

**DIGITAL PRESERVATION AND ACCESS TO THE SOUTH AFRICAN
DOCUMENTARY NATIONAL HERITAGE AT THE NATIONAL LIBRARY OF
SOUTH AFRICA**

BY

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DISSERTATION

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DEDICATION

I dedicate this dissertation to my loving parents who are forever and deeply supportive, and encouraged me during the course of my studies. Through their inspiration and encouragement, I am able to undertake my Masters' degree and actually prepare myself to encounter the eventualities of life with confidence, enthusiasm and fear of God.

I dedicate this dissertation to all public and private institutions that are eager to making digital access and preservation of documentary heritage a reality. To them I say, digitisation is the best option to preserve our heritage.

DECLARATION

I declare that DIGITAL PRESERVATION AND ACCESS TO THE SOUTH AFRICAN DOCUMENTARY NATIONAL HERITAGE AT THE NATIONAL LIBRARY OF SOUTH AFRICA is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and citations under the supervision and guidance of Professor S.T. Bopape. I further declare that this has not previously formed the basis of the award of any degree in any other institution.

Masekoameng C.M

Surname and Initials

Date

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ABSTRACT

Digitisation of library materials offers Library and Information Services (LIS) organisations, national libraries in particular, opportunities to preserve and manage fragile and unique materials, by protecting their physical, saving them from deteriorating and facilitating unmediated access to such collection. The aim of the study was to examine processes involved in the digitisation of the South African National Documentary and Cultural Heritage for the purpose of preservation and access at the national library of South Africa (NLSA). The study was guided by the systems theory by looking into the selection, processing and disseminating of digital records at the NLSA. The study examined adherence to the policies and national legislative frameworks, the technologies used for digitization and access to digitized collections, tools used for accessing digital collections, as well the challenges experienced in the NLSA digitization project. Qualitative research methodology was adopted, through a case-study research whereby, semi-structured interviews, document analysis and observations were triangulated as data collection methods for the study. The key findings showed that the digitisation project at the NLSA adheres to pieces of national legislation and international guidelines such as International Standards Organization (ISO), the and draft digitisation policy developed by the Department of Sports, Arts and Culture which takes into consideration the national legislative framework such as the RSA Constitution, the NLSA Act, the Legal Deposit Act, Copyright legislation, and the Promotion of Access to Information Act (PAIA). However, the content analysis of these legislation did not mention anything about the handling and management of digital collections. Technologies and equipment used in the digitisation process included high quality scanners, servers and hard drives with software such as Optical Character Recognition, Content document management software and the NLSA website. The challenges uncovered in the study in relation included duplication of digitisation efforts and lack of expertise in digitisation. This study recommends that given the evolution of technology, the NLSA should migrate to a more convenient cloud storage that has a large advantage in case of unlimited storage, and keep up to date with the trends of digitisation technology. Legislation governing the LIS in South Africa also needs amendment to cater for the handling and management of digital collections.

Key words: DIGITAL PRESERVATION, NATIONAL LIBRARY OF SOUTH AFRICA, DOCUMENTARY HERITAGE, COLLECTION DEVELOPMENT, ACCESS,

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LIST OF ABBREVIATIONS

ALA	American Library Associations
AACR	Anglo American Cataloguing Rules
ARL	Association of Research Libraries
CD	Compact Disk
CD-R	Compact Disk Recordable
CD ROM	Compact Disk Read Only Memory
CMS	Content Management Systems
CRM	Conceptual Reference Model
DAC	Department of Arts and Culture
DC	Dublin Core
DISA	Digital Innovation South Africa
DPI	Dots per inch
DVD ROM	Digital Video Disk Read Only Memory
ESARBICA	Eastern and Southern African Regional Branch of the International Council of Archives
FRBR	Functional Requirements for Bibliographic Records
4 th IR	Fourth Industrial Revolution
IFLA	International Federation of Library Association
ISO	iPhone Operation System
ISO	International organisation for standardisation
LAN	Local area network
MARC	Machine-Readable Cataloguing

MODS	Metadata Object Description Schema
NLSA	National Library of South Africa
OAIS	Open Archival Information System
OCLC	Online computer Library Centre
OCR	Optical Character Recognition
OPAC	Online Public Access Catalogues
PDF	Portable Document Format
SA	South Africa
ST	Systems Theory
SADC	South African Development Community
TIFF	Tag Image File Format
UPS	Uninterrupted Power System
URI	Uniform Resource Identifier
WORM	Write Once Read Memory
WWW	World Wide Web

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CHAPTER ONE

INTRODUCTION AND BACKGROUND INFORMATION

1.1. INTRODUCTION

The main purpose of libraries is to provide their users with access to information by acquiring, organising, preserving and disseminating information in a variety of formats (Abdulsalami, Okezi & Agbo, 2013; Aliyu, 2015). Therefore, a library can be defined as a collection of information sources acquired, organised, preserved and disseminated for use by library users and clientele. This study looks specifically at the preservation and access of library materials by national libraries, with particular reference to the National Library of South Africa. For decades, libraries have preserved their information sources and materials of value in various formats, including parchment, paper, videotape and photographic film and different kinds of channels for information storage and dissemination. Preservation is a strategy or an approach to ensure that usefulness and utility of the library collection to its current and potential clients is sustained for a longer period. The Digital Preservation Handbook (2006:1) defines preservation as the ongoing process of formation and maintenance of the “best environment” promising for the storage and/or usage of an artefact or object to prevent it from “damage and to enable it to live as long a lifetime as possible”. The *Longman dictionary of contemporary English* (2014: 1292) defines preservation as “keeping something in its original state or in good condition”. In the context of the above definitions, the purpose of preserving records or artefacts is to enable access to the objects for use at some unspecified time in the future.

Various strategies and techniques can be used to preserve library materials. Among some of the options of preserving library materials is digital preservation, achieved through digitization. While digitization is the process of converting paper-based information materials into digital format, digital preservation involves a variety of technical approaches to ensure that publications in digital format are retrievable, readable and consistently usable over time (Corrado & Sandy, 2017). Therefore, in line with international best practices, libraries should create digital records of materials for both preservation and use. Masenya and Ngulube (2019) confirm that due to the

proliferation of digital resources and the realities of digital revolution, libraries are compelled to consider digitising their resources in all spheres. In this age of digitising library materials, libraries must preserve their valuable resources or collections through the process of digitisation for as long as the library user needs them for specific purposes. For this reason, Perry (2014) suggests that it is important to understand what digital preservation is and how it can be used effectively to preserve collective knowledge for use by future generations of library users and clientele. The American Library Association [ALA] (2018) also explains digital preservation as a consolidation of policies, approaches and activities needed to ensure that digital objects or materials remain accurate, manageable, and accessible to library users and systems over a long period “regardless of the challenges of component and management failures”.

Digital preservation of library materials is not a new concept for libraries, especially state or national libraries. The preservation of digital materials has played an important role in libraries and is understood in the library context as the process of keeping collection and information that the library has acquired and processed, available for use as long as they are needed. Digital preservation is also a function that allows library staff to preserve the treasure of knowledge for future generations (Amrohi & Chauhan 2014). Oguche and Aliyu (2020) wrote:

The purpose of digital preservation is to ensure the protection of information of enduring value for access by present and future generations. Libraries and archives have served as the central institutional focus for digital preservation, and both types of institutions include digital preservation as one of their core functions.

Digital preservation deals with the regular maintenance aspect of records in the library. It is also one of the processes that can assist in avoiding loss, damage through mutilation and embezzlement of historical artefacts (de la Porte & Higgs, 2019).

Digital access to library materials is fulfilled using various technological advancements to improve library services. The availability of and access to the Internet is an important network infrastructure that makes it possible for digitisation in this era of information globalisation and explosion. Internet connectivity enhances teaching, access, preservation, studying, research, publishing and communication in any library (Uzuegbu & McAlbert, 2015).

Therefore, with new development in Information and Communication Technologies (ICT's), state or national libraries are today responding to the global technological changes and emerging current trends by adopting digitisation, digital libraries and creating institutional digital repository projects by converting some of their printed information resources into digital formats for the purpose of long-term preservation and access (Arora, 2009). Although digital records are affected by several things such as viruses, obsolescence, deletion, power supply, digital preservation is regarded as one of the significant developments in the present worldwide information services. Digital preservation guarantees prolonged existence and effective access to information and its use. Digitisation in a national library is, therefore, referred to as all the processes involved in making collections of historic and other materials available online (Jagboro, Omotayo & Aboyade 2012).

Nnenna and Eminike (2015) remark that there are three major reasons for digital preservation activities in libraries, namely, (1) there is a need to preserve endangered library resources; (2) improvement of the efficiency of information search mechanisms; and (3) digitisation improves access to library resources. In other words, digitisation is a means to preserve and facilitate access to fragile collections and to reduce the physical handling of originals. Over and above, the main objective of digitisation is to preserve and provide access to all digitised content.

Nnenna and Emenike (2015) state that most libraries are digitising materials which might be lost in the future, such as manuscripts, research projects, newspapers, photo images, analogue maps, non-live musical recordings, government official gazettes and several other historical records. Hence, for the library resources to have a global and optimal usage, there is a need for its collections to be digitised. Digitisation is, therefore, useful in preserving precious materials and making them available for use by the public. Making high-quality digital images available electronically will reduce wear and tear of fragile items. Britz and Lor (2004), however, caution that digital copies should not be seen as a replacement for original pieces. Therefore, original documents should be cared for even after digitisation. Preservation remains a secondary benefit of digital projects (Britz & Lor 2004).

1.2. BACKGROUND INFORMATION

Among some of the key and fundamental functions of national libraries globally is to collect, organise and preserve documentary or published national heritage resources of countries in which they exist and operate. De Beer, Van Der Merwe, Ball and Fourie (2016) state that the International Federation of Library Association's (IFLA) statement on Legal deposit legislation mandates national libraries to collect, document, preserve and make accessible all published materials produced by a country, although public and university libraries may serve as places of legal deposit. The ultimate purpose of these functions is to make those materials accessible and available to all the citizens of a country. National libraries, therefore, play a crucial role in collecting, organising, preserving and providing access to cultural and historical resources of society (Bonn, Kendall & McDonough, 2017). Mosweu and Simon (2018) also confirm that national libraries are clearly mandated to collect, preserve and make accessible South Africa's published documentary heritage. Nowkarizi, Fanudi and Nowrouzi (2012: 305) wrote:

National libraries are the treasure and sentry of a nation's cultural heritage and have their roots in the nation's past. In addition, national library collects the products, sets of scientific, artistic, and cultural activities, and is considered as the heart of information system of the country. With respect to central position of information and informing in human's present civilisation, a national library is an institute which plays an active role in forming today culture and changing the society toward a better tomorrow despite preserving yesterday's inheritance.

Traditionally, national libraries have been involved in preserving their countries' published and documentary cultural heritage, which are in the form of printed books, written manuscripts, and other published materials (Amhori & Cauhan, 2014). However, in the current buzzword of the fourth industrial revolution (4IR), digital preservation of library materials in national libraries is also fast becoming the norm. National libraries also seek to contribute and become part of the world's information dissemination agencies in the current state of globalisation. The current crop of information users also prefer digitised information. This is because information in digital format has the advantage of reaching a wider community of information users at the same time and at any time. As a step forward in making print and hard copy formats available online for many library users, it becomes essentially necessary to digitally scan these library materials, especially archival records, newspapers, textbooks, theses, dissertations, court cases and other fragile materials so that users

can gain unmediated access to a wide variety of information online (Jagboro, Omatayo & Aboyade, 2012). The Department of Arts and Culture [DAC] (2019) shows that the National Library of South Africa (NLSA) is:

a statutory body whose object is to contribute to the socio-economic, cultural, education, scientific and innovative development of South Africa by collecting, recording, preserving, and making available the documentary national heritage and promoting an awareness and appreciation thereof, by fostering information literacy, and by facilitating access to the world 's information.

The NLSA was established in terms of the NLSA Act (Act 92 of 1998) and has various programmes to facilitate access to information, of which digital preservation of library materials is one its functions. The purpose of digital preservation at the NLSA is “to preserve materials significant to the South African National Heritage and to provide access to such materials for research purposes as well as access to the general public; and to protect and preserve the South African national heritage” (Dlamini 2015:1). Drijfhout and Ledwaba (2011:1) note that “the NLSA strives to ensure equitable access to its comprehensive collections for all members of South African society and that its collections contain a wealth of information including South African books, periodicals, newspapers, maps, special collections, government publications, and foreign official publications”.

Advances in information technology have prompted not only the national libraries, but also all institutions mandated to collect, organise and distribute information across the globe to also embark on the integration of information technology in their operations. Information technology in libraries and information services centres, including national libraries, serve as tools for the improvement of access to information, especially in situations where attention is drawn to the preservation and access of intellectual heritage and educational content of nations. “Digitised images and born-digital objects need to be preserved for future access and use” (Verheul 2006). Lor (2007: 307) confirms that digital preservation is a powerful tool for promoting access and way of promoting awareness and appreciation of Africa’s cultural heritage. As such, it is assumed that the NLSA is also involved in digital preservation of its materials because the entire intellectual property and documentary heritage of the country is housed and accessed in the NLSA.

According to Drijfhout and Ledwaba (2011), the NLSA was one of the founding members of Digital Innovation South Africa (DISA), which was established in 1997. The aim of DISA was to implement digital technologies in libraries, for the enhancement of access to South African content of high socio-political interest, more specifically those related to the South African freedom struggle. DISA became a centre of digitisation expertise in SA, and provided training and support across South and Southern Africa, while the NLSA contributed by way of digitising journals and other publications from its collections. Drijfhout and Ledwaba (2011) confirm that “the NLSA is the primary resource of the South African published documentary heritage”.

1.3. STATEMENT OF THE PROBLEM

The need for digitisation of the National Documentary Heritage in South Africa has been mentioned repeatedly in the workshops (Carstens, 2014; Drijfhout & Ledwaba, 2011), and articles in professional journals (Saunders, 2005; Gibson & Luthuli, 2012; Nicholson, 2015; Lor, 2017). Still, there is an apparent dearth of empirical literature on the processes involved of digitisation of library materials in the country, particularly at the NLSA. The Department of Arts and Culture (2019) only shows the existence of digital preservation services in this library without showing the processes involved in digitising the documentary national heritage of the country. In the NLSA Annual report (2017/2018), only newspaper digitisation project is reported. Therefore, it is not known what other types of library material candidates for digitisation at the NLSA are, how they are digitised and how to access the digital collections at the NLSA, hence this study.

Digital preservation should, therefore, combine policies, standards, strategies and actions to ensure that digital materials are created, organised and made accessible to library users. Along these lines, there is a need to look at policies, standards and legislative frameworks that guide the process and implementation of digital preservation at the NLSA. There is also a need-to-know the types of library materials that the NLSA digitises, guided by which policies, legislation and standard guidelines and procedures, as well as how digitised materials are organised for easy access and

retrieval, including the hardware and software used to digitise SA's national documentary heritage. Furthermore, the challenges faced by the national library in their quest to digitise the intellectual property of the nation of SA may pave the way for some solutions to digitisation in the country. Moreover, the hardware and software required to facilitate the digitisation of materials is undergoing continuous technological developments, which requires on-going research and development programmes. Liu (2004) emphasises that researchers and practitioners need to know about the best practices that have been developed to deal with the challenges posed by digitisation in libraries. Studies of this nature could make citizens aware of the digital information resources available for their access and use at the NLSA. Mkuwira (2015) complements that such studies would also assist other libraries involved in digital preservation to have an insight into what is required to come up with sustainable digitisation projects or programmes. Therefore, an empirical investigation or research as to how the NLSA engages in the digitisation process of the documentary national heritage is required for those who have a stake.

1.4. PURPOSE OF THE STUDY

1.4.1. Aim of the study

The aim of this study is to examine processes involved in the digitisation of the South African documentary national and cultural heritage for the purpose of preservation and access at the National library of South Africa.

1.4.2. Objectives of the study

- ❖ To analyse the NLSA digital preservation policy and its adherence to existing legislation and other guidelines relating to the digitisation of documentary national heritage.
- ❖ To establish systems used in the organisation, indexing and retrieval of digitised materials at the NLSA.
- ❖ To determine infrastructural and technological facilities used for digital information system in NLSA (Scanners, computer, software, output media, access points, network support); and

- ❖ To identify challenges experienced by the NLSA in digitising the documentary national heritage.

1.5. SIGNIFICANCE OF THE STUDY

National libraries across the globe are expected to handle the proliferation and growing amount of information effectively and efficiently. The only way the vast amount of information can be handled in an effective and efficient manner is when it is in digital format. It is within the mandate of the national libraries across the world that they need to safeguard information produced within a specific country in whatever format it is produced or published. Information produced in digital form, online or on CD, digitised images, and born-digital objects must be preserved and made accessible to users anytime they need them. Protection and preservation of digital information is, therefore, a major concern, more specifically for national libraries, because of their legal obligation of preserving the national documentary heritage of their countries.

This calls for the application of certain standards to use in digitising, storing and making accessible digital objects in their repositories. There is a need to know if there are currently any standards for the development and building of digital repositories, and how these are being applied or used in national libraries. It is also not known if national libraries use common standards to describe and string digital objects.

There is no comprehensive study that has been conducted in South Africa relating to digital preservation at the NLSA. Therefore, the study sought to add to the body of literature in the field, and specifically on the topic of digital preservation of the national documentary heritage. The public, interested individuals and organisations need to understand the preservation and access to digital library materials in the National library of South Africa.

The study is important for libraries in South Africa, the national library to be specific, since they play a vital role in teaching, preservation, learning and research. The study would also assist library management and all NLSA stakeholders in decision-making and the formulation of improved policies regarding the preservation and access of digital library materials in the national library of South Africa. Through this study,

citizens in the country will have basic knowledge of how to access digitised collections from the national library.

1.6. RESEARCH METHODOLOGY

This section is just a brief discussion of the data collection methods used in the study, of which details are provided in chapter three of this report.

1.6.1. Research design

This study adopted qualitative research using a case study research design. The study sought to draw data and information from the context in which the phenomenon occurs through examining the processes and techniques followed in digitising the Documentary National Heritage at the NLSA, and to solicit perspectives of those participating in the study. The application of a case study research design in this study helped the researcher to find out how digital preservation and access of the documentary national heritage is achieved at the NLSA.

1.6.2. Population and sampling

The population of this study consisted of four library staff members working in the preservation and conservation services of the NLSA, who were purposively selected because they are actively involved in the process of digitisation on a daily basis.

1.6.3. Data collection

This study triangulated three data collection methods, namely, semi-structured interview, document analysis and observation. The main instrument of data collection was the semi-structured interview. This type of data collection instrument allowed the researcher to make follow-up questions in cases where responses from interviewees were not clear. Document analysis was also adopted to analyse the NLSA's existing preservation and digitisation policy to confirm its adherence to collection development policies, national legislation, and other standards to digitise library materials. This allowed the researcher to verify or to triangulate not only the types of materials and content candidates for digitisation, but also processes that should be undertaken

before the material is digitised. The data was collected under the global pandemic, Covid-19 (Coronavirus). Interviews were conducted face-to-face with the participants with the following protocols: wearing of face mask, social distancing of two meters apart, hand sanitising of hands with an alcohol based sanitiser and washing hands with soap.

With observation, the researcher's intention made a site visit to the NLSA in Pretoria on the 10th March 2021 to observe the methods and tools used to digitise library materials and to record these methods and techniques as they occur in a natural setting. This assisted the researcher to determine the systems used to index and retrieve digitised content at the NLSA, as well as the infrastructural tools used to digitise the documentary national heritage. The photos of the equipment used were also taken.

1.6.4. Data analysis

Data was analysed using the thematic analysis method, whereby similar responses from participants are grouped and categorised into themes.

1.6.5. Quality Criteria

Paying attention to credibility, transferability, dependability and confirmability increases the trustworthiness of the study or research. This is about how the researcher establishes if the findings of the study are dependable, credible, transferable and confirmable, of which details will be provided in chapter three.

1.7. Discussion of key terms

Yusuf and Chell (2005:28) point out that defining terminology in research is a way to dispel confusion and to improve understanding, for both those who are new to the subject and those who are familiar with the subject. The following terms and perceptions discussed in this segment are clarified and expressed according to what they mean and how they are understood in the current study:

1.7.1. Digitisation

This study deals with the digitisation of the national documentary heritage at the NLSA. Most of the literature on the subject defines digitisation as a process of capturing an analogue signal into digital form (Kayicki, 2018). Digitisation describes the process of making an electronic version of a 'real world' object or event, enabling the object to be stored, displayed and manipulated on a computer, and disseminated over networks and/ or the World Wide Web (Shekar, Mallifarjun & Shivarama, 2015). This process is conducted to preserve rare and fragile collections by making them more accessible to a wider audience (Rowley & Smith, 2012:274).

1.7.2. Digital preservation

Digital preservation is a digital hub where old, decaying and significant materials that are worthy of digitisation are digitally analysed, processed and stored for future use. Constantopoulos, Dallas, Androutsopoulos, Angelis, Deligiannakis, Gavrilis, Kotidis, and Papatheodorou (2009) define digital preservation as a process that ensures long-term preservation and retention of the authoritative nature of data. Preservation activities should ensure that data remain reliable, consistent and usable while maintaining its integrity. Various authors provide the following definitions of data preservation:

- ❖ The process of maintaining a digital object for as long as required in a form which is authentic and accessible to users (Brown, 2013, p. xii).
- ❖ Viana and Sato (2014) define data preservation as the ability to ensure that digital data being stored today can be read and interpreted in the future.
- ❖ Conway, Moore, Rayasekar and Jean-Yves (2011) define digital data preservation as an active management of digital information over time to ensure its integrity, authenticity and chain of custody.

The definition provided by Brown (2013) is appropriate in this study. This is informed by the way it enhances the managed activities that are necessary to ensure continued access to digital materials for as long as necessary and needed.

1.7.3. Digital Access

This refers to the electronic or digital access to digitised information resources in a soft copy format. This can also be known as having the electronic technology to gain access to digitised information resources. According to Ribble (2010), digital access is defined as “*full electronic participation in society*”. In other words, everyone should have access to digital technology, especially technologies that are free, like the internet. A common term for describing the gap between people who have access to technology and those who do not is called the “Digital Divide”.

1.7.4. Heritage

Heritage is a long-term preservation of history for future generations to enable them to know their roots of where they originate. Cultural heritage refers to contemporary society’s use of the past. “Our cultural heritage” contributes to the shaping of national stereotypes and regional identity, and it is a modern or postmodern reflection of the past (Boyd & Timothy 2003). As extracted from the White Paper on Arts and Culture (2017:20), “Heritage is the sum total of wildlife and scenic parks, sites of scientific and historical importance, national importance, national monuments, historic buildings, works of art, literature and music, oral traditions and museum collections and their documentation which provides the basis for shared culture and creativity in the arts”.

1.8. OUTLINE OF CHAPTERS

Chapter One: Introduction and Background to the study

Chapter One has introduced the topic and conceptualised the study. It also defined and provided detailed discussion of the terms like digitisation, digital access, preservation of library materials and effective preservation, which was fundamental to this study. The research problem, the problem statement, purpose of the study, aim of the study, objectives of the study, significance of the study, research methodology, research design, population and sampling, data collection, data analysis and quality criteria of the study were also discussed in this chapter. It has also defined the fundamental terms used. The chapter ends by outlining the structural outline of the chapters.

Chapter Two: Literature review

The chapter reviews literature on policies and legislation for digitisation, systems for organisation of digitised collections, metadata, descriptive metadata, metadata standards, access, infrastructural and technological facilities, digitisation devices, storage devices, software requirements, and digitisation challenges. Chapter two also discusses the theoretical framework underpinning the study.

The systems theory is discussed in detail together with key functional components of a library, which include selection and acquisition of library materials; organisation, indexing and storage; and access and retrieval of digital content or materials.

Chapter Three: Research methodology

Chapter three outlines the research methodology used in the study. This includes the research design and method. It also discusses the target population; the area where the study is conducted; the unit of analysis utilised; how sampling was done; how the sample size was chosen; quality criteria for data collection instrument utilised; and ethical considerations.

Chapter Four: Data presentation, analysis, and interpretation

This chapter presents the data collected from the target population through semi-structured interviews, document analysis and observations. The presentation of the results is guided by the objectives of the study, which are organised according to themes. This chapter is presented in terms of actual words of participants in order to address the objectives of the study.

Chapter five: Major findings, conclusions and recommendations

This chapter presents findings collected from the target population through semi-structured interviews, document analysis and observations. The presentation of the

results is guided by the objectives of the study, which are organised according to the themes.

This chapter also presents conclusions and recommendations based on the findings and data presentation in Chapter Four. It provides conclusions of the investigation. This section proposes recommendations to address issues identified during the study. The recommendations address each of the research objectives of the current study.

CHAPTER TWO

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1. INTRODUCTION

The previous chapter has introduced the reader to the problem and sub-problems that guide this study. The purpose of the study, comprising of the aim and the objectives, has been clearly outlined. In this chapter, an in-depth review of literature related to the digitisation of library materials is conducted. Literature review entails careful and in-depth examination or evaluation of published information or data related to a specific topic or subject. This published information includes a collection of sources cited and a bibliographical list of information sources, as well as critical appraisal of inventive publications on the subject covered. These publications include print books, e-books, print journal articles and e-journal articles, magazines and newspaper reports.

The purpose of this chapter is to help the researcher to understand the broad scope of the selected topic as well as to draw comparisons through referencing. Every objective has been put in relation to all the relevant studies that were conducted before, to either support or dispute claims in the research. Each objective is presented with an extensive literature review. This is done to develop new theoretical points of views. A literature review is information or texts that include findings and knowledge that has been found about a particular topic. Literature review helps in understanding the subject or topic at hand. However, before discussing the literature related to this topic, it is important to discuss the theoretical framework on which this study is based.

2.2. THEORETICAL FRAMEWORK – SYSTEMS THEORY

Petchko (2018) states that a theoretical framework is a means to organise knowledge about the world in a systematic (structured) and generalisable (applicable to a broad class of things) way. Essentially, a theory is a simplified version of reality that shows how things are related and which factors are more important than others in a relationship. A theory is significant to a research study because it lays the foundation and attempts to explain why things happen the way they do (Neuman, 1997; Leedy,

1997; Leedy & Ormrod, 2001; Maxwell, 2005). Therefore, just like a solid foundation is to a house structure, so is a theoretical framework to a research study. Accordingly, digital preservation as a phenomenon has also been explained through a variety of theoretical frameworks and models. A theoretical framework of a study is the structure that holds and supports the theory of a research work. There are different models or theoretical frameworks for operating digitisation services or projects that suit every size and type of the organisation.

The Systems Theory (ST) was adopted as the theoretical framework of this study. The biophysicist Ludwig von Bertalanffy promulgated the ST in the 1940s. The theory has exerted its influence on many fields of academic disciplines such as sociology, biology, physics, education and currently Information Studies. The rationale for adopting the ST is to study how elements within a system or an organisation interact to achieve its goals and sustain the system using inputs from both the internal and external environments (Mele, Pels & Polese, 2010: 126-135).

A system is defined by Von Bertalanffy as a set of dynamic factors required to maintain integrity through mutual interactions, and an organised entity made up of interrelated and interdependent parts that interact with each to achieve organisational goals (Von Bertalanffy, 1968). A system, therefore, could be described as a set of interconnected and interrelated parts that work together harmoniously and coherently to achieve the set goals and objectives of the organisation (Ng, Maull & Yip, 2009: 377-387)

A system is distinguished from others by clear-cut boundaries through which it establishes internal and external environments (Mele, Pels & Polese, 2010). Heylighen and Joslyn (1992) cited in Batane and Motshegwe (2012:4) defined the ST as a trans-disciplinary study of the abstract organisation of phenomena, independent of their temporal or spatial scale of existence type and substance. There are two main types of systems: open and closed systems. While the open system has boundaries, which are difficult to identify, and interacts with its environment, the closed system does not receive and exchange information with its environment (Amagoh, 2008:5).

This study is based on a systems model or theory that relates to the key functional components of any library which include selection and acquisition of library materials; organisation, indexing and storage; as well as access and retrieval of digital content or materials. Selection and acquisition are concerned with the process of selecting materials for acquisition and deciding on the materials that should be digitised. It considers the approaches to selection, legal, policy and technical issues that should be considered when making decisions for acquiring digital materials and converting them from print to digital. There are existing policies, legislations, guidelines and standards for digital preservation practices in South Africa, which will be used as a yardstick for establishing the extent to which NLSA is involved in digital preservation.

Organisation, indexing and storage are involved with the process by which the new digital or digitised content is brought within the intellectual and physical control of the repository or digital library (Brown, 2013: 129). The key process involved in this component includes the assignment of metadata (e.g., bibliographic information) to each digital document being added to the collection. This component also carries out indexing and storage of documents and metadata for efficient search and retrieval. Once the digital content is under the control of the repository, it should be accessible to the user community. Access and retrieval are therefore processes by which end-users can access, browse, search, retrieve and view the contents of the digital library for effective use.

A systems theory is a theoretical perspective that analyses a phenomenon seen as a whole and not as simply the sum of elementary parts. The focus is on the interactions and relationships between parts to understand an entity's organisation, functioning and outcomes. A system can be defined as an entity, which is a coherent whole (Ng, Maull & Yip, 2009) such that a boundary is perceived around it in order to distinguish internal and external elements and to identify input and output relating to and emerging from the entity.

Figure 2.1: Systems model / theory (Von Bertalanffy, 1946)



The Working Group on Information Systems (2012) provides a compilation of different Data Lifecycle Models that can be adopted for operating a digitisation service or project. However, most of the models revolve around a systems theory, which relates to common functional components of any library, namely: selection and acquisition; organisation, indexing and storage; organisation, indexing and storage, as shown in Figure 1 above.

2.3. DIGITAL PRESERVATION POLICIES AND LEGISLATION.

This objective of the study relates to the systems theory when the theory's concern is with "input". Systems theory uses digital preservation policies, legislation and guidelines to select library materials that are worthy for digitisation. In this respect the NLSA uses several pieces of legislation to enable them to informatively select library materials for digitisation. Every organisation is managed by a policy, and libraries are no exception, whether they are independent entities such as public libraries or institutionally linked departments in an institution such as university and government department libraries (Glayton & Gorman, 2001: 18). Digital preservation is part of collection development, and libraries must have collection development policies. Therefore, there should be rules and regulations on digital preservation concerning selection, organisation and access of digital materials in the form of a policy document. Looking at the systems theory on which this study is based, selection policies have to do with the input, by describing what kind of materials are candidates for digital preservation. Digital preservation decisions and activities should therefore be based on policies, which must also be guided or operate within the confines of national

legislation frameworks. Therefore, the digitisation of materials in national libraries should operate within the mandate of a collection development policy, which in turn must operate within the national mandates of a country's legislation. This entails that the collection of a library grows rapidly in line with the information needs of its patrons at the same time adhering to the collection development policy in place.

2.3.1. Collection development policy

A collection development policy is defined as a written statement of the library's intentions to build or develop its collection. Cabonero and Mayrena (2012:1) confirms that:

Collection development policy is a written statement of the library's intentions for developing its information resources by establishing ground rules which will eventually provide framework for collaborative collection development program.

In this sense, a collection development police outlines the framework, plan, roadmap (procedures), guidelines, or a blueprint which the library must follow to build its collection or what to do and what not to do when developing library collections. It is also referred to as a statement or document that represents a plan of action and information, which is used to guide the staff's thinking and decision-making. Specifically, the staff consult the collection development policy when considering which subject areas to enlarge, and to determine how much emphasis is to be given to each area. The policy should be such that it becomes a means of communication with the library's service population and the people who provide it with funding (Evans, 2004).

2.3.2. Functions of a collection development policy

A collection development policy has many functions. Among some of these functions include stating how selection decisions are made, what is to be acquired, how it is to be acquired, what is to be preserved, how it should be preserved and what is to be discarded. It is used to provide a point of reference for library staff to consult when developing or building materials for the library, serving as a source of reference when the availability or non-availability of an item or service is challenged or questioned; and serving as a mechanism for communicating with library patrons and those who provide

its funding. The International Federation of Library Associations (IFLA) categorises these functions into four main dimensions, namely, selection, planning, public relations and resources sharing (IFLA, 2001).

Deepa (2017: 70) wrote:

Collection development policy has many functions like describing current collections, providing a framework for developing and maintaining collections, assisting in budgeting, assisting staff to consider the long term and short-term objectives of the organisation, prioritising different activities etc. It helps to develop a realistic and practical acquisition program for procuring resources for the future. It provides clear and specific guidelines for the selection, acquisition, storage, preservation, relegation, and discard of stock. These policies can help in improving communication between the library and users and in enhancing understanding of the objectives of the library by administrators whose decisions influence resource allocation. The policies to be effective should be flexible and should be reviewed and revised periodically.

2.3.3. Digital collection development policy

The above definition of a collection development policy entails that to realise the activities of digital preservation, the library should have a digital preservation policy that pronounces its obligations to their preservation strategies and actions. The process of developing and maintaining a digital collection development policy, including reviewing of the established policy periodically, makes it possible for the library to establish and shape its specific context and digital preservation undertakings. The existence of a formal digital collection development policy, which also provides guidance about the library's preservation function, also makes it easier for the library to document its preservation practices into implementable strategies that are standardised. Dressler (2017:137) examined existing digital preservation policies at Association of Research Libraries (ARL) institutions, and analysed the content of the policies. The study resulted in finding "that 32 (26%) ARL institutions at that time had an existing digital preservation policy in place, from the institutions that responded (58% response rate). In total, 23/40 institutions without a current policy indicate there is, or will be, work to complete a policy within the coming year (2016-2017)".

Digital collection development policy is essentially important as it provides procedures and rules that should be adhered to when developing the collection of a library whether in print or in electronic format. It is the goal of any library to meet its patrons' dynamic information needs. Patrons now need information in digital form, which obligates

libraries to change and modify the collection development policies to accommodate digital formats of information. This is where digital preservation comes in, to preserve according to the digital preservation policy and the collection development policy. The policies guide the library on the library materials that are adequate to be digitally preserved.

Furthermore, not all important records within the national library collection can necessarily be digitised (Mapulanga 2013). According to Ritchie (2002: 519), “the main components of the National Library of South Africa’s collections are books, newspapers, periodicals, official publications, foreign official publication, electronic publications, maps, photographic materials, manuscript materials, and an eclectic collection of paintings and other networks”. The general book collection is composed of not-fiction in different subject fields such as social sciences, humanities, literature, as well as fiction in different languages that are spoken in South Africa. There is also the African collection comprising materials on Africa south of Sahara and Southern Africa (Ritchie, 2002:519).

2.3.4. Digital preservation legislation

Digital preservation is not just about solving technical problems. “There are also other issues, such as, managerial, economic and legal, that have to be dealt with in the process of digital preservation. A major legal issue is that of intellectual property rights, especially copyright. Digital preservation strategies will involve copying digital information many times and migration to new technological environments over time” (Ayre and Muir, 2004). Among some of the issues that librarians must deal with in respect of digital preservation and the South African Copyright laws include:

- When are items considered to be in the public domain in South Africa, and what can the NLSA do with these items?
- Can NLSA claim copyright to materials in their collections if individuals or entities have deposited it?
- As curators of digital materials, is the NLSA allowed to digitise materials even if they are uncertain as to who the copyright owner is or was?
- As curators, is the NLSA allowed to assign certain Creative Commons licenses to materials that they digitise?

- What rights does the NLSA have as entities that digitised materials, e.g., do they own the digital copies? Can they charge fees for reproduction in published works? (Van der Walt, 2020)

Nsibirwa (2014) notes that preservation and access of South Africa's national cultural heritage is dependent upon appropriate legislation and its implementation thereof. Therefore, most of the books in the National Library of South Africa are collected through the Legal Deposit Act (Act 54 of 1997), which requires publishers to supply copies of each new publication to the National Library of South Africa or to places of legal deposit (Nsibirwa 2014). This entails that the publisher shall, for each published document, supply to the prescribed places of legal deposit the prescribed number of copies. However, it is not known how much and in what manner the existing national legal deposit law, copyright law, and related legislation provide for the digital preservation of library materials at the NLSA.

2.3.5. The NLSA Collections

The NLSA also holds a comprehensive collection of South African official publications, newspapers, magazines and journals. Official publications are material published by government or any document published on instruction at the expense of government. These include a collection of parliamentary publications such as whitepapers, debates of parliament, bills, government gazettes and statute books. Most government publications are received by the NLSA under the legal deposit. Official publications also included publications from neighbouring states in the Southern African Development Community (SADC) region, as well as publications collected in terms of various agreements with other countries, regionally and internationally. A collection of regulations, treaties, conventions, agreements and resolutions with other countries also form part of the collection responsibility of the NLSA.

Therefore, careful selection of materials to be digitised must take place to identify materials that are suitable candidates for digitisation. This can only be achieved if there is a policy in existence. The existing policies should also in one way or another talk to the internal policy guidelines and the national legislation. Drijfhout (2007) provides an examination of existing South African policies, legislations and guidelines for the digital preservation of library materials, but there is no study that sought to establish the

extent to which these policies and pieces of legislation are being followed or adhered to by the NLSA when digitising library materials. Kalusopa and Zulu (2009) confirm that the only study of note on digital preservation on the rest of the African continent is one that was conducted under the auspices of the Eastern and Southern African Regional Branch of the International Council on Archives (ESARBICA). The findings of this study revealed, among other things, weak policy formulation on digitisation, weak legislative framework for digital preservation and ill-defined national digitisation coordination activities on institutional, national and regional levels as some of the factors that make most African countries grapple with identifying strategies that they can use to deal with digital preservation. Therefore, Dijfhout and Ledwaba (2011) suggest “the need for a national policy that would provide guidelines in respect of national priorities, coordination and the protection of national heritage against forms of uncontrolled exports”.

2.4. SYSTEMS FOR ORGANISATION OF DIGITISED COLLECTIONS

This study objective relates to the systems theory in the manner of processing and organisation of digitised library materials. At the NLSA this objective looks at the several systems, scanners, metadata systems used to process and organise digitised library materials for easy retrieval. It is common knowledge among library information professionals that for printed materials to be easily accessed by library users, they should undergo the process of cataloguing and classification. Cataloguing and classification is the process by which information resources are described so that users can identify and locate them (Hider, 2012). In systems theory this is the processing function of a unit. Therefore, effective digital preservation begins with the organisation and classification of digital collections within the repository or database for easy retrieval and access. Brown (2013:155) notes that “it is impossible to manage any collection without some form of systematic description and documentation of its constituent parts, and further that the catalogue has been the fundamental tool of curators and information managers.” Wijngaarden (2007: 102) also notes that “to ensure future access to digital collections, three actions have to be dealt with: long-term storage, registration of metadata and development of tools for accessibility”. This implies that digital collection should be described in such a fashion that users who

need them should be able to locate them with ease. This relies more on the creation of metadata, usually described as “data about data” (Brown, 2013:155; Hider, 2012:4).

2.4.1. Metadata

Metadata is defined as data about a digital material that is deposited in an organised form suitable for electronic handling. It is “a set of information required to enable content to be discovered or retrieved, managed and used by both human agents and automated systems” (Brown, 2013: 155). Metadata serves many purposes in the preservation of digital library materials by providing a record of access points and activities that have been performed upon the digital content or material (Lavoie and Gartner, 2013). In simple terms, the purpose of metadata is to create a list of digital information sources in a systematic manner to enable library users to become aware of what information is available, and how and where it can be located. The information contained within a metadata record often encompasses a range of topics, including the description of not only the contents of the digital materials but also their form, the environment required for their preservation, their preservation history, and other matters. “The ultimate the purpose metadata in is to support the goals of long-term digital preservation, which are to maintain the availability, identity, persistence, and authenticity of digital objects over long periods of time” (Lavoie & Gartner, 2013). Brown (2013:156) distinguishes between descriptive and technical metadata. The line of demarcation between the two is that while descriptive metadata documents the content of the digital object or material of interest, and supports its intellectual management, technical metadata describes its technical characteristics and supports its preservation management.

2.4.2. Descriptive metadata

Descriptive metadata serves several purposes, including resource discovery, interpretation, source, context and structure, as well as access and rights. Resource discovery supports users to identify content through searching or browsing. Interpretation enables users to understand, select and use the contents. It works like an abstract which helps the user to determine what the content is all about, so that he or she should decide whether to use it or not. Provenance, context and structure allows

users to understand how the content was created, and how it is arranged and relates to other objects; while access and rights define the basis on which users can access and use the content, and if there are any restrictions and copyright conditions.

Therefore, the contents of a digitised collection should offer opportunities and adequate detail descriptions for users to consider whether it is appropriate for their needs. The metadata should include, where possible and applicable, the title, author (creator), period of creation, name of country of origin or residence of the object, language of the display/creation, and the description of the contents. By providing the name of author, title, subject area and other details of the material, a digital record is created, then indexed in information retrieval tools such as databases, catalogues and indexes so that users can access the information sources with ease (Onwuchekwa & Jegede, 2011). It is for this reason that operating a digital preservation project or service involves several interrelated functional issues. A sound digital project with current electronic collections or digital archives with preservation purpose must take into consideration basic issues like users, content issues and technical issues. Gibson and Luthuli (2012) remark that as libraries and information centers engage with new digital environments, issues of access for a wider community are raised.

When online access is implemented, other associated issues are raised. Brits and Lor (2004) also asked a question if African documentary heritage is digitised, how many in African countries will benefit and “will the digitised text freely available to African scholars”? Kalusopa and Zulu (2009) make mention of the study which observed that although there are electronic records that are being created daily in public sector institutions, these institutions are still lagging behind in formulating strategies for managing electronic records. The way citizens obtain access to digitised content at the NLSA warrants an investigation of this nature.

2.4.3. Metadata standards

McClelland (2003:13) notes that “metadata standards are used to describe a physical or electronic resource and can be used to manage collections of documents, images, and other information in a repository such as an archive or museum. Some metadata

elements, such as title, description, subject, and keywords, are like those that libraries use to catalogue their holdings. Other elements, such as the Uniform Resource Identifier (URI), are specific to a digital, Web-based environment. Metadata can be stored in a digital library or repository that provides services to search or browse for educational materials”.

Day (2003) acknowledges that there are many metadata standards and initiatives that have relevance to digital preservation, for examples, those designed to support the work of national and research libraries, archives and digitisation initiatives. Among some of the descriptive metadata standards are Dublin Core (DC), Conceptual Reference Model (CRM), Anglo American Cataloguing Rules, second edition (AACR2) and Machine-Readable Cataloguing (MARC) standards, Functional Requirements for Bibliographic Records (FRBR) standards and Metadata Object Description Schema (MODS). While AACR2 and MARC standards are used to catalogue printed materials, DC metadata is mainly used describe digital objects. Along these lines, DC metadata elements become one of the most popular metadata standards that facilitate cataloguing, describing and classification of such resources, and comprised fifteen elements of describing an object (Brown 2013: 158; Hider, 2012: 127).

Hider (2012: 127) further states that the DC also has its own International Standard Organisation (ISO) standard 15836: 2009, that is, the Dublin Core Metadata element set. The elements of CD metadata standard include title, creator, subject, description, publisher, contributor, data, type, format, identifier, source, language, relation, coverage and rights (ISO standard, 2009). Although Guenther and McCallum (2005) declare MODS as one of the emerging metadata standards attempting to harness developments for library needs in that it complements other metadata formats with new features or fields that are non-existent in other metadata standards, DC metadata still remain one of the highly utilised data standards in national libraries across the globe.

Alijan and Jowkar (2009) conducted a study to determine and evaluate the usage of Dublin Core metadata among seventy (70) National Library web sites worldwide. The study found that out of seventy (70) National Library web sites, fourteen (14), that is,

twenty percent (20%) were found to be using Dublin Core. A study of “ninety-eight (98) websites of the Iranian state universities of the ministry of health and medical education and ministry of Science indicate that none of these web sites use Dublin Core, metadata and that only a few of them have used overlaps elements between HTML meta tags and Dublin Core (DC) elements” (Firoozeh, Mahtab & Rasool, 2014).

2.4.4. Access

The ultimate purpose or aim of describing digital objects in any digital repository is for users to obtain maximum access to these objects. Brown (2013: 243) remarks that access means many things to many people. To some, it may entail to view a digital object on the screen; to others, it may mean to download a file, while for others, it may entail extracting the content in a format suitable for reuse elsewhere. Therefore, national libraries should consider or show in their policies what forms of access they provide to their user communities. However, users are required to possess a range of searching and browsing techniques, as well to understand the options they want to use to access a given digital content, including being able to understand if there are any possibilities of access or not (Brown, 2013: 244). The results of the study conducted by Hausner and Sommerland (2018) on meta-synthesis “showed a need for an action plan for increasing user awareness to efficiently reach target groups of national bibliographic data at its fullest potential, i.e., user awareness on the usability and the quality of the metadata”.

Hider (2012: 52) also notes, “Many libraries have developed their own collections of digital resources hosted either on their own servers or externally”. Therefore, some digital objects can be accessed using established online catalogues, while others can be accessed through internal database systems or intranets. Libraries are providing means for accessing digital collections and services, such as online databases, e-books, e-journals, institutional repositories, library websites, online public access catalogues (OPACs), the Internet and the Intranet. The increasing application of technology to library processes, especially in the current ‘Information Age’, has led to the emergence of digital libraries, which are facilitating cooperation and collaboration, resource sharing, bibliographic control, information access and information dissemination.

Therefore, there is a need-to-know what mode of access the users use to access digital materials at the NLSA. Ledwaba, Mpholefole and Tsebe (2011) have acknowledged at the IFLA conference held in Puerto Rico from the 13th to 18th August 2011 that to ensure that library users are aware of digitised versions of material, they can identify them via catalogues of electronic material, metadata standards and digital object identifiers in libraries. These are technical aspects to be considered to make digital collection not only accessible, but also integrated within the workflow of the organisation. However, up to today, it is still not known if metadata is used at the NLSA, let alone which metadata standards are used, as well as how access to digital objects at the NLSA is obtained.

2.5. INFRASTRUCTURAL AND TECHNOLOGICAL FACILITIES

This study objective relates to the Systems theory in the manner of “output” of digitised library materials. By output, this objective looks at several devices used at the NLSA to digitize library materials, store the digitised library materials, the specific software used to organise the digitised library materials, and lastly the objective looks at the mechanisms for access of digitised library materials at the NLSA. Digital preservation involves several functional issues, including technological and infrastructural facilities. Atanasopoulos, Candela, Castelli, Innocenti, Ioannidis, Katifori, Nika, Vullo and Ross (2010: 18) confirm that the digitisation project depends on sophisticated technological infrastructure. Brown (2013: 63) states that the digitisation of library materials is a new discipline, therefore “models for good practice, including technologies and services required to support them exist at varying levels of maturity of the organisation or institution”. There is no single package of hardware and software for digital preservation as technology changes from time to time. In systems theory, this involves the tools that are used for processing. Therefore, choosing a specific approach for digital preservation might entail choosing suitable technology and systems used to organise and retrieve digital content, which this study also sought to probe. In the view of Athanasopoulos et al. (2010: 18), digitisation projects depend on sophisticated technological infrastructure. These may include different machineries, software programmes and procedures, including digital multimedia technologies, web-based hypermedia and hypertext, Internet/ Intranet, user and system interfaces, OPACs, full

text search engines, relational databases, electronic document management systems and so on (Dahl, Banerjee & Spalti, 2006; Roknuzzam, Kanai & Umemoto, 2009). A basic premise by Jantz and Giarlo (2007) revolves around the fact that there are many technologies today that will help national libraries build trust in a digital preservation process and that these technologies can be readily integrated into an operational digital preservation framework.

Even though a study conducted by Ngoepe and van der Walt (2009) revealed lack of technological and infrastructural facilities to ingest electronic records into archival custody in both national and provincial archives, digital repositories still require access to new technological advancements, that is, both information systems that support digital preservation and the technical expertise to use these technologies effectively. The people digitising national library materials have to understand not only the descriptive metadata, but also components of various hardware and software requirements. Arora (2009) cautions that “it may not be possible to access the information unless there is appropriate hardware, and associated software, which will make it intelligible”.

Hardware and software refer to computer-based technology and tools that have been specifically designed to preserve digital objects. Digital preservation depends on hardware and software for the digitisation processes and operations to take place. Hardware is the general term used to refer to the physical pieces of technology designed for a specific purpose or goal. There are typical and proficient hardware technologies or tools used in the implementation and sustenance of the digital preservation undertaking. Among some of that hardware are digitisation devices such as scanners, storage devices and client side.

2.5.1. Digitisation devices

Digitisation devices or tools are used to convert analogue documents into digital format and to preserve them. The most known hardware technologies in libraries include scanners and digital cameras. A scanner is a marginal device that optically scans or

reproduces images, printed text, handwritings or objects, and converts them into similar digital images. Martinez, Cuesta, Barreiro, Alvarez and Fernandez (2008) distinguish between contact and non-contact scanners. Contact scanners are used to produce a replica of a certain object, while non-contact scanners are generally used to record larger objects such as buildings and sculptures. Puglia, Reeds and Rhodes (2004) also make mention of various types of scanners, namely, flatbed scanners, drum scanners, sheet feed scanners, book scanners and microfilm scanners. This study sought to find out types of scanners used and for what purpose when digitising materials at the NLSA.

One of the most used scanners in national libraries is the flatbed scanner. As printing paper becomes older, they become more delicate. This renders the flatbed scanner the appropriate choice of scanner for preservation. Flatbed scanners can handle rough documents with various kinds of thicknesses. By virtue of the fact that print documents are scanned from the bed of the device, this scanner becomes one of the most suitable solutions for scanning newspapers. Aora (2009) applauds “microfilming as a tried and tested technology for preservation of documents with proven longevity, since the life expectancy of microfilm is in the 500+ year range”. The technology required to access microfilm is the microfiche reader. On the other hand, Meger and Draper (2012) found book scanners to be some of the widely used devices of scanning books in Colorado State university libraries.

A digital camera may also be used in the digitisation of library materials. A digital camera is an electronic input device that converts original scenes or tone images into digital images and is capable of capturing the materials in any size (Zhou, 2016). A photo of a printed material is captured, and the result is converted into a digital object or material. A digital camera is, therefore, useful in a case of fragile materials made up of sensors made from silicon. According to Zhou (2016), many library professionals believe that digitising print materials using a digital camera required expertise of a professional photographer. However, such expertise is only required for setting up photographic or shooting studio and for training novice users of digital cameras.

2.5.2. Storage devices

It is a well-known fact that the primary objective of any digitisation project is to store digital collections or objects to ensure their long-term survival and at the same time to provide continued access to those collections. Corrado and Moulaison (2015) remark that “while there are many different technical aspects of digital preservation, one of the prominent issues is how and where to store the digital objects that are being preserved” Therefore, for digital preservation to take place, a larger or huge storage space for the digital content is required. Adequate memory, large space or file storage and good communication capabilities are some of the characteristics that any storage device for digital preservation project should have. “Although hard disc (fixed and removable) solutions are increasingly available at an affordable cost, optical storage devices including WORM, CD-R, CD ROM, DVD ROM or opto-magnetic devices in standalone or networked mode, are attractive alternatives for long-term storage of digital information” (Arora, 2009). In most cases, servers are tools that are used to store large amounts of information in digital forms and to distribute such information through networks. A server is any computer or computer programme, which is utilised to manage access to digital resources or services from an organisational network.

Arora (2009: 144) mentions some of the important features of storage infrastructure in order to satisfy the requirements for digital preservation, the availability of storage devices linked to multiple servers, high-speed throughput and separation from the Local Area Network (LAN). “Increased scalability entails that, depending on the requirements of the digital repository, the storage media should be accessible. The storage system should be a sharable device that can be accessible from multiple servers. High-speed throughput means that the storage device should utilise channels for carrying traffic between devices at high speed; and separation from the LAN requires that the storage system attached to a digital repository should only be accessible via devices physically connected to it so that the storage system remains unaffected by traffic on the user LAN and vice versa” (Arora, 2009:144).

2.5.3. Software requirements

Madalli, Barve and Amin (2012) consider that for libraries to be in a position to store, organise and retrieve digital content, they use either open or commercial or proprietary

software. Along these lines, there is a growing number of software solutions available on the market that address the digital preservation needs of libraries, categorised under commercial and open source. While commercial software refers to several fee-based digital resources that can be accessed through subscription, open-source software refers to those that people can share freely through the internet and other related platforms. Madalli *et al.* (2012) note that there is a growing number of open-source software programmes that are available free under the software licence and conditions for digital libraries and institutional repositories. The most commonly known open software in most libraries is the Open Archival Information System (OAIS). Brown (2013: 10) acknowledges the OAIS reference model for its seminal movements in the development of a coherent conceptual framework for digital preservation. The software has also been issued an International Standard (ISO 14721: 2013), which spells out a detailed model of the function and processes required of the digital repository and introducing a set of terminology for the preservation community. To this end, there is a need to know the software adopted by the NLSA.

2.6. DIGITISATION CHALLENGES

The Systems theory relates to this objective in the respect of the challenges faced when digitising library materials at the NLSA. This objective illustrates the several challenges faced in all the different stages of the Systems Theory, it can either be on the Input, processing and output stage. The preservation of digital objects involves a variety of challenges, including policy questions, institutional roles and relationships, legal issues, intellectual property rights, and metadata (Thibodeau, 2005). Moghaddam (2010) and Mutula, (2014) also make mention of “physical storage, long-term preservation and long-term access, protection of copyright and metadata beyond basic bibliographic description as some of the many issues of concern”. The general outline of digital preservation challenges is therefore well established. Hedstrom and Montgomery (1999) maintain that digital content is susceptible to loss and destruction because they are stored on fragile magnetic and optical media that deteriorate rapidly.

Ngoepe and van der Walt (2009) and Arora (2009) confirm that digital records “are fragile due to high pace of technological changes resulting in obsolescence”. Arora (2009:112-113) warns: -

Techno-obsolescence is considered as the greatest technical threat to ensuring continued access to digital contents, and further that the digital materials stored on older media could be lost because the hardware or software to read them may become obsolete. Although the media may physically survive for years, the technology to read and interpret it may exist for only for a brief period. As a result, even if the storage media is retained in the best condition, it may still be not possible to access the information it contains.

This entails that “newer versions of software and hardware usually render older versions obsolete” (Nsibirwa, 2012: 121). Hedstrom and Montgomery (1999) further state that even if the media are preserved intact, digital materials become unreadable if the playback devices necessary to retrieve information from the media become obsolete, or if the software that translates digital information from machine- to human-readable form is no longer available. Libraries, archives and other repositories that traditionally have assumed responsibility for preserving information also face technical, legal and organisational challenges in responding to the new demands of digital preservation. In a study conducted by Balogun and Adjei (2018) in the National Archives of Nigeria, it was found that issues such as lack of funding for digitisation projects, lack of digitisation policy, and lack of trained personnel are major challenges facing the digitisation project.

De Beer *et al.* (2016) found that national libraries face challenges regarding legal deposit legislation and institutional policy, legal considerations such as copyright, environmental factors, established mechanisms for deposit, information retrieval and access, preservation, human resources, financial implications and trust. Tembo, Kalusopa and Zulu (2006) also state some of the challenges regarding the status of digital heritage materials preservation in Botswana. Foremost, there is a lack of a national policy framework on digital heritage material preservation and lack of standards in digital heritage material preservation; lack of hardware, software, storage media and metadata; and lack of clearly defined national heritage institutions responsible for digital material preservation. The management of indigenous knowledge systems, in terms of their digitisation, remains to be addressed; and disaster planning and recovery in most heritage organisations remains to be addressed. De la Porte and Higgs (2019) caution that “the lack of a national policy on digitisation has possible consequences for interoperability and limited access”.

Ghana, Adu and Ngulube (2017: 1127) identified “funding, level of security and privacy, skills training and technological obsolescence as factors that pose key threats to digital preservation and thereafter recommended that the ministries and agencies can address many of the digital preservation challenges if they adopt backup, refreshing, metadata and migration strategies”. Ngulube (2012), Sigauke and Nengomasha (2011) and Kanyengo (2006) give emphasis to the enormous challenges that institutions in Africa face when it comes to preserving digital resources, despite placing efforts of promoting digital preservation. Among others, the problems include:

- Lack of trained staff or experienced library and information science (LIS) professionals in the management and preservation of digital resources in academic libraries.
- Poor technological infrastructure and adequate resources to enable preservation practices.
- Lack of policies, standards and procedures of regulating the creation, storage, retrieval and preservation of digital information resources.
- Poor collaboration efforts and partnerships.

The findings of the study conducted by Masenya and Ngulube (2019:1) also “revealed that academic libraries experienced difficulties in preserving and sustaining their digital resources because of the absence of established standards, policies and procedures, inadequate resources, as well as a lack of skills and training. They also had difficulties with limited funding and collaboration efforts, and the threat of technological obsolescence because of the constantly changing software and hardware, poor technology infrastructure and legal issues”. Mabe and Potgieter (2021) confirm that instead of one institution owning different kinds of scanners, it is better to work collaboratively to reduce duplication of resources. Therefore, collaboration should be seen as a cost-saving measure.

A study by Rakemane and Mosweu (2019:2) also revealed that “budgetary constraints, poor environmental controls, ill-equipped staff and technological obsolescence are the major challenges hampering the efforts of archival institutions in Sub Saharan Africa

to manage and preserve digital collections.” Netshakhuma (2021) found that lack of resources for running a digitisation project is among some of the obstacles towards the sustenance of digital project at the premier’s office in Mpumalanga. Preservation and digitisation of library materials also requires relevant skills. However, lack of technical skills appears to be one of the major challenges faced by national libraries in the preservation of their country’s national heritage. Poorly equipped library staff members are able to contribute towards the preservation and management of digital collection and is one of the challenges faced by heritage institutions in Sub-Saharan Africa (Rakemane & Moshewu, 2019). The development of technical skills to create, manage and preserve the national heritage is therefore one of the most important areas that digital preservation projects should focus their attention on (Page-Shipp, 2011). Other authors such as Angevaare (2009), Asogwa (2011) and Brown (2013:4) also raise this issue of lack of technical skills and knowledge in digitisation. De la Porte and Higgs (2019) conducted a study on challenges experienced by memory institutions during the digitisation of cultural heritage materials in the Western Cape, South Africa. The study found that although most memory institutions in the area followed professional and international guidelines to digitise cultural heritage materials, “the lack of a national policy on digitisation has possible consequences for interoperability and limited access. Open access to digitised cultural heritage material is encouraged, but access for use is still limited” (de la Porte & Higgs, 2019: par 4).

2.7. CHAPTER SUMMARY

This chapter reviewed the literature related to the subject of the study. It started by presenting the theoretical framework on which the study is based, namely, the systems theory, which deals with input, processing and output. Input encompasses selection and acquisition; processing comprises organisation, indexing and storage; and output involves search and retrieval. This chapter outlined literature with respect to the concepts related to policies and legislations which are collection development policy, purpose of collection development policy, and linking digital preservation with collection development policy. Digital preservation as part of collection development is discussed. The literature found that several studies that researched the same subject found that most libraries that implement digital preservation seem not to be following policy guidelines and legislation. The systems for organisation of digitised collections

were also discussed in this chapter. This is followed by a detailed discussion of metadata, descriptive metadata and metadata standards. This chapter also outlined a discussion on the access, infrastructural and technological facilities, digitisation devices, storage devices and software requirements. Lastly, the chapter discussed the digitisation challenges faced when digitising library materials. These concepts were key to answer the research question of the study and to form a basis for designing the research instrument or interview questions to be used to collect data. The following chapter (Chapter 3) will discuss the research methodology adopted in the study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. INTRODUCTION

The previous chapter provided a detailed literature review of the study. Its purpose was to identify gaps in literature, which the current study attempts to fill. To fill the gap in literature relating to the topic, sound methodological methods and procedures must be carefully chosen, adopted and followed for the purpose of data collection. Therefore, this chapter discusses the research methodology that was chosen, adopted and followed in this study for the purpose of collecting data. The chapter describes and provides motivation for the research approach and research design adopted as well as details regarding the procedures followed in collecting data at the area of study, that is, the National library of South Africa in Pretoria.

The current chapter also describes both the target and accessible populations; and provides justification for the sampling procedure adopted, including the sample size arrived at. Furthermore, this chapter explains and justifies the data collection instrument that was utilised in the study, including the process followed to test the reliability and validity of the instrument. This is essential in that the type of data collection instruments selected and used should be appropriate to sufficiently address the objectives of the study.

Lastly, this chapter explains the research ethics that were considered before this study was undertaken and data were collected. However, before coming to a discussion of research approaches and methods adopted used in the study for the purpose of collecting data, a discussion of research paradigms will provide an insight into the foundation of the methodologies that were adopted in the study.

3.2. RESEARCH PARADIGMS

Every research is based on a set of common beliefs and agreements about how research problems could be understood and addressed, which are referred to as “research paradigms” (Wahyuni, 2021). Originally presented by Kuhn (1962), the concept “paradigm” was employed to describe the “shared generalizations, beliefs,

and values of a community of specialists regarding the nature of reality and knowledge” (Creswell & Clark 2011). Antwi and Kasim (2015) state that the term paradigm originated from the Greek word “paradeigma”, which means pattern. According to Kuhn (1962), a research paradigm is an all-encompassing system of interrelated thinking and practice, which defines the nature of enquiry along three dimensions, namely, ontological, epistemological and methodological dimensions. Creswell (2013) explains further that a research paradigm is also referred to as philosophical worldviews. Each paradigm has its own ontological, epistemological and methodological purpose. The aspects of ontological and epistemological positions in research are concerned with a person’s worldview of a phenomenon that has a significant influence on the perceived relative importance of reality (Bryman, 2011). According to Creswell (2013), worldviews are general philosophical orientations about the world and the research type that the researcher brings into the study. The methodological stance in research, on the other hand, outlines four main types of research paradigms (worldviews). These are positivism, post-positivism, transformative, constructivism and pragmatism (Creswell, 2013).

3.2.1. Positivism

Henning, Van Rensburg and Smit (2004) explain that at an ontological level, positivists assume that the reality is measurable using properties that are independent of the researcher, together with his/her research instrument, and objectively given. Furthermore, positivism is concerned with revealing the truth and presenting it by empirical means. Therefore, positivists adopt scientific methods and systematise the process of generating knowledge with the aid of quantification in order to enhance precision in the description of parameters and the relationships between them (Henning, Van Rensburg & Smit, 2004).

3.2.2. Post-positivism

The post-positivism assumption represents the traditional form of research which is more inclined towards quantitative rather than qualitative approaches to research (Creswell, 2013). Widemuth (1993) explains that the post-positivist approach is a scientific, systematic, empirical, critical and controlled investigation of natural phenomena, which is guided by theory and hypotheses regarding the presumed

relations among such phenomena. According to Henning, Van Rensburg and Smit (2004), post-positivism claims that even though the object of enquiry exists, it cannot be perceived with total accuracy by observation. Put differently, complete objectivity is almost impossible to achieve, but is still pursued to regulate the search for knowledge. Furthermore, post-positivism holds claims that only scientific research is objective, certain, valid and accurate (Mertens, 2014). Table 3.1 below summarises the four research paradigms.

Table 3.1: Four major research paradigms (Creswell, 2013)

Post Positivism	Constructivism
<ul style="list-style-type: none"> ✓ Determination ✓ Reductionism ✓ Imperial observation and measurement ✓ Theory verification 	<ul style="list-style-type: none"> ✓ Understanding ✓ Multiple Participant Meanings ✓ Social and historical construction ✓ Theory generation
Transformative	Pragmatism
<ul style="list-style-type: none"> ✓ Political ✓ Power and justice orientation ✓ Collaborative ✓ Change-orientation 	<ul style="list-style-type: none"> ✓ Consequences of actions ✓ Problem centred ✓ Pluralistic ✓ Real-world practice orientation

Gray (2013) highlights that the post-positivist ontology believes that the world is external and that there is a single objective reality to any situation irrespective of the researcher’s belief. The post-positivist therefore takes a controlled and structured approach when conducting research by clearly identifying a research topic, constructing suitable hypotheses, and adopting a suitable research methodology (Gray, 2013). Furthermore, positivist researchers remain detached from participants of the research by creating a distance, which is crucial for remaining emotionally neutral for making a clear distinction between feeling and reason (Gray, 2013).

3.2.3. Constructivism

Constructivism, which is often described as interpretivism by Pickard (2013), is perceived as a learning philosophy that is founded on the premise that we are all constructing our own understanding of the world we live in through reflection of own experiences (Creswell, 2013). Constructivists hold a positive view that the world is constructed fundamentally and mentally through subjective meanings of their experiences (Creswell & Poth, 2018). People construct meanings when composing texts, read texts and hear texts. They also build their own meanings based on knowledge, which they bring to the task, and develop when performing it (Sekaran & Bougie, 2013). Constructivists also believe that human reality is created by dialogue and interpretation process through which people form and modify meanings. They also maintain that there are numerous ways of structuring the world and there are multiple perspectives in any event. Based on this rationale, constructivists do not search for the truth but seek to understand the rules that people use to make sense of the world in which they live and work by examining what happens in people's minds (Creswell, 2013). Constructivists' assumptions are also more inclined to the qualitative approach to research (Creswell, 2013).

3.2.4. Transformative

The transformative assumption holds that research enquiry needs to be intertwined with politics and political change confronting the social oppression of people who are marginalised in our society (Creswell, 2013). Chouinard (2010) elaborates that the transformative paradigm is motivated by a strong human rights and social justice agenda which is targeted at marginalised communities like women, ethnic minorities, poor people and people with disabilities. This paradigm emerged in response to people who were pushed to the societal margins throughout history and have found a means for bringing their voices into the research world. The transformative paradigm, therefore, focuses mainly on the dimensions of power, culture, social justice and privilege (Chouinard, 2010).

3.2.5. Pragmatism

Pragmatism is the view that considers the real effects or practical consequences to be crucial components of both truth and meaning. Pragmatism asserts that any theory, which proves itself more successful in controlling and predicting the world than its rivals can be closer to the truth. Pragmatists believe that the truth is not ready-made, but is made jointly by people and reality (Kaushik & Walsh, 2019). Some pragmatists believe that truth is relative to a conceptual scheme. According to Sekaran and Bougie (2013), pragmatists believe that any research that is based on either objective, observable phenomena or subjective meanings has a potential to produce valuable knowledge, which depends on the research questions of the study. Furthermore, Creswell (2013) highlights that this approach advocates for the pluralist approaches to gain knowledge of the social problem and hence its usage of a mixed methods approach to research. Creswell (2013) states further that mixed methods researchers advocate for the use of multiple methods, different worldviews and different assumptions, different forms of data collection and analysis methods.

3.2.6. Choice of research paradigm

This study adopts a pragmatism research paradigm, which uses many approaches of collecting and analysing data. Creswell and Poth (2018: 27) contend that pragmatism researchers have are free to “choose the methods, techniques, and procedures of research that best needs their needs and purpose”. Clarke and Visser (2018) confirm that the strength of a pragmatism research lies in the fact that it provides the researcher with an opportunity to employ a range of strategies to study the research problem. Maree (2016: 309) also expresses that a pragmatism position allows for multiple meanings of individual experiences. This study also uses multiple strategies such as observation, document analysis and interaction with people to understand the phenomenon, which is digitisation of the documentary heritage at the NLSA.

3.3. RESEARCH ORIENTATION

Generally, there are two approaches or orientations in research. They are known as qualitative and quantitative approaches or orientations. According to Creswell (2013),

researchers not only select the research method, but they also decide on the type of enquiry within qualitative, quantitative and mixed methods research approaches.

3.3.1. Qualitative research

Queiros, Faria and Almeida (2017) explain the qualitative research as a research methodology or orientation dealing with the comprehension of an underlying problem. It is usually adopted to produce extensive and illustrative information in order to understand different dimensions of a research problem. This is a method of inquiry whose aim is to gather an in-depth understanding of human behaviour and the reasons behind that behaviour. Qualitative research uses different methods, which focus on things that occur in the “real world” and in their “complexity” (Pickard, 2013). Qualitative researchers are mainly interested in meanings rather than numbers. Qualitative research deals with how individuals make sense of the world, how they experience events and meanings that they attribute to phenomena. They are more concerned with the quality of the experience rather than causal and statistical relationships. For Miles and Gilbert (2005), the distinguishing features of qualitative research are that it relies on linguistic (words) rather than numerical data, and employs meaning-based rather than statistical forms of data-analysis.

3.3.2. Quantitative research

Quantitative research, on the other hand, collects systematic quantified data from a selected population with the aim of generalising findings on the population being studied (Maree, 2016). Furthermore, in quantitative research, the researcher relies on numerical data to test the relationship between variables and their frequency of relationships (Charles & Martler, 2010). Quantitative studies are more preoccupied with counting rates and sizes of carrying out statistical analysis. Goertzen (2017) defines quantitative research as a systematic investigation of phenomena by gathering data that is quantifiable, and performing statistical, computational, or mathematical techniques to the collected data.

3.3.3. Mixed methods research

A combination of both approaches and their methodological methods is commonly referred to as mixed methods research approach. Mixed methods research is defined

as that kind of a research design or approach that uses and focuses on collecting, analysing and mixing both quantitative and qualitative data collection methods in a single study (Creswell & Plano-Clark (2007:5). Creswell (2013) states that the mixed methods research approach resides at the middle of the continuum because it incorporates elements of both qualitative and quantitative research approaches in a single study. The premise and conviction behind the combination of quantitative and qualitative approaches lies in the fact that it provides a better understanding of research problems than a single research approach. A mixed methods orientation is also useful particularly in terms of adopting the best of both quantitative and qualitative approaches (Creswell, 2013:22). Maree (2016:268) also states that in mixed methods research, the researcher constructs knowledge about real-world issues based on pragmatism, which places more emphasis on finding answers to research questions than of the methods used. Mixed methods research allows the researcher to get quality viewpoints of participants about the investigated matter and to get statistics or quantity of responses.

3.3.4. Choice of research orientation

Qualitative research approach was adopted in this study. Qualitative research orientation provides a detailed account of actions and representation of actions so that there is a better understanding of social issues to use it to bring about a measure of change (Henning, Van Rensburg & Smith, 2004). In a qualitative research approach, individuals are conceptualised as active agents in constructing and making sense of realities that they encounter. Creswell and Poth (2018: 45) emphasise that qualitative research is conducted in order to understand a problem or an issue that needs to be understood. This study sought to gain an insight into processes and techniques used in the digitisation of the documentary national heritage at the NLSA. Interviews are directed to staff employed in the digitisation and preservation services of the NLSA. Observations were conducted on the digitisation process until material access points. Document Analysis is conducted on the policies and guidelines that guide digitisation officials to perform their daily tasks. Qualitative studies are also employed when researchers want to empower individuals to share what they are doing, and the reasons behind their actions (Creswell & Poth, 2018). Furthermore, a qualitative study was adopted in order for the researcher to have an insight into the context or setting

in which participants address the issue at hand, and in this case, the process of digitising library materials at the NLSA.

3.4. RESEARCH DESIGN

Leedy and Ormrod (2014) mention that a research design provides a plan for collecting and analysing data in a manner that is relevant to the objectives of research. Furthermore, research design provides the population to be studied, measurement variables, the sample design, the information gathering technique and the strategy for data analysis. Every research methodology or orientation, either qualitative or quantitative has its own research designs. In this study, emphasis is placed on the adopted research designs, that is, qualitative research designs, namely, phenomenology, ethnographic research, case studies and grounded theories.

3.4.1. Phenomenology

Creswell (2013) refers to a phenomenological study as a method of research that defines the meanings of lived familiarities of phenomena or notions (thoughts) of several individuals. Phenomenology practically aims at elucidating how the life world of subjects (participants) is developed and experienced. O'Leary (2017:149) shares the same sentiment that "phenomenology involves an examination of some phenomena as they present themselves in the individuals' direct understanding and experience". According to De Vos *et al.* (2011:316), the life world describes a person's conscious experience of everyday life as it happens, and their social actions. The purpose of this approach is to describe what the life world has, or what structures and concepts of experience give form and meaning to it (Schram, 2006). Phenomenological studies require that the researcher should carefully choose participants who are well experienced with the phenomenon in question. However, finding individuals who are experienced with the phenomenon may be difficult, depending on the topic being researched (Creswell & Poth, 2018). There is always a possibility of reaching a saturation level due to a limited number of participants who are experienced about a phenomenon.

3.4.2 Ethnography

The ethnographic research approach has many things in common with the fields of anthropology and sociology (Salkind, 2010). Ethnographic research refers to an investigation of a culture through an in-depth study of members of the culture. “Ethnography is a type of qualitative research that gathers observations, interviews and documentary data to produce detailed and comprehensive accounts of different social phenomena” (Reeves, Peller, Goldman & Kitto, 2013). It encompasses a systematic collection, description and analysis of data for the expansion of theories of cultural behaviour (Leedy & Ormrod, 2015:139). This entails that the researcher’s goal is to comprehend and define the setting with which the researcher is unfamiliar with. This model of qualitative research design describes learned and observable patterns of behaviour, customs and ways of life of people. The study is conducted in a natural or real-world context where the researcher tries not to interfere with the phenomenon as much as possible in order to describe the situation as it is (Leedy & Ormrod, 2015).

3.4.3 Grounded theory

Grounded theory refers to a theory that occurs from observations made in a particular study and is grounded in a specific setting (Remler & Van Ryzin, 2015:560). According to Leedy and Ormrod (2015:142), “the term grounded refers to the idea that the theory that emerges from the study is derived from and grounded in data that have been collected in the field rather than taken from the research literature”. This means that grounded theory, by nature, begins from a particular theoretical framework that results into new ideas and knowledge about the phenomena to develop a particular theory. The major purpose of this theory is to start with the data and later use the same data to develop a theory. It uses a prescribed set of procedures to analyse data and to construct a theoretical model out of it. These forms of studies are of paramount importance, especially in a situation where current theories about the phenomenon are either not existing or not enough to assist in fielding the knowledge gap (Leedy & Ormrod, 2015).

3.4.4 Case study

According to Bertram and Christiansen (2015:42), “a case study is a systematic and in-depth study of one particular case in its context, where the case may be a person,

a group of people, a school, a community or an organisation”. A case study research is one of the research approaches that can be applied using qualitative or quantitative positions. It offers rich and in-depth information that is unique. Case studies are descriptive in nature; they describe what it is like to be in a situation. However, they can also be used to generate claims for further verification. This kind of research design allows the researcher to capture the reality of participants’ lived experiences and thoughts about a situation. What matters most in case study research is not necessarily the representative of common cases. Therefore, results cannot be generalised. Furthermore, Bertram and Christiansen (2015:43) contend that there are validity concerns, which are expressed in the case study, which involve ensuring:

- that data collected reflect the case,
- that the claims are supported by data and are not generalised beyond what the case can warrant; and
- that when the case study is instrumental, it must be carefully considered how typical it may be, and which findings can or cannot be transferred to other cases.

3.4.5. Choice of a research design

The researcher adopted qualitative research using a case-study research design. A case study design was adopted because it focusses on a single phenomenon using different and multiple methods to achieve the research objectives (Creswell & Poth, 2018: 96). The choice of a case study research design in this study lies in the fact that it sheds some light and understating of a complex phenomenon of what is already known through previous research or learning (Maree, 2016: 107). A case study is also used in the exploration of areas where existing knowledge is limited (Rashid, Rashid, Warriach, Sabir & Waseer, 2019). Therefore, the application of a case study research design in this study would help the researcher and interested parties to gain more knowledge on how digital preservation and access of the documentary national heritage is achieved at the NLSA.

3.5. POPULATION AND SAMPLING

This section looks at the selection of people who participate in the study and the reasons behind their selection.

3.5.1. Population

According to Creswell (2013), population refers to the entire group of people, events or things of interest that the researcher intends to solicit information from. In social terms, a population is simply the total available pool of individuals who could become subjects or participants in a research study. The individuals within a population usually have common characteristics (Sudman & Blair, 1999; Du Plooy, 2009). Fraenkel and Wallen (2000) refer to a population as a group of individuals the researcher is interested in studying, and upon which to further generalise findings or results of the study. A population is also defined as a cluster of people or items that share one or more features from which data can be collected and examined (Leedy, 2001:74).

The population of this study consisted of library staff working in the preservation and conservation services of the NLSA. The current study reached saturation after collecting data from four (4) crucial participants in the digital curation and preservation section of the NLSA. The researcher found that the other participants were temporary interns that could not provide reliable responses to the study at hand. However, it should be noted that despite having four participants, they were senior officials in the institution and had an extensive experience in matters relating to the digitisation of library materials. Participants had experience to an extent that they developed some of the policies being used at the NLSA. Furthermore, the researcher relied more on the other two data collection tools to give more flesh to the data collected.

Singleton and Straits (2010:155) advice that to define the target population, the researcher must specify the criteria of determining which cases are included in the population and which are excluded. The unit of analysis of this study was also made up of senior digital curation officers. Apart from the two senior officials in the digital curation and preservation section, the researcher also used five (5) digitisation practitioners who were interns, who were purposively selected for observation of the role that they play in the digitisation quality control section. The other five (5) interns

were also purposively selected from the Optical Character Recognition (OCR) section for observation of the work that they perform, of which they all fall under the digitisation department. Table 3.1 describes positions of the anonymised participants.

Table 3.2. Anonymised participants and their roles.

Participants	Positions
Participant A	Senior digital curation officers
Participant B	Senior digital curation officers
Participant C	Digitisation practitioner
Participant D	Digitisation practitioner

3.5.2. Sampling

Sampling is a research principle and technique used to select members of population to be included in the study. It has been rightly noted that because “many populations of interest are too large to work with directly; techniques of statistical sampling have been devised to obtain samples taken from larger populations” (Proctor, 2003). Research literatures explain that there are two sampling methods that could be used, namely, probability sampling and non-probability sampling (Leedy & Ormrod, 2014). Andale (2015) suggests that probability sampling is also known as a sampling method that permits every single element from the population to have an equal chance of presence in the sample.

Unlike the probability sampling method, the non-probability sampling technique uses nonrandomised methods to draw the sample. Non-probability sampling methods mostly involve judgment. Instead of randomisation, participants are selected because they are easy to access (Daniel, 2012). Diamantopoulos and Schlegelmilch (2000) mention that probability sampling uses random sampling techniques to create a sample, and it is based on the premise that every member of a population has a known and equal chance of being selected in the sample. Its major drawback is that it is tedious and time-consuming. On the other side, techniques of nonprobability sampling use non-random processes, and chances of elements being selected in the sample

cannot be calculated. Its major advantage is that it is time and cost effective (Diamantopoulos & Schlegelmilch, 2000)

The study has adopted a non-probability sampling technique in the form of a purposive sampling method. Therefore, purposive sampling in which participants are selected because of the common characteristic that they share was used. The logic behind purposive sampling lies in selecting information-rich cases (Patton, 2002: 169), that is, participants who are actively involved in the process of digitisation on a daily basis. Specific participants to be targeted in this study are the head or leader of the preservation services department at the NLSA, as well as the operational staff in the same service department

3.6. DATA COLLECTION

Data collection method is a process of gathering and measuring information on variables of interest in an established systematic manner that gives answers to research questions, evaluates the outcomes and tests hypotheses (Bertram & Christiansen, 2015:71). The data collection instruments associated with case study designs are observations, interviews and reviewing or analysis of documents (Creswell, 2014: 190; Brinkmann & Kvale, 2015: 213; De Vos, 2005: 120; Leedy & Ormond, 2015:271). In evaluating the data collection methodology to be adopted, the researcher must therefore ensure that:

- the instrument to be adopted is reliable and can be validated (reliability and validity),
- the study will be conducted within the available financial means,
- the study will be concluded within the agreed time frame (with regards to academic studies), and
- potential errors are minimised at the planning phase (Polonsky and Waller, 2010).

A case study also refers to the application of specific qualitative research methods in a specific setting (Gorman & Clayton, 2005: 47). According to Maree (2016), the most utilised data collection methods in qualitative research studies are interviews. Large

qualitative studies do not often interview more than 50 people (Vacileiou, Barnett, Thorpe & Young, 2018). Therefore, the researcher used interviews on the basis that the staff involved with the digitisation of library materials at the NLSA may not be too many to warrant quantitative data collection methods such as a questionnaire. This study used three data collection methods, namely, semi-structured interviews, document analysis and observations.

3.6.1. Interviews

An interview is a two-way conversation in which the interviewer asks participants some questions to collect data and to learn about their ideas, beliefs, views, opinions and behaviours (Maree, 2016). The primary aim of a qualitative interview is to understand the world from participants' point of view, to unfold the meaning of people's experiences, and to uncover their lived world prior to scientific explanations (DeJonckheere & Vaughn, 2019).

Interview questions are categorised into three types, namely, structured, semi-structured and unstructured questions. Structured interview questions are pre-planned and are asked in such a way that the interviewer must not deviate from the interview schedule (Zojceka, 2018). This type of interview questions are conducted quickly, which entails that an interview session may take place within a short space of time (McLoed, 2014). The interviewer controls the pace of the interview by treating questions in a standardised and straightforward manner. The problem with such type of interview questions is that they are not flexible and the responses from such interviews are not detailed. There is very little flexibility in the way questions are asked or answered in the structured-interview setting (Maree, 2016: 93).

Unstructured interview, on the other hand, may take the form of an in-depth conversation with the intention that the researcher explores with the participant her or his views, ideas, beliefs and attitudes about certain events or phenomena (Paton, 2002). The main advantage of unstructured interview is that their responses are detailed information than other types of data collection methods (Burns & Grove, 2011). There is also a prospect that the interviewee feels comfortable when having a fact-to-face conversation with the researcher as opposed to just answering

interrogatory questions about their opinions. However, prejudice and bias are among some of the limitations of the unstructured interview. Interviewees might want to 'prove' something or express their own deep feelings about a particular phenomenon under investigation. Boyce and Neale (2006: 3) also observe that "In-depth interviews can be time-consuming as an evaluation activity considering the time it takes for interviews to be conducted, transcribed and analysed".

The semi-structured interview is commonly used in research projects to substantiate data emerging from other data sources. As a researcher, you must be attentive to the responses of your participants so that you can identify new emerging lines of inquiry that are directly related to the phenomena being studied, and explore and probe this (Maree, 2016: 93). At the same time, it is easy to get side-tracked by trivial aspects that are not related to the study. Maree (2016) states that if this happens, you need to get your participant back to the interview.

The main instrument of data collection in this study was the semi-structured interview. A list of questions or the interview schedule is attached as appendix A. This type of data collection instrument allows the researcher to make follow-up questions in cases responses from interviewees are not clear. The interview process also allows the researcher to investigate in depth and examine at first hand the state of digitisation of library materials in the NLSA. Chinyemba (2002: 64) notes that a semi-structured interview is an appropriate tool that can collect information economically within the available time. Interviews for this study were organised according to the objectives, and where necessary, follow-up questions were asked to obtain in-depth information. To provide quality to the study, questions were asked randomly depending on the responses provided by participants.

3.6.2. Document analysis

Sometimes referred to as content analysis, document analysis is defined as a technique of analysing print, electronic materials and audio-visual communication media (Allen 2017). Document or content analysis is a systematic procedure of reviewing or evaluating documents, both printed and electronic (computer-based and Internet-transmitted) materials. Like other analytical methods in qualitative research,

document analysis requires that data be examined and interpreted to elicit meaning, gain understanding, and develop empirical knowledge (Corbin & Strauss, 2008; Rapley, 2007). Wagner, Kawulich and Garner (2012:148) define document analysis as a method that is integrated and conceptually informed; it involves procedures and techniques of locating, identifying, retrieving and analysing documents for their relevance, significance and meaning. Atkinson and Coffey (2011: 47) refer to documents as 'social facts' that are produced, shared and used in socially organised ways.

According to Tight (2019), documents that may be used in the systematic evaluation as part of a study take a variety of forms. They include advertisements; agendas, attendance registers, and minutes of meetings; manuals; background papers; books and brochures; diaries and journals; event programmes (i.e., printed outlines); letters and memoranda; maps and charts; newspapers (clippings/articles); press releases; programme proposals, application forms and summaries; radio and television programme scripts; organisational or institutional reports; survey data; and various public records. Scrapbooks and photo albums can also furnish documentary materials for research purposes. These types of documents are found in libraries, newspaper archives, historical society offices, and organisational or institutional files (Tight, 2019). The analytic procedure entails finding, selecting, appraising (making sense of) and synthesising data contained in documents. Document analysis yields data pieces, quotations, or entire passages—that are then organised into major themes, categories, and case examples specifically through content analysis (Bowen 2009).

One of the objectives of this study is to analyse the NLSA existing preservation and digitisation policy to confirm its adherence to collection development policies, national legislation, and other standards of digitising library materials. Therefore, it is mandatory that the contents of the digitisation policy at NLSA were obtained and analysed to verify adherence to NLSA collection development policy, national legislation and guidelines. By analysing the policy, the researcher was able to determine not only the types of materials and content, which are candidates for digitisation, but also processes that should be undertaken before the material is digitised. The identified items in the policies may be copyright guidelines, access restrictions, digital collection

development policy, digital infrastructure policy, digital preservation procedures, digital access to materials and selection guidelines

3.6.3. *Observation*

Observation is the systematic process of recording the behavioural patterns of participants, objects and occurrences without necessarily questioning or communicating with them (Hesse-Biber & Leavy, 2011). Observation is an everyday activity whereby we use our senses (seeing, hearing, touching, smelling, tasting) – but also our intuition – to gather bits of data. As a qualitative data-gathering method, observation is used to enable the researcher to gain a deeper insight into and understanding of the phenomenon being observed (Hesse-Biber & Leavy, 2011). Observation as a research method involves watching, listening and asking questions for the purpose of collecting information about the researched phenomenon. According to Gorman and Clayton (2005: 104), observation permits the researcher “to record what occurs as it occurs”.

According to Maree (2016: 91), there are four types of observation used in research, namely, complete observer, observer as participant, participant as observer, and a complete participant. As a complete observer, the researcher is a non-participant observer looking at the situation from a distance (called an etic or “outsider” perspective). As an observer participant, the researcher gets into the situation, but focuses mainly on his or her role as observer in the situation. Participant as observer is typically found in action research projects where the researcher becomes part of the research process and works with participants in the situation to design and develop intervention strategies. The researcher becomes a participant in the situation being observed and may intervene in the dynamics of the situation and even try to alter it. As a complete participant, the researcher gets completely immersed in the setting, to such an extent that those being observed do not know that they are participants of the observation. This type of observation is seldom used as it raises serious ethical concerns when those being observed have not granted consent to be observed.

The most important part of observation is the recording of the data. In recording your observations, you should capture two dimensions: your description of what you

observed (i.e. rich descriptions of what actually takes place, which should not include any value judgements) and your reflection about what happened (i.e. your own thoughts or ideas about the meaning of what was observed). It is important that you keep field notes as you conduct your observations (Maree 2016: 92).

According to Maree (2016: 92), there are hints for keeping field notes:

- Field notes should be as accurate as possible. Record what you see, hear and experience as if you are seeing it for the first time.
- Always write up the field notes as you make your observation. You make a digital recording of your observation notes. But make sure that you are clear about the where and when it was recorded (i.e., the context and the participants).
- When recording events or behaviour in a social setting, make sure that both verbal and the non-verbal behaviours are recorded.
- Reflection on your observation should be done as soon as possible after the event and should include your ideas (it appears it seems to be).

In this study, the researcher made a site visit to the NLSA in Pretoria on the 10th of March 2021 to do a complete observation of the methods and tools used to digitise library materials, and to record these methods and techniques as they occur in a natural setting. This assisted the researcher to determine the systems used to index and retrieve the digitised content at the NLSA, as well as the infrastructural tools used to digitise the documentary national heritage.

3.7. Triangulation

Ahmed (2007: 158) states “triangulation is a process of verification that increases validity by incorporating several viewpoints and methods. In the social sciences, it refers to the combination of two or more theories, data sources, methods, or investigators in one study of a single phenomenon to converge on a single construct and can be employed in both quantitative (validation) and qualitative (inquiry) studies”. Triangulation refers to the use of multiple methods or data sources in qualitative

research to develop a comprehensive understanding of phenomena (Patton, 1999). Triangulation also has been viewed as a qualitative research strategy to test validity through the convergence of information from different sources. Denzin (1978) and Patton (1999) identified four types of triangulation: (a) method triangulation, (b) investigator triangulation, (c) theory triangulation, and (d) data source triangulation.

The first type of triangulation is method triangulation, which involves the use of multiple methods of data collection about the same phenomenon (Polit & Beck, 2012). This type of triangulation, frequently used in qualitative studies, may include interviews, observations and field notes. Investigator triangulation involves the participation of two or more researchers in the same study to provide multiple observations and conclusions. This type of triangulation can bring both confirmation of findings and different perspectives, adding breadth to the phenomenon of interest (Denzin, 1978). Polit and Beck (2012) state that theory triangulation uses different theories to analyse and interpret data. With this type of triangulation, different theories or hypotheses can assist the researcher to support or refute findings. Data source triangulation involves the collection of data from different types of people, including individuals, groups, families and communities to gain multiple perspectives and validation of data (Polit & Beck, 2012).

This study used a triangulation method where three methods of data collection for the same phenomena were used, which are semi-structured interviews, document analysis and observations. The results of the interview on adherence to the digitisation policies are to be verified by the analysis of contents of those policies and legislations, while the results on technological equipment and technologies used in the digitisation are to be confirmed by observation results.

3.8. Data analysis

Qualitative data will be analysed using thematic analysis method. Thematic analysis is a process of identifying patterns or themes within qualitative data (Clarke & Braun, 2013). Thematic analysis is a method whereby similar responses from participants are grouped and categorised into themes (Nieuwenhuis, in Maree, 2016: 103). The method may be labelled the process of thematic analysis, coding, or a combination of

both. Grbich (2013) states that the thematic analysis process is conducted when a data set is complete, and one of the reasons is not often detailed in textbooks because it is particularly personal. Labels may be compulsory and can be derived from relevant previous literature, which has been reviewed from evidence within the area being studied or from views of those being observed or interviewed. However, despite the temptation for researchers to impose labels early in the process, qualitative research insists that the data should speak for itself initially before researcher- designed labels are over-imposed.

The process is one of reducing the data into meaningful groupings that are easier to manage. This study adopted segmentation out of two methods. Grbich (2013) states that segmentation may be used when close examination of fragmented data is desirable. Key word or phrases from several/ a set of responses are underlined/ listed and then tabled/ grouped and a thematic label is attached to the column. As the data mounts up, new columns and labels will be developed, and some columns will merge with others.

3.9. Quality Criteria

Paying attention to credibility, transferability, dependability and confirmability increases the trustworthiness of the study or research (Lincoln & Guba, 1985; Denzin & Lincoln, 2005). This is about how the researcher establishes if the study's findings are dependable, credible, transferable and confirmable.

3.9.1. Dependability

Dependability involves participants evaluating the findings, interpretations and recommendations of the study to make sure that they are all supported by the data received from informants of the study (Cohen, Manion & Morrison, 2011; Tobin & Begley, 2004). Dependability was established using peer examination. During peer examination the researcher discusses his/her research process and findings with neutral colleagues, such as doctoral students, who are either doing qualitative research or have experience of qualitative research. According to Bitsch (2005) and Krefting (1991), peer examination helps the researcher to be honest about his/her study and peers contribute to his or her deeper reflexive analysis.

3.9.2. Credibility

For the results or findings of a study to be credible, they must employ generally accepted research methodologies to enable others to verify them by replicating the methodology previously utilised (Kothari, 1985, 1991, 2004; Goddard & Melville, 2004). Credibility is defined as the confidence that can be placed in the truth of research findings (Holloway & Wheeler, 2002; Macnee & McCabe, 2008). Credibility establishes whether the research findings represent sensible information drawn from participants' original data and is a correct interpretation of their original views (Graneheim & Lundman, 2004; Lincoln & Guba, 1985). The researcher will emphasise credibility by adopting the credibility strategy of member checking, and will include voices of respondents in the analysis and interpretation of the data. The aim of doing member checks is to eliminate researcher bias when analysing and interpreting the results. This means that the analysed and interpreted data is sent back to participants for them to evaluate the interpretation made by the inquirer and to suggest changes if they are unhappy with it or because they had been misreported.

3.9.3. Transferability

Transferability refers to the degree to which results of qualitative research can be transferred to other contexts with other respondents – it is the interpretive equivalent of generalisability (Bitsch, 2005; Tobin & Begley, 2004). According to Bitsch (2005), the “researcher facilitates the transferability judgment by a potential user through ‘thick description’ and purposeful sampling”. Thick description involves the researcher’s elucidation of all research processes, from data collection, context of the study to production of the final report. Thick description helps other researchers to replicate the study with similar conditions in other settings. Purposive sampling helps the researcher to focus on key informants, who are particularly knowledgeable of the issues under investigation (Schutt, 2006), because purposive sampling allows decisions to be made about the selection of participants (Ary, Jacobs, Razavieh & Sorensen, 2010).

3.9.4. Conformability

Conformability of findings means that the data accurately represent the information provided by participants, and that the interpretations of those data are not invented by

the inquirer (Polit & Beck, 2012). This is about ensuring that the results are as objective as possible. An audit trail, which shows every step of data collection and analysis processes, reduces cheating in the study and ensures that the study's findings portray participants' responses and the subject knowledge of the research (Pickard, 2012: 22). The data collection technique, in which the study adopts more than two data collection methods, in which the other methods confirm the results of the other method is referred to as triangulation. In this study, the results of the interviews are also confirmed by the results of document analysis and observation.

3.10. ETHICAL CONSIDERATIONS

In South Africa, most leading universities require that all social science research involving human participants be reviewed by an independent research ethics committee (REC) before data collection can commence (Israel & Hay, 2006). Terre Blanche, Burrheim and Painter (2014:61) state that in 2003, the Human Sciences Research Council (HSRC), the largest social science research organisation in Africa, instituted compulsory ethics review for all research with human participants. In every research, there are ethical considerations that must be adhered to.

3.10.1. Permission to conduct research

The researcher applied for ethical clearance certificate at Turfloop Research and Ethics Committee (TREC). Before applying for the certificate, the Faculty Higher Degrees Committee issued a notification (attached as appendix D) that the research requires application for such certificate. This certificate served as evidence for the researcher to gain access to the NLSA and to study participants (Creswell, 2014). The ethical clearance certificate (TREC /187/2020: PG) that was issued on the 16th September 2020 is attached as appendix E.

Furthermore, there was a likelihood that the research may require the NLSA management's consent of the intention to conduct research in their organisation. The researcher needed to gather preliminary or preparatory information before the ethical clearance certificate is issued. The supervisor of this project was therefore requested to make request on behalf of the researcher. The specimen of the letter is herein attached as appendix C.

3.10.2. Confidentiality and privacy of participants

Secondly, confidentiality and privacy of participants should be protected from potential harm, embarrassment and distress when conducting research (Allen, 2017). Leedy & Ormrod (2013) state that the object of enquiry in social science research is the human being. As such, extreme care should be taken to avoid causing any harm. Participants were guaranteed anonymity and confidentiality of their participation. In addition to their privacy, participants had their names coded as “participant” in order to enhance their anonymity. The researcher ensured that all participants remain anonymous by giving them pseudonyms or labelling them as participants A, B C and so on, depending on their number. This was done by changing any real names with false names and disguising any details of the interview which may reveal the identity of participants.

3.10.3. Consent form

Thirdly, before the interview commenced, participants were asked for permission to be interviewed and were given a consent form (attached as appendix B) to append their signatures. This form is to make them to be fully aware of everything that is going to take place in the interview. This meant that participation was voluntary. In line with ethical considerations, the researcher started by explaining the purpose of the study to all participants. The researcher reminded them that their contribution was voluntary and that they had a right to stop the engagement at any point when they felt uncomfortable during the interview process.

Despite ensuring their confidentiality, participants that refused to be recorded had various reasons. One expressed that she had a bad experience of being recorded. The second one indicated his measure of dissatisfaction with recordings. He added that it is not easy for him to trust investigators with his recorded voice. He explained that the researcher presented the data in a way that led him to being reprimanded by his superiors for divulging the information that was not meant to be released. By refusing to be recorded and offered to have notes taken, it would save his job even if the superiors discover something that is not intended for sharing with non-employees of the organisation.

3.11. CHAPTER SUMMARY

The chapter focussed on the research methodology that was followed to conduct the current study. It addressed study population, sampling, data collection, data analysis, data presentation and ethical considerations. It has been highlighted that the research adopted a constructivist research paradigm, which involves the employment of the qualitative research methodology. The population of the study included two senior data curation officials and three interns. Semi-structured interviews, observations and content analysis were used as data collection methods of the study. Ethical principles that were adhered to have also been discussed in the chapter. The next chapter deals with analysis and interpretation of data collected.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

4.1. INTRODUCTION

The previous chapter discussed the research methodology used in the collection of data in the current study. It focused on the methods and processes followed by the researcher to collect data in order to address the study's research objectives. The current chapter presents, analyses and interprets data. The findings and results of data collected from the target population through semi-structured interviews, observations and document analysis are presented and analysed. Leedy and Ormrod (2013) and Saldana (2013) recommend that during the presentation of data, researchers are expected to think as spectators rather than as presenters to mitigate bias. Data is presented, analysed and interpreted in accordance with the objectives of the study and the themes identified from the responses. De Vos, Strydom, Fouche and Delpont (2011) opine that the presentation and analysis of findings is crucial because scholars are permitted to reduce collected data to an intelligible and interpretable form so that the relations of problems are easily studied and tested to the point where conclusions are drawn. Monette, Sullivan and De Jong (2011) state that data analysis unlocks the information hidden in the raw data and transforms it into something useful and meaningful.

The study used semi-structured interviews, document analysis and observations as data collection methods. While the semi-structured interview was the dominant data collection method in this study, document analysis was employed to determine adherence to the digitisation and preservation policy in the collection development of the NLSA, the national legislation, guidelines and standards. On the other hand, observation was used to understand the technologies and equipment used, as well as the step-by-step process of digitisation. Therefore, some of the findings (from the interviews) are presented verbatim on the tables and the main themes highlighted in bold, and then discussed narratively. Observation results are presented in the form of photos captured at the NLSA.

4.2. SEMI-STRUCTURED INTERVIEW RESULTS

The researcher conducted semi-structured interviews with officials who are directly involved with the digitisation process of the NLSA. Senior digital curation officers were interviewed first. Thereafter, interviews were conducted with digitisation practitioners on the lower level about procedures relating to the digitisation and access of the national documentary heritage of South Africa. This gave an idea of how the digitisation of library materials at the NLSA was conducted at the time of this study.

4.2.1. Digitisation policy at the NLSA

In this section, the researcher wanted to know if there were any guidelines, legislations and policies that have been developed for the NLSA adhere to during the digitisation of library materials at the NLSA. This a matter of determining the influence of policy and legislation in conducting digital preservation and access to NLSA library materials. This was a good step in identifying key legislations that are linked to the NLSA digitisation policies. Participants knew the legislation but were not so confident about it because some said the legislation is still a draft copy. The following table (Table 4.1) shows how participants responded to the questions.

Table 4.1: Digitisation policy at the NLSA

<p>Participant A</p>	<p><i>Yes, there is a digitisation policy that guides us on what we digitise and why we digitise together with the principles that must be followed when digitising. The digitisation policy used at the NLSA is firstly aligned with the International standards (ISO), in terms of guidelines of how we digitise and the standards that one must follow when digitising library materials. The other digitisation policy was developed by the Department of sports arts and culture because they are the managers of libraries, museums, and archives, so they developed a digitisation policy. The policy developed is a draft, however, we do follow it as advised which the review of the</i></p>
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	<i>national policy on the digitisation of heritage resources of May 2018 (draft).</i>
Participant B	<i>The policy was review so that it may be finalised, and we do follow it for as long as we have digitisation projects. We have developed a step-by-step guideline for the NLSA that provide detailed rules to enable successful digitisation, it is a standard operating procedure manual (SOP)</i>
Participant C	<i>The NLSA is guided by the copyright policy especially when digitising its collection. The copyright policy stipulates all the guidelines to be followed when digitising the intellectual property according to the rights given to an author or the owner of the intellectual property. According to the copyright law, every publisher or author exhausts the rights to the intellectual property after 50 years of the death of the original author and 50 years after the date of first publication in terms of the copyright policy.</i>

The verbatim response from participant A shows that there were policies and guidelines for the digitisation of library materials at the NLSA. It has also been revealed that the digitisation policies at the NLSA are also aligned with International Standards Organisation (ISO) and guidelines. Hider (2012) has referred to the ISO standards in the literature review. In as much as there are established standards for management of records in record management organisations, there are also standards for digital processes and services. Well-known standards for digital conversion and migration processes are:

- ISO 13008:2012: Information and documentation- digital records conversion and migration process.
- .ISO /TR 13028: 2010: Information and Documentations: Implementation of guidelines for digitisation of records.
- ISO 17068:2017: Information and documentation – trusted third party repository for digital records. (Katuu, 2016).

Halbert, Skinner and McMillan (2009: 88) state that these guidelines on digitisation enhance strong governance structures that promote transparency and accountability. These guidelines must be established to alleviate a lawless environment when accessing and preserving digitised library materials. The results further show that there is a standard procedure operating manual that is being followed to digitise the documentary national heritage at the NLSA. This entails that reference must always be made to the ISO when they are involved with digitisation.

Responses from participant B show that there is national legislation that is being followed, but it was still a draft. National legislation followed at the NLSA is still in the process of development by the Department of Arts and Culture (DAC) of the Republic of South Africa (Dlamini, 2015). The name of the legislation or the discussion document is the Review of the National Policy on the Digitisation of Heritage Resources of May 2018. Several digitisation projects mushrooming in South Africa might have prompted this policy document. This policy is the key legislation regulating the digitisation of heritage resources for the purpose of preservation, access and management of ownership, and record-keeping in cloud storage. Noonan (2014:12) also reports that the goals of a good digital preservation policy are to provide guidance and authorisation on the preservation of digital materials and to ensure the authenticity, reliability and long-term accessibility.

Participant C also referred to the copyright policies and legislation as one of the guidelines in the digitisation of the national documentary heritage. Nicholson (2019) warns that the Copyright Act of 1978 is inadequate, outdated and irrelevant to the digital world. Copyright laws do not permit libraries to digitise library materials without copyright permission. It is for this reason that the Department of Sports, Arts and Culture is in the process of drafting new legislation that would encompass the digitisation of the national documentary heritage. Netshakhuma (2021) also confirms that any organisation involved in the digitisation of its materials must comply with copyright legislation in its country.

Therefore, the digitisation of library materials must be guided by legislation and international standards of digitisation management to ensure reliable governance.

Good management of digitisation should “include guidelines for digitisation, collection management, access, metadata, intellectual property (including copyright and privacy issues) and how digitisation and preservation should be performed” (de la Porte & Higgs, 2019: 6). The Draft Review of the National Policy on the Digitisation of Heritage Resources of 2018 and the Standard Operating Procedure Manual of 2020 enforce the efficient access, systematic digitisation, and control of digitised library materials, from the time they are created up to the time they are needed and accessed.

Participants went further to mention that those standards were developed by the Department of Sports, Arts and Culture and they did not seem confident about the policy, as it was a draft. Participant A suggested that the National Policy on Digitalisation of Heritage Resources for Museum, Libraries and Archives must be a finalised policy. Participant A further stated that *in accordance with the policy, we digitise newspapers, books, maps, photographs, art and manuscripts. In accordance with the policy, the key factors looked at when digitising NLSA library materials are:*

- ❖ How damaged the material.
- ❖ How old the material is.
- ❖ The materials that are in danger and damaged.
- ❖ The materials that are in high demand and many people want access to it simultaneously.

Newspapers appear to be a common candidate for digitisation at the NLSA. Drijfhout (2012) shows newspapers that have been digitised at the NLSA and further confirms that most of the country’s troubles and complex past is documented, stored and bound in newspapers, as the most social, political and literacy sources of information. The NLSA Corporate Communications (2020: par 3) confirms that “rare and special collections such as the bleak collection, consisting of material from the Khoi and San people and the Black Press Collection, black owned and controlled printed media during the colonial era, have been identified as key deliverables of the project”. Therefore, it is important that these precious resources of information about South Africa’s history should be preserved for future reference. Participant B also confirms this:

“The other main objective of the NLSA, is to preserve the national heritage of South Africa as quick as possible before it decays and get lost for ever....”.

Newspapers in their original records of historical importance are vulnerable to natural degradation, and the prospects of digitising newspapers promise opportunities for improved preservation and widening of access to them (Sigauke, 2017).

4.2.2. Technologies and equipment used to digitise and organising digitised materials

The four participants were further asked about technological tools and equipment used to digitise library materials at the NLSA. This was done before observation was made so that the researcher should at least have an insight into those technologies before observation is conducted. Carstens (2017) emphasises that organisations involved in digitisation should establish the kind of equipment suitable for their in-house digitisation project. Table 4.2 below shows how they responded.

Table 4.2: Technologies used to digitise and organise digitised materials

Participant A	<p><i>Firstly, to digitise you will need electronic equipment and the kind of equipment used to digitise paper is scanners, however, this are not the ordinary scanners used to scan paper, but this are large format scanners, high quality scanners. These scanners produce images or pictures of high quality, and this is to ensure that the NLSA preserves high in resolution scanned pictures. The high-quality scanners also ensure that when the digitised materials are accessed in the future, they are still of high quality. The large format or high-quality scanners ensure that it captures a material at its best origin, the way it is. The scanners scan up to a quality of 600 dpi (dots-per-inch) or ppi (Pixels per inch). The large format scanners are controlled by a desktop computer with their own software. The software enables the scan operator to crop the scanned image where necessary.</i></p>
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Participant B	<p><i>The technologies used after scanning the library materials are software's. This are called image manipulation software's or computer programs. This software's are used on a desktop computer. The next stage after scanning is called the post processing stage. The post processing stage is where the scanned picture is being edited using a software on a computer to adjust where necessary. The software helps in manipulation the image in way that, if you want the scanned image in black and white or give the image more colour.</i></p>
Participant C	<p><i>Another software used is for OCR (optical character recognition). After scanning the image, the image won't be selectable, or even a highlightable text in the scanned document. The OCR software makes the picture or library material searchable and highlightable. After doing all the manipulation on the scanned document, the library material is then put online for NLSA patrons to access.</i></p>
Participant D	<p><i>The next stage after digitising the library material is called post-processing. This is for describing and organising the digitised library materials, there is a software used on a desktop computer. The digitised library materials are moved from one computer to another using external hard drives. The digitised file is then manipulated using multiple softwares for organising and indexing to promote easy retrieval access. The software may be used for editing on the digitisation picture, making it straight, cropping unwanted things if necessary, weather make the image black and white or colour.</i></p>

4.2.2.1. Scanners

Participant A made mention of scanners which are not just ordinary, but of high quality. Because of the size of digitisation projects, large format scanners, digital cameras and recorders are required (Mabe & Potgieter, 2021). Carstens (2017) also shows that the equipment used in the digitisation of materials at NLSA include Flatbed scanners (A3)

and large format scanners (A0), as well as digital video cameras. Drijfhout (2012: 31), who wrote, “two large-format scanners were obtained with the purpose of scanning historical maps and newspapers”, also shares the same sentiment. Furthermore, “other equipment includes flatbed scanners, microfilm and film negative scanners, digital cameras and digital video technology” (Drijfhout, 2012: 31). Dlamini (2015) also maintains that for the NLSA to better serve the goal of its digitisation project, they “acquired two dedicated Zeutschel OS 14000 scanners for both campuses in 2011 which scan up to 600 dots-per-inch (dpi)”. Carstens (2017) further alludes that there are ILO standards that are being used in terms of meeting the needs of digitisation, such as:

- ISO 14524 (Opto-electronic conversion function)
- ISO 215550 (Dynamic Range: Film scanners)
- ISO 16067 (Resolution: Print Scanners)

The response from Participant B also shows that the quality of the material produced after digitisation is more important. The participant made mention of image manipulation software. The elements needed for production of high-quality digitised material are image sensors, the type of lightening lens types and the scanner construction (Carstens, 2017: 4). The NLSA also ensures that technology used at its institution is the best in the industry so that they produce quality work. The IFLA guidelines on digitisation project (2002: 20) recommends to “use scanners that can accommodate the type of media involved (transparent or reflective), the range of details, tones and colours present in the documents; and the physical condition of the documents”. The digitisation of library materials at the NLSA is a process that encompasses high-quality technological equipment (Carstens, 2017).

Biyela, Oleyude and Haumba (2016) recognise that the equipment used in digitisation in South Africa, Nigeria, and Uganda includes a personal computer and a 3D large high production scanner. Since there is a threat for a rapid change in computer hardware and software technology (Oguche & Aliyu, 2020), there is a need to ensure that the technology used will last for a long time. A study conducted by Carsten (2017) shows that the NLSA conducted extensive research to establish which equipment could give the library the best value for money in their newspaper digitisation project.

Although the equipment used at the NLSA was purchased primarily for newspaper digitisation, it could be used also for various other digitisation projects.

4.2.2.2. Optical character recognition software

A response provided by Participant B further shows that after digitising, the image is adjusted or edited for it to be visible and searchable. Participant C confirms that the image is made searchable and retrievable through a software called Optical Character Recognition (OCR). The importance of OCR is also recognised by Biyela *et al.* (2016) in their study on the state of digitisation of indigenous knowledge in South Africa, Nigeria and Uganda. OCR “is defined as the process of digitising a document image into its constituent characters... It is a piece of software that converts printed text and images into digitised form such that it can be manipulated by machine” (Islam, Islam & Noor, 2016: 1). Meshesha (2008: 6) explains, that the “OCR software accepts a scanned image of a text document and passes the image through many stages before it is translated into a computer understandable format, and further that once the OCR converts the document image to text, the result is post-processed to verify and correct recognition errors”. The IFLA guidelines on digitisation project (2002:17) also explains how source documents are converted to bit mapped images that are easy for a computer to store and retrieve.

4.2.2.3. External hard drives

The other equipment emphasised under the technology used to scan was the external hard drives as shown by participant A, who said

*“The technological equipment used to digitise is the large format scanners for scanning the different kinds of library materials, desktop computers of image manipulation after scanning the library material, **external hard drives** for moving of scanned library material from one place to another. The library materials are moved around the institution after scanning and manipulation, on an **external hard drive** to maintain the quality of the image and to move it to a preservation server. There are also **aircons** to **control maintain a cool temperature for the equipment** as they are continuously working.*

External hard drives are therefore important in the digitisation projects. Eke (2011) emphasises that external hard drives of high storage capacity should be purchased for backup purposes. Matlala (2019) states that TIFF and JPEG files being saved on a couple of personal computers and backed up in external hard drives. This shows that saving digitised images in external hard drives is not only about moving it to the preservation server, but also to a back-up in case something happens.

4.2.2.4. Server

A server is also an important technological tool for the digitisation project at the NLSA. Participant B has this to say:

*When digitising, storage space is very critical as the digitised files are big in size, they consume a lot of space as they are of high quality. The Tiff file created when digitising consumes a lot of space, hence the digitised library materials with the big sizes are stored **in servers**. The room where the **servers** are kept, is a room that has all the fire preventative measures and the servers also have a back-up named the **Uninterrupted Power System (UPS)**. The UPS system is there to keep the server running because if it shuts down and switch on again it is at risk of losing many digitised files. The servers are kept in an environment where if the power supply cuts, the batteries will pick up where the power was cut to keep the servers running. As the server runs the whole time, 24/7, there is an aircon to keep it cool and it may get hot at times due to continuous running.*

A server can be hosted either locally or externally (Hider, 2012). The NLSA stores their digitised library materials electronically in large storage servers on site and off site at the Cape Town campus. The collection at the Cape Town campus is also backed up at the Pretoria campus. This back-up strategy is referred to as mirror backup (Zhao & Lu, 2018). This entails duplication of data files to ensure that there are always data files or folders to remain with if something happens to other data. In the case of the NLSA, if anything happens at the Pretoria or at the Cape Town Campus, what is available as backup at either of the campuses should remain. Drifjhout and Ledwaba (2011: 5) acknowledge that “Digital or electronic collections are resource-intensive and require that proper infrastructure be in place. For this reason, the NLSA acquired high-capacity servers to house the collection in anticipation of the high digital volumes

expected. High-capacity servers are not the only determining factor for managing digital collections. According to Participant B, the ultimate goal of collecting and managing digital collections is to provide access to the users of these resources”.

4.2.2.5. Air conditioning and uninterrupted power supply system (UPS)

Other key success factors for digitisation appears to be a conducive environment with air conditioning as shown by participant A and Participant B. Participant B also emphasised an uninterrupted power supply environment. Therefore, the physical and technical infrastructure are prerequisite for the development and sustenance of any digital repository, more especially in developing countries (Okoroma, 2019). Zaveri (2015) reckons that since technologies for digital preservation services depend on electrical power, libraries must address issues of providing uninterrupted power supply, especially in areas where there are regular outages and load shedding. In as far as air conditioning is concerned, Ifijeh (2014) notes that digital preservation methods are also based on location, the weather and the environment, and cautions that air conditioners should be installed in rooms to control the temperature and humidity.

4.2.3. Access to digitised materials

The digitisation process at the NLSA involves access of library materials after everything is digitised. One of the aims of the NLSA is to preserve library materials, and digitisation is one the preservative measures used. NLSA library materials are preserved to be accessed in future and when needed by NLSA patrons. Therefore, participants were asked about how users have access to the digitised collection. Their responses are depicted in table 4.5.

Table 4.3. Access to digitised materials

<p>Participant A</p>	<p><i>The NLSA uses a dual system for access to digitised library materials. One focuses on the preservation side and the second one is making the digitised materials accessible to the public. When digitising library materials, one on the guidelines of digitisation stipulates that there should be two files created, one is for preservation and one is access for the public/ NLSA patrons. For the preservation side, the file is put in the deep archive as it is for future access and the on the access side, the file is manipulated to ensure easy access on the NLSA website</i></p>
<p>Participant B</p>	<p><i>The NLSA uses OCR (Optical Character Recognition) on all its digitised library material. And a metadata description is used to describe the digitised library materials. This is to promote the easy retrieval of the digitised library materials as they will now be easily searchable either by date, author, title, or the kind of material.</i></p>
<p>Participant C</p>	<p><i>The digitised library materials are only accessible online at the NLSA. However, there are measures in the pipeline to make the accessibility more remote than only at the NLSA. The digitised NLSA materials are accessed through the NLSA website on a system named Content DM. There are still amendments that must be made on the policies of the NLSA so that access can be remote.</i></p>

4.2.3.1. Dual access system

Participant A showed that when digitising library materials at the NLSA, there will always be two copies of the digitised material. One will go straight to the preservation servers, and the other will be a working copy, which is manipulated and arranged in such a fashion that it is easily accessible by NLSA patrons. Large format scanners scan to create a file format named a TIFF (Tag Image File Format) file, which is stored for preservation in the servers and the other one is for patron access. However,

participant A did not say anything about how the digital record used for access by the public is accessed.

4.2.3.2. Metadata description

Participant B makes mention of metadata description which is done to ensure easy retrieval of digitised records or materials. Metadata description is about systematic organisation and indexing of the digitised records. As defined by Brown (2013), metadata is about assigning a digital record a set of information required to enable it to be discovered or retrieved. It involves all processes and activities of providing digital records with access points like author, title, date of publication, format of material, subject of the material etc, which will be used by library patrons to access these records (Onwuchekwa & Jegede, 2011). Participant A states that before the digitised material is uploaded online, there will be a metadata description done on the material. This is where the material is described on a deeper level by its date, ISBN, name of the publisher, the material subject, the call number of the material and where its original copy is located on the shelves, and the kind of material. These can also be used as filters to search on the system; users can search the digitised material by the name of the author, title, date and ISBN. In other words, the digitised material can be searched on the system by its metadata description elements. The library materials are stored in such a way that they have their own unique identifier for easy location and retrieval of the digitised material. According to the literature of this study, Brown (2013: 155) notes that “it is impossible to manage any collection without some form of systematic description and documentation of its constituent parts, and further that the catalogue has been the fundamental tool of curators and information managers.”

According to Participant A, there is a convention at the NLSA for naming and categorising digitised library materials as they are being described for easy retrieval. The naming convention is a standard for every library material when anything is digitised. This will be the title of what is digitised, the year, the month, and the date of publication. For easy retrieval of the digitised material, there is a spreadsheet designed to record what was digitised and when. The main retrieval tool is the access system named Content DM software. The Content DM is used for access by the NLSA patrons.

4.2.3.3. Online or website access

Participant C showed that the digital materials at the NLSA could be accessed online through its website. Pearce (2013) emphasises the fact that libraries need to find their place in the network environment when people can access their content through the web. Participant B further said,

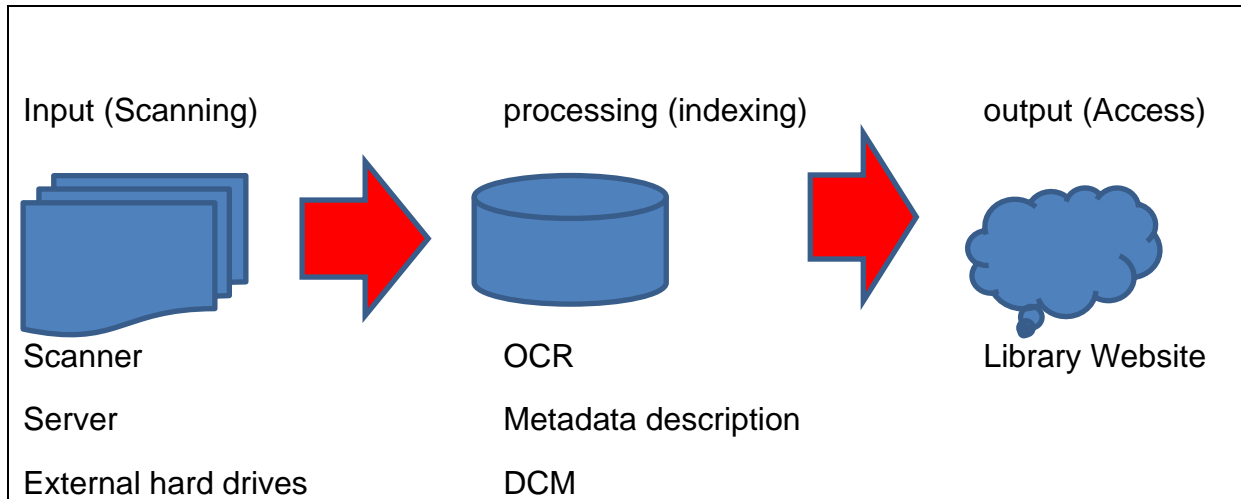
*accessing digitised content of the NLSA, one must have internet access to gain access to the NLSA website, where all the NLSA digitised content is made accessible. They are access through a system called the **Content Management Systems (CMS)**. This system enables the digitisation practitioner to manage the content on what should be accessed at a time. The NLSA also has available, preservation software to enable longer preservation and easy retrieval for future use. This software or computer program control large amounts of storage space for the digitised content and backups.*

Content management system refers to the software that is used in the process of collecting and classifying information resources for the purpose of storage, retrieval, dissemination, updating and reuse (Nowkarizi, Fanudi & Nowrouzi, 2012). It is a software system that provides preservation, organisation and dissemination services for digital collections (Yan, 2004). The digital content management system facilitates acquisition, storage, management, preservation and accessibility of digital documentary heritage (Verheul, 2006: 94). It is an infrastructure for creating and maintaining content or data (Ramana, 2008). Although there are many kinds of content management systems in the market at present, none of the participants mentioned the software system that is currently in use at the NLSA.

From the perspectives of the theoretical framework on which this study is based, the digitisation of national documentary at the NLSA also follows the same systems theory. The systems theory consists of input, processing and output. Input devices include scanners, digital cameras, external hard drives, servers and other equipment, while the procession unit consists of OCR, metadata description software and content management systems for indexing digital records for easy retrieval purposes. On the other hand, output tools include the library website and other tools that can be used to

retrieve digitised content, or make digital records available to library users on the web. This can be illustrated in figure 4.1.

Figure 4.1 Digitisation and systems theory



4.2.4. Challenges experienced in digitisation

Participants were further asked about the challenges that they encounter in the process of digitisation. From the responses in table 4.6 below, duplication, lack of skills on digitisation, and lack of remote access to digital content at the NLSA are some of the challenges that have been mentioned.

Table 4.4. Challenges experienced in digitisation

<p>Participant A</p>	<p><i>There is a lot of duplication where there is no centralized system, because we want to save a lot of decaying library materials with digitisation in a short period of time. NLSA should be able to see that, this and that has already been digitised and we can move on other things. And then the institutions performing digitisation can later swap the digitised library materials for access.</i></p>
<p>Participant B</p>	<p><i>The digitalisation practitioners lack the practical knowledge of digitisation for preservation and access. This derails the NLSA to progress according to the required time as the institution first must provide digitisation skills to</i></p>

	<i>practitioners with inhouse training as they will be seeing the systems and large format scanners for the first time. The mistakes that they may do may hinder the preservation quality to the heritage of South Africa.</i>
Participant C	<i>Digitised library materials are only accessible at the NLSA through the NLSA website. If a patron is not at the NLSA, may not be able to access the digitised library materials.</i>
Participant D	<i>There is a need of a back-up generator for in cases when there is load shedding or most preferably the whole NLSA should be solar powered for a more efficient and environmentally friendly supply of power. Hence, there is a high chance that we will be experiencing a lot of load shedding in the coming years.</i>

4.2.4.1. Duplication

Duplication of effort in digitising newspaper collections due to lack of national policy is one of the risks that were mentioned by de La Porte and Higgs (2019). Sankar, Ambati, Pratha and Jawahar (2016: 433) also found that “duplication of work was a major problem that reduced the total output, since different libraries have a copy of each of the many books; the same books were digitised at different centres”. Duplication is also a direct result of lack of collaborative digitisation policies (Mabe & Potgieter, 2021). Therefore, responses by participant A show that there is a need for a centralised digitisation system in all institutions that are engaged in the digitisation of library materials and the documentary heritage of South Africa. The centralised digitisation system will eradicate large amounts of duplication and save a lot of time for the NLSA and other institutions involved in the digitisation of library materials.

Cloud storage of digitised materials is imagined as a solution to current digitisation challenges. According to participant A, *there is a need for **cloud storage of digitised library materials** because the cloud storage has a lot more storage that the servers used at the NLSA, however the cloud storage system is much more expensive than the current system used.*

Laudon and Laudon (2015) define cloud computing as a model in which computer processing, storage, software and other services are utility-supplied as a pool of virtualised resources over the network, primarily the internet. Hu, Wang, Pan and Shi (2011) postulate that storing records in the cloud improves transparency and the provision of government services in government departments as has been seen in countries like Canada, the United States of America, the United Kingdom and China, to mention but a few. The same cannot be said about the states in the global margin like the Republic of South Africa. In situations where cloud storage is used, those in need of information would not visit a physical location, because the required records and information would be accessed virtually from the storage. Kuiper, Van Dam, Reiter and Janssen (2014:1) opine that despite the potential advantages offered by cloud computing, such as cost reduction in setting up cloud storage infrastructure, increased flexibility and agility when sharing digitised library materials, the public sector in South Africa lags behind. On the other hand, Ngoepe (2014:8) mentions that although public servants informally and unconsciously put some records in the cloud, government departments in South Africa are sceptical to entrust their data to the Cloud Services Providers (CSP) due to reasons comprising the lack of trust in the cloud storage, jurisdiction, legal implications, data privacy and security risk related to the Minimum Information Security Standards (MISS). The author added that this leaves the NLSA to face challenges like limited access to data in the provision of improved service delivery, as well as a lack of storage space for both paper and digital records.

In South Africa, the responsibility of regulating government records to support e-government falls under the investments of the National Archives and Records Services of South Africa (NARSSA), which according to Ngoepe (2014), has not designed the necessary infrastructure to manage and preserve digital library materials of the NLSA. As a result, the absence of policies that regulate the storage of records in the cloud leaves government departments to put away hard copies in an inaccessible storage with only a few authorised users to ensure that it retains its integrity and authenticity (Higgins, 2011:79).

4.2.4.2. Lack of skills and knowledge in digitisation

Participant B indicates that *digitalisation practitioners lack the practical knowledge of digitisation for preservation and access*. De La Porte and Higgs (2019) lament the lack of staff expertise to oversee the digitisation project and to appropriate in-house skills training and development interventions in managing digital projects. Participant B also suggests for in-house training of digitisation staff. Liebetrau (2010) makes mention of “digital chaos”, resulting from lack of skills, knowledge and understanding which can too easily undermine digitisation projects. Furthermore, due to lack of skills, the library may end up with “unsuitable hardware and software purchases, inadequate infrastructure, use of proprietary software with expensive licensing requirements, inconsistent or inappropriate use of international industry standards and other factors impede successful large-scale digitisation” (Liebetrau, 2010: 2).

4.2.4.3. Lack of remote access to digitised collections.

The ultimate aim of any digital project is to preserve and provide access to digital collections. One of the participants (C) lamented the lack of remote access to digital collections at the NLSA. The NLSA Corporate Communications (2020: par 2) also stresses that the NLSA makes use of platforms, including its website, social media platforms Online Public Access Catalogues (OPAC's), e-publications, online databases etc. to provide remote access to its collections. However, there is still a compelling need to extend the NLSA's existing digital collections to enhance access, research and learning.

4.3. RESULTS OF DOCUMENT ANALYSIS

To verify adherence to international and national legislation and guidelines in the digitisation project of the NLSA, the researcher requested the NLSA digitisation or collection development policy. The researcher was furnished with the following policy documents:

- Policy on access to the digital material at the NLSA (2020)
- Preservation and conservation services digitisation standard operating procedure manual, version 2.0.1. (2020)

- Review of the National Policy on the Digitisation of Heritage Resources –Final draft (2018)
- Managing Digital Collections: A collaborative Initiative on the South African Framework, By National Research Foundation (2010).

4.3.1. Policy on access to the digital material at the NLSA (2020)

The analysis of the policy document on access to digital materials shows that the digitisation policy of the NLSA adheres to legislation such as The National Library of South Africa Act, Act 92 of 1998; the Constitution of South Africa, Act 108 of 1996; the Copyright Act, Act 98 of 1978; and the Promotion of Access to Information Act 2 of 2000. It has been shown in the introduction of this study that the NLSA was established in terms of the NLSA Act (Act 92 of 1998). However, there is nothing in the legislation that says something about the digitisation of national documentary heritage. Therefore, the NLSA Act (Act 92 of 1998) was specifically designed for published collections, rather than digital collections. The question that arises out of this finding is whether the legislation that established the NLSA should be amended to include the digitisation project. However, this entity (NLSA) has various programmes that facilitate access to information, of which digital preservation of library materials is one.

The RSA Constitution (Act 108 of 1996) is included in the policy document by virtue of the right of access to information enshrined in the constitution and its Bill of Rights. This legislation links to the responsibilities that libraries have on the freedom of expression and freedom of access to information (van Vollenhoven, 2015). Section 32 of this legislation states that “everyone has the right to access information held by the state, any information held by another person, and that is required for the protection of rights” (Act 106 of 1996). However, there is nothing said about the right of access to digital information in the Act. Like the NLSA Act (Act 92 of 1998), section 32 of the RSA constitution (Act 108 of 1996) may also require an amendment.

The Promotion of Access to information Act (Act 2 of 2000) “give effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any

rights; and to provide for matters connected therewith” (Act 2, 2000: 1). The act also says nothing about access to digital information, which also entails amendment to the legislation.

The Copyright Act (Act 98 of 1978) is also a very significant part of the digitisation procedure, as it includes legal considerations that must be considered concerning the creation and preservation of digitised collections. In accordance with the draft Review of the National Policy on the Digitisation of Heritage Resources May 2018, “the introduction of digital material into the realm of copyright law has not substantially changed the current practices of downloading electronic books, digital music, and educational materials have already been established under the controlled rights management processes. It is necessary to clarify the position on the ownership of state archives, to ensure that access is provided to the digital heritage and to digital forms of published materials, and to introduce open content models to enhance the range of materials available through digital means”.

The NLSA policy on access to the digital materials further mentions preservation and conservation policy, special collections policy and collection development policy as some of the guidelines to which it adheres. To have an insight into the policy on access to digital materials at the NLSA, one should also read these policies. However, it is not stated how these policies are made available to library users, so that they should have an insight into how they should request digital materials from the NLSA. The policy also further mentions information access services manual, but it is not known how library users can access this manual. This is despite section of the policy showing that depending on the type of materials needed, the user can make requests for digital materials through the Information Access Services of the NLSA.

The manual on access to digital materials at the NLSA further mentions the document entitled, *Managing Digital Collections: A Collaborative Initiative on the South African Framework*, by the National Research Foundation (NRF) as a standard for operating the digitisation project. In the introduction of this document, it is stated:

The document would provide an overview of requirements for building good digital collections, sound digital collection management practices and guidelines for data sharing and long-term preservation and access (NRF, 2010)

Furthermore, it is stated,

The document is directed at organisations that are or will be developing digital collections and specifically managers at those organisations who will be responsible for managing such collections. It is intended as a reference source for decision-makers such as digital project managers, repository managers, curators, digital information managers, senior librarians, and information technology managers (NRF, 2010).

Therefore, all organisations in South Africa engaged in digitising their collection, including the NLSA, are expected to adhere to this framework. According to Liebetrau (2010), this document was published as an introductory guide intended to supplement a series of regional training workshops aimed at assisting universities and heritage organisations to gain valuable digitisation skills. Ubogu, Klapwijk, Groenewald, Nicholson, McGovern and Liebetrau (2010) argue that “the objective of this Framework is to provide high-level principles for planning and managing the full digital collection life cycle”. The framework “covers topics such as community practice; copyright and related matters; collection development; digital objects; metadata; infrastructure; preservation; project planning; collections management, quality assurance and evaluation” (Balugan & Kalusopa, 2021).

4.3.2. Preservation and Conservation Services Digitisation Standard Operating Procedure Manual

The other policy used by the NLSA that was furnished to the researcher was the preservation and conservation services digitisation standard operating procedure manual. This procedure manual shows that this policy is in conjunction with the National Library of South Africa Act 92/1998, the Constitution of the Republic of South Africa 1996, the Copyright Act 98/1978, and the Promotion of Access to Information Act 2 of 2002. The scope of this document is limited to procedures and processes relating to the digitisation of NLSA collections. The main purpose of the manual is to:

- “provide documented procedures and step-by-step instructions for staff members tasked with digitising the NLSA collections.

- ensure staff are skilled and equipped to comply with standards, and best practices for image formats; technical specifications and quality control; data obsolescence and migration; physical storage and access control.”

Some of the legislation also appear in the access policy, while others do not. The legislation that was not included in the policy on access are the Legal Deposit Act 54 of 1997, the National Library of South Africa Act 92 of 1998 and the Promotion of Access to Information Act 2 of 2002. The Legal Deposit Act 54 of 1997 makes provision for the accessibility and preservation of the national documentary heritage through legal deposit of published documents. According to the literature review, Nsibirwa (2014) confirms that the Legal Deposit Act (Act 54 of 1997) requires publishers to supply copies of each new publication to the National Library of South Africa or to the places of legal deposit. This legislation was written in the context of printed, paper and tangible material. This legislation does not make direct provision for digital material held by Legal Deposit Libraries.

The results of the document analysis shows that the Act does not provide for specific handling of non-book materials such as electronic documents, photographs, CD-ROMs and videos, which contain information that should be digitally preserved, rather than physically preserved, to enhance public access to and prevent loss through technological obsolescence. Many of the new submissions to the Legal Deposit libraries are provided in digital form, and these are increasingly born-digital materials that have not risen from the digitisation of previously analogue source materials (Nicholson, 2015). This legislation should be amended to introduce procedures and practices that explicitly reference the standards for such digital publications and materials, and the methods used to submit these to the depository (Nsibirwa, 2014). Any proposed and all the newly proposed amendments should also include the way legal deposits are required to be transformed into digital repositories in terms of standards arising from this policy.

The National Library of South Africa Act 92/1998 makes it an obligation for the preservation and conservation services digitisation standard operating procedure manual to preserve and give access to the rich South African heritage collection housed in the National library of South Africa (NLSA). The policy offers the NLSA a step-by-step procedure as an alternative way of accessing fragile and unique content to its users, and to preserve the NLSA collection digitally, thereby protecting the physical handling of fragile collection and saving the deteriorating collection. The manual enables the NLSA to give effect to the Promotion of Access to Information Act 2 of 2002, through the preservation and conservation services section. Hence the main activities of this section is mainly scanning and archiving for preservation and publishing of items on the internet for electronic access. The main objective of this manual is mainly focussed on the Promotion of Access to information of the South African documentary heritage through the digitisation process of fragile and old materials that are worthy of digitisation. The preservation steps are provided in the manual in the form of Tiff file that is preserved in the deep archive for future access.

4.3.3. Review of the National Policy on the Digitisation of Heritage Resources –Final draft 2018.

The breakdown of the policy document on Review of the National policy on Digitisation of Heritage Resources- Final draft (2018) shows that the National policy on the digitisation of Heritage Resources of the NLSA adheres to legislation such as the Constitution of South Africa, 1996; the Copyright Act, Act 98 of 1978; and the Promotion of Access to Information Act 2 of 2000. According to this policy, the South African Constitution of 1996 enshrines the right of access to information and makes it incumbent upon the state to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. In response to this constitutional imperative, government – the DAC in particular – has, in terms of the Legal Deposit Act, the Promotion of Access to Information Act and the National Library of South Africa Act, introduced a variety of regulations which make provision for access to information. This legislation does not consider the predominance of future electronic and digital forms of information. Such legislation must be reviewed to ensure that a consistent regulatory environment is in place to ensure accessibility of the

information. However, the Electronic Communications and Transactions Act, 2002 (Act 25 of 2002) does address the legal status of electronic records.

The Review of the National Policy on the Digitisation of Heritage resources final draft (2018) had this to say with regards to Copyright:

that at various stages within the digitisation life cycle various provisions must be introduced in terms of copyright and other rights, and these include the following: Identifying any rights issues and who owns the rights; negotiation of the rights for the creation and use of digital objects and resources; including right terms and conditions into all digitisation contracts; documenting the rights and linkage of these rights to the objects themselves; defining the systems and processes to support rights management and licensing; determining who should be granted access, and under what conditions; constructing technical and control measures to prevent unauthorised use and access, include limiting access to high quality images while providing access to low-resolution versions and also limiting the usage of digital cameras in libraries , archives and museums; negotiating rights for re-use, such as learning materials, and; securing rights to external content. These provisions must be included into institutional strategies for contracts for mass digitisation as well as policies and procedures for ad hoc requests for creating digital copies.

Promotion of Access to Information Act 2 of 2000 and in the Review of the National Policy on the Digitisation of Heritage resources final draft of 2018, were used concurrently with South African Constitution in a sense that the universal access to digital heritage can be seen as an interpretation of the constitutional right of access to information. It was shown in the analysis of the Review of the National Policy on the Digitisation of Heritage Resources –Final draft 2018, that several challenges exist in providing such widespread access. These are firstly, the ongoing situation of the digital divide and the need to create a broad Information Society in South Africa; secondly, the constitutional requirement for transparency of information concerning government processes; and thirdly, the constitutional right to privacy.

Larger libraries and archives are providing access to electronic indexes, but few have digital libraries in place. This applies equally to the museum sector and to the lack of virtual museums. According to McMillan, Schultz and Skinner (2011:42), providing

access to digital resources will reduce the threat of loss through the excessive handling of these items, and will reduce potential damage to fragile items.

4.5.4. Managing Digital Collections: A collaborative Initiative on the South African Framework, By National Research Foundation (2010).

From the establishments of this policy, developments in information and communication technologies (ICTs) have presented opportunities for the rapid production of data, digital content, digital collections, institutional and subject repositories, digital libraries and archives. Some of the new areas of decision-making faced by directors, curators and managers are setting up a networked infrastructure, purchase of hardware and software, copyright concerns, workflow and quality assurance. The document analysis of this policy established that the policy provided by the NRF is functioning at the NLSA in adherence to the following legislations: the South African Intellectual Property, Amendment Act, 1997; the IFLA Information Policy: Copyright and Intellectual Property; and the South African Copyright Act No. 98 of 1978 (as amended in 2002). The policy addresses the digital collection development issues for the NLSA.

The policy advises the NLSA on the Intellectual property policy that it is important for the institution or library to be up to date about the Intellectual Property policy, which allows for the management of an entire digital project. This policy should address all items of copyright in full, as well as other important issues relevant to the management of a digital project. The library should draft this policy with the assistance of a legal advisor or an Intellectual Property lawyer. The policy should be revised regularly to address any changes or new developments in the digital environment (Hofman, 2009: 14). The aims of this policy are to (National Research Foundation, 2010):

- ❖ provide an overview of some of the major components and activities involved in creating good digital collections;
- ❖ provide a sense of the landscape of digital collections management, and identify existing resources that support the development of sound local practices;

- ❖ encourage community participation in the ongoing development of best practices for digital collection building, and contribute to the benefits of sound data management practices, as well as the goals of data sharing and long-term access;
- ❖ introduce data management and curation issues;
- ❖ assist cultural heritage organisations to create and manage complex digital collections;
- ❖ assist funding organisations who wish to encourage and support the development of good digital collections; and
- ❖ advocate the use of internationally created appropriate open community standards to ensure quality and to increase global interoperability for better exchange and re-use of data and digital content.

According to the document review, the IFLA policy guides the NLSA on matters such as the intellectual output generated by the staff of an institution during the course of their work (digitisation). This can include emails, texts, datasets, presentations, and so on. Other materials can include research output such as theses, dissertations and articles, donated material collected by individuals, as well as materials harvested by the institution. Because the size and formats of these objects can vary, different format types for digital objects need to be addressed separately. The International Federation of Library Associations (IFLA) document for the descriptions, theory and practice of collections provides valuable information on standards for collections and ingest in repositories and databases.

The policy dedicates a whole chapter on copyright and related matters in digitisation. The policy acknowledges that copyright is a very important aspect of the digitisation process, as it encompasses legal considerations that have to be made regarding the creation and maintenance of digitised collections. Briefly, a copyright is a right granted by law to an author, designer, or artist to prohibit others from copying or exploiting his or her works in various ways without permission. The policy attempts to address copyright issues at the NLSA. It covers works that should be protected by the South African copyright when doing digitisation at the NLSA. The policy stipulates the guidelines on the copyrights being transferred to other parties as movable property by assignment, testamentary disposition, or operation of law.

The policy makes clear the limitation that the Copyright act recognises as a fair portion of work that may be copied in terms of fair dealing, where the fair dealings apply, and on what purposes they apply. With regard to the copyright act, the policy advises the NLSA to make every effort to obtain permission from rights holders and to keep records of these attempts before deciding on proceedings with the digitisation of the material (depending on its importance and value), but providing a disclaimer and an invitation to rights holders to negotiate a reasonable copyright fee, as this could put the NLSA or project team at risk of an infringement claim, resulting in a 'take-down' notice, or an embargo on the material and/or litigation in terms of the Copyright Act.

4.4. OBSERVATION RESULTS

This section covers what the researchers witnessed when the digitisation session was taking place at the NLSA. Photos of the equipment used in the digitisation at the NLSA are also included in the section.

4.4.1. Observation done in the Scanning room

The types of equipment used in the scanning room are two large format scanners for scanning all sorts of print materials that can be found in the NLSA. The other type of equipment used are desktop computers with large monitors to enable full view of the material being digitised and to allow manipulation of the document. The third equipment used is the external hard-drive or hard-disc that is used to move electronically converted documents from one place to another. One scanner used at the NLSA which is the fastest and mostly used to scan books and v- shaped library materials is named the Cobra machine/scanner (Figure 4.2). This type of scanner is more convenient when scanning bound books.

Figure 4.2 Cobra machine/scanner



Scanners are in an infrastructure that is light controllable. The room in which the scanners are operated is a bit dark so that the only visible light is from scanners. This is to avoid any foreign light to reduce the quality of the scanned document. The machines mainly use cameras and a high quality lense to capture images of the print materials of the NLSA. Zhou (2016) confirms that a digital camera may also be used in the digitisation of library materials. A digital camera is an electronic input device that converts original scenes or tone images into digital images and is capable of capturing the materials in any size. Light is a major factor that may distort the quality of the digitised library material.

At the time when the study was conducted, the NLSA was digitising an old periodical, or a newspaper named the Umteteli wa Bantu: The mouthpiece of the African people,

which dates to 1934. The reason for the library material to be digitised was to increase its accessibility, and it was in danger of being lost through decaying and wearing off.

Desktop computers were mainly used in image manipulation such as cropping the unwanted part of the scanned material, adjusting the size of the image, zooming, etc. The documents are normally adjusted to 400-600 dots per inch (dpi). The name of the system used on the computer to adjust the scanned image came with the machine, and it is named Easy scan Cobra.

The other machine in the department is used to scan print materials that are easily scanned on a flat surface such newspapers and all sorts and sizes of maps. The name of the scanner is Zeutschel (Figure 4.3), which also came with its own system/ software called *Only scan*. All these large format scanners are imported from Germany. The reason for importing machines from Germany is because they have technology that is more advanced than in South Africa, which is a developing country.

Figure 4.3 Zutchel machine/ scanner



The Cobra machine is better than the Zeutschel machine in terms of pace of scanning documents. It even has extra options like automatic scan where you just turn the pages of the book and it scans automatically. The Cobra machine can scan up to 700 pages in a day and the Zeutschel only scans about 400 pages a day. The Cobra machine is also known as the one-shot scanner just like a normal digital camera. On the other hand, the Zeutschel is also known as the overhead scanner as it moves towards the material scanned and back. In other words, it moves up and down the material by going over our heads. Carstens (2017) also confirms that the equipment used in the digitisation of materials at NLSA includes Flatbed scanners (A3) and large format scanners (A0) as well as digital video cameras.

An advantage regarding the Zeutschel is that it scans larger materials in size, while Cobra scans bound books. This means that the operator does not have to unbind the books for proper scanning. Zeutschel has a lot of work as it is also operated using the operator's foot. Operators are required to move a lot around the machine. A system or software is a very critical tool used when scanning, as it is also used to describe scanned documents, and to write the name of the document and its dates according to when they were published. Madalli *et al.* (2012) confirm that for libraries to be in a position to store, organise and retrieve digital content, they use either open, commercial or proprietary software. This enables easy retrieval of the scanned material in the next steps of digitisation. When scanning print materials, it is obligatory to save each job as you scan per individual title.

4.4.2. Observation at the OCR section

The next stage after library materials have been scanned and digitised is the Optical Character Recognition (OCR). OCR is performed on a desktop computer on the scanned and digitised materials brought by external hard drive from the scanning room. The document comes in a Tiff format and must be converted in the OCR section into a PDF format to make it searchable when it is accessed digitally. The OCR is done to make research a more easy and efficient retrieval of digitised library materials. When doing research on a particular concept, you will simply just search for a word on a system and the system will bring everything that has to do with that word.

Before digitised materials go to the public, they have to be stored in the server. The importance of OCR is mainly for when they are needed in the future, they should be easily retrieved. After the files have been converted and OCR performed on them, they can now be uploaded on the Content DM system for access following the Copyright policy so that they can be available to the public. Content DM is a system or platform that patrons use to access digitised content. It is regulated and controlled internally by a coordinator, which controls who access what at what time and how much of it should be accessed. The Content DM coordinator uploads the newly digitised files to be accessed by patrons at any given time.

When scanning a library material, there are two copies created on a normal basis. These are called TIFF files. One TIFF file goes straight to the server to be stored for preservation or future access, and the other TIFF file is the one that is manipulated and made available for access for NLSA patrons.

4.5. CHAPTER SUMMARY

This chapter presented data collected from semi-structured interviews, observations and content analysis. The target population came from the National Library of South Africa digital preservation and conservation sections. The responses were grouped according to the themes which were classified according to the objectives of the study. The actual words of participants were used to express the ideas. The main driver of digitisation at the NLSA is to preserve the documentary heritage of South Africa, and to promote easy access to library materials.

It has also been noted that the digitisation policy followed at the NLSA is a draft policy. However, the legislations referred to in this policy do not have anything to say about the handling of digital information. The dominant candidates for digitisation at the NLSA appear to be newspapers. The equipment used in digitation are scanners, OCR and Content Document Management software. The next chapter provides the interpretation and discussion of findings.

CHAPTER FIVE

MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1. INTRODUCTION

The previous chapter presented, analysed and interpreted the results of data collected through semi-structured interviews, observations and document analysis. This chapter summarised major findings in order to derive conclusions, and to make recommendations based on the findings and conclusions. The aim of this study was to examine the processes involved in the digitisation of the South African documentary national cultural heritage for the purpose of preservation and access at the National library of South Africa. In order to realise this goal, the objectives of the study were:

- ❖ To analyse the NLSA digital preservation policy and its adherence to existing legislation and other guidelines relating to the digitisation of documentary national heritage;
- ❖ To establish the systems used in the organisation, indexing and retrieval of digitised materials at the NLSA;
- ❖ To determine the infrastructural and technological facilities used for digital information system in NLSA (Scanner, computer, software, output media, access points, network support); and
- ❖ To identify challenges experienced by the NLSA in digitising the documentary national heritage.

The current chapter, therefore, comprises the following: a summary of major findings and conclusions presented according to the objectives of the study, as well as recommendations.

5.2. MAJOR FINDINGS

This section summarises the major findings derived from data collected in chapter three, and then presented and discussed in chapter four. These are presented according to the objectives of the study.

5.2.1. Policies and adherence to legislation

The results of the semi-structured interviews with four (4) senior staff members in the digitisation department showed that the NLSA is adhering to national and international policy guidelines and legislations. The interviewees hinted on International Standards Organisation (ISO), the Draft policy on the review of the national policy on the digitisation of National Heritage Resources (2018), and the copyright legislation.

Since this study used triangulation, the interview results were confirmed by policies and guidelines that were provided to the researcher to analyse their contents. These policies and guidelines included the following:

- Policy on access to the digital material at the NLSA (2020)
- Preservation and conservation services digitisation standard operating procedure manual, version 2.0.1. (2020)
- Review of the National Policy on the Digitisation of Heritage Resources –Final draft (2018)
- Managing Digital Collections: A collaborative Initiative on the South African Framework, By National Research Foundation (2010).

The content analysis of these policies show that these policy guidelines and legislations take into consideration the NLSA Act, the Legal Deposit Act, the R.S.A Constitution, Copyright legislation, and the Promotion of Access to Information Act. However, further content analysis of these legislations showed that there is lack of management of digital collections in these legislations. The results further showed that newspapers are the most dominant candidates for digitisation because of the important information they contain and their vulnerability to damage and decay.

5.2.2. Systems used to access digitised collections

Access forms part of the systems' theory as output. It was picked up that digitised library materials at the NLSA can only be accessed at the NLSA through the organisation's website. The NLSA uses Content DM to remove and allow access to certain digitised materials.

5.2.3. Digitisation infrastructure and equipment

These formed part of input and processing functions of the systems theory. The findings of the study showed that the equipment used in the digitisation of materials at the NLSA include high quality scanners, image manipulation software, servers, optical character recognition software and external hard drives. Most importantly, the room where the digitisation equipment is kept, specifically where the scanning of library material is done, is in a light controlled environment, where lights are dimmed so as not to disturb the lighting of the two large format scanners. Another finding was that there is air conditioning for the machines to get cooled off as they are scanning, as well as uninterrupted power supply.

The observation results confirm that the NLSA digitisation equipment is made up of two large format scanners, namely, Cobra and Zeutschel. The Cobra scanner eliminates the unbinding of books for optimum scanning. The Cobra machine is also considered to be the fastest scanner at the NLSA. The other brilliant piece of equipment at the NLSA is the Zeutschel large format scanner. This scanner is designed to scan very big maps, images and books of all sizes.

5.2.4. Challenges encountered in digitisation

Findings from semi-structured interviews showed that the NLSA is faced with a challenge of duplication in the digitisation industry because there are several other public and private institutions performing digitisation. The other challenge appears to be lack of human resources with expertise in digitisation. From what has been

observed, the personnel involved in the digitisation department operating the scanning machines are temporary employees who are trained in-house by the NLSA. Further, there were no permanent employees in the digitisation department except for the two-senior staff (interviewees) managing temporary workers. Lack of remote access to digital collections was also one of the major concerns raised by the interviewees.

5.3. CONCLUSION

The current study investigated the digital preservation and access to the South African documentary national heritage at the National Library of South Africa with the aim of examining processes involved in the digitisation of the South Africa documentary national and cultural heritage for the purpose of preservation and access at the NLSA. The literature review showed that the process is vital in an attempt to save the national documentary heritage of South Africa from decay and wearing out. The study has revealed that it is important to preserve our heritage digitally through digitisation and increased access to digitised library materials by properly digitising them. This study also recognised that access and preservation efforts were being disadvantaged by challenges such as incompetent or complete lack of human expertise, lack of up-to-date policy, and financial and technological resources.

Digital storage space, financial support for technological infrastructure, employee retention and unqualified staff were highlighted as major concerns. Based on the findings presented in Chapter Four, effective leadership, adequate training, sufficient budget, partnerships and collaboration opportunities were among factors enabling effective digital preservation and access practices in digitisation institutions.

It is clear from the study that the road to successfully implement effective digitisation, preservation and access to South African documentary heritage at the NLSA is not an overnight work. This means that the NLSA still has a long way ahead towards achieving a sustainable digital preservation which is one of its major objectives. However, reviewed literature has made known of the progress and common examples

for digitisation, preservation and access to documentary heritage initiatives in international countries such as Australia, the United Kingdom, the United States of America, the Netherlands and Singapore, just to name a few. There is, therefore, a need to collaborate and benchmark with these international organisations in terms of what is successfully operating in their institutions that may be learned by institutions in other countries such the National Library of South Africa.

5.4. RECOMMENDATIONS

The present study observed that rare and unique library materials will be lost if digitisation, preservation and access issues are not resolved in the near future. Therefore, the study ends by making recommendations that may address some of the issues and challenges identified from semi-structured interviews, observation findings and document analysis in order to enhance and improve digitisation, preservation and access programmes at the NLSA. These recommendations would also strengthen the process involved in preserving and accessing digitised materials at the NLSA.

5.4.1. Policies and adherence to legislation

- ❖ It is clear from the study that there is legislation provided by the South African government from the Department of Art, Sports and Culture for digitisation processes at the NLSA. However, digitisation practitioners showed that legislation is still work in progress. It is therefore recommended that the legislation for managing all digitisation projects in South Africa be finalised.
- ❖ It was also found that legislation that is presently being adhered to has nothing to say about the management and handling of digital records. It is also not up to date with digitisation trends. It is therefore recommended that the amendment of all these legislations to include digital records in their provision is required. Legislation must also include elements of digitisation such as cloud storage, and cover all aspects relating to copyright and intellectual property of digital records. This is evidenced by participants, who indicated that they consult numerous pieces of legislations to form copyright information. This is an indication that cloud storage is not legislated within the government of South

Africa. South African legislation on digitisation needs to be updated regularly; and technology is dynamic.

- ❖ For effective digitisation processes at the NLSA, the government must provide support by effectively promulgate cloud storage and copyright legislation. This will result in the protection by the South African law, of the NLSA's vision to improve preservation and access to digitised library materials.
- ❖ There is a need for a centralised digitisation system for all institutions performing digitisation to avoid further duplication of digitised content. This will enable expeditious digitisation and preservation of the South African documentary heritage. Digitisation is the future; digitised library materials have proven to be key, especially during the 2019 Coronavirus pandemic, which prohibits the physical use of print library materials, but promotes the use of digitised library materials.

5.4.2. Digitisation infrastructure and equipment

- ❖ The government should consider reviewing the academic curriculum of higher education, particularly in the field of Information studies/ librarianship in order to include IT-related modules. This is informed by the fact that digitisation is heading towards the IT industry where digitisation practitioners need to have a bit of IT and ICT background.
- ❖ Library staff involved in digitisation should update themselves with new digitisation technologies in the market.

5.4.3. Access to digitised collections

- ❖ The NLSA must develop an organisation-owned cloud storage system in order to maximise the size of digital storage in the preservation of digitised library materials. However, the government must develop regulations that should be followed when preserving and accessing library materials on the cloud.
- ❖ It emerged from this study that digitised library materials are only accessed at the NLSA, which limits access to those who can travel to the institution. The NLSA should develop a system that allows for remote access of digitised library materials, which complies with the copyright policy and guidelines.

Digitised library materials may also be dependent on software for search and retrieval and other functionality. However, software and hardware obsolescence seemed to be the biggest threat as changes in coding, formats, software, operating systems and hardware can render digitisation equipment unusable. Technical strategies such as migration, competition and other technology preservation strategies should thus be employed to combat technology obsolescence.

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APPENDIX A: Interview schedule

Questions for the interview:

SECTION A:

1. Is there any policy for the digitisation of library materials at NLSA?
2. In accordance with this policy, what types of materials do you digitise at the NLSA?
3. Is your digitisation policy aligned to any national legislation and guidelines to digitise library materials at NLSA?
4. If yes, what policies, national legislation and guidelines do you take into consideration when digitising library materials?
5. If no, how is your digitisation policy not aligned?
6. Why do you have to adhere to the above-mentioned national legislation and guidelines?

SECTION B

7. What technologies do you use to digitise library materials?
8. Are the people who digitise library materials qualified to use these technologies?
9. How are digitised materials described and organised for easy access?
10. What tools or systems do you use to organise, index and preserve or store library digitised materials?

SECTION C

11. What infrastructural and technological tools are required to digitise library materials?
12. Provide a step by step process of digitising library materials, and indicate together with the devices used to store digitised content?

SECTION D

13. How do library users get access to digitised library materials?

- 14.**What systems or tools are in place to facilitate retrieval and access to digitised library materials?
- 15.**What systems do library users use to locate digital content in the library?

SECTION E

- 16.**What challenge does the NLSA face facilitate the digital preservation and access of digitised library resources?
- 17.**What strategies can be adopted to overcome these challenges?
-

APPENDIX B

Consent form

UNIVERSITY OF LIMPOPO

ETHICS COMMITTEE

PROJECT TITLE: The state of digital preservation of and access to the Documentary National Heritage at the National Library of South Africa, South Africa.

PROJECT LEADER: Clement Mahudu Masekoameng and Prof. S.T. Bopape

CONSENT FORM

I, _____ hereby voluntarily consent to participate in the following project: *(it is compulsory for the researcher to complete this field before submission to the ethics committee)*

I realise that:

1. The study deals with _____ (eg. effect of certain medication on the human body) *(it is compulsory for the researcher to complete this field before submission to the ethics committee)*
2. The procedure or treatment envisaged may hold some risk for me that cannot be foreseen at this stage;
3. The Ethics Committee has approved that individuals may be approached to participate in the study.
4. The experimental protocol, i.e. the extent, aims and methods of the research, has been explained to me;
5. The protocol sets out the risks that can be reasonably expected as well as possible discomfort for persons participating in the research, an explanation of the anticipated advantages for myself or others that are reasonably expected from the research and alternative procedures that may be to my advantage;
6. I will be informed of any new information that may become available during the research that may influence my willingness to continue my participation;
7. Access to the records that pertain to my participation in the study will be restricted to persons directly involved in the research;

8. Any questions that I may have regarding the research, or related matters, will be answered by the researchers;
9. If I have any questions about, or problems regarding the study, or experience any undesirable effects, I may contact a member of the research team;
10. Participation in this research is voluntary and I can withdraw my participation at any stage;
11. If any medical problem is identified at any stage during the research, or when I am vetted for participation, such condition will be discussed with me in confidence by a qualified person and/or I will be referred to my doctor;
12. I indemnify the University of Limpopo and all persons involved with the above project from any liability that may arise from my participation in the above project or that may be related to it, for whatever reasons, including negligence on the part of the mentioned persons.

SIGNATURE OF RESEARCHED PERSON

SIGNATURE OF WITNESS

SIGNATURE OF PERSON THAT INFORMED
PARENT/GUARDIAN

SIGNATURE OF

THE RESEARCHED PERSON

Signed at _____ this ____ day of _____ 2019

APPENDIX C

Letter of request to conduct research

UNIVERSITY OF LIMPOPO: FACULTY OF HUMANITIES
SCHOOL OF LANGUAGES AND COMMUNICATION STUDIES
DEPARTMENT OF MEDIA, COMMUNICATION AND INFORMATION STUDIES
Tel.:

The CEO
National Library of South Africa
Private Bag x 990
Pretoria
0001

REQUEST FOR PERMISSION TO CONDUCT RESEARCH

Dear Sir/Madam

My name is **Clement Mahudu Masekoameng**, and I am a registered Masters student in the Programme of Information Studies: Department of Communication, Media and Information Studies at the University of Limpopo. I am conducting research entitled: *"Digital preservation and access to the South African Documentary National Heritage at the National Library of South Africa"*. This project is conducted under the supervision of Prof. S.T. Bopape: HoD: Communication, Media and Information Studies in the University of Limpopo.

I am hereby seeking for your consent to kindly allow me to conduct semi-structured interviews with staff working in the digital preservation section of your library, including the head of preservation services. The list of questions to be asked is hereon attached. I would also like to access your digital preservation policy and /or collection development policies to enable me to conduct a document or content analysis of those policies. Furthermore, I would like to make some observations on the process followed and the equipment used for the digitisation of library materials in your library.

The study seeks to add to the body of literature in the digital preservation of national documentary heritage. Through this study the public and interested individuals and organisation will understand the preservation and access to digital library materials in the National library of South Africa. The study would also assist library management and all NLSA stakeholders in decision-making and formulating improved policies regarding

the preservation and access of digital library materials in the National library of South Africa.

I have attached a copy of the ethical clearance certificate issued by the University of Limpopo Research Ethics Committee. For more information about this research project, please don't hesitate to contact me on my contact details above. Alternatively, you can contact the supervisor of this research project as follows:

Name: Prof S.T. Bopape


Tel.: 015 268 4015

Cell No.: 079 522 3805

Email: solomon.bopape@ul.ac.za

Yours collegially

Mr CM Masekoameng (201404218)

A handwritten signature in black ink, appearing to read 'C.M.' with a stylized flourish above it.

Appendix D

Notification for Ethical Clearance



University of Limpopo
Faculty of Humanities
Executive Dean

Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 4895, Fax: (015) 268 3425, Email: Satsope.maoto@ul.ac.za

DATE: 1 July 2020

NAME OF STUDENT: C.M MASEKOAMENG
STUDENT NUMBER: (201404218)
DEPARTMENT: MINF – Information Studies
SCHOOL: LANGCOM

Dear Student

FACULTY APPROVAL OF PROPOSAL (PROPOSAL NO. FHDC2020/5/19)

I have pleasure in informing you that your MINF proposal served at the Faculty Higher Degrees Meeting on 20 May 2020 and your title was approved as follows:

TITLE: DIGITAL PRESERVATION AND ACCESS TO THE SOUTH AFRICAN DOCUMENTARY NATIONAL HERITAGE AT THE NATIONAL LIBRARY OF SOUTH AFRICA

Note the following:

Ethical Clearance	Tick One
In principle the study requires no ethical clearance, but will need a TREC permission letter before proceeding with the study	
Requires ethical clearance (Human) (TREC) (apply online) Proceed with the study only after receipt of ethical clearance certificate	✓
Requires ethical clearance (Animal) (AREC) Proceed with the study only after receipt of ethical clearance certificate	

Yours faithfully

Prof RS Maoto,
Executive Dean: Faculty of Humanities
Director: Dr JR Rammala
Supervisor: Prof ST Bopape

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Appendix E

Ethical clearance Certificate



University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 3935, Fax: (015) 268 2306, Email: anastasia.ngobe@ul.ac.za

TURFLOOP RESEARCH ETHICS COMMITTEE
ETHICS CLEARANCE CERTIFICATE

MEETING: 16 September 2020

PROJECT NUMBER: TREC/187/2020: PG

PROJECT:

Title: Digital Preservation and Access to The South African Documentary National Heritage at The National Library of South Africa

Researcher: CM Masekwameng

Supervisor: Prof ST Bopape

Co-Supervisor/s: N/A

School: Languages and Communication Studies

Degree: Master of Information Studies



PROF P MASOKO
CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: **REC-0310111-031**

Note:

- i) This Ethics Clearance Certificate will be valid for one (1) year, as from the abovementioned date. Application for annual renewal (or annual review) need to be received by TREC one month before lapse of this period.
- ii) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee, together with the Application for Amendment form.
- iii) PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

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