ARTIFICIAL INTELLIGENCE TO SUPPORT PUBLIC HOSPITALS' RECORDS MANAGEMENT IN TSHWANE MUNICIPALITY GAUTENG PROVINCE, SOUTH AFRICA

by

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DEDICATION

This dissertation is dedicated to my late mother, Ramokone Epina Ledwaba, whom, before her departure from this earth made me promise that I will complete my matric. With this special request, I promised myself and her dear spirit that I will do the extraordinary and go beyond what was requested of me.

DECLARATION

I declare that **Artificial intelligence to support public hospitals' records management in Tshwane Municipality Gauteng Province, 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 that this work has not been submitted before for any other degree at any other institution.

.... 19/09/2024

Name: Ms R.F Ledwaba **Date**

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ABSTRACT

In recent years, there has been an outcry by the South African citizens over government's poor service delivery which includes service delivery in hospitals. One of the main causes of poor service delivery in hospitals has been indicated by different sources as being poor records management which usually leads to long waiting period in queues by patients before they can get medical attention. This study investigated the use of artificial intelligence (AI) to support public hospitals' records management in Tshwane Municipality Gauteng Province, South Africa. The study was guided by the following objectives: To establish how records are managed in Tshwane public hospitals; to determine records management functions that could be executed using AI; to determine the perceptions of records officials and nurses in Tshwane public; to identify the skills necessary for adopting AI technology in Tshwane public hospital and lastly to propose adoption of AI technology to support records management in public hospitals of Tshwane Municipality. The Technology Acceptance Model and Records Continuum Model theoretically underpinned this study. A quantitative research approach which is guided by the positivism research paradigm was adopted in this study. Simple random sampling was used to sample a population of 297 consisting of records officials and nurses only, from Steve Biko Academic Hospital and Kalafong Tertiary Hospital which resulted in a sample size of 168 respondents after being calculated using the Raosoft sample size calculator. The collected data was analysed using a computer-assisted statistical software of IBM-SPSS called Statistical Package for Social Sciences (SPSS) version 26 for Windows

The study found that the current state of records in both hospitals was not satisfactory, leading to unacceptable long waiting periods by patients. The findings of the study revealed that AI could have a positive impact in improving these records management challenges. Further findings in the study indicated that AI for records management can improve the hospitals' service delivery. Recommendations made in the current study was that the hospitals must consider the current workflow and challenges faced by patients seeking medical attention due to long waiting period caused by poor management of records and implement a system that will mitigate the current problem faced by public hospitals in Tshwane Municipality with regards to the management of records. Further recommendations were that different institutions who manage large volume of records, consider the implementation of AI technology to overcome records management challenges and poor service delivery. The implementation of AI for managing records in hospitals could assist the Department of Health in improving their hospitals' service delivery, including long waiting period by patients and the management of records in public hospitals.

KEY CONCEPTS

Records; records management; patients' records; artificial intelligence; service delivery; public hospitals.

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LIST OF ACRONYMS AND ABBREVIATIONS

4IR	Fourth Industrial Revolution
AI	Artificial Intelligence
AIT	Artificial Intelligence Technology
DT	Digital Technologies
ECT	Electronic Communication Transaction Act
HPCSA	The Health Profession Council of South Africa
IRMT	International Records Management Trust
ML	Machine Learning
MISS	Minimum Information Security Standard
MPS	Medical Protection Society
NARSSA	National Archives and Records Services of South Africa
NLP	Natural Language Processing
OCR	Optical Character Recognition
PAIA	Promotion of Access to Information Act
PAJA	Promotion of Administrative Justice Act
PFMA	Public Finance Management Act
POPI	Protection of Personal Information Act
TAM	Technology Acceptance Model
TREC	Turfloop Research Ethics Committee
SPSS	Statistical Package for Social Sciences

CHAPTER ONE: BACKGROUND OF THE STUDY

1. 0. INTRODUCTION

Public hospitals generate or collect as well as utilise a larger volume of records and information to assist in running the hospitals' records management, especially patients' records and the hospital's personnel records. These records which are created by health care centres must be properly managed, maintained and stored to ensure their effective utilisation by medical staff, patients and medical records experts as well as the state (Ngwenya, 2019). However, the management of patients' records and administration systems in public health institutions has been publicly criticized in recent years (Makua & Khunou, 2022) Accordingly, Marutha (2016) posits that ineffective management of records can result in poor and untimely data recording, incorrect filing, and absence of record keeping space. Therefore, it is important for public hospitals to have an effective record keeping system to ensure proper records management that will in turn offer good service delivery to citizens. In accord, Seniwoliba, Mahama and Abilla (2017) confirm that in a complex and big institution like that of a public hospital, it is impossible to manage records singlehandedly and manually, and also provide a swift service to patients.

As much as hospitals can hire more records officers to manage their records, it remains intensely impossible for them to manage records properly owing to the number of records housed by public hospitals (Ambira, 2016; Kamatula & Kemoni, 2018). Therefore, artificial intelligence (AI) technological systems such as machine learning technology might assist in enhancing the quality of records management in government departments that deals with a plethora of records daily. AI is one of the Fourth Industrial Revolution (4IR) technology systems adopted by various organisations to make business processes better, faster and productive. Kurzweil (1990) defines AI as the skill of creating machines that carry out activities that require intellect when performed by human beings. Furthermore, Frackiewicz (2023) avers that the traditional way of managing records such as filing, storing and maintaining physical records can be labour intensive and time consuming, often involving manual processes which sometimes results in human error. However, with AI machine learning technology application, public hospitals can automate records management tasks and process large volumes of physical records quickly and accurately. Therefore, this study sought to investigate artificial intelligence as a method for effective records management in public hospitals of Tshwane Municipality, Gauteng.

The Apies River is known by its Tswana name, Tshwane. The Tswana clan has also used it to refer to Pretoria. Raper (2008) mentions that during the process of changing South Africa's geographical names, the term Tshwane was suggested as a substitute for the name Pretoria. Some municipal or metropolitan districts have undergone boundary changes as a result of restructuring, incorporating residential areas and former municipalities. Akasia, Atteridgeville, Laudium, Mamelodi, and Saulsville have been included to the Pretoria metropolitan region, which is now known as Tshwane (Raper, 2008). According to South African Medpages, [s.a.] the surrounding population of Tshwane, Gauteng, is served by 15 public hospitals in the Tshwane Municipality. However, this study was focused on two selected public hospitals from the Tshwane Municipality area, which in the past few years have been on the news about patients complaining of waiting time when seeking medical assistance (Maurice, 2022). The hospitals are Kalafong Tertiary Hospital and Steve Biko Academic Hospital. Kalafong Tertiary Hospital is situated in the west of Pretoria in a township called Atteridgeville. On the other hand, the Steve Biko Academic Hospital is located around Pretoria Central.

The selection of these two hospitals was influenced by the dissatisfaction expressed by Tshwane residents over long waiting periods before receiving medical attention at these hospitals (Mchunu, 2021; Maurice, 2022). Consequently, Makua and Khunou (2022) support that the ineffective disorganized filling systems in community health centres has led to patients' long waiting time. Therefore, this study on AI to support public hospitals' records management in Tshwane Municipality Gauteng Province, South Africa is pertinent.

1.1. RESEARCH PROBLEM

Media reports (Luthuli & Kalusopa, 2017; Maurice, 2022; Katuu, 2015) and studies on service delivery in South African public hospitals have shown that patients are usually not able to get a timely service delivery owing to lack of effective records management that results in patients' long waiting periods in hospitals. Poor records management in public hospitals affect patients' livelihood as access to patient record becomes a hassle due to misfiling, over cramped storages as well as difficulty in locating other records which results in patients waiting for their records unacceptably longer than required (Luthuli & Kalusopa, 2017). The use of the traditional paper record system in most public health sectors including hospitals in South Africa, often causes delay in retrieval of patients' files and long patient waiting time (Elikwu, Igbokwe & Emokhare, 2020). According to Marutha (2011), patient's waiting time in public hospitals is generally long as records officials takes a lengthy time to obtain the patient's medical records from the system or records management storage. Furthermore, Mchunu (2021) asserts that some of the shortcomings of poor service delivery in public hospitals include incorrect record keeping, lack of management plan, and failure to follow fundamentally sound records management procedures. Artificial intelligence may assist with proper organisation, quick and easy access techniques to speed up the retrieval of records. AI machine learning technology's application in selected Tshwane Municipality public hospitals for the management of records is vital, as it may allow quick and easy retrieval of patients' records reducing long queues in hospitals (Marutha, 2011). Hence, this study sought to explore AI as a tool to support public hospitals' records management in Tshwane Municipality Gauteng Province, South Africa.

1.2. PURPOSE OF THE STUDY

Creswell (2018) mentions that "purpose statement is the central controlling idea that sets forth the intention of the whole research study". The aim of the study was to investigate artificial intelligence to support public hospitals' records management in Tshwane Municipality Gauteng Province, South Africa.

1.2.2. The objectives of the study are to:

- Establish how records are managed in Tshwane public hospitals
- Determine records management functions that could be executed using AI.
- Determine the perceptions of records officials and nurses in Tshwane public hospitals towards AI technology systems in managing records.

- Identify the skills necessary for adopting AI technology for records management.
- Propose adoption of AI technology for the management of records in public hospitals of Tshwane Municipality.

1.3. SIGNIFICANCE OF THE PROPOSED RESEARCH

For various audiences who might find value in reading and utilizing the study, the significance of the research study conveys the magnitude of the research problem (Creswell, 2009). According to Marutha (2011), the study's significance is utilized to support claims about how important the research is for theoretical viewpoints, policy concerns, real-world problems or social issues that affect people's lives on a daily basis. Therefore, this study will assist the Tshwane Municipality public hospitals to determine the extent to which AI may assist them to improve records management. The successful implementation of AI will also assist in making changes to how patients' records are managed; for example, patients' records will be easily accessible in a quick and efficient manner, resulting in patients' satisfaction and improvement in waiting time. The study's findings will help Tshwane's public hospitals determine whether using AI technology to enhance recordkeeping is necessary to prevent poor service delivery at these facilities. The study will also be beneficial to all government departments dealing with many records daily to understand the importance of AI technologies and their benefits in managing records effectively and improving services.

1.4. DEFINITION OF KEY CONCEPTS

According to Creswell's (2013, quoted in Punch, (2016, 95) definition of key concepts occurs when terms are used in the research study which may not be easily understood by people outside the field of study of the research undertaken or when difficult technical concepts are employed.

1.4.1. Record

According to the National Archives and Records Service of South Africa (2006), a record is regarded as all information that has been captured, regardless of format, whether electronic, paper-based, or on a medium such a CD, video cassette, or document. A record can also be defined as evidence of activities within an organisation which is documented and filed. Similarly, Mampe and Kalusopa (2012) define records as “information documented in any form created, received and maintained by an organisation as evidence of its daily transactions”. Furthermore, Katuu (2015) elucidates that a record is a document that is generated or received during the course of a business activity as a tool and saved for use or reference at a later stage. There are two forms of records namely, electronic records and paper-based records. Electronic records refer to an important asset such as a documented information, which requires being managed systematically through the relevant system to prevent any issues that can affect its contents such as deletion, modification, loss and damage (Zawiyah and Umi, 2015; Umi and Zawiyah, 2016), whereas paper-based records are records which are created manually and filed manually in a physical storage such as the filing cabinets. Both forms of records are regarded as important as they provide the same mandate of providing evidence of the events that took place.

1.4.2. Records Management

Records management is defined as a unit or division within an organization tasked with keeping records in order to meet community needs, ensuring staff compliance with business operational requirements and properly account to the citizens (Kemoni & Ngulube, 2008). Accordingly, Mutula and Wamukoya (2007:12) assert that “records management is an area of administration responsible for the organised control of records, including processes for capturing and maintaining evidence of information about business activities and transactions in the form of records”. The activities in records management involve the creation or receipt of records, as well as their use, preservation, and disposal in accordance with retention schedules (Elikwu, Igbokwe & Emokhare, 2020). In the words of Mnjama (2004: 37), “records management occupies a strategic position in the effective and efficient management of organisations, particularly in the public sector where officials have to be accountable and transparent to citizens”. In order to resolve any maladministration such as unauthorised access to patient information, misplaced documents, or improper filing of records in public hospitals’ records management, it is crucial to adhere to good governance principles, including transparency, accountability, and the rule of law, when handling patient records.

1.4.3. Patient Record

According to the South African Department of Health (2017), patient record refers to any relevant record created by a medical professional during, after, or in connection with a consultation, examination, and the administration of health management. A health record contains the information regarding an identifiable person's health that has been captured by a medical professional, either personally or at his/or her direction.

1.4.4. Artificial Intelligence

Kalaiselvan, Sharma and Gupta (2021) define AI as the application of intelligent systems and program to digitise, classify, store, and maintain records effectively and efficiently.

1.4.5. Machine Learning

Machine learning is the process of automation that enables machines to analyse a huge data set, recognise patterns and learn from the data to provide support for predictions and decision-making (Wang and Siau, 2019).

1.4.6. Automation

Automation refers to a system or technology that automates tasks that was previously done manually (Wang & Siau, 2019). Lee and See (2004) define automation as a technology that has the ability to enhance human performance and safety while also actively selecting data, transforming information, making decisions, or managing processes.

1.5. OUTLINE OF CHAPTERS

This dissertation is composed of five chapters and the following summary outlines how chapters are arranged in the dissertation. The contents presented in each chapter are briefly discussed as follows:

Chapter one: Introduction and Background of the study

This chapter introduces the topic of the study and also provides a brief background of the study which covers the research problem, the aim and objectives of the study, significance of the study and the scope and limitations of the study and concludes with the definition of key concepts. The research problem was structured as the main anchor of the entire research study, while the significance of the study profiled the rationale, importance and relevance of the study. The key concepts in this study were comprised of records, records management, patients record, artificial intelligence, and technology.

Chapter Two: Literature Review

Chapter two includes the theoretical framework and literature review pertaining to records management and AI in organisations. The chapter covers the Records Continuum Model, Technology Acceptance Model (TAM) and a brief discussion on AI, as well as the relevance of the two models to the current study and the literature reviewed based on the objectives of the study.

Chapter Three: Research Methodology

This chapter covers the methodology chosen to conduct this research. It includes the research paradigm and approach, justification of the employed research design, population and sampling of the study. The research paradigms discussed in this study involves, positivism, interpretivism, pragmatism and critical realism paradigms. The chapter also covers data collection procedures, instruments, validity and reliability of instruments, as well as data analysis and ethical considerations.

Chapter Four: Presentation, Analysis and Discussions of the findings

Chapter four outlines presentation and discussions of the findings of the study on AI for proper records management in selected public hospitals in the Tshwane Municipality. The aim of this chapter is to discuss what the findings of the study mean to the researcher and the reader; it also highlights the body of knowledge to which the research is contributing. This chapter also presents findings on functions that could be executed through AI, records management practices in public hospitals, perceptions of records management officials towards AI technology system for effective records management and skills necessary for implementing AI for proper records management in public hospitals.

Chapter Five: Summary, Conclusions and Recommendations of the study

This chapter summarises the main findings of the study with regards to AI for proper records management in selected public hospitals in Tshwane Municipality. The chapter further makes conclusions and recommendations based on the findings of the study. This final chapter ties everything together with the major findings summarised and presented under each objective of the study.

1.6. CHAPTER SUMMARY

This chapter introduced the study and orientation to the study. The chapter also covered the research problem, aim of the study and the objectives of the study. Concepts taking precedence in this study were also discussed. Lastly, the next chapter outlines literature reviews guided by the objectives of the study and theoretical framework.

CHAPTER TWO: LITERATURE REVIEW

2.0. INTRODUCTION

Chapter one outlined the introduction, background and the research problem of the study. This chapter discusses the literature review and theoretical framework in relation to AI for proper management of records. Owing to the study's adoption of two different theories (Records Continuum Model and Technology Acceptance Model), the researcher opted to design a theoretical concepts model to outline these theories' components, as well as indicating the theories' relevance to the study. This chapter is structured based on the five objectives of this study, the research problem and the theories employed in this study. This chapter discusses theoretical framework, first followed by literature review.

2.1. ROLE OF THEORY IN THE STUDY

According to du Plooy-Cilliers, Davis and Bezuidenhout (2021), a theory is an organised explanation of the concepts, constructs, assumptions and relationships of a particular phenomenon or activities within a discipline. It provides the foundation for a research enquiry and forms the conceptual and theoretical framework within which data are collected, interpreted and understood (du Plooy-Cilliers, et al., 2021). This study adopted a theoretical framework in support of the objectives of the study and the problem statement.

2.2. THE ROLE OF THEORETICAL FRAMEWORK IN RESEARCH

A theoretical framework is a structure that summarises concepts and theories developed from previously tested and published knowledge which you synthesise in assisting you to have a theoretical background for your data analysis and interpretation of the meaning found in your research data (Kivunja, 2018). According to Kivunja (2018), theoretical framework consists of the opinions of prominent researchers in your field regarding your research topic and the issue you intend to study. Varpio, Paradis, Uijtdehaage and Young (2020) define theoretical framework as a set of concepts and premises that are logically formed and connected as well as derived from one or more hypotheses and created by a researcher to support a study.

Mensah, Frimpong, Acquah, Babah and Dontoh (2020) describe the functions of theoretical framework as follows:

- The theoretical framework gives the research inquiry both direction and impetus, which helps to promote research while ensuring the extension of knowledge.
- Theoretical framework strengthens a study's rigour and empiricism.
- It makes research findings more relevant, consistent with the field's theoretical constructs as well as ensuring generalisability.

The study is guided by two theories, namely: The Records Continuum Model and Technology Acceptance Model (TAM) (Holden & Karsh, 2010; Upward, 2000) which are discussed in the following sections. The theoretical framework outlined the Records Continuum Model, TAM theory and AI as concepts which are all in support of the research problem and the objectives of this study.

Although there are a large number of research studies on AI (Colavizza, Blanke, Jeurgens & Noordegraaf, 2021; Sarker, 2022), those focusing on the records management are rather rare, particularly with regards to medical records. Moreover, Modiba (2021) confirms that there isn't a comprehensive theoretical framework that provides details on how to define an AI approach for proper records management. The researcher employed the use of two theories (Records Continuum Model and TAM) and adopted a theoretical framework that better highlight the connections between AI, Records Continuum Model and TAM in supporting records management functions. Therefore, this study adopted an eclecticisms approach of using multiple theories to support the study’s aim and objectives (Barker, Spackman & Nancarrow, 2001). According to Barker, Spackman and Nancarrow (2001) a new metatheory can be formulated to describe how two or more theories mesh together.

2.3. RECORDS CONTINUUM MODEL

Yusof and Chell (2000) define records continuum as a continuing set of dimensions and activities intended to manage and maintain the records from their first stage of inception or creation to their final stage which is disposition. Similarly, International Records Management Trust (IRMT) (1999) defines records continuum as the consistent and systematic process of records management throughout the life cycle of records, from the implementation of record-keeping systems through the creation and preservation of records, to their retention, disposition and use as archives.

Records Continuum Model was first developed by Frank Upward and his colleagues, Sue McKemmish and Livia Lacovino at Monash University in the 1990s in an effort to simplify the complexity involved in the contexts in which records are created and managed (Frings-Hessami, 2017). The model comprises four dimensions in the management of records. According to Frings-Hessami (2017), the four dimensions issue a way of showcasing recordkeeping stages that take place in a continuous way, encompassing the creation of documents, their capture in recordkeeping systems, their organisation into archives and their pluralisation to meet the needs of various stakeholders. The four dimensions are Create, Capture, Organise and Pluralise and are explained in the following subsection.

a) Create

The first dimension in the records continuum is create, which is the initial stage in the process of a record life cycle. This is the stage where an organisational activity is detailed in a form of documentation, e.g., the writing of a circular or a memo in an organisation is an example of creating a document that will later be regarded as a record which will follow all the dimensions of a records continuum. Reed (2005) refers to this stage of a continuum as the locus of all action, further highlighting that things within this dimension are in the process of inception and may exist in versions or as partial expressions. In this study, the process of creation took place when the patient came to the hospital to consult for the first time and their information was documented by creating a file for the patient which at a later stage then becomes a record when other information about the patient is added on the file and follows all the records continuum processes.

b) Capture

Karabinos (2018) postulates that the capture dimension occurs when documents are integrated into an organisational records management system. Therefore, for the purpose of this study, the patient's record is assigned a reference number according to the hospital's file plan policy and the record now works in tandem with other hospital's records. Reed (2005) further articulates that at this point, metadata elements required to make the context of the document known are included in the file and the record is able to be referenced or drawn upon by others. With attributes from this dimension, records now attest to evidence of action and are able to be distributed, accessed and conceptualised by others involved in undertaking business activities (Reed, 2005). In this case, the capture dimension makes it possible for records officers to be able to create and store records on the electronic records system, thereby making it simpler for them, nurses and doctors to identify and access patient's records quickly and easier.

c) Organise

At this level, this is the dimension of policy or rule establishment which will affect the 'create' and 'capture' dimensions (Reed, 2005). The organise dimension is when the record is classified based on the hospital's file plan and filed accordingly in the hospital's registry office or records management storage and thus adding the record to the hospital's records management programme. The record is classified according to the relevant classification system guided by the hospital's records management policy manual and made available to all users of the hospital. Records are organised to allow easy access and retrieval, for safety reasons, to make audit tracking possible and easy, to avoid misplacements and for identification of records. Having an organised records management system in place might assist the hospital staff in discharging their daily duties by providing accurate and timely service to citizenry.

d) Pluralise

Reed (2005) affirms that the 'pluralise' dimension is the broader social environment in which records operate, the legal and regulatory environment which translates social requirements, different for every society and at every period, for recordkeeping. This dimension focuses on the preservation and archiving of records, where access and retrieval are guided by legislations governing records management, e.g., MISS, Promotion of Access to Information Act (PAIA). This is where records are made available to the public to access, review and analyse beyond the boundaries of a single creating entity for as long as they are required. Figure 2.2 illustrates the Records Continuum Model dimensions as discussed earlier.

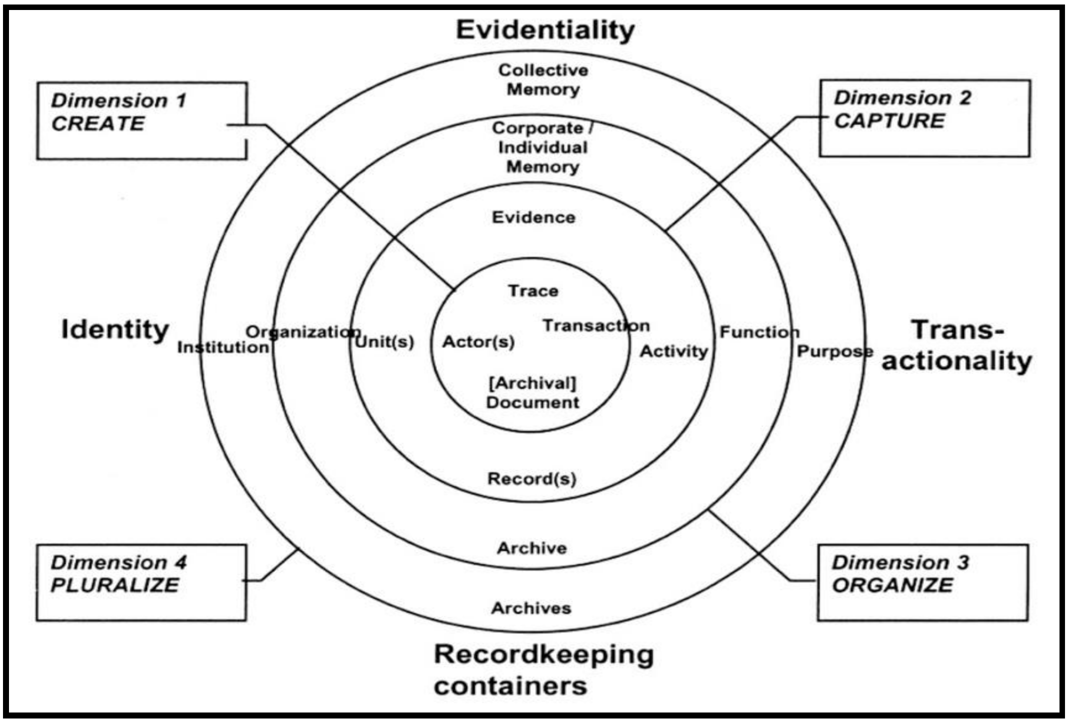

Figure 2.1. Records Continuum Model (Upward, 2000)

2.3.1 CRITIQUES OF RECORDS CONTINUUM MODEL

Researchers need to be aware of the limitations or criticisms that comes with theoretical frameworks when applying a theory to a study. As much as one theory can be regarded highly by researchers, other researchers may still find it to be misleading or irrelevant. The same applies with the Records Continuum Theory, as some researchers, (Piggot, 2012; Van Bussel, 2017; & Karabinos, 2018) have pointed out that the records continuum model is confusing and sometimes leads to even the literature professionals struggling to comprehend the intended meaning of the continuum writing. Moreover, Karabinos (2018) postulates that the continuum model appears to have a degree of universality, but as much as other democratic states practice transparency with regards to access to records, in other countries this transparency is not a cultural norm, disagreeing with the alleged universality of the records continuum model. Irrespective of these criticisms surrounding the records continuum model, this model was also found to be relevant in developing systems that will make it possible for all the stakeholders to access and use the records when they need them (Frings-Hessami, 2022). Hence, the theory was regarded as relevant to address the current research problem and objectives of the study.

2.3.2. RELEVANCE OF RECORDS CONTINUUM MODEL TO THIS STUDY

To succeed in the implementation of AI technology system for proper records management in selected public hospitals of the Tshwane Municipality, the use of Records Continuum Model assisted the researcher in investigating manual records systems while AI provided guidance on management of electronic records in the Tshwane Municipality selected hospitals. Therefore, the Records Continuum Model was pertinent in guiding the AI technology system through the stages of a record from its inception (create) to the last stage of preservation (pluralisation) as automation of records takes place. Marutha (2016) conducted a study to investigate records management in support of service delivery in the public health sector of the Limpopo Province and emphasises that consideration of the Records Continuum Model is pivotal when planning and implementing any records management system. The records continuum is all about records management, from the planning stage before its creation, during the process of designing the records management system as well as during its life span after its creation (Yusof & Chell, 2000).

Records Continuum Model is appropriate for this research in foregrounding records management activities and business processes carried out by the Tshwane Municipality public hospitals daily. The model showcased records as they were firstly, created when patients came in the hospital for medical attention by opening a new patient's file; secondly, by capturing patients' information (e.g., profile information, diagnosis and prescriptions) as well as storing them on the records management system; thirdly, by organising which is when records are arranged to become part of the hospital's institutional memory and lastly pluralising. This is the stage where the records are retained as evidence of their collective memory; this is done either by archiving the records at an onsite storage or by transferring them to an off-site archival repository for preservation (Reed, 2005).

2.4. ARTIFICIAL INTELLIGENCE (AI)

According to McCarthy (2007), AI refers to the science and engineering of making intelligent machines, particularly intelligent computer programs. Moreover, Sarker (2022) posits that AI-based modelling is the key to building digitised, intelligent and effective records management programmes. AI encompasses components or tools all which sprang from the emergence of the 4IR. The study was also guided by these components of AI Model which are machine learning, natural language processing, computer vision, robotics and optical character recognition (OCR). These components are all discussed under the subtopic *"tools and infrastructures of AI technology"* under objective four of the skills necessary for adopting AI for records management.

2.4.1. RELEVANCE OF ARTIFICIAL INTELLIGENCE TO THE STUDY

According to Snyder, Wu, Miller, Jensen, Bantug and Wolff (2011) delivering healthcare to patients has become complicated with healthcare infrastructure in most hospitals being strained because of administrative problems and limited resources. Information technology tools have demonstrated to alleviate this burden on health services and AI techniques such as Natural Language Processing (NLP) and ML have been identified as among the most promising approaches to support healthcare administration by lessening administrative demands on hospital officials (Snyder et al., 2011). This also applies for records management processes as the application of AI can help reduce intense labour and provide quick and easy management of records improving service delivery in hospitals. Information is critical in the delivery of medical attention to patients, and the field of records management has evolved in recent years to focus on how records are created, used, maintained and stored in health care, with a particular emphasis on technology (Hersh, 2009).

2.5. TECHNOLOGY ACCEPTANCE MODEL (TAM)

The origin of TAM was introduced in the 1980s by its developer Fred Davis, due to concerns that employees were not utilizing the information system technologies made available to them in order to improve business production (Holden & Karsh, 2010). Furthermore, Holden and Karsh (2010) accentuate that the key to increasing use of a new technology was to first increase acceptance of that technology, which could be assessed by asking individuals about their future intentions to use the IT. The theory postulates that a person's desire to use the technology and their behaviour when using the said technology is predicted by their perception of that technology's usefulness (Modiba, 2021). For the purpose of this study, the perceptions of users were examined based on perceived use and users' skills on AI technologies and the attitudes towards using AI technologies.

a) Perception

Goldstein (2014) defines perception as referring to how people organise, interpret and comprehend the sensory data they get from their surroundings, such as visual, aural, tactile, gustatory, and olfactory stimuli. It is the mechanisms by which sensory inputs are turned into significant experiences and play a role in how well a person understands their environment. Similarly, Macdonald (2011) asserts that perception is a person's unique method of viewing a notion that incorporates memories, experiences and the distribution of information during the comprehension process. Officials in the field of records management have displayed a combination of enthusiasm, caution and curiosity towards the application of AI technologies in their industry. The perceptions of the participants for the current study in the selected Tshwane public hospitals will determine the outcome of the proposed technology in the two selected hospitals.

b) Usability

The word usability was coined long ago to replace the term "user friendly". This is because in the early 1980s the term came to have some unfavourably ambiguous and subjective meanings. The term it was meant to replace, usability, has, however, practically reached the same level of devaluation in the intervening years (Bevan, Kirakowski & Maissel 1999; Lewis, 2014). Lewis (2014) purports that it is critical to distinguish between formative and summative usability's objectives and methods when talking about usability. According to the summative conception, a product is useful when users are able to utilise it for the intended purpose successfully, efficiently and satisfactorily. According to the formative idea, usability is dependent upon usability issues not existing (Lewis, 2014). Furthermore, Modiba (2021) argues that the major challenge with AIT is that because the process is gradual, AIT cannot immediately start managing the records efficiently on its own; it needs to be trained in how to do so. Moreover, it is important to thoroughly identify the training needs of the personnel to guarantee proper and effective machine learning so that the records are handled successfully and efficiently (Kashaija, 2022).

2.5.1. CRITIQUES OF TECHNOLOGY ACCEPTANCE MODEL

TAM is the most used theory in research, especially in the social sciences discipline. However, this model has been widely criticised leading to its founders frequently updating it with the intention of better explaining it to the readers. According to Malatji, Eck and Zuva (2020) a state of theoretical chaos and uncertainty have resulted from researchers' independent attempts to expand TAM in order to make it adapt to the constantly shifting information technology environments. Studies have shown that with TAM, the variable pertaining to client behaviour, which must be evaluated using subjective measures such as behavioural intention and interpersonal influence, is one of TAM's limitations (Maruping, Bala, Venkatesh & Brown, 2017). Additionally, Shan and King (2015) posit that underlines of behaviour is unable to be quantified reliably in observed research, owing to various multiple subjective elements, such as values and norms of societies and personality attributes. Despite the criticisms surrounding TAM many researchers continue to utilize the model in their research investigation to measure the behavioural intentions of the users. Thus, the current study adopted TAM to measure the users' perceptions and usability towards AI in managing records.

2.5.2. RELEVANCE OF THE TAM MODEL TO THE STUDY

The emergence of technology is forcing most businesses including government institutions such as hospitals to adapt to the new internet of things. Many government institutions are gradually adopting technology, either fully or partially (Chibuye & Phiri, 2022). This advancement in technology is causing many institutions to change rapidly to provide proper service delivery to citizens. The same applies to the records management industry where the records management programmes can be enhanced by the use of AI technologies. This is supported by a statement in a study by Mporokoso and Phiri (2016) who affirm that a web portal service would be able to increase overall business efficiency and improve corporate responsiveness, as well as maintain a competitive edge to make the firm more profitable and sophisticated. It can then be deduced that adoption of a technological system can alleviate the slow provision of service in organisations. However, the success of this adoption of technologies will be determined by the users' acceptance and usage. Therefore, the rationale for using TAM in underpinning this study was because the study's focus is on AI for proper record management, a migration from manual to automation of which the TAM assumption is based. The model was used to measure perceptions and usability of the users towards the new system in this current study.

2.6. LITERATURE REVIEW

This section proceeds to discuss literature review in detail guided by the objectives of the study. Kitely and Stogdon (2014) define literature review as a shorthand way to refer to the body of published knowledge regarding a specific topic. It is a thorough synopsis of the ideas, issues, approaches, and research findings that have been documented on a specific topic or area (Kitely & Stogdon, 2014). In accord, Punch (2016) contends that 'no research takes place in a vacuum; the researcher needs to identify and review the literature that is relevant to the study and also determine how the reviewed literature will be utilised in the proposal and in the dissertation'. Literature was reviewed using different methods of resources to extract sources, such as e-journals, Google Scholar, print books, the internet, government manuals as well as databases subscribed to by the University of Limpopo such as Sabinet, Emerald, ResearchGate, ProQuest and the University's previous master's and PhD's dissertations.

2.6.1. THE ROLE OF LITERATURE REVIEW

Creswell and Creswell (2018) articulate that the purpose of literature review is to assist the researcher in determining whether the topic of the study is worth studying and highlights insight with regards to ways in which research can limit the scope to a required area of inquiry. Literature review shares the results of other studies previously conducted that are closely related to the current study being undertaken (Creswell & Creswell, 2018). The role of literature review in a study is to provide existing information from other researchers that support the arguments or discussions of the study currently under investigation. The review of literature in this study provides a clear comprehension of records management and AI in organisations. Makgahlela (2021) notes that literature review helps the researcher to identify gaps, strengths and weaknesses in previous studies. Therefore, the literature review helps the researcher to indicate potential gaps in the field of study, while bringing forth potential opportunities of properly managing the records through AI. He further maintains that literature review allows the researcher to establish what has been discovered by researchers in the field so that there is no duplication of researching the same phenomenon. Accordingly, the review of literature on AI for proper records management paved a way for the researcher to expand on what has already been studied. Hence, the researcher reviewed existing literature on records management and AI to identify loopholes in the existing body of knowledge.

2.9.2. Records management practices in public hospitals

Makgahlela (2021) defines records management practices as a combination of all the processes and procedure to be followed in managing records. According to Tagbotor, Adzido and Agbanu (2015), the importance of properly managing records cannot be overemphasised as records hold a vital part in any organisation and as such, it has a mandate to follow all the practices and procedures governing records management. Schellnack-Kelly (2014) affirms that the effective application of the National Archives Records Management Policy would ensure that all public bodies observe and comply with the rules governing the management of records in relation to the creation, management and disposition of all information sources. However, most local government institutions and municipalities as well as hospitals in South Africa are unable to manage their records effectively and efficiently (Makgahlela, 2021).

Good records management systems that provide accurate and timely retrieval of patient health records can enhance quality care for patients. Duplication of records resulting from multiple registration and misplacement of some of the patients' records exacerbates long waiting time for patients worse and causes delay in proper care delivery (Awogbami, Opele & Awe, 2020; Sani, Ibrahim, Ango, Hussaini & Saleh, 2016). Poor records management in hospitals can cause serious implications to patients who require urgent medical attention. Inaccessibility to patients' medical records can result in difficulty to attend to the patient without knowledge of history of diagnosis. The Medical Protection Society (MPS) (2014) purports that medical records should contain all the necessary and useful information that healthcare specialists, or health carers, can readily rely on in the future. The information in the medical records should include patients' personal information, past and present medical assessments, past and present treatment courses, relevant family and social history, lifestyle and beliefs. Therefore, this study was aimed at examining the records management practices within selected public hospitals in Tshwane Municipality. Chinyemba (2003) highlights that records management supports good governance by providing accurate information, evidence of an event and organisational administration by providing an audit trail. Moreover, Mampe and Kalusopa (2012) aver that proper records management in government departments supports efficiency and effectiveness in service delivery, for example, by documenting policies and procedures that inform service delivery for the public.

According to Seniwoliba et al. (2017), record management processes provide a framework for retaining, preserving, conserving and providing for the disposition of records and what is contained in them. They further maintain that the framework assists in providing guidelines designed to inform people on decisions regarding professional record keeping. Without policies governing records management, there will be no control over records, and this could result in loss, unauthorised access to records, records theft, etc. Therefore, the legal framework governing records management is crucial in ensuring the security of information. Comprehensive and updated policy is important to ensure complete protection for all government and private organisations' records as it provides the archival administration wide powers the security and protection of records (IRMT, 1999). Accordingly, a study conducted by Adegboyega and Musa (2019) reveals that, properly managed health records could perform important functions, including detailed information provision with regards to patients' health conditions, as well as being useful for health facilities in response to complaints from the clients.

Health care facilities keep records to ensure accountability and proper planning. Therefore, it is imperative that they manage a sound and effective records management programme. Relatedly, a study investigating "Knowledge and skills requirements for a records manager in Botswana in the networked environment", by Mosweu (2019) found that the availability of legislative framework for digitized records management is not guided by operational regulations to fully support the e-government agenda in terms of managing resultant digital records. Similarly, Kamatula and Kemoni (2018), in their study, revealed that the Records and Archives Management Act of 2002 was the only legislative framework records officials were familiar with in terms of public records management. Existing legislation, policies and regulations in some government departments are not adequate and effective in managing records, especially with regards to digital records (Kamatula & Kemoni, 2018). In accord, Ikonne, Alegbeleye and Isaruk (2021) investigated the "Influence of health records management practices on quality health care service delivery in public health facilities in Rivers State, Nigeria". The study concluded that quality health care service delivery cannot be accomplished without the implementation of standard health records management practices in any health facility. Therefore, it is imperative that in the planning strategies, organisations ensure that their operational strategies are integrated with the legislative framework that fully supports records management to ensure compliance.

2.9.3. Records management functions that could be executed through AI

Duplication of records, misplaced documents, unacceptable time taken to locate records, and overfilled storages are some of the problems that can be alleviated by using AI systems technology (Modiba, 2021). AI technology can also be used to encompass the cultural, professional and societal outcomes of recordkeeping in an organisation (Colavizza et al., 2021). Furthermore, Colavizza et al. (2021) postulate that automation in the form of AI techniques is increasingly applied both to scale traditional recordkeeping activities, and to experiment with new ways of capturing, organising, storing and accessing records. Therefore, records management functions in Tshwane Municipality public hospitals could be improved with the execution of AI applications such as ML that can perform multiple functions simultaneously in a short period of time, saving time, office space and unauthorised access to patients' information.

Machine learning is a division of AI that focuses on ways to build computers that improve automatically through experience (Brei, 2020). Kaplan and Haenlein (2019) describe ML as a system's ability to accurately interpret external data, to learn from such data and to use what it has learned to achieve specific goals and tasks through flexible adjustment. ML also has its own subfields and deep learning is one of them. Deep learning involves gathering knowledge from data by forming a hierarchy of concepts that enables a computer to learn complex concepts from simpler ones. The concepts are placed on top of one another developing a graph that is deep with many layers (Brei, 2020). ML relies on different algorithms to solve data problems and the kind of algorithm employed depends on these machine learning AI capabilities that can assist hospitals in the management of records by, for example, automating, classifying, storing, tracking and accessing records and therefore, alleviating the manual labour processes of managing records which may sometimes cause delays in retrieving patients' records.

According to Reddy, Fox and Purohit (2019) the following functions can be executed by the use of AI technology systems:

- By using ML and Natural Language Processing technology, accuracy in information searches and retrieval speed can be improved.
- Hospitals can also use enhanced ML techniques to support hospital appointments scheduling and prioritisation according to patients' sickness to ensure waiting period reduction and provide effective health care.
- Systems such as NLP uses voice recognitions and transcription to compile electronic health record documentation and can also record medical notes allowing clinicians more time with patients.

Awogbami, et al. (2020) conducted a study on records management practices using a descriptive survey design and found that misfiling was identified as a possible barrier preventing quick retrieval of patients' records. The study further revealed that respondents thought it necessary for the health care centre to manage patients' records electronically for storage and easy retrieval. Hence, the implementation of AI in hospitals could bring about a change for these kind of dissatisfactions by providing a better, innovative way of filing and storing files which enables quick retrieval of patients' records. The implementation of AI technology in records management can lead to various benefits, including improved search and access to records, errors resulting from manual production and increased compliance with regulatory standards governing records management (Modiba, 2021). Moreover, Kostoff and Jordon (2019) posit that AI can assist in identifying and managing sensitive or confidential information in records by, for example, using its audit trail system to detect intrusion and monitor user activities, thereby improving the security of records.

Accordingly, Davenport and Kalakota (2019) aver that AI technology such as robotic process automation performs structured digital activities for administrative purposes, including those involved with information systems, performing tasks as if they were a human user following a script or rules. This form of AI in the health care is used for repetitive tasks such as prior authorisation and updating patient records (Davenport & Kalakota, 2019). It can then be deduced that AI with its many different state of the art technology systems is slowly but surely attracting adoption by organisations including the records management discipline to improve business productivity, customer care and service delivery. Furthermore, Thiébaut and Thiessard (2018) in their study, found that artificial intelligence neutrals networks can de-identify patient notes in electronic health records, outperforming the traditional existing methods.

2.9.4. Perceptions of Records Management officials towards AI technology system for effective records management

It seems like records management officials at different departments have different views towards the adoption of technological systems for records management including AI technology. Using a convergent design, Modiba (2021) conducted a study at the Council for Scientific and Industrial Research (CSIR) and found that some records management specialists claimed that the adoption of AIT would still not improve the effectiveness of records management, while others claimed that AIT will replace them and leave them with no jobs.

Contrarily, a study by Pera, Kaur and Rao (2014) revealed that participants were comfortable working with e-medical records. The staff perceived that e-record saves time and will assist in ensuring timely decision-making and patient care as access to patients’ health history is faster with electronic management. Furthermore, Newa and Mwantimwa (2019) assert that electronic records management is perceived as being able to minimise records management challenges and errors usually done by humans. Accordingly, Awogbami, et al. (2020) established that the Health Information Management Practitioners perceived their paper-based medical records files as well arranged.

However, a substantial number of the respondents identified misfiling as a possible barrier for quick retrieval of patients' records. Moreover, majority of the respondents thought it necessary for the hospital to automate records for easy storage and retrieval. Therefore, the implementation and usage of AI systems in the Tshwane Municipality public hospitals could have an impact on proper records management by saving the time taken to access patients' records, saving the hospitals' money in terms of maintenance and also saving office space. Furthermore, investigating AI Model in an Enterprise Resource Planning Cloud based system, Yathiraju (2022) found it to have positive implications for individuals and organisations to improve management performance. A questionnaire survey by Kashive and Powale (2020) revealed that the user's level of perception on the ease of use of any new technology affects their intention to utilise it. Additionally, understanding the goals and motivations of each individual user will help to create the ideal environment for them, which will enhance their attitude and contentment and encourage them to utilise the technology in the long run (Kashive & Powale, 2020).

Contrarily, Reddy et al. (2019) revealed that there has been a misconception with regards to abilities of AI with a mistaken notion that AI will replace human staff altogether. Such perceptions are inaccurate, and if a balanced perspective of the limitations and capabilities of AI is taken, one can ascertain which parts of the records system AI can be integrated to make a meaningful impact. Moreover, it was revealed in Awogbami et al (2020) that respondents thought it necessary for the medical centre to keep patients' records electronically for easy storage and retrieval. It can then be deduced that electronic system is seen as necessary in properly managing records. However, the same electronic system if integrated with AI technology system could do wonders in changing the narrative with regards to hospital patients complaining of long waiting periods due to poor records management. The two systems can improve the flow of information by making access and retrieval of records easy and quick reducing waiting time.

2.9.5. Skills necessary for adopting AI technology for records management

The researcher saw it pertinent to include the tools and infrastructure necessary for implementing AI technology in records management on this section. The reason was to highlight the types of tools and infrastructures that are important in implementing the technology system and to also indicate some of the challenges that could emerge after implementation of the system. Therefore, the skills, tools and infrastructure necessary for AI adoption are discussed next.

1. Skills

According to Stanley and Williamson (2017), skill is a paradigm of what can be improved with training. Inadequate skills can hinder the interest of users towards the adoption of technological systems in an organisation. The implementation of a new system requires that employees be skilled in managing it (Kanzi, 2010). Therefore, how the system is used will be determined by the skills acquired to operate that technology. When implementing AI technology, the records officials should be considered with regards to how they are going to manage the application when executing records functions. Training and workshops will be part of the requirement for officials. According to Freda (2014), poor skills in information technology results in traditional records managers and archivists being very conservative and technophobic. Bughin, Hazan, Lund, Dahlström, Wiesinger, and Subramaniam (2018) in a McKinsey report, mentions that in terms of implementing AI technology in organisations, certain technological skills are required. They include IT specialists and computer programmers, technology designers, advanced technology maintenance skills, and basic digital skills. Moreover, there are some issues with the availability of data and label, the familiarity of the machine learning model and the capability of easily integrating such models with existing electronic health record systems that have yet to be addressed (Reddy et al., 2019).

Lack of competent staff for e-records management and low budget to support training for staff may affect the success of the AIT functionality. Accordingly, Kashaija (2022) suggests that hiring qualified staff and training staff in house on e-records management might have an advantage on the usage of technology systems. Similarly, Msiska, Kumitawa and Kumwenda (2017) support that education and employment levels have a positive association with records management electronic systems. A study conducted by Mosweu (2019) recommends that records management professionals need capacity building to enable them to obtain skills required to manage records in the networked environment. Therefore, trained and qualified records staff complement the success of a new implemented technological system such as AI technology.

The success of every organisation is based on the kind of staff that organisation has, hence organisations need to hire skilled people or have in place training as well as skills development projects that support the development of staff to ensure good business productivity. Rolan, Humphries, Jeffrey, Samaras, Antsoupova and Stuart (2019) in their study revealed that retraining staff to reduce the knowledge and skills gap is necessary. These skills or training projects will come in handy when new systems are adopted by the organisation. Records management programmes are no exceptions when it comes to training and skills development in equipping the records staff with the most relevant skills to manage new systems to properly manage records. In the current information age where technology takes centre stage, institutions are required to upskill records management officials (Kavishe & Dulle, 2016; Chigariro & Khumalo, 2018).

2. Tools and Infrastructures of AI technology (Components of AI)

According to Robbins and van Wynsberghe (2022), AI is reliant on massive, climate-intensive infrastructures, such as those for electricity, precious minerals, connectivity or data transfer. Also, Ashok, Madan, Joha and Sivarajah (2022) mention that the adoption of AI in digital technologies (DT), including the records management industry, are proliferating a profound socio-technical transformation. The necessity of addressing infrastructure alongside AI points to the phenomenon of carbon lock-in, in which society's capacity to reduce carbon emissions in technological, economic, political, and social spheres is constrained by the inherent inertia created by ingrained technological, institutional and behavioural norms (Robbins & Wynsberghe, 2022). The following section discusses the components of AI (as indicated in section 2.5.) and these components also double as tools and infrastructure of AI technology. This is in accordance with avoiding repetition of words in this study.

a) Machine Learning (ML)

The term ML was first used in 1959 by Arthur Samuel, who later defined it as a scientific subject that allows computers to learn without being explicitly taught. According to Wang and Siau (2019), ML is an automated technique that enables computers to examine massive amounts of data, spot trends and draw conclusions from the data to provide support to predictions and decision-making.

The main goal of ML is to establish computer programs that can retrieve data and use them for self-learning (Ali, Naeem & Bhatti, 2020).

Luz, Vollmer, Decruyenaere, et al. (2020) assert that ML techniques can be applicable to the management of records by storing patients' health records which contains all the information about the patient health history, namely, physician notes, nursing assessments, patient problem lists, patient medication lists, discharge summaries, etc. In the words of Luz et al. (2020), they mention that "early identification of septic patients through machine learning-derived prediction models could improve and facilitate patient care in situations where time is life". Therefore, as much as ML can assist health institutions in identifying those patients that need urgent medical attention, they can also assist in the efficient and effective management of patients' records by quickly retrieving records for those patients who needs urgent medical attention.

b) Optical Character Recognition (OCR)

OCR refers to a field of research in pattern recognition, AI, and computer vision. It is the electronic conversion of handwritten, typewritten, or printed text into machine-translated images (Asif, Hannan, Perwej & Vithalrao, 2014). OCR is extensively used to identify and search text in electronic documents. According to Asif et al. (2014), scanned papers can now be converted into completely searchable documents with text information that is recognised by computers thanks to OCR. This OCR extracts the relevant data and automatically adds it into an electronic database, instead of manually retyping the text. These processes can also be applicable in the digitisation of records.

c) Natural Language Processing (NLP)

NLP is a subfield of AI that focuses on enabling computers to comprehend, analyse and produce human language in a way that is both meaningful and contextually relevant (Jurafsky & Martin, 2008). Goldberg (2020) asserts that NLP involves developing algorithms, models and systems for processing and analysing natural language text or speech data. Its main goal is to bridge the gap between human communication and computer comprehension, enabling computers to carry out tasks such as speech recognition, sentiment analysis, text summarisation and language translation among others (Goldberg, 2020).

d) Robotics

According to Wang and Siau (2019), robotics is the branch of technology that creates machines called robots that can imitate human behaviour. Robots are referred to as military robots, agricultural robots, medical robots, or household robots, depending on their uses. Many of the robots are not necessarily like humans, as most are designed to carry out repetitive and dangerous tasks depending on the industry in which the robot is adopted, rather than to perform high-precision and creative activities (Wang & Siau, 2019). Most robots are capable of doing duties normally done by human beings, such as lifting heavy loads, shelving records, talking and walking like people. AI has enormous potential in the records management industry and many other areas. AI-based breakthroughs like facial recognition and self-driving cars have been developed. These applications necessitate the automatic decision-making and interaction of AI systems with the outside world.

e) Internet Connection

The adoption of AI technology in organisations may face infrastructure challenges that could be a barrier in terms of functionality, and this include connectivity as most AI technology require network or strong bandwidth in order to function. This is supported by a study by Ojobor (2023) that revealed that poor broadband connectivity is one of the other obstacles to the adoption and usage of blockchain technology in libraries in South-eastern Nigeria.

f) Power Shortages

Although the implementation of AI technology may come in handy in improving records management and service delivery in selected public hospitals of the Tshwane Municipality, the power shortage crisis declared as a disaster in South Africa could have a negative impact in the smooth functioning of the system. Therefore, the Department of Health (DoH) is required to have a backup plan such as a generator to ensure the smooth running of the system. Complete recovery plans decrease the impact caused by disasters as not being able to access or retrieve patients' records can lead to hospital operations disruption or shutdown (Oketsang, 2016). When AI is implemented, it is often not a standalone object, but interacts with the technologies we use and takes data from our social arrangements to generate its outputs (Robbins & Wynsberghe, 2022). This also applies to the use of electricity to support its functionality.

2.9.6. Adoption of AI technology for the management of records

The adoption of AI to Tshwane Municipality public health sectors can come as a timely intervention to improve records management setbacks and service delivery. The benefits of AI application have been highlighted by other organisations who adopted the system for better business productivity. According to Reddy et al. (2019), combining ML techniques with electronic health records can assist health workers and records officials in retrieving accurate and relevant patient information. The terms "automation," "access" and "AI" are increasingly used to describe the past. Jaillant (2022) quotes that “we do not have record-keeping problem; rather, there are too many records, many of which are locked away in dark archives (Jaillant, 2022). Hence, the disruptions and delays that comes with retrieval of records from storages in bigger institutions such as hospitals handling many records.

AI has also been used in libraries to allow self-service to users. An example of this is the robot Libby at the University of Pretoria that does multiple tasks previously done by humans. AI can be useful in the records management for indexing and abstracting, information access and retrieval (Ayinde & Kirkwood, 2020). Davenport and Ronanki (2018) conducted a study on 152 cognitive projects to assess the impact of AI in business. Their study categorised the effect of AI into three components: process automation, cognitive insight and cognitive engagement. The study showed that process automation deals with back-office automation in administrative and financial tasks such as transferring data from e-mail. Cognitive insight detects patterns from massive amounts of data using machine learning techniques such as detecting fraudulent activities. Cognitive engagement is concerned with automated communication with customers and employees via NLP technologies (Davenport & Ronanki, 2018). In light of the aforementioned, it can be deduced that the selected public hospitals of the Tshwane Municipality can benefit from AI technology in managing the hospitals’ information processes such as integrating from paper-based functions to automated ones to ensure better productivity and good service delivery. The technology can also allow the hospitals in conducting audit trails of the movements of records and prevent unauthorised access. Moreover, AI technology can also help the hospitals in communicating with patients and employees on how and where to access information, particularly patients' records through its state-of-the-art technological capabilities. The adoption of AI technology could also alleviate some of the burdens carried out by hospital officials in terms of records management services and allow self-service for users to speed up services in hospitals.

According to Bohr and Memarzadeh (2020) AI is ready to support healthcare personnel with a variety of tasks from administrative workflow to clinical documentation. Bohr and Memarzadeh (2020) further articulate that patient health records have historically been physician-oriented and have often lacked patient-related functionalities. However, with the development of AI this could change as renowned AI technology can allow self-management and improve the outcomes of patients, by implementing a patient-centric personal health record (Bohr & Memarzadeh, 2020). This will allow ample freedom for patients to manage their conditions, while affording clinicians ample time to perform more crucial and urgent medical tasks.

2.10. CHAPTER SUMMARY

This chapter covered theories with relation to managing records effectively to improve access and retrieval of patients' records in public hospitals. The chapter highlighted a systematic literature review of major studies in records management, both globally and locally. The Records Continuum Model and AI Model were discussed as the theoretical framework underpinning this study. Literature was reviewed guided by the objectives of the current study. The study also highlighted the relevance of the Records Continuum Model for the study. This chapter pointed out that there is a need for a proper records management system in public hospitals. The next chapter covers the research methodology of this study.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0. INTRODUCTION

Chapter two discussed the theoretical framework and the review of literature pertaining to this study. This chapter focuses on the research methodology used to conduct this study. The chapter entails describing the research paradigm, research approach and design, population and sampling and data collection.

3.1. RESEARCH METHODOLOGY

According to Patel and Patel (2019), research methodology refers to the way of studying how research is scientifically conducted. When choosing research methodology, it is always important to apply the right methodology that will support credible results of the study's findings. Masuku (2013) notes that research outcomes are often judged based on the methodologies used for the study. In accord, Ncube and Rodrigues (2017) aver that selecting an appropriate methodology for the study is very important as it determines how the whole research process will turn out.

3.2. RESEARCH PARADIGM

The term paradigm originates from the Greek word *paradeigma* which means pattern. The term was first coined by historian Thomas Kuhn in 1962 to describe a cluster of beliefs and dictates which for scientists in a particular discipline influence what should be studied, how research should be done and how results should be interpreted (Bryman, 2012). According to du Plooy-Cilliers, et al. (2021) paradigms are referred to as research traditions or worldviews. It is crucial for a researcher to understand the paradigm to adhere to, because this establishes the questions that are deemed worthy of inquiry and the processes required for the answers to these questions to be accepted (du Plooy-Cilliers, et al., 2021). The different epistemological paradigms that can be used to underpin research, include interpretivism, positivism and the critical realism paradigms which have been proven to be mostly used in records management by other researchers (Ngwenya, 2019; Makgahlela, 2021). The current study is guided by the positivism paradigm which is described in detail in 3.2.3. The researcher adopted the positivism technique because of its nature of showcasing facts in terms of quantities that can be processed by using statistical techniques (du Plooy-Cilliers, et al., 2014). This paradigm technique supports the quantitative approach employed in this study.

3.2.1. Interpretivism

Interpretive methodology requires that social phenomena be understood "through the eyes of the participants rather than the researcher" (Cohen, Manion & Morrison, 2007; quoted in Rehman & Alharthi, 2016: 6). Interpretivists gather mostly qualitative data from the participants of the study. Interpretive paradigm is applicable in grounded theory, ethnography, phenomenological study, case studies, and content analysis (Ngwenya, 2019

Interpretivists mainly seek to comprehend human behaviour and to view the world from the perspective of the subject of their research (du Plooy-Cilliers, et al., 2014). Owing to its common association with qualitative approach studies, the researcher opted not to employ this method because the research approach adopted for this study is of quantitative nature, and therefore, seeks to record facts in terms of quantities that can be processed by statistical procedures to uncover reliable and valid casual correlations.

3.2.2. Positivism

According to Richards (2003), the term positivism was first coined by the French philosopher Auguste Comte during the early 19th century on the stance that only scientific knowledge, experiment and observation reveal the truth about reality. Jakobsen (2013) asserts that positivism refers to philosophical positions that emphasise empirical data and scientific methods. Moreover, Ngwenya (2019) posits that positivism is concerned with models and theories which are used to define variables, frame and test the hypotheses. Positivism is mostly associated with quantitative research approach because of its ability to quantify the collected data and to uncover behaviour which can be analysed (Makgahlela, 2021). The quantitative methods mostly used by positivists are experimental, cross-sectional and longitudinal methods. Dikotla (2016) avers that the advantage with positivism theory lies in its ability to be more broadly generalised, which enables data collection on the same topic in different social contexts.

The positivism research paradigm collects evidence of data through experiments and observations (Dikotla, 2016). According to Sarantakos (2005), data collection techniques in positivist paradigm requires hard data in the form of numbers to enable evidence to be presented in a quantitative form. Rehman and Alharthi (2016) elucidate that the epistemological stance of positivists is that of objectivism. With positivists, social reality is regarded as complicated and cannot easily be subjected to statistical deduction.

However, positivists maintain that it is possible to adopt a distant, detached, neutral and non-interactive position (Morris, 2006). The current study adopted positivism paradigm because of its association to quantitative research studies. Although there have been some criticism surrounding this technique, the researcher saw it fit to use it in this study because of its ability to insist on honest representation of facts and preciseness of measurements of collected data of which the current study aims to achieve in meeting the purpose and objectives of this study.

3.2.3. Critical Realism

Du Plooy-Cilliers, et al. (2014) articulate that critical realism's origin stems from Germany and was founded out of the frustration with positivism's antihumanism nature and interpretivism's amoral and passiveness. Critical realism attempts to address the weaknesses of the positivist and the interpretivism paradigms. The ontological position of post-positivism is that of critical realism (Rehman & Alharthi, 2016). According to Neuman (2011), critical realism researchers investigate conditions to stimulate grassroots action. Critical realism usually uses mixed methods research such as quantitative and qualitative approaches to complement each other (Neuman, 2011; du Plooy-Cilliers, et al., 2014; Rehman & Alharthi, 2016). For instance, similar to positivists, critical theorists think that social realities are already created in social systems and are just waiting to be revealed (Cohen, et al., 2007; Neuman, 2006). With regards to interpretive paradigm, critical theory concurs with the interpretive paradigm's claim that social realities are generated and created by human beings (Cohen, Manion & Morrison, 2011; Neuman, 2006). The goal of critical theorists is to expose the underlying unfair structures in social institutions and encourage the reformation of laws and policies to be enacted to promote equality, justice, fairness, equal distribution of resources and empowerment in people's lives (Neuman, 2007). The central belief of critical realists is that the material, cultural and historical conditions in which individuals find themselves in, may hold them back (du Plooy-Cilliers, et al., 2014). This is in support of other research studies that indicate that most public hospitals still use the traditional way of managing records because they are more familiar with the traditional system as opposed to technological system (Msiska, et al., 2017; Kalusopa, 2017; Marutha, 2011). However, the critical realism technique was not adopted in this study simply because it deals with mixed methods research studies. Using this method would have made it difficult for the researcher to produce reliable findings on the basis that the data collected in quantitative research are only measured and tested statistically.

3.2.4. Pragmatism

Pragmatism is offered as a counterargument to positivism and "metaphysical" (based on critical theory, post-positivism and participatory approaches) thinking by Morgan (2014). According to Shannon-Baker (2015), pragmatism is founded on the idea that theories can be generalised and contextualised by examining their "transferability" to different contexts. It is characterised by an emphasis on communication and cooperative meaning-making to create practical solutions to social issues (Shannon-Baker, 2015). According to Teddlie and Tashakkori (2011: 99), pragmatism has been suggested as the "best paradigm" for research in the literature on mixed methods. In contrast to the critical realist approach to mixed methods research, a pragmatism approach gives less influence on philosophical presumptions when conducting research procedures (Shannon-Baker, 2015). Therefore, researchers are less restricted on how they conduct research. Although it is possible to adopt pragmatism in a quantitative research approach (Creswell & Creswell, 2018) in support of the objectives of the study, the researcher used the same reason the critical realism was not adopted which is owing to its association with mixed method approached, which could lead to unreliable research findings. As such, the study used positivism research paradigm.

3.3. JUSTIFICATION FOR USING POSITIVISM RESEARCH PARADIGM

The choice of positivism paradigm in the current study was motivated by the fact that it produces precise quantifiable data and uses statistics in yielding research findings and therefore, complementing the quantitative research methodology employed for this study. Positivists believe that "humans could improve their own worlds and become better people through educating themselves" (du Plooy-Cilliers, et al., 2014). Accordingly, this research study could be the starting point for the selected Tshwane Municipality public hospitals and other government departments managing myriads of records to learn about the importance and effectiveness of AI technologies in records management to improve service delivery. In addition, the positivism technique enabled the researcher to achieve the purpose of the study, by gathering accurate data about the management of records in the Tshwane Municipality public hospitals. A positivist approach implies that the researcher remains detached, neutral and objective as they measure aspects of social life, examine evidence and replicates other research studies (Neuman, 2011).

3.4. RESEARCH APPROACH

Research approaches are plans and procedures for research that stretch the steps from broad assumptions to detailed methods of data collection, analysis and interpretation (Creswell & Creswell, 2018). There are various research methods that are commonly used in scientific research. According to Abutabenjeh and Jaradat (2018), research methods consist of three elements which are quantitative, qualitative and mixed methods. All these elements are important and selecting one over another depends on the purpose of the study, the researcher's objectives and the conceptual or theoretical framework adopted in the study. The current study adopted a quantitative approach method. This method was found to be relevant to this study as it was also used by other researchers who conducted studies on a large number of participants, particularly on a large group of participants.

3.4.1. Quantitative Research Approach

Quantitative research is defined as an objective approach which involves collecting and analysing numerical data and applying statistical tests to the data to gather conclusions (Ngwenya, 2019). According to Goertzen (2017), quantitative approach helps the researcher to answer the “what” or “how” of a given situation. With the quantitative approach, questions are direct, quantifiable and contain phrases such as what percentage? What proportion? To what extent? How many? How much?” (Goertzen, 2017). Data collection methods in quantitative research include content analysis according to a coding system, quasi-experiments, questionnaires, statistics and structured interviews (Leedy & Ormond, 2005). These tools help the researcher in examining and exploring the population’s experiences and behaviours towards certain things.

3.4.2. Qualitative Research Approach

Punch (2016) simply defines qualitative approach as empirical research where data are not in the form of numbers. Qualitative research is much more than just research which uses non-numerical data in the sense that it is a way of thinking, or an approach, which similarly involves a collection or cluster of methods as well as data in a qualitative form (Punch, 2016). Furthermore, du Plooy-Cilliers, et al. (2014) highlight that qualitative researchers are interested on the in-depth of human experience, including all the personal and subjective mannerisms that are characteristic of individual experiences and meanings associated with a particular situation. Qualitative data collection tools include interview, focus groups, observations and document analysis. Data collection tools in qualitative approach assist the researcher to have a comprehension of the social occurrences and peoples’ behaviours. However, the researcher did not choose this approach because the intention was to generalise results to a broader population, and to analyse data statistically which proves to be time effective and less complicated, which is impossible to do with a qualitative approach as the aim of qualitative is to emphasise words rather than figures when collecting and analysing data, meaning they use methods that will assist them to gain in-depth understanding of their population to make inferences.

3.4.3. Mixed Methods Approach

According to Creswell (2014), mixed method approach focuses on amalgamating quantitative and qualitative approaches in a research study. The mixed method approach involves combining quantitative and qualitative methods in a research study in the sense that one approach's weakness can be compensated by the other's strength.

However, Creswell (2014) advises against using an embedded approach as it can be a rigorous and time-consuming process for the researcher when collecting and analysing data. Although there are other positive advantages of using mixed method such as the advantage of collecting qualitative and quantitative data at the same time in the same place (Creswell, 2014), this approach was not employed in this study owing to its time-consuming nature of analysing both qualitative and quantitative data, which would result in gathering and analysing data taking longer than expected (Creswell & Creswell, 2018). Therefore, quantitative was the chosen approach in addressing the research problem and the objectives of this study.

3.5. THE RATIONALE FOR USING QUANTITATIVE APPROACH

The quantitative approach was found relevant for the study as the theoretical outline of the study applied the positivism research paradigm in answering the objectives of the research study in connection with records management. Consideration of the objectives of the current study influenced the choice of quantitative approach as a method of collecting data from the two selected Tshwane Municipality public hospitals. Moreover, the quantitative approach's primary concern is the measurement of phenomenon in terms of quantity (Patel & Patel, 2019). Therefore, this approach was found to be suitable in assisting the researcher to collect data from the target population in the two selected public hospitals in Tshwane Municipality.

As of the 19th century until the middle of the 20th century, the social sciences were dominated by the quantitative approach. However, as interest in qualitative research grew, mixed methods research began to take shape (Creswell, 2014). In view of this, it can be deduced that all these research approaches are important. The researcher, however, found quantitative approach as appropriate for this study in the sense that the population size from the two selected Tshwane Municipality public hospitals can be easily managed by a data collection tool that will not be time-consuming (Creswell, 2014; Makgahlela, 2021). Accordingly, the use of quantitative research enabled the researcher to arrange large amounts of confusing data in graphical form or statistical summaries to adequately respond to research questions (Ngulube, 2009). Hence, the adoption of quantitative approach entailed measuring phenomenon variables based on statistical information, such as the proportion of persons who agreed or disagreed with particular statements or claims, and then interpreting the findings (Dikotla, 2016). Moreover, quantitative approach in the current study was also adopted to better understand the factors or variables that influence an outcome. For example, in response to long waiting period in public hospitals, the researcher may seek to discover what factors influence the hospital's poor records management in terms of patients' records retrieval (Creswell & Creswell, 2018). Therefore, for the purpose of this study, a quantitative research approach was employed.

The use of this approach was influenced by the objectives of the research, target population, sampling method and data collection method. More importantly, this method was found to be relevant to this study as it was also used by other researchers who conducted quantitative studies, particularly on a large group of participants (Kanzi, 2010; Zervas, Alifragkis & Sampson, 2014; Malake & Phiri, 2020; Gesmundo, Glorioso, Raviz & Apat, 2022). Quantitative research approach is concerned with assigning figures to observations to produce quantitative data through counting and measuring "things" or "objects" (Brynard, Hanekom & Brynard, 2014). Therefore, the current study was concerned with assigning a structured and rigorous approach to data collection and analysis to make it suitable for addressing research questions that involve numerical data.

3.6. RESEARCH DESIGN

Babbie (2004) defines research design as "a plan that involves a set of decisions regarding what topic is to be studied among which population with which research methods for what purpose". Research design refers to a strategy that outlines how the researcher will select the study design, how the researcher will gather data from respondents, how the researcher will choose respondents, how the data will be analysed, and how the researcher will present your findings (Kumar, 2019). Sukamolson (2007) posits that, as much as it is crucial to use the proper data analysis tools, it is even more important to use the correct research design. There are different types of quantitative research design, which include survey design, experimental design and descriptive design which are briefly described next.

3.6.1. Survey Design

Survey design is defined as the provision of a quantitative description of the attitudes, opinions, and trends of a population or examining a sample of that population to determine whether there are any correlations between its variables (Creswell & Creswell, 2018). Survey design is composed of different forms which are, mail surveys, telephone surveys, personal interviews, group administrations and questionnaires. One of the primary benefits of employing survey designs is that they enable the researcher to collect a wealth of information from an individual at any time in almost any setting (Du Plooy-Cilliers, et al., 2014).

However, the survey design was not adopted for the current study to look at the impact of AI for proper records management because of its tendency to be ‘artificial and potentially superficial’, which could be potentially unethical for this study (Du Plooy-Cilliers, et al., 2014). It has an advantage of collecting data ubiquitously but does not support the current study’s objectives as data were collected only at the selected hospitals at a given time to respect the demanding work associated with the study’s respondents.

3.6.2. Experimental Design

According to Kumar (2019), an experimental study is that study in which the researcher starts the investigation with the cause and waits to observe the effects. Similarly, Creswell and Creswell (2018) articulate that an experimental design involves the systematic manipulation of one or more variables in order to evaluate the impact of the manipulation on a desired outcome. The advantage of experimental design is its ability to conduct experiments in controlled environments which then allows the researcher to repeat the experiment on more than one occasion and compare the results.

However, this research design also has its disadvantages and one of them is that it is not always possible to eliminate extra variables because experiments can sometimes lead to extortion of results (Du Plooy-Cilliers, et al., 2014; Creswell, 2014; Kumar, 2011). Hence, the researcher opted to employ a research design that would support the reliability and objectivity of the collected data which is descriptive design.

3.6.3. Descriptive Design

According to Patel and Patel (2019), the purpose of research design is to enable the collection of relevant data with the least amount of expenditure, money and time. Kumar (2011) articulates that descriptive research aims to systematically narrate a situation, problem or phenomenon or provide information about certain things and to also make comparisons. Additionally, Punch (2016) asserts that descriptive research aims to collect, organise and summarise data about a situation that is been studied. Descriptive design was employed in this study in order to achieve the objectives of the study.

3.7. JUSTIFICATION FOR THE ADOPTION OF DESCRIPTIVE RESEARCH DESIGN

Research on AI for proper records management appears to be limited, particularly in public hospitals. Hence, the adoption of a descriptive research design was seen as suitable for the current study, as it allows the researcher to describe an experience or a problem and also provide more insight on the situation (Punch, 2016). This design was used to determine the potential of AI towards managing records effectively. Moreover, descriptive design was employed in this current study owing to its ability to better narrate a situation and provide more insight on a subject. Williams (2007) postulate that descriptive research focuses on examining the connections between two or more phenomena or defining characteristics of a specific situation based on observations. Therefore, this approach is relevant to this study as it is aimed at identifying a technological system, in this case AI technology for improving the management of records in two selected public hospitals in Tshwane Municipality in the Gauteng Province.

3.8. POPULATION OF THE STUDY

Abutabenjeh and Jaradat (2018) define population as a group from which the researcher wants to draw conclusions. Similarly, Marutha (2011) refers to a population as a large pool from which the researcher measured the results and from which our sampling elements are taken.

The population of the study included all the records management staff members and nurses in selected Tshwane Municipality public hospitals. The population is important to the study as these staff members are the ones who use patients' records daily to provide services in the hospitals. Due to lack of funding, time, and respondents' availability, it was not possible to research the entire study population (Maree, 2016; Marutha, 2011). Therefore, the researcher selected two hospitals out of the 15 hospitals found in the Tshwane Municipality to conduct a study about proper management of records and AI as a tool to improve records management in public hospitals.

An interview with the HR personnel from both hospitals revealed that Kalafong Hospital has an estimated population of 123 nurses and 15 health records workers, whereas Steve Biko hospital has 128 nurses and 31 health records workers including two records managers, which adds up to a total of 297 of the population size.

3.8.1. Sampling

Sampling is the act or process of choosing a suitable sample, or a representative part of a population for the purpose of determining parameters or characteristics of the whole population (Mujere, 2016). For the success of a good and meaningful research study, the researcher must ensure that an appropriate sampling technique is employed in the study. A probability sampling method called simple random sampling was used to sample the population. When simple random sampling is used, all elements have an equal probability of being selected (Mujere, 2016). The researcher randomly selected respondents from the total population of 297. To apply random sampling, the researcher requested the staff establishment list in which all employees of the hospital are listed according to their units and ranks (Marutha, 2011). Raosoft sample size calculator in figure 3.1, was used to calculate the sampling size (Raosoft.com, 2015). Based on the said calculator, a sampling size of 297 is 168, which is made of confidential level of more than 95% and less than 5% margin of error. According to Alhomoud, Basil and Bondarev (2016), Raosoft sample size calculator was designed to calculate the sample size and determine the number of responses needed for a study to meet the desired confidence level with the margin of error (usually 5%).

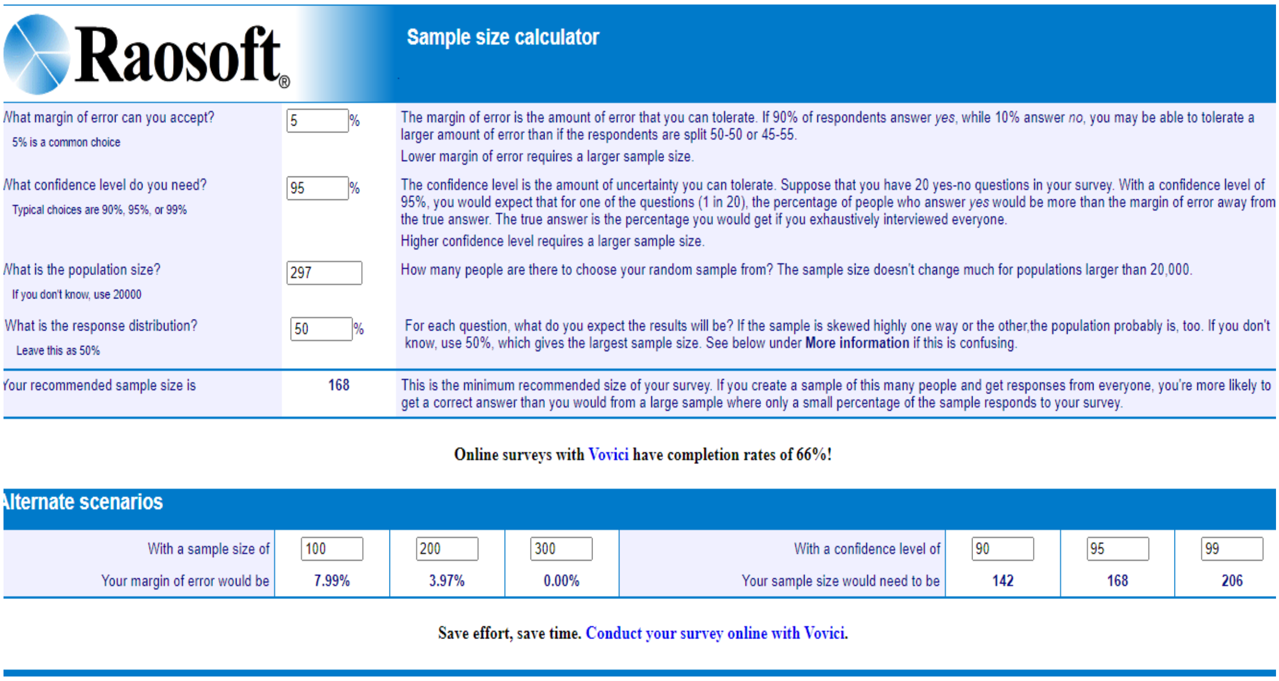

Figure 3.1. Raosoft sample size calculator (Raosoft.com, 2015).

3.9. PRE-TESTING OF DATA COLLECTION INSTRUMENT

A pilot study, also known as pre-test, is defined by Kumar (2019) as determining the study's feasibility by undertaking a small-scale study to decide if it is worth carrying out a full investigation. Additionally, Creswell and Creswell (2018) assert that the purpose of pilot testing is to establish the content validity of an instrument's scores as well as to create improved questions, forms, and instructions. Furthermore, Phellas, Bloch and Seale (2011) buttress that for the researcher to improve the standard of questioning before they are used in survey, the questionnaire needs to be pre-tested first. Therefore, the questionnaire pre-test was conducted to ensure reliable results of the collected data (Leedy & Ormrod, 2005).

Before the actual study can begin, the researcher gave twenty Google Forms surveys to nurses and health records staff from various medical facilities who were not included in the primary study. Moreover, the instrument was also given to two records managers to take part as experts in the records management discipline to ask for their opinions and direction regarding the instruments. The reason for choosing these participants was because they were easily accessible and in a similar type of setting that the current study is taking place.

The data collection instrument was pre-tested because the researcher wanted to identify loopholes in the data collection tool such as the respondents' understanding towards questions asked; the questionnaire's layout, including to check if the font size of the instrument was clear and readable and that questions were easy to respond to. According to Mavodza and Ngulube (2011), "a higher response rate enhances the reliability and validity of the data collection results". After the pre-test was conducted, feedback from respondents confirmed that health records management officials and nurses were relevant to the study because they managed to respond well to the pilot questionnaire and seemed to understand the process of records management. It was also apparent from the participants' feedback that some of the questions were not relevant. Therefore, this assisted the researcher to reconstruct the data collection tool in preparation of the main data collection.

3.10. STUDY AREA

According to Kumar (2019), a study area is any academic or practice institution in which the researcher is conducting a study. This could be any health, education or other needs of a community, attitudes of people towards a situation, occupational mobility in a community or domestic violence (Kumar, 2019). Accordingly, the current study focused on AI for proper records management in selected public hospitals of the Tshwane Municipality in Gauteng, South Africa. Kalafong Tertiary Hospital and Steve Biko Academic Hospital are both located in the Tshwane Municipality of the Gauteng Province in South Africa and serve the communities of Tshwane as a whole. Both hospitals are academic hospitals for the University of Pretoria. The rationale for choosing these hospitals to conduct a study was because of the dissatisfaction expressed by Tshwane residents over long waiting periods before receiving medical attention at these hospitals which is usually attributed to poor records management.

3.11. DATA COLLECTION INSTRUMENT

According to Sadan (2017), data collection refers to the techniques used to collect data in a systematic way as the researcher chooses and uses various data collection tools for the study. The data collection tools are categorised as self - reports, observation and biophysiological measures. Data collection can be performed by way of qualitative approach, quantitative approach or mixed methods. In terms of qualitative approach, the researchers only work with few informants who are interviewed extensively, whereas quantitative is concerned with collecting data from a large pool of people with pre-coded questionnaires (Ngwenya, 2019). Data collection process is the important part of evaluating the research study by deriving opinions and information from the target population of the study. Therefore, it is imperative to select a data collection instrument that will help to yield reliable and valid results. According to Cai and Zhu (2015), without the use of high-quality data collection instruments, the accuracy of the research conclusions is easily challenged. There are different types of collecting data namely, questionnaires, interviews, observation, document analysis, focus group, etc. However, for the purpose of this study, a questionnaire was employed as a tool to collect data from respondents, and it is discussed in the subsequent section.

3.11.1. Questionnaire

For this study, a questionnaire was selected as the data collection tool. According to Silverman (2017), a questionnaire is described as an instrument used to collect statistical data in research. Silverman (2017) further maintains that a questionnaire is a research tool that involves a series of questions with the aim of collecting information from the respondents. A questionnaire can be used in all the research approaches to collect data from respondents. The questions included in a questionnaire can either be closed-ended or open-ended depending on the kind of research approach used by the researcher.

However, both structures of questions can also be used in a mixed method study. Accordingly, the current study adopted a structured questionnaire with close-ended questions to collect data from the respondents. This method was found to be suitable as closed-ended questions allowed the respondents to only choose from the provided answers, which saves time in terms of completing the questionnaire as the respondents were only required to tick or select from the provided answers. The use of questionnaires also allowed the researcher the opportunity of choosing a suitable way from the two ways of distributing the questionnaire, e.g., via email or by meeting the participants in person at their place of work. Questionnaires are both time and cost effective as they can be mailed to the respondents.

However, this method can also have a disadvantage as some of the respondents may take longer to check their emails or there may be a delay with regards to mail delivery, resulting in late responses from the participants. Hence, the researcher opted to distribute in person to avoid complications or delays. The drawbacks about this data collection instrument are that compiling questions, distributing the questionnaires as well as collecting them from respondents is time consuming (Marutha, 2011). Moreover, there is no opportunity to clarify issues in instances where respondents do not understand some of the questions unless respondents get in touch with the researcher (Kumar, 2019).

The questionnaires were distributed to health records officials and nurses in their working stations. The researcher left the questionnaires with respondents to allow them enough time to complete them. This allowed the respondents to fill in the questionnaire at their convenient time without disturbances. Additionally, this method of collecting data allows respondents to read and think about suitable answers. The researcher then collected the data collection tools at a later date.

3.12. DATA COLLECTION PROCEDURE

This section outlines the procedures undertaken by the researcher before collecting data. The researcher started by determining the target population for the study then designed a questionnaire (see Appendix D), which is the data collection tool employed for this study. After developing the data collection instrument, the researcher applied for permission to conduct the study (see Appendix A) from the Turfloop Research Ethics Committee (TREC) where the ethical clearance certificate was granted (see Appendix C). The ethical clearance certificate was then used to request permission from Gauteng Provincial DoH to conduct the study at the two selected public hospitals.

The process of requesting permission from the DoH was conducted as follows:

As required by the DoH to apply for approval, the researcher uploaded the research proposal and ethical clearance certificate on the National Health Research Database. The UL TREC was also added as a form of application for approval. After approval was granted (see Appendix F), each hospital provided the researcher with an official who was in charge of facilitating access to the respondents, managing the distribution of the questionnaires and overseeing the collection of the respondents' completed questionnaires.

The researcher conducted the pre-testing of the questionnaire. Guided by Danchev and Ross (2014), the researcher was careful to comply with the standards of collecting data from respondents, by attaching a cover letter and an informed consent to the questionnaires to allay the participants' worry with regards to anonymity and confidentiality. The cover letter also assured the respondents of their voluntary participation in the study. This assurance resulted in respondents cooperating positively to the study, and therefore, yielding quality data. The questionnaires were distributed to health records workers and nurses available in the hospitals. The researcher then collected the completed questionnaires at a later date. Collection of data took three weeks to complete.

3.13. DATA ANALYSIS

According to Bryman (2016), data analysis refers to the systematic review and interpretation of data to find trends, patterns, and insights that answer research questions of the study. The researcher employed the computer-assisted statistical software of IBM-SPSS called Statistical Package for Social Sciences (SPSS) version 26 for Windows to analyse the collected data. Ong and Puteh (2017) define SPSS as a statistical package designed by the IBM Corporation and widely used by researchers or academics in the whole world. Accordingly, with the aid of SPSS, the researcher was able to thoroughly investigate the test assumptions, including those related to the normalcy test, and do an accurate frequency analysis. (Ong & Puteh, 2017). In this regard, data analysis was analysed quantitatively using SPSS V26 for Windows system with the help of a statistician. This software was deemed appropriate for this study because of its ability to provide accurate statistical program for quantitative data analysis which includes frequencies, tabulations and bivariate statistics. Results of the findings were presented in a form of tables and graphs.

3.14. QUALITY CRITERIA

Janetzko (2008) states that there are various ranks on which to describe the goodness or quality of data. Traditionally, the goodness of data is conceived in terms of validity, objectivity and reliability. In using the quantitative method as a tool for collecting data, the researcher ensured that the information obtained is reliable and valid, and that the findings are honest, and representative of the exact information provided by the respondents, and therefore, achieving the level of objectivity. Quality criteria was utilized in this study in ensuring credibility and confirmability of the research findings. Criteria considered for the quantitative approach are validity, reliability and objectivity (University of Limpopo Postgraduate Manual, 2023: 85; Neuman, 2014: 2 & 12).

3.14.1. Validity

Whiston (2012) defines validity as gathering data that are appropriate for the intended use of the measuring instruments. According to Surucu and Maslakci (2020), validity is determined in accordance with the interpretation's relevancy and suitability of the data obtained from the measuring instrument as a result of the analysis. To ensure that the research yields useful results, the measuring tool must measure what it purports to measure. For this study, validity was maintained by ensuring that the questionnaire distributed to the participants is free of errors, the language used is easy to understand for all the participants and the questions are appropriate and related to the study at hand.

3.14.2. Reliability

Reliability assesses an instrument's accuracy over time and is therefore linked to the results of the research (Du Plooy-Cilliers, et al., 2014). In view of this, the test-retest approach was employed to assess the reliability of the questionnaire. Therefore, the research instrument was applied to two different sample group at different times (as indicated on section 3.9. Pre-testing of data collection instrument). The researcher conducted the first test by distributing the Google form questionnaires to respondents at different hospitals that did not form part of the population of the study and used the same questionnaires to the actual sample group at the two public hospitals in Tshwane Municipality which are

Kalafong Tertiary Hospital and Steve Biko Academic Hospital which where the focus of this study.

The researcher then compared the results obtained on different occasions to determine consistency. Makgahlela (2021) asserts that when multiple researchers utilize a data collection tool in steady conditions and get results that are relatively similar, the instrument is deemed dependable. Therefore, the data collection instrument used for this study was adapted from previous studies (Modiba 2021; Legodi, 2021; Ngwenya, 2019) on records management assuming that they had already been tested, thereby ensuring reliability and validity of the instruments. However, the researcher also established new questions related to the objectives, purpose of the research study and the theories adopted in this study.

3.14.3. Objectivity

Percival and Schroeder (2017) define objectivity as a way of ensuring accurate, reliable and unbiased information in a research study. In accord, Sarantakos (2005) points out that during the entire study process, researchers must set aside their personal beliefs and values. To ensure objectivity, the researcher ensured that data analysis was accurate by making use of the data that were collected from respondents without making any fabrication or adjustments on the results.

3.15. ETHICAL CONSIDERATIONS

According to Plooy-Cilliers, et al. (2014), ethics are a matter of integrity on a personal level, but their implications may affect not only the involved person. The researcher adhered to the standards of professional conduct and behaviour required when conducting a research study. In the words of Creswell (2009), “It is important for researchers to protect their participants, develop a trust with them and promote the integrity of research and guard against misconduct.” Thus, the participants were informed about the objectives and purpose of the study by the researcher. To ensure that the ethical consideration standards are adhered to the researcher followed the following broad principles of ethics:

3.15.1. Permission

As guided by Arifin (2018), the researcher followed all the procedures of requesting permission to conduct the study. Request for permission was sought and acquired from the University of Limpopo Turfloop Research Ethics Committee where an ethical clearance certificate was granted (see Appendix D). Moreover, permission to conduct the study at the selected Tshwane Municipality public hospitals was also requested from the Gauteng Provincial Department of Health and granted for both hospitals (see Appendix E and F).

The process of requesting permission from the DoH was conducted as follows: the researcher uploaded the research proposal and Ethical Clearance Certificate provided by the University of Limpopo on the National Health Research Database as required by the department to apply for permission and the UL TREC was also attached as a form of application.

3.15.2. Informed Consent and Voluntary Participation

To make an informed decision with regards to participating in the study, participants were provided with an informed consent form (attached as Appendix E) that made it clear that respondents are not obliged to answer questions or a question that they don't feel comfortable to answer, and that anyone can withdraw at any time, if they want to discontinue with the participation as specified in the University of Limpopo Policy on Research Ethics (University of Limpopo Postgraduate Manual, 2023; Arifin, 2018). More importantly, participants were also allowed to ask questions and get clarity before completing the questionnaire.

3.15.3. Anonymity

According to Dube, Mhlongo and Ngulube, (2014) anonymity is defined as a means of taking out the participant's name from a questionnaire or any method used to collect data in order to protect them from harm. To support this, the data collection tool was unnamed, and it was also stated on the first page of the questionnaire for the participants not to fill in their names to assure the respondents that their information is protected.

3.15.4. Confidentiality

Pickard (2013) elucidates that confidentiality means that the identity of the participant will be concealed in the use of any data provided by that participant. The researcher outlined the intentions of the study's' data collection process by providing respondents with a cover letter (attached as Appendix B), which stated that as part of the research process and the data collection process, participants need not worry about their information being distributed as the collection of data is confidential and access to collected data was only limited to authorised people (the researcher, supervisor and the statistician assisting with analysing data on SPSS). Moreover, the questionnaire was formulated in such a manner that respondents' personal information and the institutions involved in the research was treated with high confidentiality.

3.15.5. Plagiarism

Lim and Nather (2015) postulate that plagiarism is unethical and an act that goes against morality. Plagiarism occurs when one takes credit by claiming the ideas from previous publications without properly citing the sources. In addressing plagiarism, the researcher referenced all sources cited in this study at the end of the dissertation. The research proposal also tested for plagiarism and kept similarity index to 15% using Turnitin system.

3.15.6. Respect and Dignity

Danchev and Ross (2014) assert that people should always be treated with respect and dignity, and never be used as mere instruments to gain desired results. Accordingly, throughout the data collection process, the researcher exercised a high level of respect towards participants. By giving participants enough information to enable them to fairly weigh the risks and potential benefits of participating in the research project, the researcher additionally showed concern for the welfare of the participants.

Respondents were treated fairly and equitably as well as ensuring that no respondent was unduly burdened or harmed. Although there was no respondent who showed adverse psychological reactions owing to some conflicts and tensions in the workplace or because of their participation in this study. Prior to data collection, the researcher made arrangements with the closest medical facility for counselling in the event that such instances occurred.

3.16. SCOPE AND LIMITATIONS OF THE STUDY

According to du Plooy-Cilliers, et al. (2014), scope of the study refers to the researcher being able to clarify what exactly the research study entails and being able to avoid including information that is not relevant to the study. In contrast, limitations of the study can be described as constraints or limits in a research study that are caused by circumstances and not by the researcher, such as access to information, financial resources or time (du Plooy-Cilliers, et al., 2014). The scope of the current study's focus was on health records workers and nurses responsible in handling records on a daily basis to provide service at selected hospitals in Tshwane Municipality, Gauteng. The study intended to include doctors as part of the population.

However, it proved difficult during the pretesting of the questionnaire as the results indicated nonresponse from doctors. This could be owing to their demanding work which often involves emergencies. The research area is only limited to Kalafong Tertiary Hospital and Steve Biko Academic Hospital in Tshwane Municipality as indicated under the population of the study. Hospitals are big institutions with different organisational functions or units which made it a challenge in terms of grouping respondents in one office set up to draw a sample, especially with regards to nurses as they are situated in different wards sections. Therefore, after the researcher has used the staff establishment list to apply simple random sampling to select the participants, the data collection tool was distributed by visiting different wards in order to access the selected participants. Hospitals create and manage different records. However, for the purpose of this study, the focus was only on patients' records as they serve an important purpose in terms of the hospitals' service delivery.

3.17. CHAPTER SUMMARY

This chapter outlined the research methodology used in the study. The chapter discussed the research paradigm; the research approach, research design, data collection methods and data analysis techniques adopted and explained the researcher's positivism's stance to research and why they chose to adopt the quantitative approach. The chapter also covered the reasons for choosing descriptive research method as the study’s research design for AI for proper records management in selected public hospitals of the Tshwane Municipality in Gauteng, South Africa. Furthermore, this chapter explained population and sampling and sampling techniques, test-retest, validity and reliability, study area, data collection instruments, data collection procedure, data analysis, and ethics. The next chapter focuses on the analysis and presentation of the research results acquired from the study.

CHAPTER FOUR: PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION OF THE FINDINGS

4.0 INTRODUCTION

The preceding chapter described the research methodology applied in this study. This chapter presents the quantitative data collected from the two hospitals. This chapter presents, analyses, interprets and discusses the findings of data collected from the respondents to investigate AI to support records management. Therefore, in this chapter, discussions of the findings are combined together with presentation, analysis and interpretations of the collected data. The data were organised and analysed into more straightforward reports using charts and tables.

The objectives of the study and the theories applied in this study served as the guidelines for the six sections of the structured questionnaire that was used to gather data from respondents. Questionnaires were distributed to 168 participants. However, only 126 were completed and returned to the researcher. Each section in the questionnaire represents data collected from the 126 respondents from both hospitals. The researcher analysed and presented clear and accurate data informed by Mertens (2017) by manipulating and interpreting data to derive meaning to answer research objectives and to test hypothesis. The concerned respondents, i.e., records officials and nurses, were chosen because they manage records daily to discharge their duties which made them relevant to the current study.

The researcher distributed the questionnaires and collected them after seven days to give respondents enough time to complete them without disturbing their busy work schedule.

The study's adoption of quantitative approach required a system that will be able to analyse statistical data such as Excel or Statistical Package for the Social Sciences (SPSS). In terms of data analysis, the university statistician assisted the researcher with analysis of the data and thereafter the researcher presented variables through graphs and charts using SPSS V26 for Windows. Presentation of data was designed in a form of charts and/or graphs and tables with interpretation of the data analysis findings. Data were analysed and interpreted according to the objectives of the study which are as follows:

- To establish how records are managed in Tshwane public hospitals.
- To determine records management functions that could be executed using AI.
- To determine the perceptions of records officials in Tshwane public hospitals towards AI technology systems in managing records.
- To identify the skills and infrastructure necessary for adopting AI technology in Tshwane public hospitals.
- To propose adoption of AI technology to support records management in public hospitals of Tshwane Municipality.

4.1. RESPONSE RATE

According to Morton, Bandara, Robinson, and Atatoa Carr (2012), a response rate involves a description of the population suitable for the study and the cooperation rate such as the number of questionnaires completed by respondents who were able to participate. One hundred and sixty-eight (168) questionnaires were prepared and distributed to records management officials and nurses at the two selected hospitals. Upon collection of the questionnaires, the researcher managed to receive only 126 questionnaires back which means 42 questionnaires were not returned. Therefore, the data collection tool ensured a 75% response rate, which is ideal to make conclusions in a quantitative study based on the assumption by Kothari (2004) who notes that a response rate of 60% or 70% is considered as being good and very good respectively.

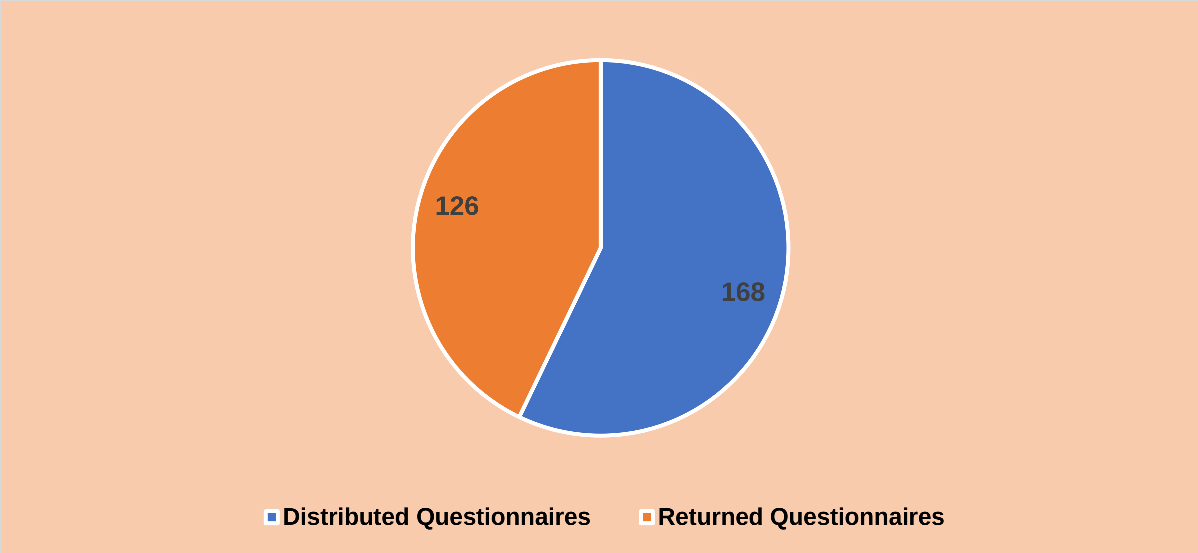

Figure 4.1. Response rate

4.2. PART A: DEMOGRAPHIC INFORMATION OF THE RESPONDENTS

The data for demographic was important for this study in depicting the respondents' age, educational level, rank and the years of experience in the public health service.

4.2.1. Gender: N=126

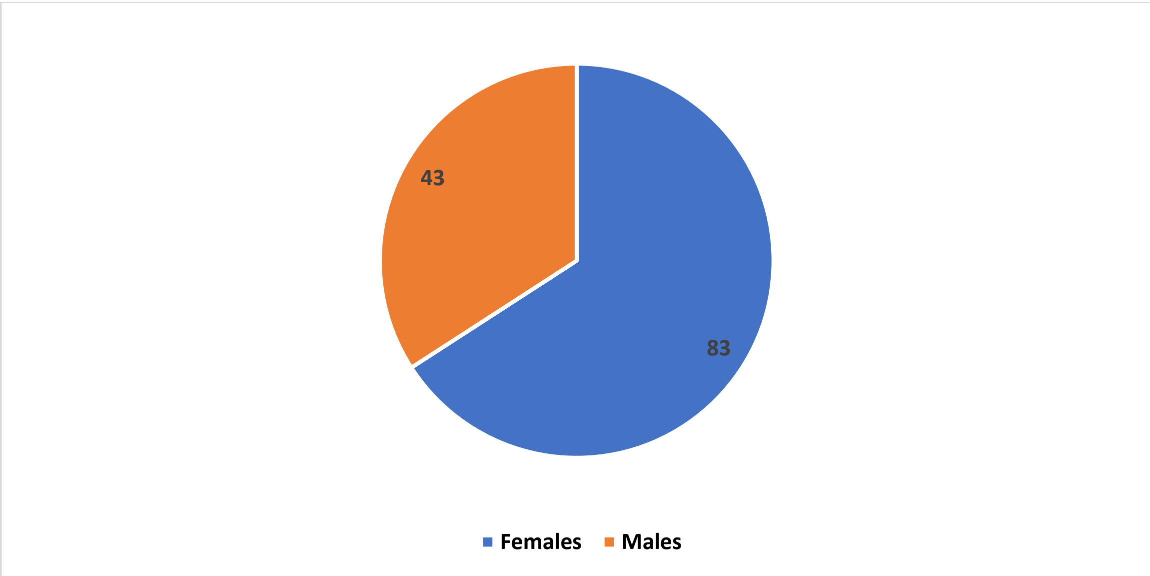

Figure 4.2. Gender: *N=126*

The respondents were asked to indicate their gender by choosing between the two options of female and male. Figure 4.2 shows that out of 126 respondents, 83 (66%) were females whereas 43 (34%) were males. Data collected from the respondents established that participants of this study were predominantly females as compared to males. This could be because most of the respondents were nurses, a profession which has previously been dominated by female staff members around the world.

Another reason could be because the records sections in both hospitals have fewer staff members as compared to the nursing section. Studies have shown that there has been a low intake of males in the nursing profession for years. According to Evans (1997), statistics indicate that men in nursing remain a small minority, further indicating that 3.1% of nurses are males in Canada and the United States, whereas there is only 8.77% of male nurses in the United Kingdom. Similarly, Shakwane (2022) reveals that the percentage of males in the nursing profession has persistently remained low. Regardless of females outweighing males in this study, gender plays no role in terms of AI technology usability that could improve service delivery in hospitals. The expectation here was that the nurses and records officials in both hospitals would use AI technology for the management of records in improving services.

4.2.2. Job Title of the respondents

The respondents were asked to indicate their job title to identify the balance between the respondents in the two-unit sections which is the records section and the nursing section.

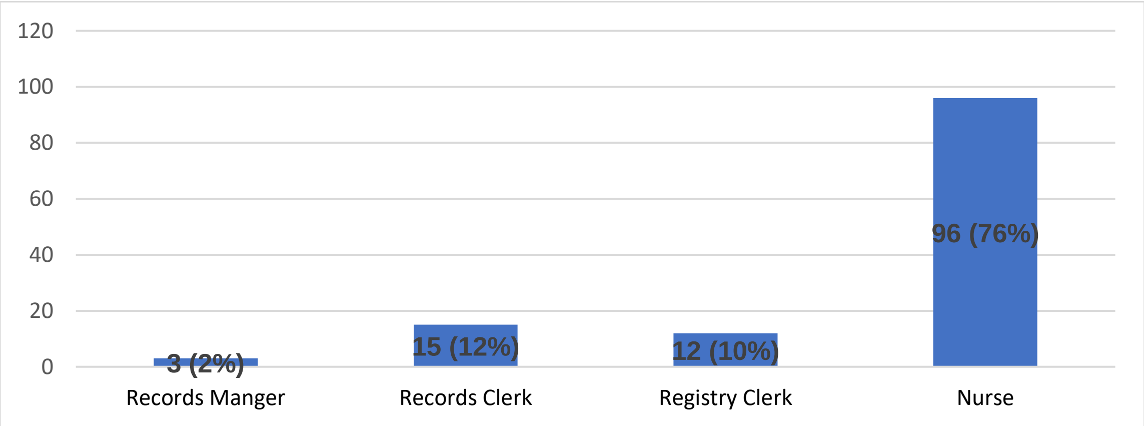

Figure 4.3. Job title of the respondents: *N=126*

The findings highlighted on Figure 4.3. shows that three (2%) of the 126 respondents are records managers, while 15 (12%) are records clerks, 12 (10%)

are registry clerks and 96 (76%) are nurses. With the majority of the respondents being at 96 (76%), this is a clear indication that the hospitals' number of records staff members is lower than the number of nurse's staff. The hospitals' staff intake for records staff members is lower than that of nurses' staff.

This could be because of the limited number of registry or information desks in hospitals, which results in the lower employment of records officials, while nurses are highly demanded because of the size of the hospital and the number of patients the hospital can take daily. This correlates with a study by Nei, Snyder and Litwiller (2015) who reveals that nursing is considered to be the occupational field with the largest job growth.

In accord, Houston Christian University (2023) confirms that millions of people are employed in the nursing profession, which has long been one of the fastest growing professions in the U.S. Moreover, Houston Christian University (2023) further notes that as the healthcare industry has emerged as the largest employer in the country over the past several years, the increase of nursing jobs has accelerated. Contrary to the current findings, findings from a study conducted by Marć, Bartosiewicz, Burzynska, Chmiel and Januszewicz (2019) highlight that shortage in the nursing occupation have reached a critical point for healthcare services locally as well as globally. Furthermore, Cotterell (2023) notes that the South African public system has 5 000 vacant positions that cannot be filled owing to budget constraints. Cotterell (2023) further reveals that over 50-million citizens rely on the country's public health sector which currently has only 22 090 nurses employed.

4.2.3. Number of years in the public service

The question was intended to find out from the respondents the length of service they had in the public health sector. Figure 4.4 shows the number of years served by the respondents in the public health.

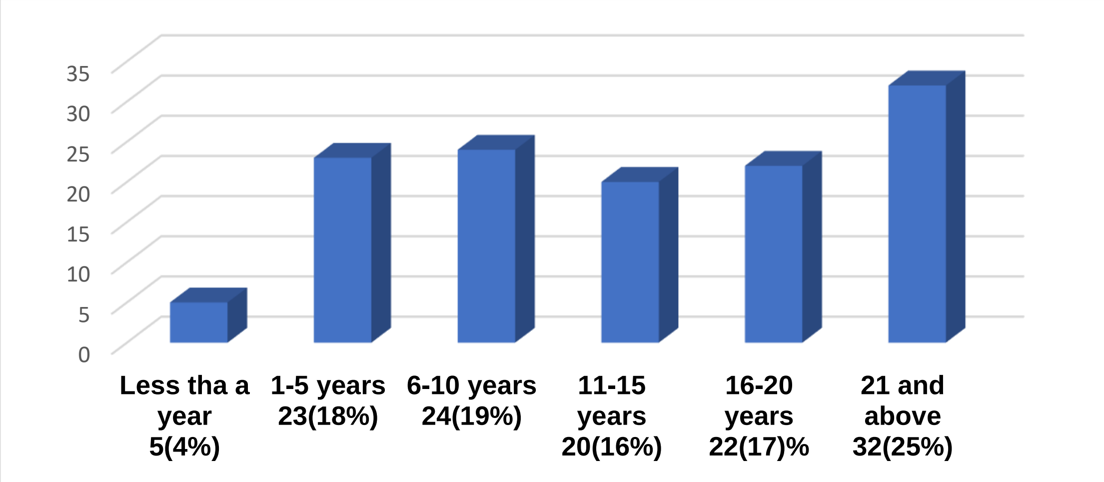

Figure 4.4. Number of respondents' years in the public health: *N=126*

The findings presented in Figure 4.4 bar graph shows that five (4%) of the respondents that took part in the study have been in the public health sector for less than a year, while 23 (18%) served from 1 to 5 years. Twenty-four (19%) respondents indicated 6 to 10 years of service in the public health sector, with 20 (16%) respondents indicating 11 to 15 years of service and 22 (17%) stating that they have been in the public health for 16 to 20 years.

About 32 (25%) of the respondents revealed that they have 21 and above years of service in the public health. Therefore, the findings revealed that majority of the respondents have been in the public health system for long, which is over 21 years and above. This could be owing to other factors such as being comfortable in one position or field (stagnation) or lack of career growth. This correlates with a statement by Zamir (2018) who posits that a person who is stagnant in a position will find themselves in the same rank for a long time, and even if they dislike their position, they will find it hard to leave or change a career. However, working at a hospital for a long time could also be attributed to good working environment, including good employee benefits and good renumeration. This is supported by Thompson and Bruk-Lee (2021) who state that individuals are happy and more likely to stick with organisations that offer competitive salaries, opportunity for career advancement, flexibility over scheduling one's time employment stability and a comfortable, safe working environment. With the results revealing majority as having been in the public health for over 21 years, this could mean it is likely possible for them to embrace the new technology in improving their work performance.

4.2.4. Respondents' educational level

Respondents were asked to indicate their level of education with the aim of determining their likelihood and capabilities on the usage of the AI technology for records management.

Table 4.1. Educational level: *N=126*

QUALIFICATION LEVEL	FREQUENCY	PERCENTAGE
Grade 12	25	20%
Diploma	67	53%
Undergraduate degree	21	17%
Honours degree	6	5%
Master's degree	5	4%
Doctoral degree	2	2%

The results presented on Table 4.1 reveal that out of 126 respondents, over half 67 (53%) of the respondents are in possession of a diploma qualification, 25 (20%) are at grade 12 level, 21 (17%) are at undergraduate level, whereas six (5%) of the respondents are in possession of an honours degree and five (4%) a master's degree. The lowest number of respondents two (2%) are at doctoral level. Therefore, the findings on over half of the respondents having diploma qualifications could be translated into having a positive outcome in instances where the usage of AI technology to manage and control the records is introduced and implemented in the two hospitals as records personnel could adapt quickly to the AI technology usage owing to their educational background. These current findings are supported by Denkowska, Fijorek and Wegrzyn (2020) who express that additional education increases the level of innovation and competitiveness in the country's economies. Professionals in any field have to invest in life-long learning as this is important to remain updated with the ever-changing current trends (Zamir, 2018). Therefore, the educational position of the staff members at both hospitals could assist in the usability of the technology which will improve service delivery. Similarly, Msiska et al. (2017) confirm that education and employment levels have a positive link with the usage of electronic medical records.

4.3. PART B: RECORDS MANAGEMENT PRACTICES IN THE TSHWANE MUNICIPALITY PUBLIC HOSPITALS

The questionnaire addressed the first objective of the study by asking respondents about the records management functions or how records are managed in the Tshwane Municipality public hospitals. The following questions were asked under the following objective:

- Format used to create records.
- The type of records that are created in the hospital.
- The period of time taken to retrieve records in the hospital.
- Format of storage used to store records.
- Availability of records backup system

4.3.1. Format used to create records in the hospital

The respondents were asked which format was used by the hospital to create records. The intention here was to find out the current records creation format used by the hospital; this may assist in identifying gaps that are causing records management challenges, resulting in poor service delivery in the hospitals. Findings from the question are highlighted below.

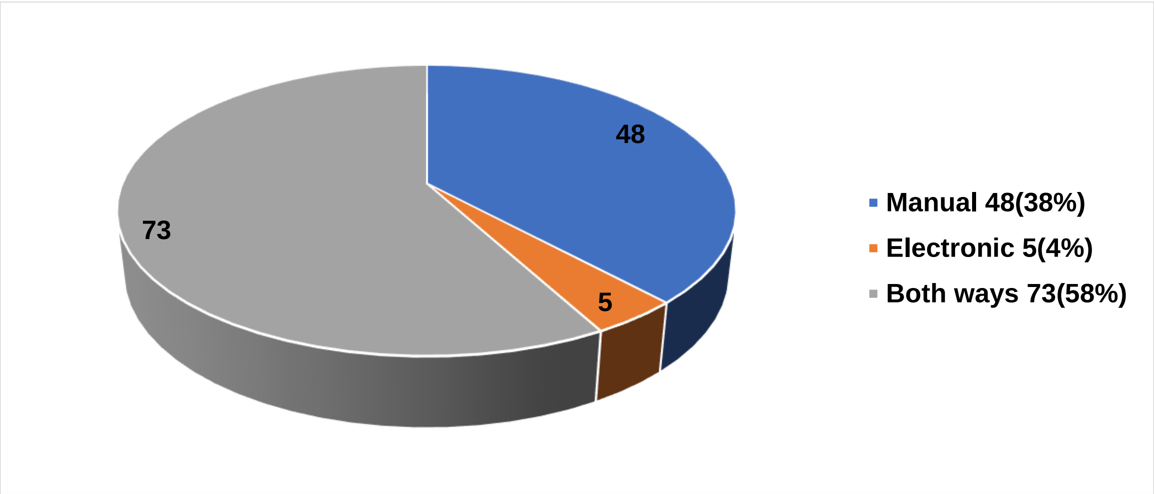

Figure 4.5. Records format used to create records: *N=126*

Figure 4.5. shows the findings which indicate that 48 (38%) respondents revealed that the hospital uses the manual format to create records, five (4%) noted that records are created electronically, whereas 73 (58%) reported that the hospital creates records manually and electronically. The majority indicate that the hospital uses both electronic and manual records format. This is in correlation with findings from a study conducted by Ramaphoko and Makgahlela (2023) on *"Records management practice to support patients' treatments in selected public clinics of Mankweng in Limpopo Province, South Africa",* which revealed that records in selected public clinics in Mankweng were created manually and electronically and filed daily. The current study's findings are further corroborated by a study conducted by Awogbami, et al. (2020) who found that 91% of the respondents believed it was pertinent for the hospital to automate records to improve storage and retrieval. Furthermore, Pyrene (2015) recommends the adoption of electronic records management systems because of its ability to improve poor records management.

Contradicting the current findings are Wamukoya and Mutula (2005) who aver that most organisations have primarily operated in paper-based environments for far too long, that switching from paper to automated systems was bound to be more difficult than is commonly believed. Furthermore, Msiska, et al. (2017) argue that despite the emergence of electronic records systems, some health officials still prefer the traditional way of physically managing records over electronic records management systems.

4.3.2. The type of records created in the hospital

The question posed to the respondents here was to find out the type of records created in both hospitals. This question was pertinent in measuring the number and kind of records housed by both hospitals. Table 4.2 below presents the results.

Table 4.2. Type of records created in the hospital: *N=126.*

RESPONSES	NO. OF RESPONDENTS	PERCENTAGE
Patient files records	83	66%
Appointment records	07	6%

Policy documents	12	10%
Discharge records	24	19%

When the respondents were asked which type of records were created in the hospital, 83 (66%) revealed that patients' file records were created, seven (6%) indicated appointment records and 12 (10%) noted that policy documents were created, while 24 (19%) stated discharge records. The results on Table 4.2. show that a highest number 83 (66%) of the respondents showed patient files records as the type of records created in both hospitals. In contrast, there is a low number seven (6%) on appointments records, which means that appointments records might not be created or kept in the hospital's central records management system. This could be because the hospital is trying to avoid duplicates of records in cases where appointment information is included in the patient file records. In corroborating this, a statement by Awogbami, et al. (2020) opine that multiple registration of records and misplacement of some of the patients' records make the situation of long waiting time for patients worse as well as causing delay in proper care delivery.

That majority 83 (66%) of patients said the records created in the hospital are patients' file records gives an indication that patients' records play a crucial role in the hospital. This statement is supported by that of Adegboyega and Musa (2019) who reveal that if properly managed, medical records could perform important activities such as provision of information regarding patients' health conditions. Furthermore, Sani et al. (2016) note that records are invaluable resources that provide patients with high-quality, evidence-based and safe healthcare because of the information contained in them. To maximise the effectiveness and quality of health care delivery, records management plays a crucial role in the healthcare sector by ensuring that the appropriate medical record is delivered in a secure format to the right person at the right time.

4.3.3. The period of time taken to retrieve records in the hospital

The question posed to the respondents was how long it took to retrieve patients' records in the hospital. Respondents were asked this question to measure the length of time it takes before a patient can have access to their file and be attended to by medical professionals. Findings are demonstrated on the Table 4.3.

Table 4.3. The period of time taken to retrieve records in the hospital: *N=126.*

RESPONSES	FREQUENCY	PERCENTAGE
5-10 minutes	26	21%
10-30 minutes	28	22%
30-1 hour	30	24%
Not sure	2	33%

Long waiting period in public hospitals has become a nightmare for patients as they queue for longer period of time to get medical attention. Rutaremara (2019) opines that difficulty in filing medical records is one of the factors affecting patients' long waiting time. Table 4.3 indicates the results of the findings that reveals that out of 126 respondents 23 (18%) answered that it takes 5-10 minutes, 28 (22%) noted 10-30 minutes and 30 (24%) answered 30-1 hour, while the remaining 42 (33%) demonstrated that they were not sure. The 30-1-hour waiting period response by 30 (24%) respondents may be a clear indication that the existence of records management policies that direct the creation and management of records is ignored or barely mentioned by the records staff.

The current study established that a high number 42 (33%) of respondents answered not sure to the question, indicating that they might not be aware of a uniform required time frame for file retrievals, or they might not be paying attention to the time frame as most patients are now used to these long waiting time in public hospitals. A study on *"Records management practices in public and private hospitals in Umhlathuze",* conducted by Luthuli (2017) found that patients waited an hour and more for their records to be retrieved before they can be provided with medical attention. Therefore, the adoption of AI technology might assist in reducing the time frame of records retrieval in the hospitals. This is supported by findings in Elikwu, Igbokwe and Emokhare's (2020) study revealing that utilising an electronic health information system platform improves the standard of care delivery while cutting down on total patient waiting times. However, contrary to this, Mokgoko (2013) articulates that in spite of the new technology developments in the health care centres, patients still experience unacceptable long waiting periods before getting medical attention in public hospitals.

4.3.4. Format of storage used to store records

The respondents were asked which format of storage the hospital used to store records, and the results are depicted in Figure 4.6. The purpose of the question was to find out the type of records storage used by both hospitals and identify if the current storage could be affecting the management of patients records during retrieval. The results of the study could assist in choosing the relevant AI technology system during implementation of the system.

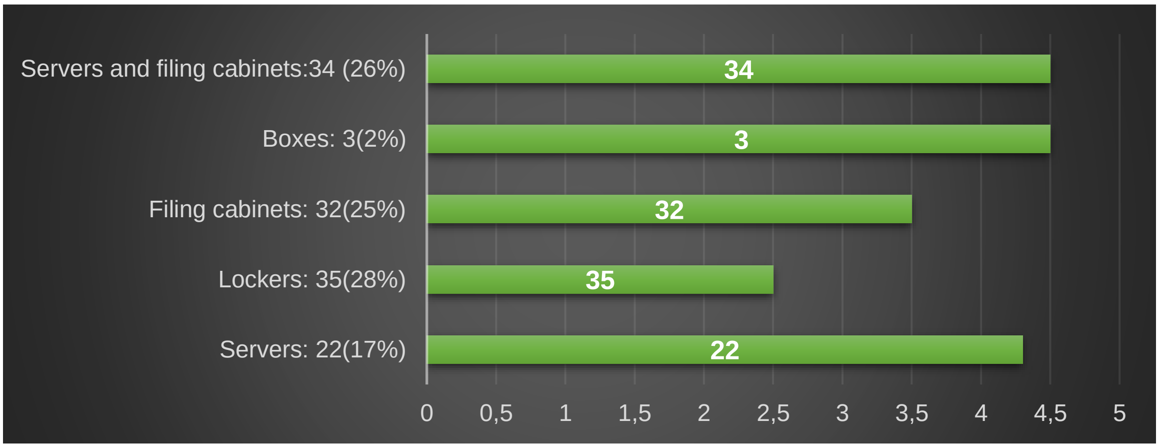

Figure 4.6. Format of storage used to store records: *N=126*

Figure 4.6 reveals the findings of the study that show that out of 126 respondents 22 (17%) of the respondents noted that records were stored in servers, 35 (28%) indicated lockers and 32 (25%) noted filing cabinets while three (2%) stated that records were stored in boxes. The remaining 34 (26%) of the respondents indicated servers and filing cabinets. Findings show that there is a contradiction with regards to responses to the question as 35 (28%) of the respondents indicated that lockers were used to store records, whereas another questionable number 34 (26%) reported that records were stored in both servers and filing cabinets. The respondents 35 (28%) who noted lockers as a format of storing records contradicts earlier findings of the current study that indicated that both hospitals are using electronic and paper-based formats of records.

However, this could be because despite the hospital using hybrid formats of managing records, paper patients' records may still be used on a daily basis instead of electronic records, hence the long waiting period of patients in hospitals. Findings show that a low number three (2%) indicated boxes as a format of records storage. This may be because some records are stored in boxes after use before they can be moved to filing cabinets, another reason might be because of lack of enough filing cabinets. These findings are in correlation with Luthuli (2017) who revealed that most hospitals do not have file storages, resulting in their records usually found packed in boxes and on the floor.

According to Marutha (2021), without the aid of a powerful technology, managing patient records across several files could be straining for large healthcare organisations. Similarly, Newa (2019) reveals that electronic records improve the use of office space by reducing redundant records.

4.3.5. Availability of records backup system

The respondents were asked if the hospital have a backup system for risk management in the event of risk crisis to save records, and 126 responded to this question. The answer to this question was important in finding out whether there is a backup system in case of a crisis, so that the AI system if implemented will be able to continue from the previous system and do more. Figure 4.7 presents the results.

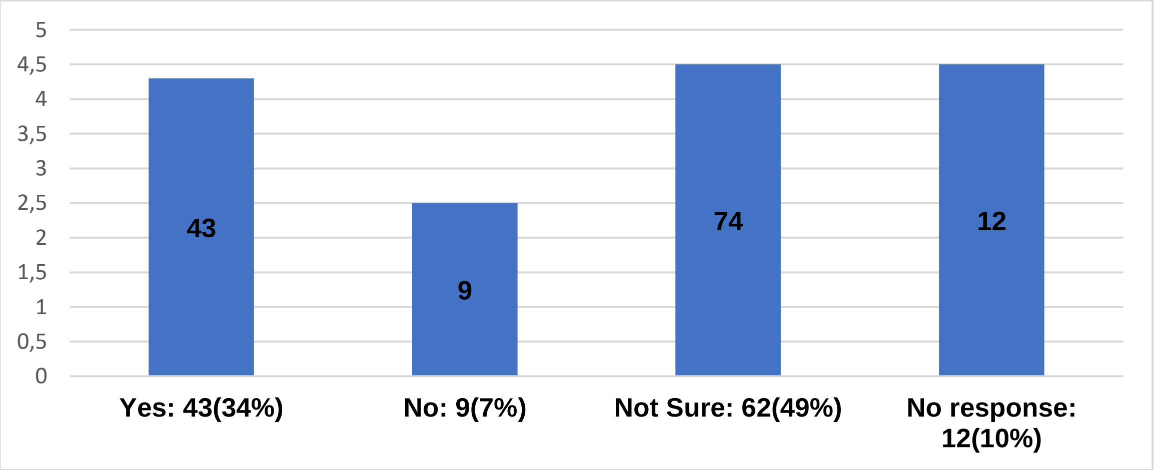

Figure 4.7. Availability of records backup system: *N=126*

Any organisation should always have a risk or disaster management plan such as a backup system for records recovery. Magama (2017) emphasises that backup relates to producing multiple copies and keeping them in various remote places from one another. In responding to the question on whether the hospital has a backup system for risk management in the event of risk crisis to save records, Figure 4.7 depicts the results that show that the majority of the respondents 62 (49%) indicated they were not sure if the hospital has a backup system, while 43(34%) noted yes and nine (7%) selected no, whereas 12 (10%) refrained from answering the question. The indication by majority 62 (49%) of the respondents not being sure if the hospital has backup system in cases of risks could be an indication of the ignorance of the staff members to not know about the system that they use every day.

The current findings corroborate with that from a study conducted by Mampe and Kalusopa (2012) who found that improper records management resulted in lack of awareness towards records management policy and procedure manual. This then calls for records management training or workshop for staff members to address records management practices including disaster management plans. Contrary to the current findings, a study by Ngwenya (2019) revealed that majority of the staff members received no formal training on managing the records. This lack of training usually leads to staff members not been aware of other records management practices, including the systems used. Additionally, the literature review presented in the current study on Ikonne, Alegbeleye and Isaruk (2021) argues that the provision of high-quality medical care services cannot be achieved in the absence of conventional health records management practices.

4.4. PART C: RECORDS MANAGEMENT FUNCTIONS THAT COULD BE EXECUTED THROUGH AI

The second objective of the study addressed the records management functions that could be executed through AI. Five questions were asked under this objective and the findings are presented as follows:

- Application of AI for records management functions.
- AI as a tool to improve records management.

- The purpose of records management legislative frameworks.
- South African records management legislative frameworks.

4.4.1. Application of AI for records management functions

Figure 4.8. presents the findings of the respondents' answers when asked to indicate records management functions that AI can be applied to. This question tried to find out the if respondents were aware of the different types of functions in the records management that could be executed by the use of AI technology. The options provided as answers were formulated in a form of records life cycle process.

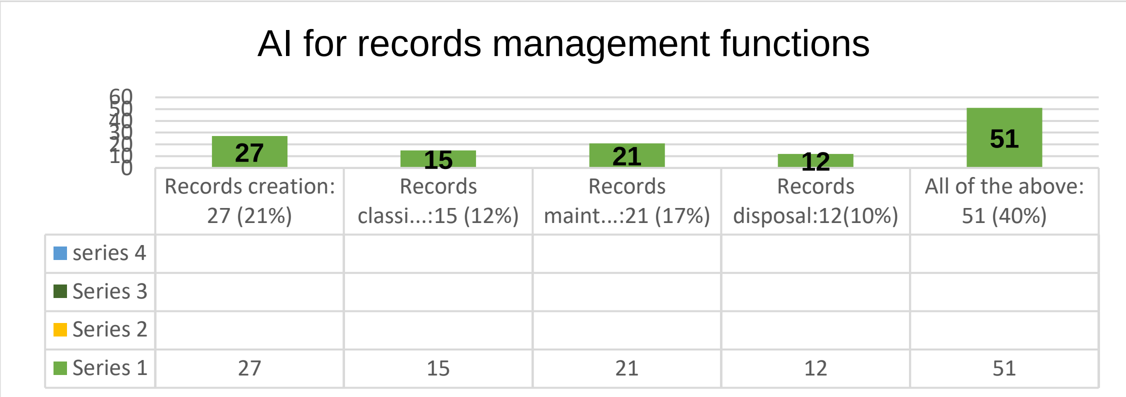

Figure 4.8. Application of AI for records management functions: *N=126.*

Findings depicted on Figure 4.8 reveal that of the 126 respondents, 27 (21%) respondents revealed that AI can be applicable in records creation, 15 (12%) indicated it can be applied to records classification and 21 (17%) showed that it can be applied to records maintenance. In contrast, 12 (10%) reported that AI can be applicable in records disposal, whereas 51 (40%) of the respondents indicated that AI can be applied to all of the above options. This shows that most of the respondents 51 (40%) acknowledge that AI can be applied in all stages of a record life cycle process. The current findings agree with findings from a study conducted by Modiba, Ngulube and Marutha (2023), articulating that AI may be utilised to manage records efficiently. These findings provide a clear indication that AI technologies are capable of handling almost all the duties in records management.

4.4.2. AI as a tool to improve records management

Respondents were further requested to indicate the extent to which they agree or disagree with the statement below.

Table.4.4. AI as a tool to improve records management: *N=126*

STATEMENTS	AGREE	UNSURE	DISAGREE	TOTAL
1. Files/records search accuracy and retrieval speed will be improved.	78(62%)	48(38%)	0(0%)	100%
2. Patients' waiting time will be reduced and service provision will be efficient.	88(70%)	38(30%)	0(0%)	100%
3. Health record documentation and capturing will be reduced allowing clinicians more time with patients.	69(55%)	33(26%)	24(19%)	100%
4. There will be unavailability of storage.	0(0%)	41(33%)	85(67%)	100%
5. AI will facilitate adequate records classification.	57(45%)	64(51%)	5(4%)	100%

Table 4.4 summarises the respondents' responses when asked whether they agree, disagree or are unsure of the improvements that can be brought by AI for records management. The first statement was on the respondents to scale whether AI will improve files/records search accuracy and retrieval speed. Seventy-eight (62%) respondents agreed with the statement, the remaining 48(38%) were unsure, while none of the respondents disagreed with the statement. A substantial 78 (62%) proportion of the respondents agreed that AI will improve files/records search accuracy and retrieval speed. This finding correlates with a statement by Reddy et al. (2019) who postulate that using AI technologies such as machine learning and NLP improves accuracy in information searches and retrieval of records speed.

Regarding the statement on whether patients' waiting time will be reduced and service provision be efficient, a total of 88(70%) agreed with the statement and 38(30%) were unsure, while none of the respondents disagreed with the statement. Furthermore, the findings revealed that 69(55%) respondents agreed with the statement that said with the use of AI health record, documentation and capturing will be reduced allowing clinicians more time with patients, while

33(26%) of the respondents stated that they were unsure, followed by 24(19%) who disagreed with the statement.

Respondents were also asked if AI will lead to unavailability of records storage, of which none of the respondents agreed with the statement whereas 41(33%) were unsure, followed by a substantial total of 85(67%) who disagreed with the statement. Furthermore, 57(45%) of the respondents agreed with the statement that said AI will facilitate adequate records classification, with 64(51%) indicating they were unsure and five (4%) disagreeing with the statement. From the statements, the overall indication is that majority 88(70%) of the respondents agrees that AI as a tool can bring improvements for records management while a minimum of respondents was unsure, and only a few respondents disagreed with the improvements. This could be because they have noticed the challenges within the records management programmes and see AI as a solution to mitigate challenges faced by both hospitals.

Similar to these findings are the findings from a study conducted by Marutha (2021) that suggested migrating from paper-based recordkeeping to a fully digital records creation and management system could be beneficial for health institutions. Moreover, Modiba, et al. (2023) in a related study also revealed that AI performs tasks that would take numerous staff members extra hours to complete. Therefore, this indicates the importance of an adoption of AI technology in public hospitals to improve service delivery.

4.4.3. The purpose of records management legislative frameworks

Respondents were requested to indicate their responses with regards to the purpose of records management legislative frameworks. This was to find out if the respondents understood the reasons for having and complying with records management legislations and also to be aware that the legislatives will still apply to AI technologies in the management of records. The results are depicted in the below Table 4.6.

Table 4.6. The purpose of records management legislative frameworks: *N=126*

RESPONSE	NO. OF RESPONDENTS	PERCENTAGE
1. For the development and compliance of File Plan policy	44	35%
2. For development of Records Management Procedure Manual	40	32%
3. For updating and reviewing of records management policies	23	18%
4. For implementation of staff training on records management	7	6%
5. For disposing records	12	10%

Table 4.6 demonstrates the findings to the question posed to the respondents. The results of the findings established that majority of the respondents 44 (35%) cited that the purpose of legislative frameworks is for the development and compliance of file plan policy, followed by a total of 40 (32%) who revealed that legislatives are for the development of records management procedure manual. Furthermore, 23 (18%) of the respondents stated updating and reviewing of records management policies, whereas seven (6%) indicated that legislative frameworks are for implementation of staff training on records management and 12 (10%) stating that legislative frameworks are for disposing of records. Presentation of the findings reveals that most 44(35%) of the respondents demonstrated the purpose of records management legislative frameworks as being for the development and compliance of File Plan policy. This is a clear indication that respondents are not fully aware of the purpose of records management legislations, which could be attributed to lack of records management training attendance.

On this aspect, Kamatula and Kemoni (2018) postulate that policy and legislative framework governing records management seems inadequate and ineffective, more especially regarding electronic records management. This relates to the respondents' responses that showed that most respondents think legislatives are for the development of a file plan and a procedure manual. Therefore, the low responses on other options indicate their lack of knowledge on where else legislations should be applied. The low responses of the respondents could be because records management legislations are not effectively implemented and exercised in the hospital. Relatively, Schellnack-Kelly (2014) reveals that effective implementation of the National Archives Records Management Policy would guarantee that all public organisations follow and comply with the norms governing the management of records.

4.4.4. South African records management legislative frameworks

Respondents were asked to indicate the different legislative frameworks governing records management. The respondents had the freedom of choosing from different options. The reason for asking this question was to find out if respondents were familiar with all the legislations governing records management. Table 4.7 below explains the results.

Table 4.7. South African records management legislative frameworks: *N=126*

RESPONSE	NO. OF RESPONDENTS	PERCENTAGE
The National Archives and Records Service of South Africa Act (Act no. 43 of 1996) (NARSSA)	35	28%
Electronic Communication and Transactions Act (Act no. 25 of 2005)	37	29%
Protection of Personal Information Act (Act no. 4 of 2013) (POPI)	39	31%
The Public Finance Management Act (Act no. 1 of 1999 as amended) (PFMA)	26	21%
The Constitution of the Republic of South Africa (Act no. 108 of 1996)	50	40%
The Promotion of Administrative Justice Act (Act no. 3 of 2000) (PAJA)	23	18%
National Health Act (Act No. 61 of 2003)	3	2%
The Health Professions Council of South Africa (HPCSA) (2008) guidelines (HPCSA)	6	5%

Table 4.7 shows the findings that indicates that majority 35 (28%) of the respondents stated the National Archives and Records Service of South Africa Act as the legislations for records management, followed by a substantial number of 37 (29%) respondents selecting ECT Act, and 39 (31%) indicating POPI Act, whereas 26 (21%) selected PFMA. Furthermore, 50 (40%) indicated the Constitution of the Republic of South Africa, and 23 (18%) stated the Promotion of Administrative Justice Act, followed by three (2%) of the respondents who cited the National Health Act, while six (5%) mentioned the Health Professions Council of South Africa.

Those who selected the Constitution of the Republic of South Africa as one of the legislative frameworks governing records management were a total number of 50 (40%) which gives an indication that they are more familiar with this legislation than the others. This is in correlation with the findings by Ngwenya (2019) who conducted a study among Diepsloot clinics in Gauteng Province and found that out of 50 participants, 43 indicated that they were not aware of legislative frameworks governing records management. Hence, this once more indicates that staff members in both hospitals need records management training which will open their eyes to more records management procedures.

4.5. PART D: USER PERCEPTIONS TOWARDS AI TECHNOLOGY SYSTEM FOR EFFECTIVELY MANAGING RECORDS

This section presents the findings of the data analysis under the third objective of the study. The objective of the study was to explore the perceptions of the respondents towards AI for proper records management. The results of the findings are presented in three sub-topics below.

- Application of AI technology on records management.
- Improvement of patients’ service care with AI for records management.
- Usage of AI technology for records management in hospitals.

4.5.1. Application of AI technology on records management

Respondents were asked about their understanding on the application of AI technology for records management and results are presented on the next table. It is important for the staff members to understand the importance and intentions of the implementation of a new system in an organisation so that it will be easier for them to accept and adapt to the new system, hence this question was asked in finding out if the respondents understood the application of AI technology for records management. Table 4.8 below explains the results.

Table 4.8. Application of AI technology on records management: *N=126*

RESPONSE	NO. OF RESPONDENTS	PERCENTAGE
AI allows fast and easier access to records	55	44%
AI reduces storage space	47	37%
AI allows effective classification of records	40	32%
AI provides safety of records	28	22%
AI allows effective retrieval of records	77	61%
AI reduces disaster risks	26	21%
Other	15	12%

Table 4.8 shows that as many as 55 (44%) of the respondents indicated that AI allows fast and easier access to records, 47 (37%) highlighted that it reduces storage space. Moreover, 40 (32%) of respondents cited that AI allows effective classification of records, while 28 (22%) indicated that AI provides safety of records and a high number 77 (61%) asserting that AI allows effective retrieval of records. A further 26 (21%) of the respondents answered that it reduces disaster risks, whereas 15 (12%) stated other. The responses show that most respondents' understanding of application of AI on records is that it allows effective retrieval of records and quick and easy access to records. This indicates that there is a need for training of the new AI system for staff to learn other capabilities of AI for records, if the hospitals were to adopt the AI technology. In correlation to the findings of the current study, as highlighted in literature review, studies revealed that the use of machine learning algorithms automatically analyses and classifies the digitised records content, making it easier for users to search and retrieve information quickly, saving time (Benke & Benke, 2018; Reddy et al., 2019; Colavizza et al., 2021; Frackiewicz, 2023). In line with the findings from a study by Awogbami, et al. (2020) it was established that

respondents identified misfiling as a possible barrier hindering quick retrieval of patients' records.

4.5.2. Improvement of patients' service care with AI for records management

Table 4.9 summarises the respondents' answers when asked if they believed records management with the assistance of AI technology could improve patients' service care. This question intended to find out the perceptions of the respondents towards AI technology in support of records management in hospitals to improve patients' service care. Table 4.9 below explains the results.

Table 4.9. Improvement of patients' service care with AI for records management *N=126*

RESPONSE	NO. OF RESPONDENTS	PERCENTAGE
Yes	78	62%
No	12	10%
Maybe	36	29%

Out of the 126 respondents 78 (62%) stated 'Yes', whereas 12 (10%) answered 'No' and 36 (29%) answering Maybe. The majority 78 (62%) of the respondents' response to the question is a clear indication that AI could bring along excellent patients' service care in the hospitals. This is in line with findings by Msiska, et al. (2017) who established that electronic medical records improve data quality and patient management efficiency, corroborating with the respondents' high response when asked if they believed AI for records management could improve patients' service care. Similarly, Modiba (2021) in his study confirmed that AI can be used to perform records management programmes throughout the life cycle of records. Furthermore, Awogbami, et al. (2020) revealed that respondents thought it was necessary for the health centre to manage patients' records electronically for easy storage and retrieval.

With regards to 36 (29%) respondents answering 'Maybe', this could be attributed to some of the challenges normally encountered with the use of technology such as power failure or connectivity. In corroborating this statement, Ojobor (2023) opines that poor connectivity is an obstacle to the adoption and usage of blockchain technology.

4.5.3. Usage of AI technology for records management in hospitals

The question posed to the respondents was to find out if it will be easy for staff members to use the new AI technology if implemented in the hospital. Adopting a new system in an organisation must be done with the intention of getting fruitful results from it and this involves being easy to be managed or used by the users of that particular system. Hence, this question intended on revealing if respondents thought it would be easy for staff members to use AI technology if implemented in the hospital. Table 4.10 below explains the results.

Table 4.10. Usage of AI technology for records management in hospitals: *N=126*

RESPONSE	NO. OF RESPONDENTS	PERCENTAGE
Yes	38	30%
No	23	18%
Not sure	65	52%

The results presented on Table 4.10 indicate that 38 (30%) of the respondents stated, ‘Yes’ and 23 (18%) noted ‘No’, while a substantial number 65 (52%) of the respondents selected ‘Not sure’ to the question. Looking at the presentation of the findings, there is a clear indication that training will be required for staff to familiarise themselves with the AI technology system for them to be able to use the system. Presentation of the findings reveals that over half (52%) of the respondents are not sure if using AI technology will be easy for staff members. These findings 65(52%) clearly indicate that respondents are not sure of their capabilities in terms of utilising the AI technology if implemented. This corroborates with findings in Kashive and Powale (2020) that the user's level of perception on the ease of use of any new technology affects their intention to utilise it. Contrarily, findings from a study by Waithera, Muhia and Songole (2017) established that adaptation and use of electronic medical records have brought about satisfaction among patients and health providers. It can then be deduced that with training and more practice of the system the staff will eventually adapt to the usage.

4.6. PART E: SKILLS NECESSARY FOR ADOPTING AIT TECHNOLOGY IN TSHWANE PUBLIC HOSPITALS

Under objective four, three sub-themes which were relevant to AI as part of the problem statement were discussed, the sub-themes were skills, tools and infrastructures necessary for adopting AI for records management. However, in this section, the objective of the study addressed the skills requirements needed for staff to understand and effectively manage the AI technology for records management. The findings from the two questions asked under this objective are presented as follows:

- Skills necessary for adopting AI technology.
- Measures to be taken to improve staff knowledge on AI technology for records management.

4.6.1. Skills necessary for adopting AI technology

Respondents had to respond to the question that asked which skills are necessary for adopting AI technology. AI technology is new in most organisations and will require staff members to get trained in using it. This prompted the question in finding out whether the respondents we familiar with the required skills for AI technology implementation and usage. Results are shown on Table 4.11.

Table 4.11. Skills necessary for adopting AI technology: *N=126.*

RESPONSE	FREQUENCY	PERCENTAGE	TOTAL
Big data scientists	36	29%	100%
IT professional and programmers	55	44%	100%
Documentation digitization specialists	89	71%	100%
Records management specialists	76	60%	100%
Advanced Technology Maintenance workers	23	18%	100%
Scientific researchers	32	25%	100%
Other	0	0%	100%

An overwhelming number 89 (71%) of the respondents revealed that documentation digitisation specialists' skill is necessary, while 76 (60%) cited records management specialist is a required skill for adopting AI technology. Furthermore, 36 (29%) noted big data scientist skill and 55 (44%) indicated IT professional and programmers. However, there was a low response of 23 (18%) with regards to the option of advanced technology maintenance workers. In contrast, the option of scientific researchers drew a response from 32 (25%) respondents and zero (0%) response for the option of other. Majority 89(71%) of the respondents indicated documentation digitisation specialist as a skill requirement for employing AI technology. The low response 32 (25%) and non-response to the two options of scientific researchers and other, indicate that respondents might not be familiar with the aforementioned two skills and their necessity for the success of implementing AI technology.

Findings of the current study are in correlation with a statement by Bughin et al. (2018) in a McKinsey report, who expresses that in terms of implementing AI technology in organisations, certain technological skills such as basic digital skills are required. This will also require records officials to upgrade their skills to manoeuvre the new system. Furthermore, in this era where computer technologies are used to capture and administer most records, upskilling records management officials is crucial (Kavishe & Dulle, 2016; Chigariro & Khumalo, 2018). Accordingly, Chibuye and Phiri (2022) highlight that many government institutions are gradually adopting technology, either fully or partially, forcing them to invest in training for their employees.

4.6.2. Measures to be taken for staff to understand AI technology for records management

According to Modiba (2021), the application of AI to perform records management functions comes with a greater level of complexity and precision. The purpose of the question was to find out what measures to be taken by the hospital management to ensure that the staff understand the implementation of AI technology in managing records. Their responses are shown in Table 4.12.

Table 4.12. Measures to be taken for staff to understand AI technology for records management: *N=126.*

RESPONSE	NO. OF RESPONDENTS	PERCENTAGE
1. Attend training on AI	72	57%
2. Attend workshops on AI	38	30%
3. Read AI books	14	11%
4. Register for AI courses	2	2%

Table 4.12 depicts the results of the findings which reveal that 72 (57%) of the respondents revealed attending training on AI as a measure to assist staff in understanding AI for records management. Thirty-eight (30%) chose attending workshops on AI and 14 (11%) reading of AI books, another two (2%) selected registering for AI course. With 72 (57%) of respondents indicating attending training on AI to understand the system, it is apparent that the implementation of AI will require an extensive training for staff. This finding agrees with findings of Rolan et al. (2019) whose study revealed that retraining staff to reduce the knowledge and skills gap is necessary in familiarising officials with AI technology. Furthermore, these findings are supported by Nwankwo (2017) who established that shortage and inadequate training of healthcare professionals result in available workers operating under pressure and tending to long patient lines.

4.7. PART F: ADOPTION OF AI FOR THE MANAGEMENT OF RECORDS

The last objective of the study was to propose the adoption of AI technology for records management to the two selected Tshwane public hospitals. One question was asked under this objective which sought to find out whether respondents agreed, disagreed, strongly agreed, strongly disagreed or were neutral to the question that asked respondents to show by choosing the options provided on what could be accomplished by adopting AI for the management of records and health care services. The findings from the respondents' answers are discussed next:

4.7.1. Rating the respondents' level of impartiality, agreement and disagreement towards adopting AI for the management of records and health care services.

Table 4.13 indicates the results to the question posed to the respondents on the improvements brought by AI for records management. The reason for asking this question was to reveal what would be accomplished by adopting AI technology for the management of records in public hospitals and the provision of service delivery in health care. This question was answered by using a scale that measured the respondents' level of agreement with the provided options to the question. Table 4.13. Adoption of AI for records management and the health care services: *N=126*

STATEMENTS	SD	D	N	SA	A
Provide effective management of records	0(0%)	4(3%)	18(14%)	77(61%)	27(21%)
Provide reliable storage facility	0(0%)	1(1%)	9(7%)	78(62%)	38(30%)
Provide easy and quick retrieval of records	2(2%)	0(0%)	4(3%)	65(52%)	55(44%)
Provide adequate maintenance of records	5(4%)	2(2%)	57(45%)	42(33%)	20(16%)
Improve service delivery in the hospital	2(2%)	1(1%)	40(32%)	56(44%)	27(21%)

Table 4.13 shows that as many as 104 (83%) of the respondents strongly agreed and agreed to the statement 'adopting AI will provide effective management of records', in contrast to the 4 (3%) of the respondents who disagreed, whereas 18(14%) were neutral to the statement and none strongly disagreed. Concerning AI providing reliable storage facility, 116 (92%) of the respondents strongly agreed and agreed with the statement, while 9 (7%) were neutral and 1 (1%) disagreed and none strongly disagreed. Moreover, 2 (2%) of the respondents strongly disagreed with the statement provide easy and quick retrieval of records, whereas 4 (3%) were neutral and 0 (0%) disagreed.

However, a total of 120 (95%) strongly agreed and agreed that AI will provide easy and quick retrieval of records. Moreover, when asked about AI's adequateness for records maintenance, a notable 57 (45%) of the respondents were neutral as opposed to 69 (55%) who strongly disagreed, disagreed, strongly agreed and agreed to the statement. As many as 43 (34%) of the respondents strongly disagreed, disagreed and were neutral to the question on whether AI will improve service delivery in the hospital, whereas 83 (66%) strongly agreed and agreed which gives a clear indication that respondents strongly believe AI can bring better outcomes to the hospitals.

The positive results from majority of the respondents about the improvements that AI can bring to the hospitals, matches a statement by Reddy et al. (2019) who mentions that combining ML techniques to electronic medical records can assist health workers and records officials to retrieve relevant and accurate patient information. In a similar study by Waithera, et al. (2017), it was revealed that electronic medical records programme has led to the increase and improvement of quality patient care and great collaboration between health care providers.

4.8. CHAPTER SUMMARY

This chapter covered the analysis, interpretations and discussion of findings of the study. The findings were guided by the objectives of the study. Discussions of the data analysis were connected to the relevant literature review and theories employed in this study. The researcher's aim was to give the reader a clear understanding of the data collected by explaining them through charts and tables in a quantitative format. The following chapter presents and summarises the conclusions and recommendations of the study.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0. INTRODUCTION

The previous chapter demonstrated the data analysis from the collected data as well as the interpretation and discussion of the results of the respondents. The discussions of results of the current findings were supported by other findings from previous research studies that either corroborated or contradicted with the current findings. This chapter provides an overview of the current study in three parts, summarising chapters of the current study, main findings of the study based on the objectives the study, conclusions and recommendations based on the findings of the data collection.

Literature review was rigorously consulted and used to support the current study's research topic and the theories adopted in this study. To provide the reader with the kernel of the research, each chapter is summarised together with the main findings of the study. The conclusions and recommendations based on the findings are also explained in the following sections.

5.1. SUMMARY OF CHAPTERS

Each chapter in the study was first introduced before proceeding to an in-depth discussion of the topics and sub-topics included in the study. Chapter one served as an overview to introduce the reader to the topic of the study and provided the background of the study. The chapter also covered the problem statement which prompted the researcher to investigate or explore this research study. The chapter also outlined the purpose, objectives of the study, significance of the study as well as defining the key concepts of the study.

Chapter two covered the theoretical framework where theories adopted in the current study were showcased, the chapter further discussed literature review guided by the five objectives of the study, relevance of the theories adopted in the study were also discussed to justify their usage in the study.

The third chapter mainly focuses on the research methodology employed in the current study, research design, research paradigms as well as justifying each choice of research method used in the study. The study adopted a quantitative approach method and a positivism research paradigm to support the aim and objectives of the study.

In chapter four data collection results were analysed, presented, interpreted and findings were discussed as one. Data were analysed in accordance with the objectives of the study. Charts and tables were used to present the following sub-topics in the study: the demographic information of the respondents, records management practices in the Tshwane Municipality public hospitals, records management functions that could be executed through AI, user perceptions towards AI technology system for effectively managing records, skills necessary for adopting AI technology in Tshwane public hospitals and proposing the adoption of AI for the management of records. And lastly, the fifth chapter which is the last chapter of this study focuses on the aim and objectives of the study, summary of chapters, summary of findings, conclusions and recommendations based on the findings revealed during the study's investigation.

5.2. SUMMARY OF THE MAIN FINDINGS

The findings are summarised according to the objectives of the study stipulated on chapter one and are discussed as follows:

5.2.1. Findings on records management practices in the Tshwane Municipality public hospitals

The study results revealed that records were both manually and electronically created, indicating a migration from paper to electronic records. This migration of records might come in handy in the implementation of AI technology such as machine learning as the use of technology in the hospitals would not be a new thing to the staff. This is supported by Awogbami, et al. (2020) who mentioned that respondents believed that automation of records can improve storage and retrieval of records Furthermore, the findings of the study showed that patient records are created in the hospitals. Records are invaluable resources that provide patients with high-quality, evidence-based and safe healthcare because of the information contained in them (Sani et al., 2016). This does not mean that only patients records are created in the hospitals but that some records which are associated with patients' medical attention are included in one file as one to avoid duplications.

The study results also indicated that it took 30 minutes to 1 hour for records officials to retrieve patients file records, which is a long period for a patient to wait before getting medical assistance. This means that the retrieval method in the hospital is not effective and requires an upgrade such as an AI technology. Elikwu, Igbokwe and Emokhare's (2020) revealed that utilising an electronic health information system platform improves the standard of care delivery as well as cutting down the total period that patients wait to get medical attention It was also established that records were stored in servers and filing cabinets, reducing records storage space. Furthermore, although the hospital might have a backup system for their records as per the records management governance, results showed that respondents were not aware of the hospitals' backup system for records management.

5.2.2. Findings on records management functions that could be executed through AI

The study findings highlighted that AI technology can be applied to all the stages of a record life cycle process. Moreover, there was a positive feeling towards the implementation of AI technology for records management as results revealed that AI could bring improvements for records management in the hospitals as well as service delivery for the citizens of Tshwane Municipality. Although, the staff were not fully aware of the legislations governing records management, most were aware of the Constitution of South Africa (Act no. 108 of 1996) and NARSSA. It is apparent from other conducted studies that the staff members are often not aware of the legislations governing records management (Kamatula & Kemoni, 2018). It was further shown that most of the respondents believed that the purpose of legislations in records management were used for the development and compliance of the file plan. The adopted AI system would have to be one that will be compatible with the legislations governing records in ensuring that compliance is practiced at all times. Therefore, it is pertinent that the staff be familiar with these legislations.

5.2.3. Findings on the perceptions of records officials in Tshwane public hospitals towards AI technology systems in managing records

Basically, the respondents felt that the introduction of AI technology will improve their work and the way they served patients, therefore it had a favourable effect on them. Findings further showed that AI could allow quick and easy access, as well as effective retrieval of records (Modiba, et al., 2023; Benke & Benke, 2018; Reddy et al., 2019). Furthermore, findings established that using AI technology might be a challenge for staff members as an emerging technology in the hospitals. Some staff might have difficulty in using the new system.

5.2.4. Findings on skills necessary for adopting AI technology in Tshwane Municipality public hospitals

Technically, every new system requires one to have skills in successfully managing and getting the required end result out of it. The same applies to the implementation of AI technology in hospitals. Findings under this objective resulted in different answers with regards to skills necessary for adopting AI technology. There was a positive response with regards to documentation digitisation specialist as a skill requirement for employing AI technology. However, there was a low response with regards to the option of advanced technology maintenance workers. A majority of respondents suggested attending training to understand and manoeuvre AI technology system for the management of records. According to Chigariro and Khumalo (2018) upskilling records management officials is crucial in ensuring that they can be able to execute their duties via technological systems afforded to them.

5.2.5. Findings on proposing the adoption of AI for the management of records

Findings revealed that respondents are more welcoming to the adoption of AI for records management. This was indicated by the majority number of responses that showed that respondents strongly agreed that the adoption of AI will improve the hospitals' records management programme which will lead to a timely medical attendance to patients as records will be easily accessible and retrieved. Waithera, et al. (2017) confirmed that electronic medical records programme has led to the increase and improvement of quality patient care.

5.3. CONCLUSIONS

Conclusions of the study emerge from findings derived from the collected data and are arranged according to the objectives of the study as also arranged in the previous chapter on data analysis, interpretation and discussion of the findings.

5.3.1. Conclusions on records management practices in the Tshwane Municipality public hospitals

Although the hospitals have adopted the electronic format of managing records, challenges in the management of records are still evident as findings of the study has revealed. The retrieval of records in the selected hospitals was ineffective, as citizens continue to complain about the long period of waiting before getting medical assistance. The overwhelming number of records created and housed by both hospitals and the daily high patients' intake are too much for the understaffed records officials, as findings of the current study revealed that records staff members in both hospitals are way lower than nurses' staff. Therefore, it can be concluded that the implementation of AI technology is very important in these hospitals to mitigate records management challenges.

5.3.2. Conclusions on records management functions that could be executed through AI

Records management system in both hospitals is considered ineffective as hospitals continue to be overcrowded with patients waiting to be served. The effectiveness and efficiency of managing records depends on the compliance of records management policies and procedures by all involved in the management of records. Most of the staff are not familiar with the legislations governing records management besides the Constitution and the NARSSA, meaning compliance was not of utmost importance. The study concludes that training of the staff is necessary for them to familiarise themselves with procedures and policies regarding the management of records.

5.3.3. Conclusions on user perceptions towards AI technology system for effectively managing records

In investigating the perceptions of respondents on AI technology for effective management of records, it was concluded that respondents perceived the application of AI on records as an improvement for quick and easy retrieval of records as well as records storage reduction. The records officials and the nurses were not sure if utilising AI technology would be easy for them. However, they were very positive that AI would bring a great change to the records management challenges and improve health care delivery to patients. The perception of the staff was that AI will allow easy and quick retrieval of records to reduce patients' waiting time.

5.3.4. Conclusions on skills necessary for adopting AI technology in Tshwane public hospitals

With regards to skills necessary for adopting AI technology in Tshwane public hospitals, the researcher concluded that understanding the skills necessary to adopt the system will make it easier for employers to adopt the AI technology and for staff members to manage the system. Skills to utilise and maintain the system was pointed out as necessary for AI system. Therefore, the study concludes that employing skilled officials and training current records officials for AI technology system will prove success for the implementation and usage of the system.

5.3.5. Conclusions on proposing the adoption of AI for management of records

The researcher concluded that AI would assist public hospitals in managing their records and improving service delivery. This is apparent from the high responses shown by majority who strongly agreed that with AI there will be improvement of service provision in the hospitals. Hospitals can use enhanced machine learning systems in support of patients' appointments scheduling and prioritisation according to patients' sickness to ensure waiting period reduction and provide effective health care.

5.4. RECOMMENDATIONS

The objective of recommendations is to point out shortcomings in the current study and provide strategies for addressing them in future research (Fouche, Strydom & Roestenburg, 2021). A comprehensive review of findings of the study led to the researcher making the following recommendations:

5.4.1. Recommendations about demographic information of the respondents (Job Title)

After results showed that records officials' staff are way lower than nurses' staff, the researcher recommends that the DoH consider recruiting more health records officials to manage their records. This could help in alleviating the poor service delivery faced by citizens in public hospitals, which are often owing to understaffing in the records management, which inevitably causes delays in retrieving records for patients. Hospitals are big institutions that deals with large numbers of patients daily. Therefore, they house a large number of records which could be manageable if there is enough manpower and good systems such as AI technology.

5.4.2. Recommendations about records management practices in the Tshwane Municipality public hospitals (Policy Compliance)

The DoH should ensure that there is compliance on the implemented policies on service delivery for patients, for instance the allocated time frame of patients' waiting period should be complied with to avoid patients' long waiting. The study further recommends that a backup system that is off-site be implemented for unforeseen risks that could take place in the hospitals records centre causing damage to patients' records.

5.4.3. Recommendations about records management functions that could be executed through AI (Records Management Legislations)

In light of the findings revealing that most of the respondents believed that AI can be applicable to all the stages of a record life cycle process, it can then be deduced that recommending the implementation of AI technology system for the different processes of running the hospitals' records management programme is ideal as it will assist in improving long waiting periods by patients.

5.4.4. Recommendations about user perceptions towards AI technology system for effectively managing records

The presentation of the findings revealed that a large number of respondents believed that AI could improve the hospitals' health care delivery. Therefore, the study recommends that the hospitals consider the current workflow and challenges faced by patients seeking medical attention due to long waiting period caused by poor management of records and implement a system that will mitigate the current problem faced by public hospitals in Tshwane Municipality with regards to the management of records.

5.4.5. Recommendations about skills necessary for adopting AI technology in Tshwane public hospitals

The study recommends that skilled computer technicians be employed or outsourced for the implementation and maintenance of the AI technology should the hospital consider adopting the AI system. This will allow the technicians to identify and overcome the system setbacks at an early stage and find solutions. If the hospital was to implement AI technology, it will also be ideal for the hospitals to arrange training of the system so that staff members can be able to utilise the new system. Creating sandbox environment for staff may also assist in user acceptance testing and user training. According to Olmstead (2024) a sandbox offers a safe, isolated, and virtual environment that imitates the production setting, facilitating extensive testing and experimentation.

5.4.6. Recommendations about proposing the adoption of AI for management of records

The study recommends that other than the public hospitals, more government departments that manage a plethora of records on a daily basis must consider implementing the AI system to provide proper service delivery to the public. The Department of Home Affairs is one of the institutions that could overcome the records management challenges that come with large volumes of records to be managed daily and also end long waiting periods of clients in their departments.

5.5. RECOMMENDATIONS FOR FUTURE RESEARCH

Although the study's intention was to achieve an in-depth investigation about AI for proper records management in selected hospitals, certain aspects that need to be explored further to expand the research knowledge on the use of AI for managing records is still evident. The current study established that poor records management was the cause of long waiting time by patients' seeking medical attention in the hospital. Findings revealed that it takes more than 30 minutes to retrieve patients' records. Therefore, further inquiries are recommended on the impact this could have on patients' lives. Moreover, a considerable number of respondents have shown that they have no knowledge of the legislations governing records management. Further research on records management legislations and compliance by staff in public hospitals is recommended.

5.6. LIMITATIONS OF THE STUDY

The study was slightly affected by the timing of data collection as this took place during the festive season when most staff members are on leave. This resulted in 126 questionnaires being returned instead of the intended 168. However, the 75% participation rate was enough to draw research conclusions in a quantitative study. Another limitation was that most of the respondents asked one similar question before accepting to take part in the study. The question was whether the implementation of AI for records management will result in people losing their jobs, of which I assured them that was not the case as the recommended AI technology was a machine learning technology that will need human assistance in order to function.

5.7. CONCLUSION OF THE WHOLE STUDY

Chapter five outlined the main findings of the study based on the theoretical framework and objectives. This chapter made recommendations based on the findings of the study and conclusions of the study in view of the research problem. Recommendations for further research was also made under this chapter for more enquiries to be conducted on other aspects that are pertinent to be researched on. The recommendations include further inquiry on the impacts long waiting period could have on patients' lives, further research should be conducted on records management legislations and compliance by staff.

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APPENDIX A: COVER LETTER

School of Communication, Media and Information Studies

Private Bag X1112, Sovenga, 0727, South Africa

Tel: (015) 268 3194, Email: ledwabaraisibe@gmail.com

Dear Participant

I am Ledwaba R.F., doing Master's research in Information Studies at the University of Limpopo. The title of the study is: ***"Artificial intelligence to support public hospitals' records management in Tshwane Municipality Gauteng Province, South Africa"*** under the supervision of Prof L.A. Makgahlela.

My aim is to gather information about your views on the subject. Please be assured of the following:

- Your identity will be kept confidential and anonymous throughout the study.
- Your participation is voluntary. You can withdraw and discontinue participation.
- You may also refuse to answer any questions you want and still remain in the study.
- The researcher may also withdraw you from this research if circumstances arise that warrant doing so.

If you volunteer to participate in this study, you are expected to do the following things:

- Participate in filling in the questionnaire.
- Please do not write your name on any of the pages or documents you submit.

Thank you for your co-operation.

Yours Sincerely

____

Ledwaba R.F

APPENDIX B: INFORMED CONSENT

I hereby agree to participate in research regarding "Artificial Intelligence for effective records management in public hospitals of the Tshwane Municipality, in Gauteng Province, South Africa". I understand that I am participating freely and without being forced in a way to do so. I also understand that I can stop this interview at any point should I not want to continue and that this decision will not in any way affect me negatively.

I understand that this is a research project whose purpose is not to necessarily benefit me personally.

I have received the contact details of the researcher should I need to speak about any issues which may arise in this interview.

I understand that this is a consent form and it will not be linked to the questionnaire and that my answers will remain confidential.

I understand that if possible, feedback will be given to my municipality on the results of the completed research.

……………………..	……………..
Signature of participant	Date

APPENDIX C: QUESTIONNAIRE

Close-ended Questionnaire for collecting data about Artificial intelligence to support public hospitals' records management in Tshwane Municipality Gauteng Province, South Africa.

Please Note: Artificial Intelligence is the art of creating machines that perform functions that require intelligence when performed by people (Kurzweil, 1990).

QUESTIONNAIRE COMPLETION GUIDELINES

Please answer questions by making a tick (√) or a cross (X) next to the correct answer. *The questionnaire will take approximately 15 minutes to complete.* *Use "N/A" for not applicable questions, please answer all questions.* *Complete this questionnaire as guided and as honest as possible.* *Kindly respond to all questions.*

Part A: Demographic information of the respondents

1. Gender

1.	Male		2. Female	

2. Current job title?

1. Records Manager	
2. Records Clerk	
3. Registry Clerk	
4. Nurse	

3. Number of years in Public Health.

1. Less than a year	
2. 1-5 years	
3. 6-10 years	
4. 11-15 years	
5. 16-20 years	
6. 21 years and above	

4. Please indicate your educational level.

1. Grade 12	
2. Diploma	
3. Undergraduate degree	
4. Honours degree	
4. Master’s degree	
5. Doctoral degree	
6. Doctorate	

Part B: Records management practices in the Tshwane Municipality public hospitals

5. Which format does the hospital use to create records?

1. Manual		2. Electronic		3. Both ways	

6. What are the types of records that are created in the hospital that you know of? Choose all that apply.

1. Patient files records	
2. Appointment records	
3. Policy documents	
4. Discharge records	

7. How long does it take to retrieve records in the hospital? (Please indicate your answer with a tick or a cross).

1. 5-10 Minutes		2. 10-30 Minutes		3. 30-1 Hour		4. Not sure	

8. Where do you store records in the hospital? Choose all that apply.

1. Servers	
2. Lockers	
3. Filing cabinets	
4. Boxes	

9. Does the hospital have a backup system for risk management in the event of risk crisis to save records?

1. Yes		2. No		3. Not sure	

Part C: Records management functions that could be executed through AI

10. To which functions do you think artificial intelligence should be applied in the management of records in the hospital? (Tick all that are applicable)

STATEMENTS	
1. Records creation	
2. Records classification	
3. Records maintenance	
4. Records disposal	
4. All the above	

11. State whether you Agree, Unsure or Disagree with the statements below about artificial intelligence as a tool to improve records management at the hospital. Please indicate with a cross (X) in the column that describes your response using the following scale: 1 = Agree; 2 = Unsure; 3 = Disagree.

STATEMENTS	A	U	D
1. Files/records search accuracy and retrieval speed will be improved.			
2. Patients waiting time will be reduced and service provision will be efficient.			
3. Health record documentation and capturing will be reduced allowing clinicians more time with patients.			
4. There will be unavailability of storage.			
5. AI will facilitate adequate records classification.			

12. Are you aware of the legislations governing records in the hospital?

1. Yes		2. No	

13. To what purposes are these Records Management legislative frameworks applied in the hospital?

STATEMENTS	
1. For the development and compliance of File Plan policy	
2. For development of Records Management Procedure Manual	
3. For updating and reviewing of records management Policies	
4. For implementation of staff training on records management	
5. For disposing records	

14. From the options below, select any of the South African Records Management legislative frameworks used to manage records in the hospital (Tick all that are applicable).

STATEMENTS	
1. The National Archives and records service of South Africa Act (Act no. 43 of 1996)	
2. Electronic Communication and Transactions Act (Act no. 25 of 2005)	
3. Protection of Personal Information Act (Act no. 4 of 2013)	

STATEMENTS	
4. The Public Finance Management Act (Act no. 1 of 1999 as amended)	
5. The Constitution of the Republic of South Africa (Act no. 108 of 1996)	
6. The Promotion of Administrative Justice Act (Act no. 3 of 2000)	
7. National Health Act (Act No. 61 of 2003)	
8. The Health Professions Council of South Africa (HPCSA) (2008) guidelines	

PART D: User perceptions towards AI technology system for effectively managing records

15. What is your understanding about the application of AI technology for records management? (Tick (√) or cross (X) all the boxes that most closely fit your opinion.)

1. AI allows fast and easier access to records	
2. AI reduces storage space	
3. AI allows effective classification of records	
4. AI provides safety of records	
5. AI allows effective retrieval of records	
6. AI reduces disaster risks	
7.Other	

16. Do you believe that Artificial Intelligence for records management could improve patients' service care?

1. Yes		2. No		3. Maybe	

17. Do you think it will be easy for staff members to use the new AI technology if implemented in the hospital?

1. Yes		2. No		3. Not Sure	

Part E: Skills necessary for adopting AI technology for records management

18. Which skills do you think are necessary for adopting AI? (Please tick as many as you like)

1. Big data scientists	
2. IT professional and programmers	
3. Documentation digitization specialists	
4. Records management specialists	
5. Advanced Technology Maintenance workers	
6. Scientific researchers	
7. Other	

19. What do you think should be done for you to understand the application of AI technology for records management? (Tick as many as you like).

1. Attend training on AI	
2. Attend workshops on AI	
3. Read AI books	
4. Register for AI courses	

PART F: Proposing the adoption of AI for management of records

20. State whether you Strongly Disagree, Disagree, Neutral, Strongly Agree or Agree with the statements below about the improvements that AI technology can bring in the management of records and the hospitals? Please put a tick (√) or a cross (X) in the column that describes your response using the following scale: =Strongly Disagree, =Disagree, =Neutral, =Strongly Agree, = Agree.

STATEMENTS	SD	D	N	SA	A
1. Provide effective management of records					
2. Provide reliable storage facility					
3. Provide easy and quick retrieval of records					
4. Provide adequate maintenance of records					
4. Improve service delivery in the hospital					
5. Reduce patient waiting time					

APPENDIX D: ETHICAL CLEARANCE CERTIFICATE

University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 4713, Fax: (015) 268 2306, Email: moore.hutamo@ul.ac.za

TURFLOOP RESEARCH ETHICS COMMITTEE

ETHICS CLEARANCE CERTIFICATE

MEETING: **21 AUGUST 2023**

PROJECT NUMBER: **TREC/548/2023: PG**

PROJECT:

Title:	Artificial intelligence for proper records management in selected public hospitals in Tshwane municipality Gauteng Province, South Africa
Researcher:	RF Ledwaba
Supervisor:	Prof MA Dikotla
Co-Supervisor/s:	N/A
School:	Languages and Communication Studies
Degree:	Master of Information Studies

PROF D MAPOSA
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.**

Finding solutions for Africa

APPENDIX E: KALAFONG PERMISSION TO CONDUCT THE STUDY

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

KALAFONG HOSPITAL
PRIVATE BAG X396
PRETORIA
0001

ENQUIRIES : MS PM MONYEPAO
TEL : 012 318 6995
EMAIL : Patricia.Monyepao@gauteng.gov.za
REF : KPTH /2023/OCTOBER
NHRD REF : GP 202308 081/ GP 202310 047

TO: Ms Ledwaba

RE: PERMISSION TO CONDUCT RESEARCH

TITLE: Artificial intelligence for proper records management in selected public hospitals in Tshwane municipality Gauteng Province.

Permission is hereby granted for the research to be conducted at **Kalafong Provincial Tertiary Hospital**.

This approval is given in accordance to the "Promotion of Access to Information Act. No 2 of 2000" and it is expected of each investigator to ensure that all patient personal information will be managed and kept safe in agreement to the act.

Please note that in addition to receiving approval from the hospital research committee, you are still required to arrange the logistics with the relevant departments. You are obliged to inform this committee in writing of any amendments made to this protocol. Importantly, you require full approval (not conditional approval) before data collection can commence.

Informed consent for participation of research subjects and collection of data remains the responsibility of the researcher.

The hospital reserves the right to revoke this consent to do research in the facility if any misconduct with regards to patient participation or inappropriate behavior on behalf of the researcher comes to light.

You are also required to submit your final report or summary of your findings and recommendations to the office of the Chief Executive Officer.

Kind regards

PROF VAN ZYL
CHAIRPERSON: RESEARCH COMMITTEE
DATE: 9/11/2023

Ethics approval submitted: **YES** **NO**

Approved.

PROF VAN ZYL
CHAIRPERSON: RESEARCH COMMITTEE
DATE: 9/11/2023

GAUTENG PROVINCIAL GOVERNMENT
Kalafong Provincial Tertiary Hospital
2023 -11- 09
P/Bag / P/Sak X396 Pretoria 0001
SUPERINTENDENTS OFFICE

Open Rubric

APPENDIX F: STEVE BIKO PERMISSION TO CONDUCT THE STUDY

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

Enquiries: Dr LMB Majake-Mogoba
Tel: No: +2712 354 2336/1141
Email-lehlohonolo.majake@gauteng.gov.za

STEVE BIKO ACADEMIC HOSPITAL

For attention: Raisibe Florence Ledwaba

NHRD Ref Number: GP_202310_047

Re: REQUEST FOR PERMISION TO CONDUCT RESEARCH AT STEVE BIKO ACADEMIC HOSPITAL

TITLE: ARTIFICAL INTELLIGENCE FOR PROPER RECORDS MANAGEMENT IN SELECTED PUBLIC HOSPITALS IN TSHWANE MUNICIPALITY GAUTENG PROVINCE, SOUTH AFRICA

Permission is hereby grated for the above-mentioned research to be conducted at Steve Biko Academic Hospital. This is done in accordance to the "Promotion of access to information act No 2 of 2000". Please note that in addition to receiving approval from Hospital Research Committee, the researcher is expected to seek permission from all relevant department. Furthermore, collection of data and consent for participation remain the responsibility of the researcher. The hospital will not incur extra cost as a result of the research being conducted within the hospital.

You are also required to submit your final report or summary of your findings and recommendations to the office of the CEO.

STATUS OF APPLICATION:
Approved

Dr. LM B Majake-Mogoba
Clinical Director

Date: 26. 10. 23

STEVE BIKO
PRIVATE BAG X 169
2023 -10- 26
PRETORIA 0001
ACADEMIC HOSPITAL

APPENDIX G: LANGUAGE EDITING CERTIFICATE

EDITING AND PROOFREADING CERTIFICATE

22 Osche Street

The Reeds

Centurion

0157

25 June 2024

TO WHOM IT MAY CONCERN

This certificate serves to confirm that I have edited RF Ledwaba's dissertation titled, **"Artificial intelligence for proper records management in selected public hospitals in Tshwane Municipality Gauteng Province, South Africa**."

I found the work easy and intriguing to read. Much of my editing basically dealt with obstructionist technical aspects of language, which could have otherwise compromised smooth reading as well as the sense of the information being conveyed. I hope that the work will be found to be of an acceptable standard. I am a member of Professional Editors' Guild.

Hereunder are my contact details:

Jack Chokwe (PhD – University of Leicester (United Kingdom)

Contact numbers: 072 214 5489

jackchokwe@gmail.com

Professional EDITORS Guild