opinion, what factors are contributing to ineffective and inefficient management of digital records and archives in the institution?
- 46) What measures has your organisation put in place for the effective management of digital records?
- 47) What recommendations would you propose to improve management of digital records in support of corporate governance?

Risk exposure and mitigation

- 48) What is your understanding of the 'risk' concept?
- 49) What sources of risks can you identify as threatening the proper management of digital records in your institution? Please tick against potential risk exposures in the risk assessment table below.

Risk type	Severe (56-65)	Major (46-55)	Moderate (36-45)	Low (26-35)	Trivial (0-25)
Environmental hazards					
Rodents					
Rapid technological advancements					
Hardware and software obsolescence					
Unauthorized access					
Accidental/malicious deletion and modification					
File naming defects					

Viruses					
Data loss during transfer					
Manmade disasters					
Lack of formal strategies					

- 50) Which categories of risks would you say digital records in your institution are exposed to? (Legal and regulatory risks, records technology risks, records control risks and administrative risks).
- 51) During which particular stages in the life-cycle are d-records exposed to risks? (Creation and capture, maintenance, ingestion (archival) stage, access (use), disposal and long-term preservation stage).
- Creation and capture stage
 - Maintenance stage
 - Ingestion (archival) stage
 - Access (use) stage
 - Disposal stage
 - Long-term preservation stage
- 52) How can the (above) identified risks be effectively mitigated? (Contingency planning, avoidance, prevention, reduction, transfer, acceptance),
- 53) Have you ever been required to avail records as evidence in any cases of litigation resulting from, or requiring the use of digital archives? Please give details.

Digital archiving framework

- Do you liaise with the archival repository staff concerning digital archives management? Please explain.
- What suggestions can you give to improve the process of digital archives management in the institution?

THANK YOU

Appendix 7: Survey questionnaire for Records Officers

Dear respondent,

I am a PhD student at the University of KwaZulu–Natal, in the Information Studies Programme. I am carrying out research as part of the requirements for the award of a doctorate degree (Information Studies). The title of my research topic is “*The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya*”.

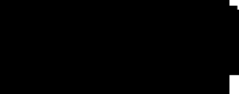
The purpose of this study is to investigate digital archiving practices in selected public universities in Kenya with a view to developing a framework for sustainable maintenance of digital archives in the institutions. A key output of this study will be a framework for digital archiving that could be adopted by your institution to enhance digital archives management. The study will also make other recommendations that your institution may find useful in streamlining organisation-wide digital archives management practices.

I wish to kindly request you to set aside some time for an interview which will enable me obtain data that will address the research questions. The information you will provide will be kept in confidence and used only for the current study.

Should you have questions about the research please contact me on 217082020@ukzn.ac.za or my supervisor on garaba@ukzn.ac.za.

Thanking you in advance for your time and cooperation.

Yours Faithfully



J. Erima

Background information

- 2) Name of the university -----
- 3) Name of School/Faculty -----
- 4) Gender
[] Male
[] Female
- 5) Which age category do you belong to?
[] 20 -29 years
[] 30- 39 years
[] 40- 49 years
[] 50+ years
- 6) Position held -----
- 7) How many years have you been working in your current position?
[] Less than a year
[] One year
[] Two to five years
[] Six to ten years
[] More than ten years
- 8) What is your highest academic qualification?
[] O-level
[] A-level
[] Certificate
[] Diploma
[] Undergraduate degree
[] Masters degree
[] PhD level
- 9) What is your area of expertise?
[] Information Science/studies
[] Records and Archives Management
[] Library studies
[] ICT
[] Knowledge management
[] Other, please specify -----

Digital archives identification and acquisition

- 10) List the key business activities of your institution.
a) -----
b) -----
c) -----
d) -----
e) -----
- 11) Which records emanate from the above (named) records? -----

- 12) Which formats of paper records do you have in your department?
- o) Files
 - p) Loose documents in folders
 - q) Documents
 - r) Computer printouts
 - s) Bound volumes
 - t) Newspapers
 - u) Photographs
- 13) Which percentage of the above (named) records could have archival value?
- a) ☐ 20%
 - b) ☐ 40%
 - c) ☐ 60%
 - d) ☐ 80%
 - e) ☐ 100%
 - f) Don't know
- 14) Which of the following type of records are generated in your organisation?
- ☐ Images Files
 - ☐ Data Files
 - ☐ Text files
 - ☐ Databases
 - ☐ Other, (please explain)

Which digital formats do you handle in the institution?

- a) word processed documents
 - b) Databases
 - c) Emails
 - d) audio visual records
 - e) Websites
 - f) Digital publications
- g) Others (Please explain) -----

Classification and description of digital records

- 15) Do you have a centralized classification system for digital records in the organisation?
- ☐ Yes
 - ☐ No
- 16) If yes, please explain the general level of compliance to the records classification system

Access and dissemination

- 17) How do you provide access to digital records and archives?
- a) Online access
 - b) Downloading to or from a host machine
 - c) Via e-mail
 - d) Distribution of printed copies

- 18) Has your unit incorporated/integrated internal controls to ensure the reliability, authenticity, integrity, and usability of agency digital records maintained in electronic information systems?
- ☐ Yes
☐ No
- 19) If yes, which of these measures have been adopted?
- ☐ Use of passwords to records to prevent alteration and deletion of records
☐ Tracking and verifying changes of digital objects regularly
☐ Regular performance audits of the IT system
☐ Standard procedures for reporting systems failure
☐ Training of staff
☐ Adequate security controls
☐ Other, please explain -----

- 1) Do you have a policy governing access and dissemination of digital records?
- ☐ Yes
☐ No
- 20) Is the file naming system effective in reducing the bring-up time for digital records?
- ☐ Yes
☐ No

Metadata

- 21) How would you rate your understanding of recordkeeping metadata?
- ☐ I have good understanding of metadata
☐ I have little understanding of metadata
☐ I have no understanding of metadata
- 22) What type of metadata do you record and why?
- ☐ Record identifier
☐ Title/name
☐ Date of creation
☐ Business purpose/process/activity
☐ Creation software application
- 23) Is the metadata recorded in a structured or unstructured format?
- ☐ Structured
☐ Unstructured

Preservation

- 24) How are manual records kept in your department?
- ☐ Wooden shelves
☐ Wooden cabinets
☐ Steel shelves
☐ Steel cabinets
☐ Others (Please explain) -----

How are digital records stored?

- a) ☐ Internally
b) ☐ Externally

- 25) How do you deal with digital records which are no longer used or required?
- ☐ Delete
 - ☐ Reformat
 - ☐ Re-writing the disk
 - ☐ Save on the computer hard disc
 - ☐ Save on external storage devices and keep in the office
 - ☐ Other, Please specify-----
-
- 2) Which of the following digital preservation strategies are in place for the management of digital archives?
- a) ☐ Bit preservation
 - b) ☐ Migration
 - c) ☐ Refreshing; emulation
 - d) ☐ Data backup
 - e) ☐ Locally developed digital preservation solution
 - f) ☐ Others (Please explain)
- 26) Do you work in collaboration with the archives repository staff in the management of digital records in the university?
- ☐ Yes
 - ☐ No
- Please explain -----
-
-

The state of digital archiving readiness

Staffing

- 27) What competencies for managing digital records do you have? (for example, ICT Skills)
-
-
- 28) How often do you attend training on recordkeeping?
- ☐ Annually
 - ☐ Biannually
 - ☐ Rarely
- 29) Have you been facilitated for any recordkeeping training?
- ☐ Yes
 - ☐ No
- Please explain your answer.
- 30) What are your training needs with regards to digital recordkeeping?
- ☐ Digital archives management
 - ☐ Digital records management
 - ☐ Management of records in a hybrid environment
 - ☐ D-records classification
 - ☐ D-records appraisal
 - ☐ Digital records preservation
 - ☐ Retention and disposal scheduling for d-records
 - ☐ D-records security

Infrastructure

31) Please indicate the digital archiving technologies that are available in your institution:

- ☐ Mobile phones
- ☐ Facsimile
- ☐ Computers
- ☐ CD-ROM, CD, VCD, Flash Discs, DVD
- ☐ Printers, scanners, photocopiers, laminators
- ☐ Digital cameras
- ☐ Tapes and cassette recorders
- ☐ Internet connectivity
- ☐ Emails
- ☐ Microfilm
- ☐ Electronic Document Records Management System (EDRMS)
- ☐ Archives Management System (AMS)

32) Are there organizational challenges (for example, management support, finances, etc.) that you face in managing electronic records in the university?

33) What proposals would you recommend for overcoming the challenges and improving the state of digital records infrastructure in the agency?

34) In your opinion, is your institution 'ready' for digital archiving?

Legal and regulatory requirements for digital records

35) What national legal and regulatory framework govern the management of digital records at your institution?

Are you well-versed with the provisions of the Public Archives and Documentation Services Act (CAP 19) of the Laws of Kenya (2012)?

- ☐ Yes
- ☐ No

36) In your view, are these laws effective in addressing digital records management issues in your organization?

- ☐ Yes
- ☐ No

37) Are there programmes, policies and procedures that guide the life cycle management of digital records in your institution?

- ☐ Yes
- ☐ No

38) Has your institution adopted the ISO 15489 Standard, records continuum model or OAIS Reference model for recordkeeping purposes?

- ☐ Yes
- ☐ No

39) If yes, are records management functions in the institution audited in line with either of these frameworks during organization-wide ISO audits?

- ☐ Yes
- ☐ No

40) With reference to the ARMA Records Management Maturity Model, kindly comment on the level of their institutions' compliance with regard to records and archives management programmes.

Challenges and recommendations

- 41) Do you face any of the following challenges while managing digital records?
(Please tick all the applicable options)
- ☐ Creation and capture of records possessing content, context and structure
 - ☐ Metadata generation and preservation
 - ☐ Changing technologies
 - ☐ Ensuring the reliability, authenticity and integrity of digital records
 - ☐ Access control
 - ☐ Digital records preservation
 - ☐ Digital records security
 - ☐ Inadequate skills
 - ☐ Lack of standardised guidelines for DRM
 - ☐ Other, please specify -----
-
- 42) In your own opinion, what factors are contributing to ineffective and inefficient digital records and archives management in the institution?
- 43) What measures has your organisation put in place for the effective management of digital records?
- 44) What recommendations would you propose to improve management of digital records in support of corporate governance?

Risk exposure and mitigation

- 45) Do you sufficiently understand 'risk' as a concept?
- ☐ Yes
 - ☐ No
- 46) What sources of risks can you identify as threatening the proper management of digital records in your institution?
- 47) During which particular stages in the life-cycle are d-records exposed to risks?
- ☐ Creation and capture stage
 - ☐ Maintenance stage
 - ☐ Ingestion (archival) stage
 - ☐ Access (use) stage
 - ☐ Disposal stage
 - ☐ Long-term preservation stage
- 48) What would you consider as the key risks facing digital records in your institution? Please tick against potential risk exposures in the risk assessment table below.

Risk type	Severe (56-65)	Major (46-55)	Moderate (36-45)	Low (26-35)	Trivial (0-25)
Environmental hazards					
Rodents					
Rapid technological advancements					
Hardware and					

software obsolescence					
Unauthorized access					
Accidental/malicious deletion and modification					
File naming defects					
Viruses					
Data loss during transfer					
Manmade disasters					
Lack of formal strategies					

- 49) Have you participated in a risk assessment involving digital records in your organization?
☐ Yes
☐ No
- 50) Which categories of risks would you say digital records in your institution are exposed to?
☐ Legal and regulatory risks
☐ Records technology risks
☐ records control risks
☐ Administrative risks
- 51) Do you understand the concept of risk management?
☐ Yes
☐ No
- 52) Which are the best ways to handle the identified risks to digital records?
(Please tick all that are appropriate)
☐ Avoidance
☐ Contingency planning
☐ Prevention
☐ Reduction
☐ Transfer
☐ Acceptance
☐ Other, please specify
- 53) Which risk management strategies are your institution currently implementing?
☐ Periodic migration
☐ Passwords
☐ Firewalls
☐ Offsite storage
☐ Regular backups
☐ Anti-virus protection
☐ Controlled access
☐ Purpose-built facilities
☐ Provision of physical security
☐ Others (Please explain-----

Digital archiving framework

54) Are you involved in digital archiving efforts in your department?

☐ Yes

☐ No

55) What suggestions can you give to improve the process of digital archives management in the institution?

THANK YOU

Appendix 8: Survey questionnaire for ICT staff

Dear respondent,

I am a PhD student at the University of KwaZulu–Natal, in the Information Studies Programme. I am carrying out research as part of the requirements for the award of a doctorate degree (Information Studies). The title of my research topic is “*The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya*”.

The purpose of this study is to investigate digital archiving practices in selected public universities in Kenya with a view to developing a framework for sustainable maintenance of digital archives in the institutions. A key output of this study will be a framework for digital archiving that could be adopted by your institution to enhance digital archives management. The study will also make other recommendations that your institution may find useful in streamlining organisation-wide digital archives management practices.

I wish to kindly request you to set aside some time for filling this questionnaire which will enable me obtain data that will address the research questions. The information you will provide will be kept in confidence and used only for the current study.

Should you have questions about the research please contact me on 217082020@ukzn.ac.za or my supervisor on garaba@ukzn.ac.za.

Thanking you in advance for your time and cooperation.

Yours Faithfully



J. Erima

Background information

- 3) Name of the university -----
4) Name of Department -----
5) Gender
[] Male
[] Female
6) Which age category do you belong to?
[] 20 -29 years
[] 30- 39 years
[] 40- 49 years
[] 50+ years
7) Position held -----
8) How many years have you been working in your current position?
[] Less than a year
[] One year
[] Two to five years
[] Six to ten years
[] More than ten years
9) What is your highest academic qualification?
[] O-level
[] A-level
[] Certificate
[] Diploma
[] Undergraduate degree
[] Masters degree
[] PhD level
10) What is your area of expertise?
[] Network Administrator
[] Systems Administrator
[] Database Administrator
[] Software/Application Developer
[] Web Administrator
[] Other, please specify -----

Do you have knowledge in recordkeeping?

- [] Yes
[] No

Digital records creation and receipt

- 11) List the key business activities of your institution.
f) -----
g) -----
h) -----
i) -----
j) -----
12) Which records emanate from the above (named) records? -----

- -----
- 13) Which percentage of the above (named) records could have archival value?
- g) ☐ 20%
 - h) ☐ 40%
 - i) ☐ 60%
 - j) ☐ 80%
 - k) ☐ 100%
 - l) Don't know
- 14) Which digital formats do you handle in the institution?
- h) word processed documents
 - i) Databases
 - j) Emails
 - k) audio visual records
 - l) Websites
 - m) Digital publications
- 15) Others (Please explain) -----
-----Is your unit concerned with management of digital information (records) during their continuum?
- ☐ Yes
 - ☐ No
- 16) If yes, please select the recordkeeping functions that your unit undertakes:
- ☐ Creation
 - ☐ Capture
 - ☐ Maintenance and use
 - ☐ Disposal
 - ☐ Other, please explain -----

- 17) How would you rate your understanding of recordkeeping metadata?
- ☐ I have good understanding of metadata
 - ☐ I have little understanding of metadata
 - ☐ I have no understanding of metadata
- 18) What kind of electronic (digital) information systems do you currently have circulating in the organization? Please select as applicable.
- ☐ Human Resource Management System
 - ☐ Document Management Systems
 - ☐ Financial Information Management Systems
 - ☐ Electronic Records Management Systems
 - ☐ Archival Information Management System
 - ☐ Other, please specify -----

- 19) Who is responsible for overseeing the design and implementation of Electronic (Digital) Records Management Systems?
- ☐ Records management unit
 - ☐ Records and archives management units
 - ☐ ICT unit
 - ☐ All

Digital records access and dissemination

- 20) Are there standards and best practice indicators adopted in your institution to guide access and dissemination of digital records?
☐ Yes
☐ No
- 21) How do you provide access to digital records and archives?
e) Online access
f) Downloading to or from a host machine
g) Via e-mail
h) Distribution of printed copies
- 22) Do you have a policy governing access and dissemination of digital records?
☐ Yes
☐ No
- 23) What method(s) does your agency employ to capture and manage digital records transmitted via email? (Choose all that apply)
☐ Print and file
☐ Captured and stored in an electronic records management system
☐ Captured and stored in an email archiving system
☐ Not captured and email is managed by the end-user in the native system
☐ Other, please specify

Infrastructure

- 24) Please indicate the digital archiving technologies that are available in your institution:
- ☐ Mobile phones
 - ☐ Facsimile
 - ☐ Computers
 - ☐ CD-ROM, CD, VCD, Flash Discs, DVD
 - ☐ Printers, scanners, photocopiers, laminators
 - ☐ Digital cameras
 - ☐ Tapes and cassette recorders
 - ☐ Internet connectivity
 - ☐ Emails
 - ☐ Microfilm
 - ☐ Electronic Document Records Management System (EDRMS)
 - ☐ Archives Management System (AMS)

Metadata

- 25) Does your agency have procedures to enable the migration of records and associated metadata to new storage media or formats so that records are retrievable and usable as long as needed to conduct agency business?
☐ Yes (Please describe)
☐ No
☐ Don't know
-
-

Preservation of digital archives

- 26) How do you deal with digital records which are no longer used or required?
☐ Delete
☐ Reformat

- ☐ Re-writing the disk
- ☐ Save on the computer hard disc
- ☐ Save on external storage devices and keep in the office
- ☐ Other, Please specify-----

- 27) Which of the following digital preservation strategies are in place for the management of digital archives?
- g) ☐ Bit preservation
 - h) ☐ Migration
 - i) ☐ Refreshing; emulation
 - j) ☐ Data backup
 - k) ☐ Locally developed digital preservation solution
 - l) ☐ Others (Please explain)

Legal and regulatory requirements for digital records

- 28) Does your department have an identifiable ICT policy?
- ☐ Yes
 - ☐ No
- 29) Does the policy address the management of digital records in your institution?
- ☐ Yes
 - ☐ No
- 30) Does your agency have a digital preservation policy or strategy?
- ☐ Yes
 - ☐ No
- 31) If yes, does the policy address the management of digital records and archives?
- ☐ Yes
 - ☐ No
- 32) Are you aware of the following recordkeeping standard and models?
- a) ☐ ISO 15489
 - b) ☐ Records Continuum model
 - c) ☐ OAIS Reference model

Risk exposure and mitigation

- 56) Do you sufficiently understand 'risk' as a concept?
- ☐ Yes
 - ☐ No
- 33) During which particular stages in the life-cycle are d-records exposed to risks?
- a) Creation and capture stage
 - b) Maintenance stage
 - c) Ingestion (archival) stage
 - d) Access (use) stage
 - e) Disposal stage
 - f) Long-term preservation stage

34) What would you consider as the key risks facing digital records in your institution? Please tick against potential risk exposures in the risk assessment table below.

Risk type	Severe (56-65)	Major (46-55)	Moderate (36-45)	Low (26-35)	Trivial (0-25)
Environmental hazards					
Rodents					
Rapid technological advancements					
Hardware and software obsolescence					
Unauthorized access					
Accidental/malicious deletion and modification					
File naming defects					
Viruses					
Data loss during transfer					
Manmade disasters					
Lack of formal strategies					

35) Have you participated in a risk assessment involving digital records in your organization?

☐ Yes

☐ No

36) Which categories of risks would you say digital records in your institution are exposed to?

☐ Legal and regulatory risks

☐ Records technology risks

☐ records control risks

☐ Administrative risks

57) Do you understand the concept of risk management?

☐ Yes

☐ No

37) Which are the best ways to handle the identified risks to digital records? (Please tick all that are appropriate)

☐ Avoidance

☐ Contingency planning

☐ Prevention

☐ Reduction

☐ Transfer

☐ Acceptance

☐ Other, please specify

58) Which risk management strategies is your institution currently implementing?

- ☐ Periodic migration
- ☐ Passwords
- ☐ Firewalls
- ☐ Offsite storage
- ☐ Regular backups
- ☐ Anti-virus protection
- ☐ Controlled access
- ☐ Purpose-built facilities
- ☐ Provision of physical security
- ☐ Others (Please explain-----)

Is your institution 'ready' for digital archiving?

Challenges and recommendations

- 38) Do you face any of the following challenges while managing digital records?
(Please tick all the applicable options)
- ☐ Creation and capture of records possessing content, context and structure
 - ☐ Metadata generation and preservation
 - ☐ Changing technologies
 - ☐ Ensuring the reliability, authenticity and integrity of digital records
 - ☐ Access control
 - ☐ Digital records preservation
 - ☐ Digital records security
 - ☐ Inadequate skills
 - ☐ Lack of standardised guidelines for DRM
 - ☐ Other, please specify -----

- 39) In your own opinion, what factors are contributing to ineffective and inefficient digital records and archives management in the institution?
- 40) What measures has your organisation put in place for the effective management of digital records?
- 41) What recommendations would you propose to improve management of digital records in support of corporate governance?

Digital archiving framework

- 42) Do you understand the concept and practice of digital archiving?
- ☐ Yes
 - ☐ No
- 43) What recommendations would you propose to improve digital records management in your institution?

THANK YOU

Appendix 9: Survey questionnaire for Administrators

Dear respondent,

I am a PhD student at the University of KwaZulu–Natal, in the Information Studies Programme. I am carrying out research as part of the requirements for the award of a doctorate degree (Information Studies). The topic of my research entitled “*The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya*”.

The purpose of this study is to investigate digital archiving practices in selected public universities in Kenya with a view to developing a framework for sustainable maintenance of digital archives in the institutions. A key output of this study will be a framework for digital archiving that could be adopted by your institution to enhance digital archives management. The study will also make other recommendations that your institution may find useful in streamlining organisation-wide digital archives management practices.

I wish to kindly request you to set aside some time for filling this questionnaire which will enable me obtain data that will address the research questions. The information you will provide will be kept in confidence and used only for the current study.

Should you have questions about the research please contact me on 217082020@ukzn.ac.za or my supervisor on garaba@ukzn.ac.za.

Thanking you in advance for your time and cooperation.

Yours Faithfully

A black rectangular box redacting the signature of J. Erima.

J. Erima

Background information

- 1) Name of the university -----

- 2) Name of School/Faculty -----

- 3) Gender
☐ Male
☐ Female
- 4) Which age category do you belong to?
☐ 20 -29 years
☐ 30- 39 years
☐ 40- 49 years
☐ 50+ years
- 5) Position held -----
- 6) How many years have you been working in your current position?
☐ Less than a year
☐ One year
☐ Two to five years
☐ Six to ten years
☐ More than ten years
- 7) What is your highest academic qualification?
☐ O-level
☐ A-level
☐ Certificate
☐ Diploma
☐ Undergraduate degree
☐ Masters degree
☐ PhD level
- 8) What is your area of expertise?
☐ Records and Archives Management
☐ Library studies
☐ ICT
☐ Human Resource Management
☐ Other, please specify -----

Digital records creation and receipt

- 9) List the key business activities of your institution.
 - k) -----
 - l) -----
 - m) -----
 - n) -----
- 10) -----
Which records emanate from the above (named) records? -----

- 11) Which percentage of the above (named) records could have archival value?
- m) ☐ 20%
 - n) ☐ 40%
 - o) ☐ 60%
 - p) ☐ 80%
 - q) ☐ 100%
 - r) ☐ Don't know
- 12) Which of the following types of digital records are generated by your School/faculty? (Please tick all the applicable options)
- ☐ E-mails
 - ☐ Databases
 - ☐ Word processed documents
 - ☐ Audio-visual records
 - ☐ Websites
 - ☐ Digital publications
 - ☐ Others, please specify-----
-
- 13) How are these digital records generated?
- ☐ Born digital
 - ☐ Converted
 - ☐ Both
- 14) Which of the following formats do you use to create electronic records? Please tick all the applicable options)
- ☐ ASCII files
 - ☐ Text files with mark-up
 - ☐ Word processing format
 - ☐ Database format
 - ☐ Spreadsheet format
 - ☐ Audio
 - ☐ Video/ moving images
 - ☐ Other, please specify -----
-
-
- 15) How are digital records stored in your School/faculty?
- ☐ Stored on CD-Rom, DVD or memory stick
 - ☐ Stored on tape (other than backups)
 - ☐ Stored on tape drive or hard disk of computer, with backup
 - ☐ Stored on server file storage, with backup
 - ☐ Via the internet
- 16) Please indicate the digital archiving technologies that are available in your institution:
- ☐ Mobile phones
 - ☐ Facsimile
 - ☐ Computers
 - ☐ CD-ROM, CD, VCD, Flash Discs, DVD
 - ☐ Printers, scanners, photocopiers, laminators
 - ☐ Digital cameras
 - ☐ Tapes and cassette recorders
 - ☐ Internet connectivity
 - ☐ Emails

- ☐ Microfilm
- ☐ Electronic Document Records Management System (EDRMS)
- ☐ Archives Management System (AMS)

Management of current digital records

17) Do you have a specific order or classification system in which you arrange and organize your digital records?

- ☐ Yes
- ☐ No

Please explain your answer-----

How do you provide access to digital records and archives?

- ☐ Online access
- ☐ Downloading to or from a host machine
- ☐ Via e-mail
- ☐ Distribution of printed copies

18) Do you have a policy governing access and dissemination of digital records?

- ☐ Yes
- ☐ No

19) Do you receive professional digital records management advice from records and archives management professionals in the university registry and archives repository?

- ☐ Yes
- ☐ No

20) If yes, which of the following indicates areas of professional records management advice given?

- ☐ Digital records creation
- ☐ Metadata creation and maintenance
- ☐ Digital records preservation
- ☐ Risk management for digital records
- ☐ Digital archiving
- ☐ Disaster management
- ☐ Other, please specify-----

21) How would you rate your understanding of recordkeeping metadata?

- ☐ I have good understanding of metadata
- ☐ I have little understanding of metadata
- ☐ I have no understanding of metadata

22) Which of the following methods do you use to ensure the security of digital records? (Please tick all the applicable options)

- ☐ Passwords login
- ☐ Data encryption
- ☐ Audit trails
- ☐ Firewalls
- ☐ Online/offline storage
- ☐ Gateway filter software
- ☐ Other, please specify-----

Management of semi-current and non-current digital records

23) How do you deal with digital records which are no longer used or required?

- ☐ Delete
 - ☐ Reformat
 - ☐ Re-writing the disk
 - ☐ Save on the computer hard disc
 - ☐ Save on external storage devices and keep in the office
 - ☐ Other, Please specify-----
-

24) How are digital records with enduring (archival) value handled in your School/Faculty?

- ☐ Transferred to secondary storage
- ☐ Transfer to archives
- ☐ Stored on computer hard drive

25) Which of the following digital preservation strategies are in place for the management of digital archives?

- ☐ Bit preservation
- ☐ Migration
- ☐ Refreshing; emulation
- ☐ Data backup
- ☐ Locally developed digital preservation solution
- ☐ Others (Please explain)

Staffing

26) Have you received continuous training in digital records management at organizational level or otherwise?

- ☐ Yes
- ☐ No

27) If so, which of the following best describes the type of training received?

- ☐ Government refresher course
- ☐ Certificate course
- ☐ Workshop
- ☐ Seminar
- ☐ Conference attendance
- ☐ Others, please specify

Challenges in digital records management

28) Do you face challenges in managing digital records?

- ☐ Yes
- ☐ No

29) If yes, which of the following indicates the challenges you face in managing digital records? (Please tick all the applicable options)

- ☐ Creation and capture of records possessing content, context and structure
- ☐ Metadata generation and preservation
- ☐ Changing technologies
- ☐ Ensuring the reliability, authenticity and integrity of digital records
- ☐ Access control
- ☐ Digital records preservation

- ☐ Digital records security
- ☐ Inadequate skills
- ☐ Lack of standardized guidelines for DRM
- ☐ Other, please specify -----

30) In your opinion, is your institution 'ready' for digital archiving?

Risk Exposure and mitigation

31) Do you understand the concept of risk management?

- ☐ Yes
- ☐ No

32) Which are the best ways to handle the identified risks to digital records?

(Please tick all that are appropriate)

- ☐ Avoidance
- ☐ Contingency planning
- ☐ Prevention
- ☐ Reduction
- ☐ Transfer
- ☐ Acceptance
- ☐ Other, please specify

33) Which risk management strategy(ies) is your institution currently implementing?

- ☐ Periodic migration
- ☐ Passwords
- ☐ Firewalls
- ☐ Offsite storage
- ☐ Regular backups
- ☐ Anti-virus protection
- ☐ Controlled access
- ☐ Purpose-built facilities
- ☐ Provision of physical security
- ☐ Others (Please explain-----

THANK YOU

Appendix 10: Ethical clearance from UKZN



02 July 2020

Ms Juliet Awinja Erima (217082020)
School Of Social Sciences
Pietermaritzburg Campus

Dear Ms Erima,

Protocol reference number: HSSREC/00001559/2020

Project title: The development of a digital archiving framework for archival repositories at selected public universities in Kenya

Degree: PhD

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 19 May 2020 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. **PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.**

This approval is valid until 02 July 2021.

To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

All research conducted during the COVID-19 period must adhere to the national and UKZN guidelines.

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

Yours sincerely,

A black rectangular box redacting the signature of Professor Dipane Hlalele.

Professor Dipane Hlalele (Chair)

/dd

Humanities & Social Sciences Research Ethics Committee
UKZN Research Ethics Office Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Tel: +27 31 260 8355 / 4557 / 3587
Website: <http://research.ukzn.ac.za/Research-Ethics/>

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

Appendix 11: NACOSTI Permit

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 381285	Date of Issue: 18 August 2020
RESEARCH LICENSE	
	This is to Certify that Mr. Juliet Awinja Erima of University of KwaZulu-Natal, has been licensed to conduct research in Kisumu, Nairobi, Nakuru, Uasin-Gishu on the topic: The development of a digital archiving framework for archival repositories at selected public universities in Kenya for the period ending : 18/August/2021. License No: NACOSTI/P/20/6217
Applicant Identification Number	Verification QR Code
NOTE: This is a computer generated License. To verify the authenticity of this document,	Scan the QR Code using QR scanner application.

Appendix12: Authorisation letter from University of Nairobi

UNIVERSITY OF NAIROBI
OFFICE OF THE DEPUTY VICE - CHANCELLOR
(Research, Innovation & Enterprise)

P.O. Box 30197-00100
Nairobi, Kenya
Telephone: +254-20-4910000, Ext 28711
+254-020-4913164 (DL)

Email: divcrie@uonbi.ac.ke
Website: www.uonbi.ac.ke

UON/RPE/3/5/Vol.XX

March 8, 2021

J.A. Erima
University of Kwazulu-Natal
School of Social Sciences
Private Bag X01 Scottsville 3209
South Africa
217082020@stu.ukzn.ac.za

Dear Ms. Erima

PERMISSION TO COLLECT DATA

I refer to your request to collect data at the University of Nairobi for your project entitled: *"Adigital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya."*

I write to inform you that your request has been approved.

You are however required to share the findings of your study with the University of Nairobi by depositing a copy of your research findings with the Director, Library & Information Services, University of Nairobi on completion of your study.


HORACE OCHANDA, PHD
AG. DEPUTY VICE-CHANCELLOR
(RESEARCH, INNOVATION AND ENTERPRISE)
AND
PROFESSOR OF APPLIED PARASITOLOGY


UNIVERSITY OF NAIROBI
DEPUTY VICE CHANCELLOR
8 8 MAR 2021

Copy to: Director, Library and Information Services

EAO:wm


ISO 9001:2015
CERTIFIED

Quality Management System Excellence in University Education and Training

Appendix 13: Authorisation letter from Kenyatta University



KENYATTA UNIVERSITY

OFFICE OF DEPUTY VICE-CHANCELLOR, RESEARCH, INNOVATION AND OUTREACH

Ref: KU/DVCR/RCR/VOL.3/311

P. O. Box 43844 – 00100
Nairobi, Kenya
Tel. 254-20-810901 Ext. 026
E-mail: dvc-rio@ku.ac.ke

Ms. Juliet Erima,
School of Social Sciences,
University of KwaZulu-Natal,
South Africa

19th April, 2021

Dear Ms. Erima,

RE: REQUEST TO COLLECT RESEARCH DATA AT KENYATTA UNIVERSITY

This is in reference to your letter dated 19th April, 2021 requesting for authorization to collect research data at Kenyatta University on the topic **"The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Universities in Kenya"** towards the award of a PhD degree of University of KwaZulu-Natal.

I am happy to inform you that the Vice-Chancellor has approved your request to collect data. It has been noted that your data will be collected from a sample of respondents including the DVC, Finance, ICT Director among others.

The University requires that, upon completion of your research, you submit a hard copy of your thesis to the Deputy Vice-Chancellor. Research who shall forward it to the University Library. Kindly therefore download, complete and sign Form RIO3 and return it to my office prior to the commencement of

Appendix 14: Authorisation letter from Jomo Kenyatta University of Agriculture and Technology



**JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY**
P.O. Box 62000-00200 Nairobi Kenya, Tel: +254-067-5870001-4, +254-67-53-52711,
Office of the Registrar (Administration)

JKU/ACA/3D

13TH MAY, 2021

Ms. Juliet A. Erima
Tel. No. 0711 370030

Dear Ms. Erima

RE: PERMISSION TO COLLECT DATA

Reference is made to your letter dated 4th March, 2021 in which you sought permission to collect data for your PhD research project entitled "The development of a digital archiving framework for archival repositories at selected public universities in Kenya".

Approval has been granted for you to collect data from the specified target group only on the understanding that all the data collected will be for academic purpose only and will be kept confidential throughout the project and after completion of the project. This is also on condition that the University Library will receive a copy of your final thesis for future reference.

Yours sincerely,

DR. ROSE M. GITHU, PhD
AC. REGISTRAR (ADMINISTRATION)

RG/ma

Copy to: Deputy Vice Chancellor (Admin)



JKUAT is ISO 9001:2015 and ISO 14001:2015 Certified
Setting Trends in Higher Education, Research, Innovation and Entrepreneurship



Appendix 15: Letter of authorization from Egerton University

EGERTON

P.O. Box 536 - 20115
Egerton, Kenya



UNIVERSITY

Tel: +254-51-2217801/808

+254-51-2217891/2

Cell: 0708489256

0775015388

Fax: +254-51-2217942

E-mail: dvere@egerton.ac.ke

OFFICE OF THE DEPUTY VICE - CHANCELLOR RESEARCH AND EXTENSION

EU/RE/GEN/089

15th March, 2021

Juliet Erima,
Moi University,
School of Information Science,
P.O. Box 3900,
ELDORET.

Email: 217082020@stu.ukzn.za

Dear Juliet,

RE: PERMISSION TO CONDUCT RESEARCH AT EGERTON UNIVERSITY

Reference is made to your e-mail dated 4th March, 2021 requesting for authority to collect data at Egerton University for your PhD research project entitled: *"The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya"*.

Authority is hereby granted for you to collect data in Egerton University from the following staff members: DVC (Administration Planning and Development), Finance Officer, Legal Officer, University Archivist, Records Manager, ICT Staff and Faculty Senior Administrative staff. It is expected that this research is purely for academic purposes and will not be used otherwise. Upon completion of the study please ensure that you provide a copy of the report for our retention.



Prof. Boaling O. Hebe, PhD

DEPUTY VICE CHANCELLOR (RESEARCH AND EXTENSION)

c.c. DVC (AP&D), Finance Officer, University Librarian, Legal Officer
Ag. DCPO, ICT Manager

"Transforming lives through Quality Education"



Appendix 16: Letter of authorization from Maseno University



Appendix 17: Informed consent for interviews



University of KwaZulu-Natal
School of Social Sciences and
Information Studies
Programme
Private Bag X01Scottsville
3209, PMB
20th January 2021.

Dear respondent,

My name is Juliet Awinja Erima. I'm a PhD (Information Studies) candidate studying at the University of KwaZulu-Natal, Pietermaritzburg Campus. The title of my research is *The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya*. The key objective of the study is to investigate digital archiving practices in archival repositories of selected public universities in Kenya with a view to developing a framework for sustainable maintenance of digital archives in the institutions. I am interested in interviewing you so as to share your experiences and observations on the subject.

Please note that:

- The information you provide will be used for scholarly research only.
- Your participation is entirely voluntary. You have a choice to participate, not to participate, or stop participating in the research. You will not be penalized for taking such an action.
- Your views in this interview will be presented anonymously. Neither your name nor your identity will be disclosed in any form in the study.
- The interview will take about one hour.
- The record as well as other items associated with the interview will be held in a password-protected file accessible only to myself and my supervisor. After a period of five years, in line with the rules of the university, it will be disposed by shredding and burning.
- If you are willing to be interviewed by using audio equipment, please indicate (by ticking as applicable).

	Willing	Not willing
Audio equipment		

- If you agree to participate in the interview, please sign the declaration attached to this statement (a separate sheet will be provided for signatures).

I can be contacted at: School of Social Sciences, University of KwaZulu-Natal, Pietermaritzburg Campus, Scottsville. Email: 217082020@ukzn.stu.ac.za
Cell: +254711370030

My supervisor is Dr. Francis Garaba who is located at the School of Social Sciences, Pietermaritzburg Campus, University of KwaZulu-Natal.
Contact details: garaba@ukzn.ac.za Phone: +27332605321

You may also contact the research office through:

P. Mohun

HSSREC Research Office

Tel: 031260 4557

Email: mohun@ukzn.ac.za

Thank you for your acceptance to contribute to this research.

DECLARATION

I..... (Full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project. I understand that I am at liberty to withdraw from the project at any time, should I so desire. I understand the intention of the research. I hereby agree to participate.

SIGNATURE OF THE PARTICIPANT

DATE

.....

Appendix 18: Informed consent for questionnaires



University of KwaZulu-Natal
School of Social Sciences and
Information Studies
Programme
Private Bag X01Scottsville
3209, PMB
20th January 2021.

Dear respondent,

My name is Juliet Awinja Erima. I'm a PhD (Information Studies) candidate studying at the University of KwaZulu-Natal, Pietermaritzburg Campus. The title of my research is *The Development of a Digital Archiving Framework for Archival Repositories at Selected Public Universities in Kenya*. The key objective of the study is to investigate digital archiving practices in archival repositories of selected public universities in Kenya with a view to developing a framework for sustainable maintenance of digital archives in the institutions. I am interested in collecting data from you regarding your experiences and observations on the subject.

Please note that:

- The information you provide will be used for scholarly research only.
- Your participation is entirely voluntary. You have a choice to participate, not to participate, or stop participating in the research. You will not be penalized for taking such an action.
- Your feedback on the questionnaires will be presented anonymously. Neither your name nor your identity will be disclosed in any form in the study.
- The records as well as other items associated with the survey process will be held in a password-protected file accessible only to myself and my supervisor. After a period of five years, in line with the rules of the university, it will be disposed by shredding and burning.
- If you agree to participate in the study by filling the administered questionnaires, please sign the declaration attached to this statement (a separate sheet will be provided for signatures).

I can be contacted at: School of Social Sciences, University of KwaZulu-Natal, Pietermaritzburg Campus, Scottsville. Email: 217082020@ukzn.stu.ac.za
Cell: +254711370030

My supervisor is Dr. Francis Garaba who is located at the School of Social Sciences, Pietermaritzburg Campus, University of KwaZulu-Natal.
Contact details: garaba@ukzn.ac.za Phone: +27332605321

You may also contact the research office through:

P. Mohun

HSSREC Research Office

Tel: 031260 4557

Email: mohun@ukzn.ac.za

Thank you for your acceptance to contribute to this research.

DECLARATION

I..... (Full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project. I understand that I am at liberty to withdraw from the project at any time, should I so desire. I understand the intention of the research. I hereby agree to participate.

SIGNATURE OF THE PARTICIPANT

DATE

Appendix 19: List of Accredited Public Universities in Kenya

COMMISSION FOR UNIVERSITY EDUCATION ACCREDITED UNIVERSITIES - NOVEMBER 2017

	UNIVERSITY	YEAR OF ESTABLISHMENT	YEAR AWARDED CHARTER
	PUBLIC CHARTERED UNIVERSITIES		
1.	University of Nairobi	1970	2013
2.	Moi University	1984	2013
3.	Kenyatta University	1985	2013
4.	Egerton University	1987	2013
5.	Jomo Kenyatta University of Agriculture and Technology	1994	2013
6.	Maseno University	2001	2013
7.	Chuka University	2007	2013
8.	Dedan Kimathi University of Technology	2007	2012
9.	Kisii University	2007	2013
10.	Masinde Muliro University of Science and Technology	2007	2013
11.	Pwani University	2007	2013
12.	Technical University of Kenya	2007	2013
13.	Technical University of Mombasa	2007	2013
14.	Maasai Mara University	2008	2013
15.	Meru University of Science and Technology	2008	2013
16.	Multimedia University of Kenya	2008	2013
17.	South Eastern Kenya University	2008	2013
18.	Jaramogi Oginga Odinga University of Science and Technology	2009	2013
19.	Laikipia University	2009	2013
20.	University of Kabianga	2009	2013
21.	Karatina University	2010	2013
22.	University of Eldoret	2010	2013
23.	Kibabii University	2011	2015
24.	Kirinyaga University	2011	2016
25.	Machakos University	2011	2016
26.	Murang'a University of Technology	2011	2016
27.	Rongo University	2011	2016
28.	Taita Taveta University	2011	2016
29.	The Co-operative University of Kenya	2011	2016
30.	University of Embu	2011	2016
31.	Garissa University	2011	2017
	TOTAL 31		

Appendix 20: Krejcie and Morgan Table

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

Appendix 21: Response to request for pilot study

