

**Application of Cloud Computing in South African libraries:**

**A case study of Polokwane Municipal libraries.**

**Masters' Degree in Information Studies**

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**Application of Cloud Computing in South African libraries:  
A case study of Polokwane Municipal libraries**

**BY**

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**DISSERTATION**

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**Supervisor: Dr JK Tsebe**

**Co-supervisor: Ms MR Mahlatji**

**2020**

## **DECLARATION**

I, Amogelang Isaac Molaudzi declare that this dissertation is my original effort and has not been submitted for any degree or examination at any other organisation, including the University of Limpopo. All citations, references and borrowed ideas have been appropriately acknowledged.



.....

**Monday, 21 December 2020**

**Mr A.I Molaudzi**

**Date**

## **DEDICATION**

This dissertation is dedicated to my late grandmother Nthuse Rampyapedi, my late grandfather Rasebetlwa Willum Molaudzi, my late aunt Mphiwe Mabina and my beloved uncle Ngwako and Doctor Mabina, my mother and father who wished me nothing but attainment in education. Last but not the least, I dedicate the study to my wife to be Mmabore Mukgerere Desiree and my son Onkabetse.

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To all of my family members, friends and colleagues, I express thanks for your priceless support and advice you offered. To all others whom I have not mentioned but in one way or the other, they played a crucial role in the achievement of this dissertation, I wish I could give individual acknowledgement. May the great Lord bless you all, your contributions are much appreciated.

## **ABSTRACT**

International, national and local public and private sectors are shifting into Cloud Computing (CC). This paradigm shift is fuelled by technological and transformational changes of CC in every sector, including libraries. Presently in South Africa, some libraries still operate on the traditional ICT based desktop applications, whereas some hardly notice that CC is part of their daily activities such as carrying out transactions in the cloud services like emailing on Gmail. There is a major gap in terms of adopting and understanding CC technology in public libraries.

Hence the study proposed to describe and explore the application and understanding of CC in Polokwane Municipal libraries. The study identified CC tools used by librarians and determined the level of librarians' knowledge and understanding of CC. The study further measured perceptions of librarians towards CC and established factors influencing the use of CC in libraries.

The researcher used a mixed-methods research approach and case study research design, located within postpositivism and interpretivism paradigm. The study was a census in nature because of the small population. Data was collected using questionnaire and interviews from 30 respondents who were librarians and participants who were library managers. Collected data were analysed through descriptive statistics and thematic data analysis.

Findings from the study reveal that librarians are not fully using CC but use some of the CC applications such as google scholar, without having detailed knowledge and understanding. The study further found out that Polokwane Municipal libraries fail to adopt CC as a result of limited budget and poor internet connection. The study recommends intensive study on factors influencing adoption of CC, workshops and training for librarians, and initiatives on fundraising within these libraries.

**Keywords: Cloud computing, desktop applications, public libraries, librarians and cloud services.**

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

CC	:	CLOUD COMPUTING
COVID 19	:	CORONAVIRUS DISEASE 2019
DSAC	:	DEPARTMENT OF SPORTS, ARTS AND CULTURE
IaaS	:	INFRASTRUCTURE AS A SERVICE
ICT	:	INFORMATION, COMMUNICATION AND TECHNOLOGY
NLSA	:	NATIONAL LIBRARY OF SOUTH AFRICA
PaaS	:	PLATFORM AS A SERVICE
RSA	:	REPUBLIC OF SOUTH AFRICA
SaaS	:	SOFTWARE AS A SERVICE
SPSS	:	STATISTICAL PACKAGE FOR SOCIAL SCIENCES
SITA	:	STATE INFORMATION TECHNOLOGY AGENCY
UL	:	UNIVERSITY OF LIMPOPO
UTAUT	:	UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY

## CHAPTER 1:

### INTRODUCTION AND BACKGROUND OF THE STUDY

#### 1.1 Background and motivation

Cloud Computing (CC) is progressively being implemented and bringing transformational changes in both public and private sectors internationally, nationally and locally. It refers to a “technological paradigm that hosts different software and applications installed on a remote server and delivered over the internet through a browser interface” (Sareen, 2013:533). Furthermore, it is a metaphor that symbolises the change from desktop applications towards web applications and services. Badwai and Kayed (2015:136) support this by maintaining that “information, communication and technology (ICT) development has brought a dramatic change in every sector and libraries are not an exception to it”. Libraries adopt CC to advance library services such as making use of CC to allow patrons to have remote access to the library collection.

Internationally, most libraries are now using CC to host digital libraries and integrate library systems to create an incorporated presence on the web to provide users with local, national and global remote access (Suman & Singh, 2016:121). For instance, CC includes applications for online reference services, bibliographic management, and online cataloguing such as Worldcat, as well as digital storage for electronic sources (Mohammed, 2018:77). In the African continent, the uptake of newer technologies such as CC is lagging in most libraries. Adegbilero-Iwari and Hamzat (2017:17) conclude that in Nigeria and many other African developing countries, attention of librarians has been drawn to an important era of modern computing services. In the Republic of South Africa (RSA), academic libraries as compared to public libraries compete on CC to show their presence on the web. This is because the higher education system has transformed after apartheid, and students are provided with advanced ICT which allow remote access to digital services (Nyahodza & Higgs, 2017:40). Universities have computer laboratories and libraries which are accessible to their student population to use on campus and remotely for academic purposes.

The use of CC in libraries requires ICT infrastructures that include network facilities, software and hardware such as remote servers virtualised on the cloud to allow access for a variety of services. Dar and Ravindran (2018:239) postulate that “CC provides a large number of services in a virtualised manner to reduce the server upgrade and high cost of administration”. These ICT infrastructures are grouped into three models, which includes “Infrastructure as a Service (IaaS), Software as a Service (SaaS), and Platform as a Service (PaaS) on computing machines that are remotely accessible through Internet” (Wada, 2018:24). Figure 1.1 below gives a clear explanation of CC models and their use within libraries.

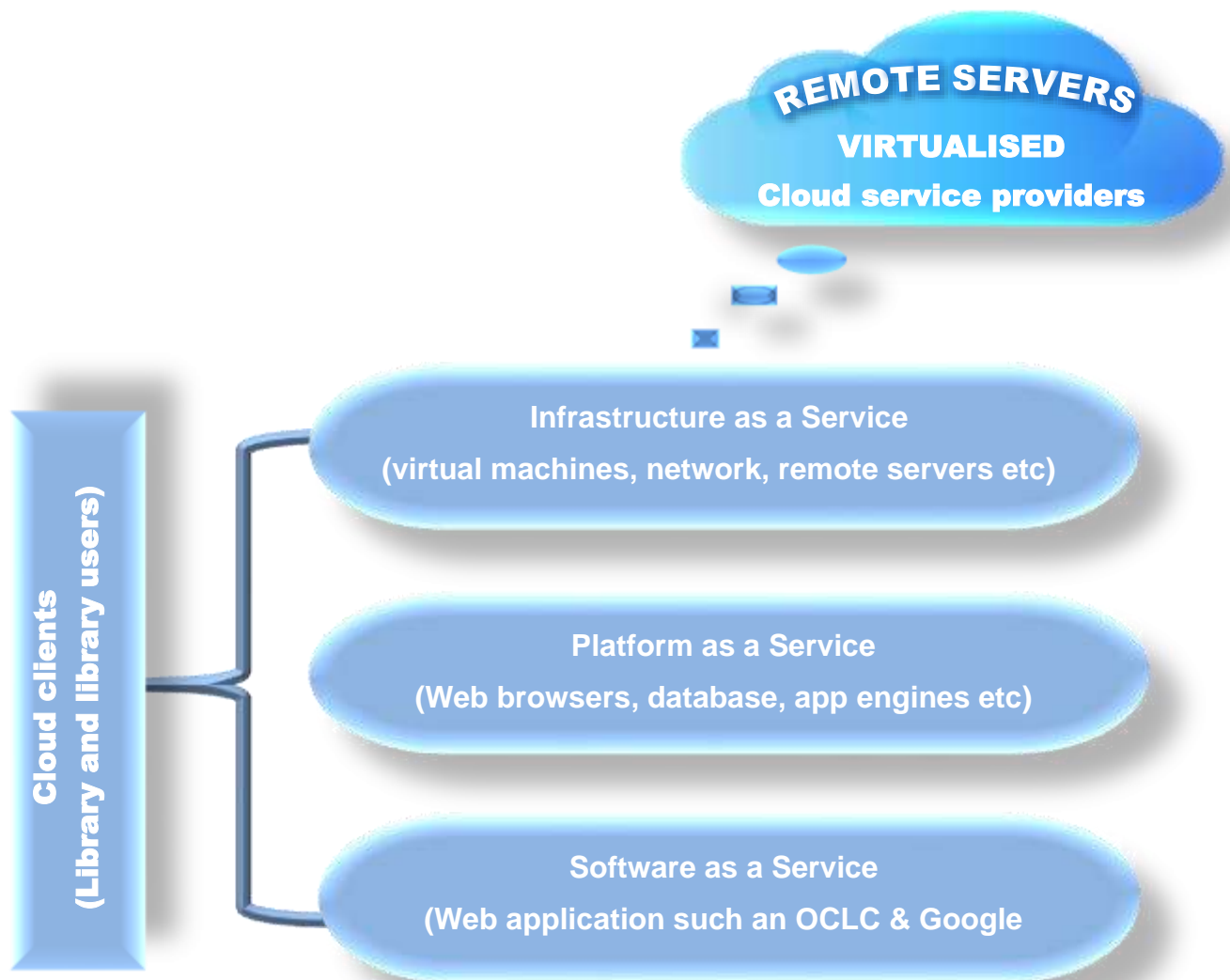


Figure 1.1: Cloud Computing diagram and models



Computing services brought by CC continually transform library services to be more convenient for users and addressing problems faced in libraries, problems such as library system breakdown. According to Sahu (2015:213), “CC allows libraries to render a variety of ICT services without much of a problem because service providers maintain servers and provide free upgrades and backup”. By maintaining both the hardware and software reduces cost for libraries. Additional advantage by Liu and Cai (2013:22) is “shifting library core applications to cloud-based services to reduce the entire local technical needs in managing server hardware”. However, the shift to CC has some technical problems. Khan (2015:7) argues that even though “CC has the potential to exceed the expectation of ICT, it has problems on items of connectivity and service providers”. Lack of good internet connectivity and CC service providers inhibits the use of CC in libraries. Suman and Singh (2016:121) allude that “some libraries do not use cloud-based services owing to the lack of good service providers and technical skills of librarians”. The shift to CC needs librarians to be trained and be able to use CC. Brata and Amalia (2018) confirm that social influence becomes the biggest supporting factor in the use of a new system by a person.

This study was pursued to explore the application of CC by Polokwane Municipal libraries. These libraries use ICT to provide library services and reading materials for a variety of purposes including self and educational development (the Republic of South Africa, Limpopo Province Polokwane Municipal, 2018:244). The background composition of these libraries was discussed under 3.5 Area of the study. It is hoped that the study will help to accelerate strategic measures of applications in CC for library functions and services rendered by the municipal libraries. According to Manaka (2019), these libraries use a library management system called Papyrus to provide library services. Ledwaba and Tsebe (2012:378) state that the National Library of South Africa (NLSA) worked on a subproject in partnership with the State Information Technology Agency (SITA), the subproject was for ICT plan to implement library management systems in all the community libraries of South Africa. Matolong (2016:13) mentions that “through Mzansi Libraries Online Project in the public libraries of South Africa, funded by the Bill and Melinda Gates Foundation, there is an effort to strengthen and grow library services through the provision of free access to the internet, and automation system”. Polokwane Municipal Libraries introduced

library management system from that subproject implemented to address ICT related problems in libraries. Bopape, Dikotla, Mahlatji, Ntsala, and Makgahlela (2017) state that efforts of this landscape from the government are set to guarantee more access to uninterrupted access to internet services in libraries.

## **1.2 Research problem**

Jan and Colin (2015:48) point out that a research problem indicates the type of phenomenon as well as the characteristics of the phenomenon being researched. In South Africa, even though CC is internationally being adopted, some libraries still operate on the traditional ICT based desktop applications, that are installed on the servers and virtualised on the library network for access. Notable with these technologies is they are more costly when considering purchases, computer and server maintenance as well as a software upgrade. Ugwoke and Okafor (2017:27) explain that libraries operating on the traditional library model are overcrowded with several challenges such as poor access time, distance barrier, high expenses and other materials which makes them inconvenient for mobility. Lack of CC in libraries limits both librarians and library users from having remote access to the library system, services and applications because desktop applications are confined to a physical location. Consequently, this limits libraries from providing effective and efficient library services because desktop applications do not make it convenient for libraries to provide users with remote access (Soniya & Senthil, 2015).

To overcome this problem, many libraries have adopted the use of CC. According to Sahu (2015:213), CC has become a new catchword in the field of libraries, which enable them to run different ICT services without problems. Compared to traditional ICT, CC is relatively cheaper to run Libraries and Information Services (LIS) because of its on-demand computing service which provides pay per usage opportunity for application of cloud-based services such as the interlibrary loan and online references (Shaw, 2013:163). However, Wada (2018:20) noted that “many people hardly notice that CC is part of their daily activities until people are engaged in carrying out their transactions in the cloud such as emailing”. Preliminary observations have noted that the Polokwane Municipal libraries still use the traditional ICT based desktop library management system called Papyrus, with misconceptions of CC and its application.

Hence, the study explores the application and understanding of CC in the Polokwane Municipal libraries in the context of LIS in the province.

### 1.3 Role of theory

The study adopted Unified theory namely the Unified Theory of Acceptance and Use of Technology (UTAUT). The theory was established by Venkatesh, Morris, Davis and Davis (2003) to provide a unified theoretical basis for information systems research studies. According to Venkatesh et al (2003) “UTAUT comprises four constructs namely: effort expectancy, performance expectancy, and social influences as predictors of behavioural intentions towards acceptance of information technology while facilitating conditions directly impacting usage behaviour”. Figure 2 below illustrates the theory.

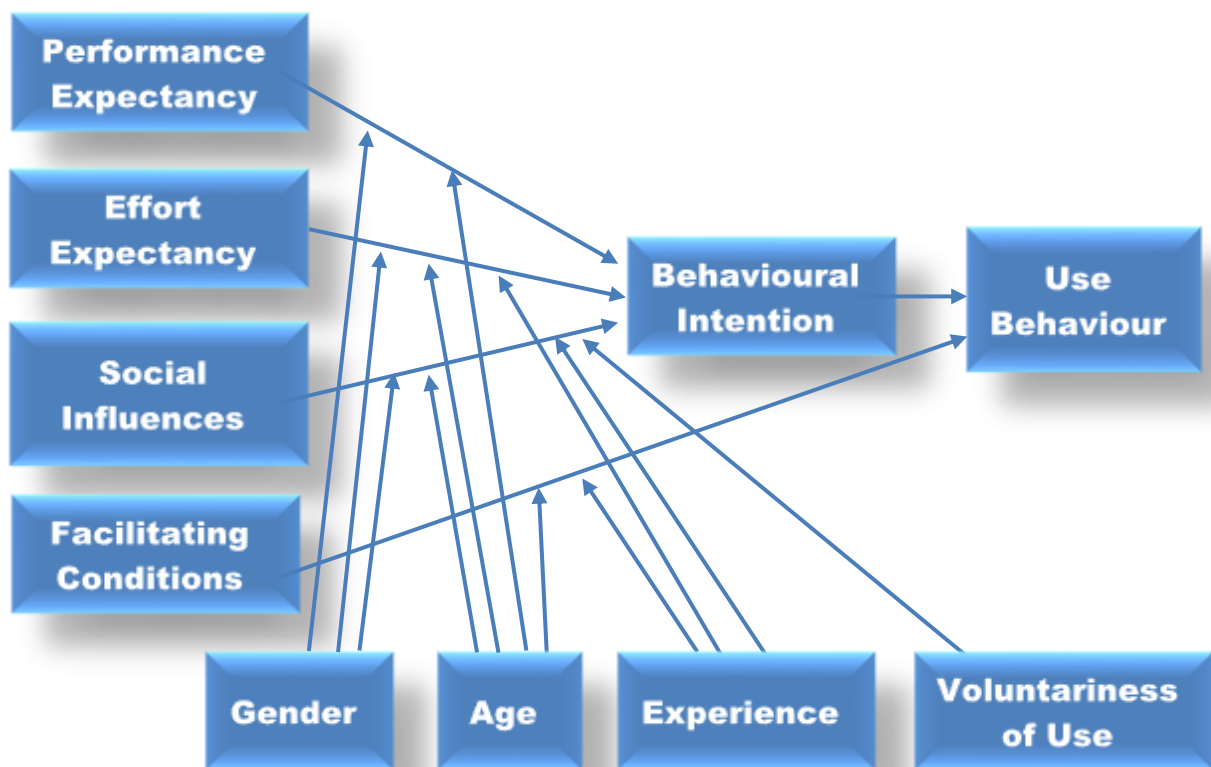


Figure 1.2: “Unified Theory of Acceptance and Use of Technology” (Venkatesh et al. 2003:445).

Venkatesh et al (2003: 447) define four constructs of UTAUT model, which the researcher used as follows: Performance expectancy was used to measure the extent to which the librarians perceive CC to be helpful in job performance. Effort expectancy was used to determine the degree of ease linked to the system use, CC in this regard. Furthermore, establish factors librarians use CC for. Social influences were used to determine the extent to which social factors encourage the practice of the new systems by librarians. The researcher used facilitating conditions to determine the degree to which a librarian understands and have faith that an organisational and technical infrastructure exists to back up the use of the system. Lastly, gender, age, experience, and voluntariness of use was used to moderate the relationships between the variables and generalisation of the results.

### *1.3.1 Hypothesis towards adoption of UTAUT in the study.*

The hypothesis of UTAUT theory in the study is formulated in line with four constructs of the theory as presented below.

#### ❖ Performance expectancy

Performance expectancy is the robust predictor of intention to use the system. Venkatesh et al (2003:447) define performance expectancy as it is a degree to which one believes that the job performance will improve by using innovative technologies. The behavioural intention to use the system can be negatively or positively influenced by the age and gender of the users. Attuquayefio and Addo (2014:84) argue that Effort Expectancy significantly predict intention to use system. In view of the above discussion, it is hypothesised that –

*H1: Performance expectancy is influenced by Polokwane Municipal librarians' age and gender.*

#### ❖ Effort expectancy

The researcher expects effort expectancy to be more important in the potential development stage of every behavioural intention to use CC by librarians. Venkatesh et al (2003:448) explain that the effort expectancy is significant in both voluntary and mandatory usage contexts, but each one is significant during the first time period,

becoming nonsignificant over periods of extended and sustained usage. Although intentions may be formed in the absence of experience with new technology, intentions can still impact actual use which is ancestor to behavioural intention (Mitzner, Rogers, Fisk, Boot, Charness, Czaja, & Sharit, 2016:2). This informed the researcher to hypotheses that-

*H2: Effort Expectancy positively influences behavioural intentions to use CC for library services and patrons' needs.*

❖ Social influence

Social influences towards a new technology within organisation can be classified under factors that include compliance, pressure and willingness for change. Venkatesh et al (2003:448) defines social influences as the degree to which an individual perceives that it is important others believe that he or she should use the new system. Social influences as a pillar of behavioural intentions to use the system can emerge directly or indirectly. Librarians can willingly use the new system or can be compelled by superiors to adopt new system. Graf-Vlachy, Buhtz & König (2018:37) affirm that social influences have been shown to profoundly affect human behaviour in technology adoption. Given the above discussion, it is hypothesised that -

*H3: Social Influence factors positively influence behavioural intentions of Polokwane Municipal librarians to use CC.*

❖ Facilitating conditions

The illustration in Figure 1.2 of UTAUT theory depicts that facilitating conditions have a positive relationship with technology usage. Venkatesh et al (2003:448) stress that the prediction of facilitating conditions is not dependent on behavioural intention. Users' knowledge and understanding of the new system, the availability of resources and managerial support can lead to the use of a new system. The study by Hamzat and Mabawonku (2018:14) reported that facilitating conditions in terms of technical and human resources had positive impact on the use digital library. Looking the non-dependence of facilitation conditions towards the use of the system, the research hypothesis that-

H4: Facilitating conditions directly and positively influence the use of CC to provide library services to the patrons.

### *1.3.2 Rational for choice of theory*

The UTAUT theory was chosen in this study because of its comprehensiveness, validity and reliability in determining factors that influence the use of technology. The model allowed the researcher to assess their ability to determine the application and understanding of CC. Moreover, the theory does not only cover the technological aspects of analysing the acceptance and use of ICT, but it also explores organisational and environmental contexts (Muhsn, Partono & Ahmad, 2016:101).

## **1.4 Purpose of the study**

The aim and objectives of the study are presented below.

### *1.4.1 Aim of the study*

The study aimed to describe and explore the application and understanding of CC in Polokwane Municipal libraries.

### *1.4.2 Objectives of the study*

The objectives of the study are:

- ❖ To identify CC tools used by librarians
- ❖ To determine the level of librarians' knowledge and understanding of CC
- ❖ To establish factors that influence the use of CC
- ❖ To measure perceptions of librarians towards CC

## **1.5 Significance of the study**

Mligo (2016:332) defines the "significance of the study in terms of what contribution the study will make to the broad literature upon completion". The study investigated the application of CC in Polokwane Municipal libraries. Therefore, the study provides a better understanding and application of CC to advance the provision of library services to users of Polokwane Municipal libraries and other libraries elsewhere in the world. The study offers various ways through which the Polokwane Municipal libraries

can apply CC to effectively render library services. Moreover, the study may contribute towards placing the needs of Polokwane Municipal libraries users before the systems by accessing CC applications and services following the view of the “value-added model in management and information systems” (Mwenje & Mukanga, 2016:869). Taylor (1986:7) explains that the activities of the value-added spectrum in input and output of data involve a trade-off of cost and benefits to the system users for purpose of placing the user before the system.

## **1.6 Scope of the study**

The researcher explored the application and understanding of CC in Polokwane Municipal libraries. The intention was to identify CC tools used by librarians, determine the level of librarians’ knowledge and understanding of CC, establish factors that influence the use of CC and measure perceptions of librarians towards CC. To accomplish the study objectives, data was collected from the librarians using questionnaires and library manager using unstructured interviews at Polokwane Municipal libraries.

## **1.7 Definition of key concepts**

This section provides clarification of the key concepts relating to issues of the study.

### *1.7.1 Cloud Computing*

Cloud computing is defined as “Internet-based computing platform, whereby shared computing resources are provided to computers and other devices on demand through the web interface” (Reddy & Reddy, 2018:89-90).

### *1.7.2 Public libraries*

This can be defined as a “library provided partly from public funds, and the use of which is not restricted to any class of persons in the community but is freely available to all community members” (Prytherh, 2016:569).

### *1.7.3 Municipal libraries*

Municipal libraries refer to public libraries serving interests of urban and rural area (Prytherh, 2016:467).

### *1.7.4 Remote access*

It can be defined as access to a system gained from a secondary location other than the primary location of the system that is being accessed on the web (Ernest, Timothy & Kpangkpari, 2016).

### *1.7.5 Web Application software*

Web Application is a “system, with application component(s) in client-side which communicate(s) with application component(s) in a web server for processing data” (Dissanayake & Dias, 2017:4).

### *1.7.6 Desktop Application*

It is a program that runs separately in a computer device that includes a desktop computer, laptop, and mobile computing device. All the components of these programmes are located within the device, and these components are executed within a single address space of the system memory (Dissanayake & Dias, 2017:3).

### *1.7.7 Worldcat*

This is a centralised online catalogue that serves more than 16,000 libraries in 120 countries. It allows search engines like Google to link library users to library resources such as catalogue, interlibrary loan etc (Joseph, 2018:10).

### *1.7.8 Papyrus*

Papyrus is the library management system that serves as an enterprise application to make books, articles and other library collection available to library users (Mwenje & Mukanga, 2016).

### *1.7.9 Virtualisation*

Virtualisation is “logical division of computing resources to be utilised proficiently, fulfilling the demands of different applications such as server consolidation,



application performance isolation, dynamic migration of workloads and application security” (Gul, Ahmed, Hafeez and Bibi, 2014:108).

#### *1.7.10 Coronavirus Disease 2019 (COVID 19)*

This refers to “acute respiratory disease that emerged in December 2019 in Wuhan, the capital of Hubei province, China caused by a newly emerged zoonotic coronavirus” Anjorin (2020:199).

### **1.8 Chapters outline**

This section gives a summary of the chapters in the study, which are presented below.

#### **Chapter 1: Background and motivation of the study**

Chapter one of presents the background and motivation of the study, problem statement, role of theory, purpose, significance, scope and definition of key concepts of the study.

#### **Chapter 2: A literature review**

This chapter presents the review of the literature based on the objectives of the study, which are subjected to subheadings. Literature is reviewed historically in chronological order by year of publication.

#### **Chapter 3: Research methodology**

This chapter outlines the research methodology that was adopted in the study. It discusses the research paradigm, research approach and design, population, sampling, data collection, quality criteria and ethical considerations of the study.

#### **Chapter 4: Data analysis and discussion of the findings**

This chapter presents data analyses and discussion of the findings. The presentation appears in two sections, section one for consists of analyses for quantitative data collected from questionnaires whereas section two consists of analyses for qualitative data collected from unstructured interviews.

## **Chapter 5: Summary of findings, conclusion and recommendations.**

This chapter concludes the study by presenting fundamental findings following objectives of the study. This chapter also gives the conclusion and recommendations to the findings of the study.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1 Introduction**

Literature review refers to a “comprehensive overview of previous researches on a subject” (Bertram & Christiansen, 2017:13). The literature review for the study is based on previously published studies on CC in libraries, grounded on theoretical framework and arranged according to the objectives of the study which are subjected to subheadings. These subheadings are discussed in the historical review type of literature and organised in yearly chronological order. du Plooy-Cilliers, Davis and Bezuidenhout (2018:102) explain that “historical review traces the chronological order of the literature, reviewing the stages of development from the past to the present”. This literature gives a historical review of CC to show literature on how CC evolved over time looking at the international, regional and local level.

### **2.2 Conceptualisation of theoretical framework**

The UTAUT theory was formulated out of eight well known theories in information system adoption research. These theories include Theory of Reasoned Action, Theory of Planned Behaviour, Technology Acceptance Model, Combined TAM and TPB, Innovation Diffusion Theory, Model of PC Utilization, Social Cognitive Theory and Motivational Model (Venkatesh et al. 2003). The UTAUT appeared to be applicable to study application of CC in Polokwane Municipal libraries. Literature support the adoption of UTAUT theory in researching implementation of a new information systems that include CC. Venkatesh (2013:63) indicates that the UTAUT provides a “holistic model to capture people’s attitudes and intentions to adopt CC solutions”. The UTAUT theory has been empirically compared and found to outperform the eight individual models in information system research (Lai, 2017). Omotunde and Omotunde (2017) investigated factors influencing administrative staffs toward the adoption of CC using UTAUT. The results showed that there is no significant influence of gender on effort expectancy, performance expectancy and social influence of administrative staffs towards the adoption of CC.

The study by Kropf (2018) utilized UTAUT theory to determine teachers' intent to use collaborative CC tools. The results indicated that constructs of CC which include Performance Expectance and Effort Expectance are strong predictors of Behaviour Intentions when moderated by age, gender, experience, and voluntariness of use. Performance expectancy had been reported as influencing factors towards information system adoption and use. Hamzat and Mabawonku (2018) investigated the influence of performance expectancy and facilitating conditions on the use of digital library by engineering lecturers in universities in South-west, Nigeria, the performance expectancy was found to be a critical factor in the use of digital library by engineering lecturers. Sair and Danish (2018) used framework of UTAUT to understand the relationships among performance expectancy, effort expectancy, personal innovativeness and behavioural intentions in a Pakistani consumer market. Results show that the performance expectancy and effort expectancy are significantly influence the behavioural intentions to adopt mobile commerce. The reviewed related literature conveys that UTAUT theory has positive input in studying adoption information systems, CC in this regard.

#### **2.4 Cloud Computing tools used in libraries**

CC tools are being used in various sectors. Mohammad and Zahid (2013) indicate that CC reduces the overheads of up-front investments and financial risks for the end-user. CC is offloading libraries of costly and time absorbing activities and maintenance of technologies. In libraries CC tools are used to reduce time and cost spent, absorbing activities and maintenance of technologies. These CC tools operate through three models in which many libraries can decide to adopt for library services. Shaw (2013:164) explains to the models as follows, firstly SaaS model for tools such as online reference and research guides, secondly PaaS model for tools such as the integrated library system and the interlibrary loan, and lastly IaaS model for tools such as discovery systems and archives". Deployment of these models in libraries depends on the kind of services provided in the library. Yuvaraj (2013) explored the librarians' curiosity in CC adoption within libraries of Indian Central Universities and identified applications and services of CC applied for library services and discloses that libraries deeply depend on CC applications which include PaaS such as google applications

to improve the quality of library services. Different studies have shown the SaaS model heavily used in libraries. Tritt and Kendrick (2014) conducted an exploratory study to assess the use of CC tools by librarians. The results indicate high use of SaaS tools that include cloud file sharing and storage such as Gmail and google drive. On the other hand, Tavluoglu and Korkmaz (2014) conclude that librarians should utilise SaaS tools to improve library services such as reference services. These authors indicate that CC can allow libraries to address reference questions using SaaS tools such as Gmail and Google forms which are simply accessed through the internet. This simplicity of access through the internet is linked to the degree of ease associated with the use of CC under effort expectancy in UTAUT theory.

Access of SaaS tools via the internet is confirmed by Murtadha and Roshanasan (2014:17), who states that “users can use SaaS applications through a web browser interface”. SaaS tools that can be accessed via web browser interface for daily duties include Google Drive, Microsoft OneDrive, and dropbox for storage and features that include synchronised data, and backup copying of files in cloud-based storage. Konganurmath and Shekar (2014:298) state that “libraries are interested in SaaS services for daily routine work”. Professional Development Services Technology in education (2015:2) upholds that “cloud-based tools are web-based applications delivered on the internet and accessible generally via a variety of web browsers such as Microsoft Edge”. Sorensen and Glassman (2015) offer a view that cloud-based services allow libraries to have substitute dynamics and strategies to render services that are not present in the old-style library system.

The old-style library system is now been replaced by developments brought by CC. Several CC services such as Microsoft OneDrive offer space for storing files. CC does not only provide storage but also provide tools to share information and library collection. Library and Information Association of South Africa (2016) also reports on continuing professional development for academic information professionals in Sub-Saharan Africa at the University of Pretoria. The report discloses that CC tools in libraries highlights the importance of publishing for professional growth and development because it is making publishing easy yet sophisticated. In CC, space for collection development in libraries is unlimited based on demand. Stukalova and

Guskov (2016:50) note that hence “libraries need space to store full texts of publications and articles, bibliographic records, manuals, and so on”. The study on the use of CC in library services by Mate (2016) notes that most of the libraries already have an online catalogue and share bibliographic data with OCLC. OCLC is one of the CC tools used to sharing libraries data and its collections.

CC tools allow libraries to provide automated library services. Neethu and Vanaja (2017) investigated the concept and applications of CC within libraries. The study claims that incorporated search engine and catalogue retrieving tools assist librarians to provide users with global access to information in real time within sustaining the fourth law of LIS stating save the time of the reader. Adamou and Ntoka (2017) examined the impact of digital equipment on academic libraries. The study found out that e-mail and Open Public Access Catalogue (OPAC) were tools used more often by both librarians and library users. Email is used in libraries because it offers an instant messaging system which enables librarians to address library choirs, were as OPAC allows remote access to the library catalogue. Wada (2018) affirms that cloud applications have anticipated a crucial role since their executions to the level which academic journals including technologies that facilitate access to academic journals are commonly cloud based. In the review of the literature on tools used in libraries, the researcher noticed that deployment of IaaS in public libraries was not extensively discussed. IaaS involves remote servers which allow libraries to virtualise library computing services and resources on Cloud for remote and easy access by library users.

## **2.5 Librarians’ knowledge and understanding of Cloud Computing**

Lifelong learning must be practised keeping abstract with new technologies in libraries. Grant (2012) researched building zones of the library road to the future with developing technologies. The study concludes that librarians must use recent technologies, advance skills, and initiate ideas and styles to advertise services offered in the library. This suggests that librarians must acquire new knowledge and make use of new technologies such as Overdrive to extend library service beyond the physical wall and keep users attracted to the library services in the shift of providing library services technologically wise. Liu and Cai (2013) researched about

acceptance of the move to CC, skills and knowledge for systems librarians. The findings throw light that system librarians must project their skills and knowledge to cover new trends. Neumann (2014) emphasizes that influence to adopt CC in libraries are massive and involve the librarians with advanced management knowledge and skills to escalate technological changes offered by CC. Even though there is a struggle to adopt CC in libraries, some libraries are actively adopting CC. People's attention in the 21<sup>st</sup> century is captured by smartphone Apps which are powered by CC, and this pose challenge to librarians' knowledge to render library services on smartphone Apps. This is proved by Dhanushraja and Dhanushraja (2014) who discussed the state of libraries in India and convey that libraries are busy adopting cloud-based services for library users while owing to the lack of library professional with skills and knowledge on CC.

Librarians' lack of skills and knowledge on CC can easily be alleviated if they have skills and knowledge in ICT. Sudhier and Seena (2014) conducted a study on analysis of ICT skills amongst the librarian of Kerala University library. They found out that librarians had moderately an average level of skill in ICT. A study by Wada (2015) measured library professionals responsibilities in managing a digitised library in a CC environment, and identify that knowledge for computer software and hardware as the one required to facilitate the application of CC in libraries. Furthermore, Wada (2015) believes that ICT competencies could be attained via strong trainings and consistent use of the CC to any aspect of services provided in the libraries. Training librarians to enrich skills and knowledge on the use of new technologies is supported by a case study on an examination of CC amongst university lecturers in Zimbabwe by Musungwini, Mugoniwa, Furusa, and Rebanowako (2016), which presents finding that there were a knowledge gap and a need for workshops to enlighten the users' knowledge on the value of CC technology.

Knowledge of CC in libraries can enable librarians best provide satisfactory services. Dhaka (2017) published a paper which shows the utilisation of CC in libraries concerning its concepts, models and applications. The paper deduces that library staff needs to be aware and understand that CC does have the potential of improving library services and workflows. Sudhier and Seena (2018) conducted a case study

on library professionals' adoption of CC technologies, studying the awareness of CC technologies amongst the librarians in the university of Kerala. The study reveals that librarians had an inadequate idea about CC technology. A case study of three state universities in Zimbabwe focused on 21<sup>st</sup> century academic library by Mabweazara (2018), presents findings that partial skills and knowledge were obstacles to adopt new trends in librarians. Aliyu, Abdulrahman and Yusuf (2019) analysed the need for CC application in Nigerian academic libraries for improved delivery of services and reveal that librarians have little knowledge about cloud CC and its unlimited benefits.

On the contrary, the study by Mahalakshmi and Ally (2012) identified the consciousness and use of CC in Indian libraries, amongst librarians of engineering colleges from Coimbatore district. The findings of the study unveil that many of the study subjects were aware of CC and half of them had positive views on the feasibility of CC application in a library. Tritt and Kendrick (2014) explored the impacts of CC on academic librarians in rural libraries. Findings present that most the librarians are aware of the use of CC libraries and have knowledge of the impact CC has on the practice of librarianship to serve library users. Majhi, Meher and Maharana (2015) assessed the understanding and knowledge of the academics with CC. The study reveals that the majority of respondents from different universities have knowledge of CC and are not lagging. The literature reviewed indicates that there is still a gap in CC knowledge and skills, even though librarians possess moderate skills in ICT. However, skills in ICT can help librarians quickly have enough skills and knowledge in CC. It seems that if librarians know software and hardware, they can easily learn the application of CC in libraries. Libraries will fully adopt CC if librarians can acquire knowledge on how CC can best improve library services hence UTAUT theory suggests performance expectancy.

## **2.6 Factors influencing the use of Cloud Computing**

Libraries are shifting towards CC and offering web-based services due to CC benefits. According to Raghavendra and Narayana (2013), these benefits include abilities to use new software without hosting it in the hardware such as server and be able to scale the computing power to meet the demand of users. Alsanea (2015) conducted a study on issues affecting the application of CC in Saudi Arabia's Government



Sector. Findings revealed that organisational and technological factors, cost effectiveness and quality of Service are features that could support government organisations in moving to CC. Gutierrez, Boukrami and Lumsden (2015) studied factors influencing managers' decision to implement CC in the United Kingdom, the study disclosed that competitive pressure, complexity, technology readiness and trading partner pressure are the key factors of CC. An exploratory study Noa (2015) focused on factors influencing the application of CC by librarians. The study found that the behavioural goal to adopt CC was impacted by personal innovativeness and perceived ease of use.

Amponsah, Panford and Hayfron-Acquah (2016) determined factors influencing CC adoption in a developing country of Ghana. The findings discover that habit, facilitating condition, price value and performance expectancy were positive significant factors influencing the implementation of CC in Ghana. Yuvaraj (2013) investigated the determining issues for the application of CC in Indian libraries. Findings of the study present that usefulness; perceived ease of use and abundant availability of the empowering technology were strong drivers of the acceptance of CC technology in the libraries. Jones, Irani and Sivarajah (2017) investigated rewards and risks of CC the UK public sector. The findings present that motivations for adopting cloud-based services that includes perceived cost savings by pulling big data storage. Adegbilero-Iwari and Hamzat (2017) reviewed library services stand route to CC acceptance in Nigerian libraries studying the use of CC and how libraries adopt CC. The reviewers conclude that the latest library services platform that is too satisfactory and convenient for use, is a certain route to wider adoption of CC. Neethu and Vanaja, (2017) explored the concepts amongst the academic libraries on CC and its conditions with libraries. From their exploration, they observe that libraries are shifting towards and taking compensations of cloud-based services more especially in digital libraries.

The study by Munguti and Opiyo (2018) established issues manipulating the implementation of CC in software development corporations in Kenya and concludes that organisational related factors and technological factors, which include complexity, perceived benefits and compatibility, influence the application of CC

within many businesses. Yatin, Alias, Awang and Burhanud-din (2018) identified factors that Information Professionals could in the adoption of CC. The drawn conclusion that top management support is a factor influencing the use of CC. Nasser and Jawad (2019) determined factors of CC adoption and discover that the decision maker's knowledge about CC is an influential reason in decision making about CC implementation.

On the contrary, the study by Raghavendra and Narayana (2013) argue that libraries are thinking to move into CC, but are experiencing issues covering administrative procedures, software, budget constraints, poor connectivity. Alsanea (2015) affirms that security concerns, lack of funds and complexity are considered as issue factors which prevent organisations from adopting CC. Muhammed, Zaharaddeen, Rumana and Turaki (2015) highlight major challenges in adoption of CC as the problems that include poor internet service, power supply, fear of hackers and insecurity. The study by Amponsah et al. (2016) determined factors influencing CC adoption in a developing country of Ghana and found that insignificant security, hedonic motivation, effort expectancy and social influence negatively influence CC application in Ghana.

Neethu and Vanaja (2017) argue that in practice, CC is encountering the many technical problems and engineering issues which result in data that is obtained illegally. Yatin et al. (2018) emphasis that compatibility issue and security concern are major concerns for organisations to move into CC. Munguti and Opiyo (2018) established factors influencing the application of CC, findings present that shared rental of physical hardware is associated with more risk of the unsolicited data leak to CC clients. Wada (2018) explains that to reinforce availability on the web, libraries find confronted by the continuous drop of budgetary allocation, cost of Internet access, poor network tools, technical know-how, and no subscription to the database. Ledwaba (2018) researched the provision of sustainable internet access to public libraries in South Africa, findings present that financial constraints were a huge factor impacting on space, additional computers and staffing. Sallehudin, Razak, Ismail, Fadzil, and Baker (2019) conducted a study on CC adoption in the public sector, the study shows that issues on the operational effectiveness of cloud adoption are at the lower stage. The study Ledwaba (2020) on the management of the internet

connectivity in the South African public libraries, concludes that lack of network infrastructure and the expensive connectivity to the internet are obstacles towards rolling out and sustaining internet connectivity in public libraries. This is supported by Virutkar (2020: 744) who explains that though the shift to cloud-based libraries is going to be achieved over a long time and it is expectable to look at various opportunities associated with benefits of CC in libraries that necessitates its adoption. Various sources on CC identify factors influencing fully adoption of CC in libraries, this is likely to impact on the perception of librarians towards CC.

## **2.7 Perceptions of librarians towards Cloud Computing**

New technologies bring different hopes towards the to the provision of library services. The study by Hoy (2012) examined CC basics for librarians and concluded that librarians believe that most CC applications are manufactured with hope to find users able to access CC applications remotely through a web browser interface from anywhere in the world at any time. The study by Koury and Jardine (2013) based on library training of cloud viewpoint, examined advantages of CC applications for library professionals. The findings disclose that librarians have a positive attitude towards the use of CC hence its tools such as Google applications establish effective collaboration and communication within libraries. Gbaje and Aliyu (2014) assessed librarians' perception on benefits of CC and found that with the use of CC librarians are confident that libraries stand a chance to benefit from a diversity of CC services such as information access, storage, sharing, and retrieval.

Tritt and Kendrick (2014) inspected the impact of CC on librarians at rural libraries. Findings reveal that librarians expressed excitements with CC as it had changed their workflow and made it flexible allowing them to be more profitable and dynamic while providing services. A knowledge study on CC technology and academic libraries in India by Dhanushraja and Dhanushraja (2014), concludes that the librarians' dream is to adopt CC and provide services of the library and expertise on demand by user workflows and to the extent of library users' satisfaction. Majhi, Meher and Maharana (2015) researched consciousness and practice of CC adoption amongst librarians of 17 Indian University Libraries. The study presents findings that the librarians are fairly interested to apply CC in the functions and services of the library. The research further

reveals that some of the librarians expressed their concern over the insecurities of CC. Wasike (2015) is of the sight that the arrival of CC demand intensive data safety and security because data stored on remote servers need a high level of security and control.

Adamou and Ntoka (2017) explored the effects of digital technologies on libraries. Looking at the findings, the study deduces that the general perception of librarians towards digital material and E-resources and services is of satisfactory. The study by Usman (2018) evaluated librarians' satisfactoriness levels towards the use of CC in Kaduna State of Nigerian academic libraries' services. The study found that librarians convey concerns over lack of trust from cloud service, these include data integrity and ownership, data privacy and absence of legislation that guide and guard deployment of the cloud. Usman (2018) further explored librarians' general perceptions of CC in their libraries and reveals that most of the librarians are of the opinion that CC can solve many challenges experienced in the library during the era of technological advancement. Yatin et al. (2018) on the study of CC, things to consider by information professionals predict that CC can be the future of libraries and become the next podium for constructing innovation ecosystem for the development of educational, economic, health and social infrastructure.

## **2.8 Summary**

This chapter outlined the presentation of a literature review to establish the need for the study on CC. The literature covered a review of studies published in international and continental countries. Countries that contributed more of the literature include the United Kingdom, Nigeria, India, Saudi Arabia, and Zimbabwe; the literature review was directed by the subheadings emanating from the objectives underpinning the study. The following subheadings were discussed tools used by librarians, the level of librarians' knowledge and understanding of CC, factors that influence the use of CC. Perceptions of librarians towards CC. The next chapter will address research methodological aspects chosen for the study.

## **CHAPTER 3:**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

The previous chapter covered a literature review of the study. This chapter presents the research methodology that was adopted to guide this study and collect data. “The research methodology is the general approach the researcher uses to take to in carrying out the research project” (Leedy & Ormrod, 2015:26). Brynard, Hanekom, and Brynard (2014:30) refer to research methodology as “the strategies followed to conduct research”. To address research methodology, the researcher outlines and discusses how research paradigm, research approach, research design, population, sampling, data collection, data analysis, quality criteria and ethical consideration were followed during research.

#### **3.2 Research paradigm**

Paradigms play an essential role in research as it presents views of the researcher on how the study will be pursued to address the research problem. The term paradigm was originated and popularised by Thomas Kuhn, who designated paradigm as “accepted model for examining problems and finding solutions” (Kuhn, 1962:23). Thomas Kuhn described “paradigm as an essential collection of beliefs shared by scientists, a set of agreements about how problems are to be understood” (Kuhn, 1962:186-187). The paradigm defines “entire constellation of beliefs, values, techniques, and so on shared by members of a given community” (Creswell & Poth, 2018:35). Paradigm influence research methodology from a theoretical perspective in which the study is placed. Guba and Lincoln (1994), in (Denzin & Lincoln, 2018:164) identify philosophical assumptions as against philosophical frameworks. Philosophical assumptions comprise of ontology, epistemology, axiology, and methodology. Creswell and Poth, (2018:20) define ontology as “nature of reality and epistemology as the theory of knowledge and how knowledge claims are justified”. Axiology refers to the “philosophical study of values and relates to ethics and aesthetics” (O'Reilly & Kiyimba, 2015:19). The methodology involves strategies that researchers use to investigate the research problem (Creswell & Poth, 2018:21).

Quality criteria relate to the judgement regarding the match between the research methods and question, targeted population and measurement of outcomes (du Plooy-Cilliers et al. 2018:27).

In the study, the researcher applied philosophical assumptions to make claims about the reality of CC in libraries and investigate how Polokwane municipal librarians know that reality. Creswell (2014:35) affirms that “philosophical assumptions help the researcher to embrace the research methodology of the study”. The philosophical assumptions are therefore explained in juxtaposition with philosophical frameworks. Creswell and Poth (2018:16) explain that philosophical frameworks guide how philosophical assumptions are situated within and influential to the research process. The philosophical frameworks grounding the study include postpositivism and interpretivism. The figure 3.1 below shows how the researcher has applied philosophical assumptions in juxtaposition with philosophical frameworks.

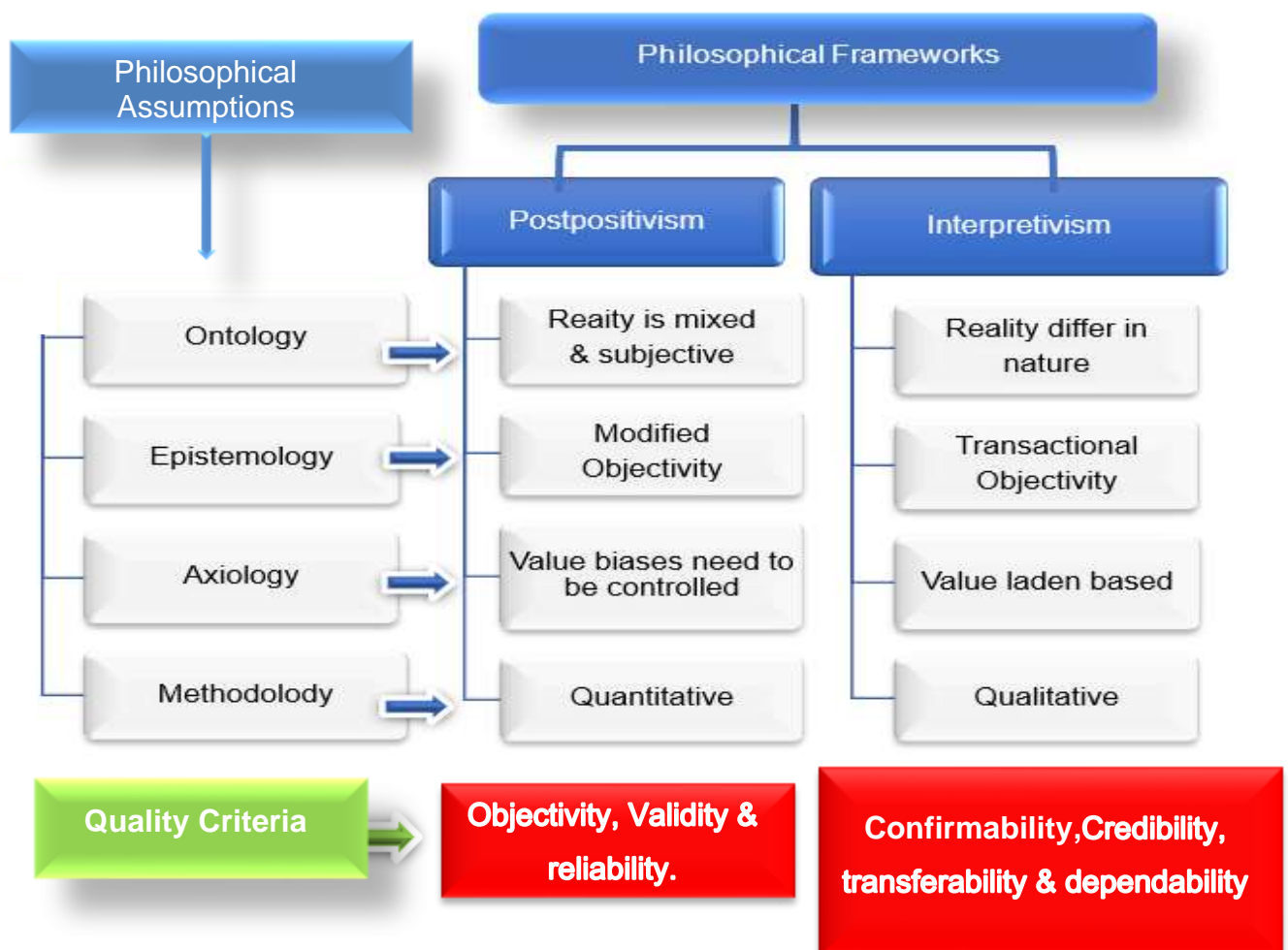


Figure 3.1: Philosophical Assumptions in juxtaposition with Philosophical Frameworks

### *3.2.1 Post-positivism*

Post-positivism strives for objectivity in their collection and interpretation of data through measuring certain variables, intending to understand the phenomena physically, socially and psychologically (Leedy & Ormrod, 2015:25). Post-positivism derived from positivism which refers to the approach of natural science and applied within natural science (Maree, 2017:56). It holds the “assumption that there is one truth about the world and that humanity, in general, can never come to know it entirely”. The researcher employed post-positivism from the ontological, epistemological and axiological position within quantitative research approach, to attempt to measure Polokwane municipal librarians’ experience, clarify and recognise their application and understanding of CC. Bertram and Christiansen (2017:23) elucidate those goals of post-positivist researchers “are to describe, explain, control and predict how natural and social world works”. From the ontological position, post-positivism stance argues that the objectivity and generalisability should still be in the core of research, as it is assumed that the “reality is only imperfectly and probabilistically apprehendable” Guba and Lincoln as cited in (Denzin & Lincoln (2018:168). From the epistemological position of post-positivism, researchers believe that knowledge is fallible but not equally fallible (Maree, 2017:59). From the axiological position, researcher value objective and value-free research expressing findings exactly without distortion (Creswell & Poth, 2018:34).

### *3.2.2 Interpretivism*

du Plooy-Cilliers et al. (2018:27) explain that “Interpretivism emerged as a reaction to the shortcomings and limitations of positivism”. The researcher applied interpretivism from the ontological, epistemological and axiological position within qualitative research approach, aimed to produce a descriptive analysis, emphasizing depth and an understanding of the social phenomenon that is interpretative (Bertram & Christiansen, 2017:26). This paradigm links with the concentration of the study, which was to explore experiences of Polokwane municipal librarians as they perceive CC in libraries. Maree (2017:60) supports that “interpretivism research philosophy believes in interpreting, learning and understanding human behaviour”. (du Plooy-Cilliers et al. 2018:34) affirm that “the reality is flowing and subjective while created by human

interaction". In that way, the interaction between researcher and respondents led to an understanding of social pheromone which was CC in Polokwane Municipal libraries.

### **3.3 Research approach**

This study employed a mixed-methods approach. Creswell (2014:226) describes "mixed methods as an approach that involves collecting both quantitative and qualitative data in response to a problem statement". The researcher used a quantitative approach to collect quantitative data which was relevant for describing CC application and understanding by Polokwane Municipal librarians and also used a qualitative approach to collect qualitative data for exploring CC application and understanding by Polokwane Municipal librarians. The study primarily collected quantitative data that was argued by qualitative data. This was because the researcher wanted to make a clear point of quantitative data. Leedy and Ormrod (2015:330) explain that "a researcher can fully address a research problem and its subproblem only by collecting, analysing, and interpreting both quantitative and qualitative data". The researcher employed mixed methods with intentions to deepen understanding of a research problem more completely. Maree (2017:313) explains that using mixed methods can be helpful to produce a deeper understanding of the study.

### **3.4 Research design**

Research design appears as the strategy to be followed by the researcher. Leedy and Ormrod (2015:92) state that "research design is a general strategy for solving the problem". Maree (2017:320) outline "types of advanced mixed methods design as experimental and social justice mixed methods design, mixed methods design case study, mixed methods design action research approach, and multistage evaluation design". The present study adopted a mixed-methods case study design. Bertram and Christiansen (2017:42) define case study "as a study in which the case in its context may be a person, group of people or organisation". In this study, the case is Polokwane Municipal libraries as an organisation. The researcher applied mixed-methods case study design to conduct a detailed description and exploration of the



application and understanding of CC in Polokwane Municipal libraries with the intention to produce quantitative descriptive information that will enhance the qualitative exploration of the case, to deeply draw an understanding of the situation (Maree, 2017:320). Bertram and Christiansen (2017:42) support that “case study may use a combination of qualitative and quantitative data”.

### 3.5 Area of the study

Area of the study focuses on the place where the study was carried out. The study was conducted at Polokwane Municipal libraries which comprise eight branches located in rural, semi-urban and urban areas. Ga-Molepo, Moletji, and Ga-Matlala libraries are located in the rural areas whereas Nivana, Westernburg, Seshego, Mankweng and Polokwane City are located in the semi-urban and urban areas of Capricorn District. All these places are based at the Limpopo Province of South Africa. Figure 3.2 below, depicts a topographic map of libraries where the study was conducted. These places include Polokwane City, Seshego, Makweng and Ga-Molepo, other places are not visible in the figure. These libraries are supported by the Department of Sports, Arts and Culture (DSAC) through the conditional grant. Public and community libraries conditional grant fund building, refurbishment and upgrading of libraries, and establish ICT connectivity in libraries to enable South Africans to gain access to information services that will improve their socio-economic conditions (National Library of South Africa, 2016).



This image is extracted from Google maps (2019)

**Figure 3.2: Map for the area of the study**

### **3.6 Population**

The subjects of the study are the targeted population of interests to help the researcher collect data in pursuing the study. Gray (2014:688) represents a “population as the totality of people, organisations or objects from which a focus and sample of the study are drawn”. This involves any group of individuals that has attributes which are of interests to the researcher. Therefore, the population of the study comprised of librarians and library managers at Polokwane Municipal libraries. Librarians were the relevant respondents of the study considering expertise in a wealth of experiences and responsibilities in the field, to ensure effective use of ICT for provision of successful library services. Library managers were apposite participants looking at their roles to assign duties and keep an eye on librarians. This means that the population of the study had suitable and knowledgeable respondents and participants to address the research problem.

### **3.7 Sampling**

A sample allows the researcher to select a population in a situation where the researcher does not want to study the entire population of interest. A sample defines a subset of a population that is considered to be representative of the population (du Plooy-Cilliers, Davis & Bezuidenhout, 2018:135). According to Manaka (2019), Polokwane Municipal libraries have 41 librarians including library managers. Hence, the population of the study was relatively small the study was a census in nature. Leedy and Ormrod (2015:151) explain that there is no point in sampling a population that is less than 100. The entire population of interests in the area of study as part of data collection in the study. The researcher collected data online and telephonically.

### **3.8 Data collection**

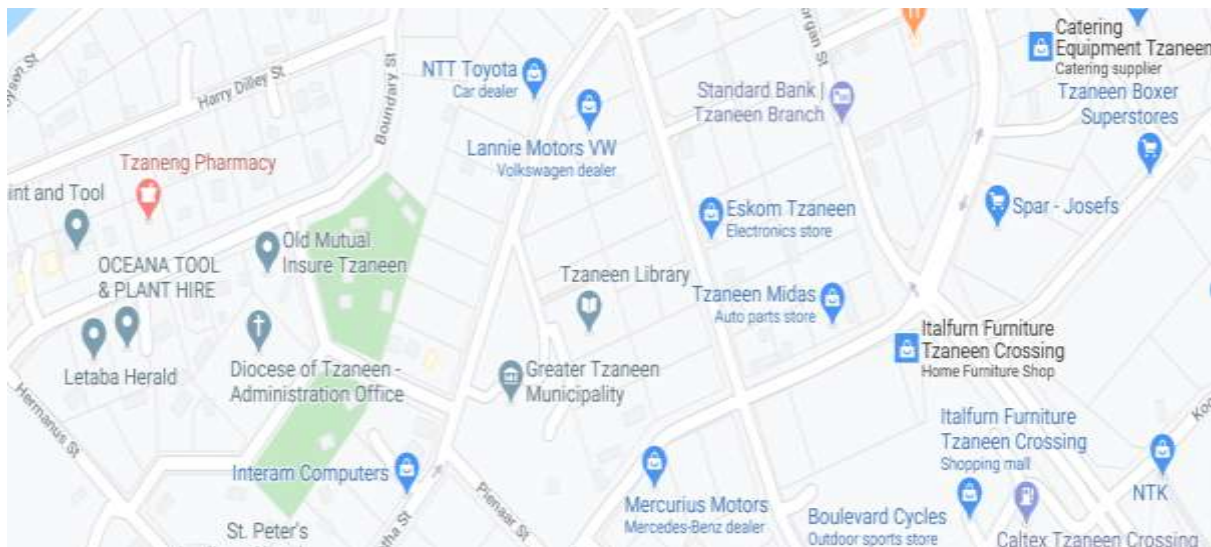
Data collection tools assisted the researcher to collect data from the population of interests to achieve the purpose of the study. Leedy and Ormrod (2015:161) explain that researchers often collect data through data collection techniques which include systematic observation, interviews or questionnaires. This study used the questionnaire within the quantitative approach, and interviews within the qualitative approach. “A questionnaire is a list of questions to be answered by the respondents”

(Bertram & Christiansen, 2017:73). The researcher was supposed to personally administrate the self-managed questionnaire to the librarians and collect completed questionnaires at a later stage. Due to the lockdown restrictions imposed by Government because of COVID 19 pandemic, the researcher collected data through the use of Google Form. Respondents were sent the link to complete a questionnaire that was designed and converted into Google form. Interviews can be defined as an interaction based on a conversation between the researcher and the participants, whereby knowledge is constructed (Brinkmann & Kvale, 2015:4). The researcher used unstructured interviews to engage the library managers for collecting qualitative data about their knowledge and opinions regarding CC application and understanding by Polokwane Municipal librarians. Interviews were conducted telephonically due to lockdown restrictions imposed by Government because of the COVID 19 pandemic.

### **3.9 Pilot Study**

The pilot study offers alleviation approach to minimise chances of failure in a research study. Doody and Doody (2015:1076) explain that a “pilot study is often performed to test the feasibility of techniques, methods, questionnaires, and interviews and how they function together in a particular context, and it can also reveal ethical and practical issues that could hamper the main study”. The researcher pre-tested two data collection methods namely questionnaires and interviews for data collection at the Greater Tzaneen library. Figure 3.3 illustrates a map of Greater Tzaneen library. Three librarians completed questionnaires’ whereas one senior librarian participated in interviews. These instruments were pre-tested to determine the time limits and clarity of instructions and identify unclear questions and terminologies. The pre-testing was done to warrant the validity and reliability of instruments. Outcomes of the pilot study presented that instructions and all questions on both instruments were clear and not confusing. However, there was only one duplication of terminology on question 2.2 of the questionnaire, and the given time limit of five (5) minutes per session of interviews was much too short for participants to comfortably and correctly answer asked questions. The following adaptations concerning the outcomes of the pilot study were corrected and applied to the target population of the study. Duplication of terminology was deleted, and the time limit per session was increased

from five (5) minutes to ten (10) minutes to accommodate participants during interviews.



This image is extracted from Google maps (2020)

**Figure 3.3: Map for the area of pilot Study**

### **3.10 Data analysis**

Data collected to address the purpose of the study needs to be analysed for exist outcomes of the study. Pagadala (2017:19) defines data analysis as an “element that relates to what is done with the information collected from the research process to make sense out of it”. In the study, descriptive statistics and thematic analysis were used. Descriptive analysis was employed to analyse and obtain percentages and frequency of quantitative data obtained through the questionnaire. The researcher used IBM Statistical Package for Social Sciences (SPSS) version 22 to sort, scrutinise, calculate and organise quantitative data which was transformed into visual overviews, such as pie charts and bar charts for easier understanding and complement the descriptive statistics and results that were obtained. Thematic analysis was used to analyse qualitative data collected through the interviews. O'Reilly and Kiyimba (2015:75) define “thematic analysis as a methodology used to identify, analyse and report data into patterns within a data set”.

The thematic analysis includes five steps. Firstly, it involves the organisation of data. Secondly, a preliminary read-through of the raw data obtained. Thirdly, is the coding and organisation of themes. Fourthly, representation of data. Lastly, it involves the formation of interpretation of data (Creswell & Poth, 2018:199). Thematic analysis was applied to create and organise data, using categorical aggregation to establish themes for the descriptive organisation of data in a way that facilitates interpretation of various aspects of the research topic, in terms of measuring the perceptions of librarians towards CC (Creswell & Poth, 2018:206). Thematic analysis was adopted and used with the assistance NVivo qualitative data analysis software. Woolf and Silver (2017:23) define NVivo as essentially a program for managing and organising concepts. This NVivo was used to classify, sort and arrange information, examine relationships in the data, and combine analysis, shaping, and searching themes. The software helped the researcher to better interpret, understand and explain response from participants in the meaningful and symbolic content of qualitative data.

### **3.11 Quality criteria**

The quality criteria assisted the researcher to ensure the quality of measurement instruments of the study in line with the research problem and subjects. Creswell (2016:251-252) explains quality criteria as “internal quality standards used as procedures during data collection analysis, and external quality standards serving as strategies ensuring the quality of research”. Hence study adopted a mixed-methods approach, the researcher addressed quality aspects of both quantitative and qualitative research approaches. For the quantitative approach, the researcher addressed validity, reliability and objectivity. For the qualitative approach, the researcher addressed credibility, transferability, dependability and conformability. Figure 3.1 on philosophical assumptions in juxtaposition with philosophical frameworks, illustrate with the quality criteria of the study. These philosophical assumptions as against philosophical frameworks enabled the researcher to determine the quality criteria of the study.

### *3.11.1 Validity*

The study must be valid to produce meaningful and credible results. Leedy and Ormrod (2015:114) assert that validity refers to “the potential of an instrument to achieve what it is supposed to measure”. In this regard, the researcher made use of a questionnaire to collect data from the sampled population and ensured that the questions asked in the questionnaire were correct, appropriate and linked with research objectives. To guarantee that the questionnaire was correct, a pilot study was conducted to identify possible errors and errors identified were modified in line with feedback and information achieved from the pilot study (du Plooy-Cilliers et al. 2018:257).

### *3.11.2 Reliability*

The measurement of instruments needs to be consistent to produce a reliable study. Reliability refers to the standardisation of the measuring tools. Therefore, the researcher conducted a pilot study at the Greater Tzaneen library to pre-test the questionnaire and check if it is used at different times to different respondents, it would yield the same data (Anney, 2014:276). The level of reliability was tested using Cronbach’s alpha test. The formula of Cronbach’s alpha test was used through excel to calculate cronbach with intentions to measure the internal consistency of the questionnaire used in pilot study and to collect data of the study at Polokwane municipal. The Cronbach from both questionnaires’ results did not have internal inconsistencies as their level of reliability was acceptable.

### *3.11.3 Objectivity*

The findings of the study reflect reality, thereby objectivity within the study needs to be maintained to produce empirical findings. Objectivity involves a focus on reliable data collection, error-free capturing and editing including unbiased information (Mouton, 2014:13). To achieve objectivity, the researcher ensured that data from the respondents were carefully captured and not manipulated for the study to be balanced, honest and open for public judgement.

#### *3.11.4 Credibility*

The measurement instruments helped to collect data that addressed the purpose of the study and that was well constructed in line with objectives of the study to produce credible findings. Creswell and Poth (2018:258) refer to credibility as an accurate interpretation of the participants' meaning. This is equivalent to what a quantitative researcher would think of as validity. In the study, the researcher established the rigour of the inquiry by adopting credibility strategies, which include having peer review and frequent debriefing sessions between the supervisors and researcher. The researcher was also collaborative and calling the participants to establish a comprehensive understanding of the study (du Plooy-Cilliers et al. 2018:258).

#### *3.11.5 Transferability*

The findings of the data collected should be useful through transferability. Maree (2017:123) refers to transferability as "the extent to which the findings of the study can be replicated in a different setting". In the study, the researcher provided necessary documentation such as research document report to make the research to be transferable and contribute to the body of knowledge.

#### *3.11.6 Dependability*

Dependability enables the findings of the study to give confidence in their evidence "Dependability involves participants evaluating the findings, interpretation and recommendations of the study to ensure that they are all supported by the data received from the informants of the study" (Creswell & Poth, 2018:256). In the study, the researcher pre-tested the data collection tools at the Greater Tzaneen library to ensure feasibility before the final administration of data collection.

#### *3.11.7 Confirmability*

Confirmability is undertaken to maintain the true findings of the study. Maree (2017:125) "says confirmability is the extent to which biases participants are not influenced by any other consideration". In the study, the researcher employed the audit trail through which the research documents were read and reviewed by an

external examiner. This was adopted to confirm if the research aspects were well addressed as indicated in the University of Limpopo research proposal guideline.

### **3.12 Ethical considerations**

Ethical consideration relates to systematised ways of considering what is right and wrong when conducting research (Brynard, Hanekom, & Brynard, 2014:94). As pointed out by Maree (2017:47), the researcher considered ethical aspects which include “permission to conduct the study, informed consent form, anonymity and confidentiality, and avoidance of plagiarism”.

#### *3.12.1 Permission to conduct the study*

Walton (2016:1) explains that “research ethics is specifically interested in the analysis of ethical issues that are raised when people are involved as participants in research”. As observed by Mligo (2016:334), The researcher employed several strategies to comply with ethical aspects of research. Firstly, the University of Limpopo Ethics Policy was complied with, and permission to pursue the study was obtained from the University of Limpopo Turfloop Research Ethics Committee (See Appendix A for Ethical Clearance Certificate). Also, permission to conduct the study was sought and granted by Polokwane Municipal libraries (See Appendix B for request letter of permission to conduct the study).

#### *3.12.2 Informed consent*

In data collection, both researcher and research subjects had to have an agreement which is reached with the aid of consent form. According to Pickard (2013:74), informed consent is “part of an agreement between the researcher and the participant that creates a mutual understanding that remains constant throughout the research”. A form of informed consent was read to the participants during phone calls for the interviews and also attached on the questionnaire to inform respondents about the nature of the study and their rights, including the right to consent as well as the right to withdraw participation at any point of the study. The participants were requested to listen when reading the letter, and respondents were requested to read the letter, agree



with the letter if they were or not willing to participate in the study. Contact details were provided for any inquiries at a later stage.

### *3.12.3 Anonymity*

Names of the participants and respondents taking part in the study are very sensitive, thereby researcher needs to maintain anonymity. du Plooy-Cilliers et al. (2018:267) state that when “anonymity is promised, the names of participants will not be recorded at any stage of the research process”. To maintain anonymity, participants were not asked to give their names when conducting interviews. The researcher did not also ask respondents to mention their names or that of their organisation when answering the questionnaire.

### *3.12.4 Confidentiality*

Data collected in pursuing a study was safeguarded through maintaining respondents' confidentiality. du Plooy-Cilliers et al. (2018:267) explain that “confidentiality is assured through making sure that information obtained from participants will be known only to the researcher and made available to no one else”. To maintain confidentiality in the study, the researcher restricted access to raw data obtained from participants and respondents only to authorised people, such as the researcher, supervisors and statistician.

### *3.12.5 Plagiarism*

The study gave birth to the new concepts and ideas, and ideas that were taken from other sources were acknowledged to avoid plagiarism. Brynard et al. (2014:96) define plagiarism as an act of cheating whereby one presents and expresses someone's work that was previously published as his or her work. To avoid plagiarism in the study, the researcher cited sources and paraphrased information obtained from the referenced sources. The researcher also used the Turnitin software to detect any form of plagiarism in the research proposal.

### **3.13 Summary**

In this chapter, the researcher outlined, described and discussed the research approach and procedures that were adopted to address the research methodology of the study. The researcher employed mixed methods within a case study design. Data were collected using questionnaires designed on Google forms, and interviews conducted telephonically from subjects of Polokwane Municipal libraries. Descriptive statistics and thematic analysis were employed to analyse the data. The next chapter presents data analysis and presentation of the findings.

## **CHAPTER 4:**

### **DATA ANALYSIS AND DISCUSSION OF THE FINDINGS**

#### **4.1 Introduction**

The previous chapter discussed the research methodology giving the direction of how the study was conducted. This chapter presents the data analysis and discussion of the findings of the study obtained from the questionnaire and interview. Google form link of the questionnaire was sent to the assistant librarians, junior librarians and senior librarians. Interviews were conducted with library managers telephonically. Quantitative data were analysed using SPSS version 22 and the results are presented in the form of text, figures, and tables. Qualitative data were analysed using NVivo qualitative data analysis software and results are presented as themes as indicated in table 5. Findings are presented and discussed following the objectives of the study which were discussed as subheadings of the literature review. These subheadings include CC tools used by librarians, factors influencing the use of CC, librarians' knowledge and understanding of CC, perceptions of librarians towards CC.

#### **4.2 Response rate**

The response rate of the study which is a potential difference between respondents and non-respondents including participants and non-participants is estimated through dividing the total number of respondents and participants by the sample size of the study. Leedy and Ormrod (2015:187) explain that the response rate of 70% is quite high because more often the return rate in a study is 50%. The response rate of the study from the questionnaires and unstructured interviews were reasonably acceptable. This was achieved by way of strong follow up to the respondents and participants. The sample size of the study was 41 librarians including 2 library managers. Due to the restrictions imposed by lockdown as a result of COVID 19 pandemic, 39 librarians were sent Google form link of the questionnaire, whereas 2 library managers were interviewed telephonically. Out of 39 librarians who were sent link only 28 submitted back questionnaires and 10 did not return the questionnaires. 28 respondents and 2 participants make a response rate of 73% which appears to be

very good. Maxfield and Babbie (2018:245) confirm that a return rate of 70% is very good.

**Table 4.1: Summary of the response rate**

<b>Data Collection Tool</b>	<b>Expected Response</b>	<b>Actual Response</b>	<b>Percentage</b>
<b>Questionnaires</b>	39	28	72%
<b>Interviews</b>	2	2	100%
<b>Total</b>	41	30	73%

### ***4.3 Results from questionnaire data collection tool.***

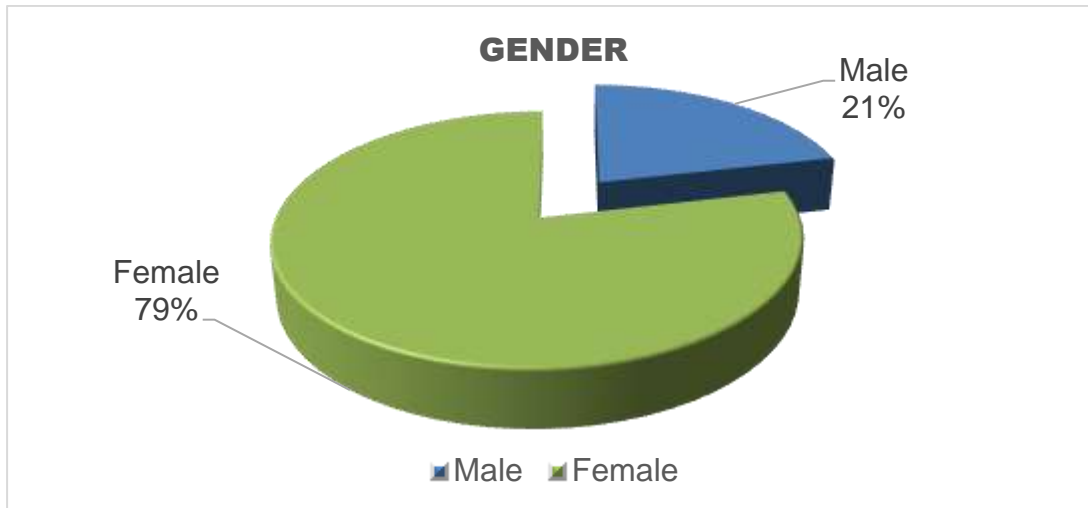
This section presents data analysis and discussion of the findings obtained from questionnaires completed by librarians through Google Form. Results were analysed using descriptive analysis, and the researcher used IBM Statistical Package for Social Sciences (SPSS) version 22 to sort, calculate and organise quantitative data which was transformed into charts and displayed following objectives of the study.

#### *4.3.1 Demographic information*

The researcher obtained demographic information of the respondents to support the findings in the objectives of the study.

##### *4.3.1.1 Gender*

Respondents were asked to indicate their gender. Out of 28 librarians who completed the questionnaire, 6 (21%) were male, whereas 22 (79%) were female. Figure 4.1 below presents the findings.

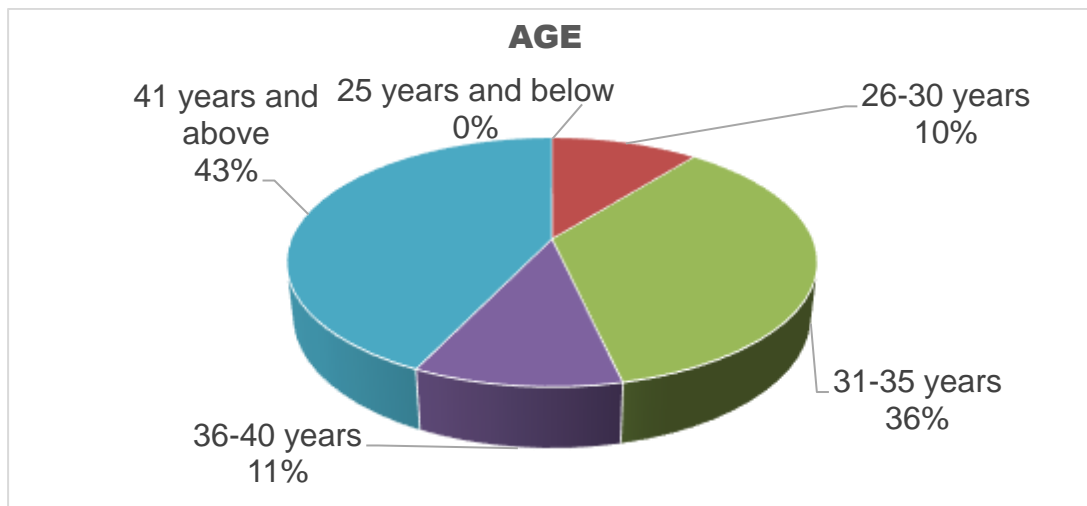


**Figure 4.1: Gender N 28**

Findings of the study present that Polokwane Municipal libraries have 22 (79%), female librarians, as opposed to 6 (21%) males. This indicates that more females are working at Polokwane Municipal libraries than males. Venkatesh and Davis (2000) explain that gender can also drive an individual to adopt technology in a workplace. Contrarily, Omotunde and Omotunde (2017) found that there is no significant influence of gender on effort expectancy, performance expectancy and social influence of administrative staffs towards the adoption of CC.

#### 4.3.1.3 Age

Respondents were asked to indicate their age category. Majority 12 (43%) of the respondents are between the age of 41 years and above, 10 (36%) between 31 to 35 years, 3 (11%) between 26 to 30 years, 3 (11%) between 36 to 40 years, and 0 (0%) between 25 years and below. Figure 4.2 below depicts the findings.

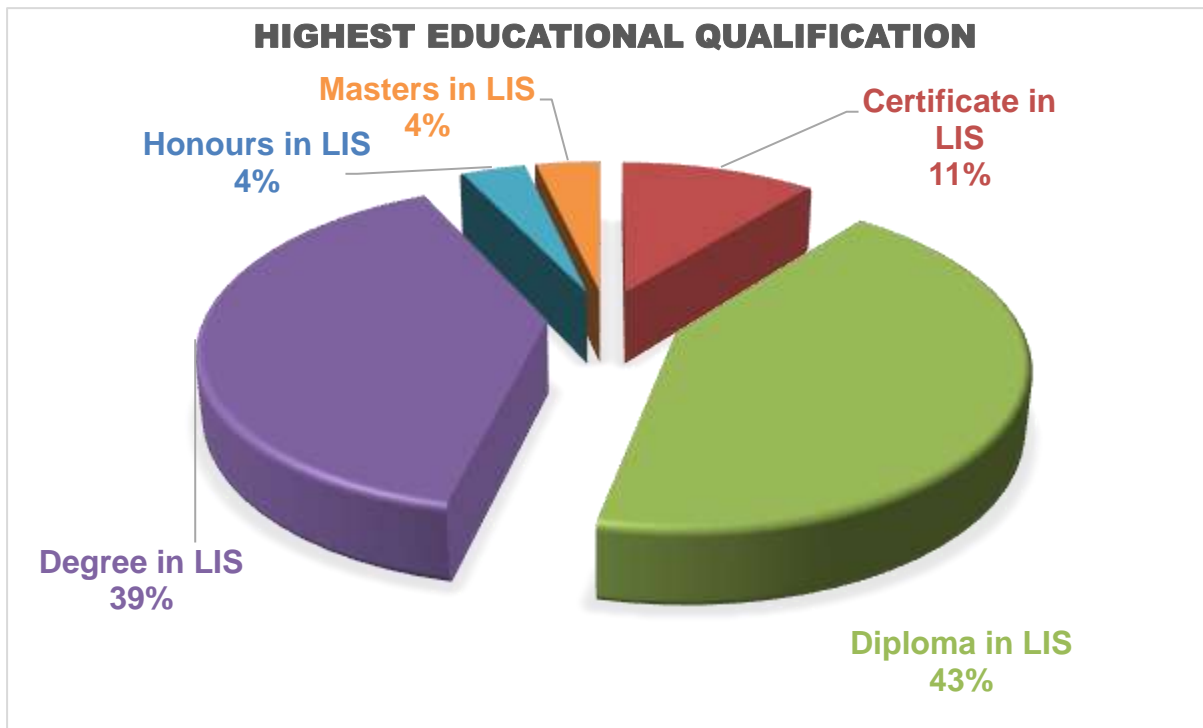


**Figure 4.2: Age of the respondents N 28**

Figure 4.2 above shows that the majority of librarians in Polokwane Municipal Libraries, are in the age of 41 years and above, 10 (36%). National Youth Commission Act (1996) defines young people as those falling within the age group of 14 to 35 years, thereby it can be concluded that majority of librarians at Polokwane Municipal Libraries are no longer classified as youth. UTAUT outlines that the predictive effect of performance expectancy towards system is mediated by age (Venkatesh et al. (2003: 448). Vaportzis, Giatsi Clausen, and Gow (2017) found that older adults lack knowledge, confidence and feeling of inadequacy as compared to younger generation. This deduce that librarians at Polokwane Municipal Libraries are likely to have negative effect of performance expectance towards CC, because older individuals may refuse to try new technologies while younger individuals are more open to trying them out (Kropf, 2018:73).

#### *4.3.1.4 Highest educational qualification*

Respondents were requested to specify their highest educational qualification. Figure 4.3 below presents findings that 3 (11%) of respondents have a certificate in LIS, 12 (43%) have a diploma in LIS, 11 (39%) have a degree in LIS, 1 (4%) have honoured in LIS, 1 (4%) masters in LIS.

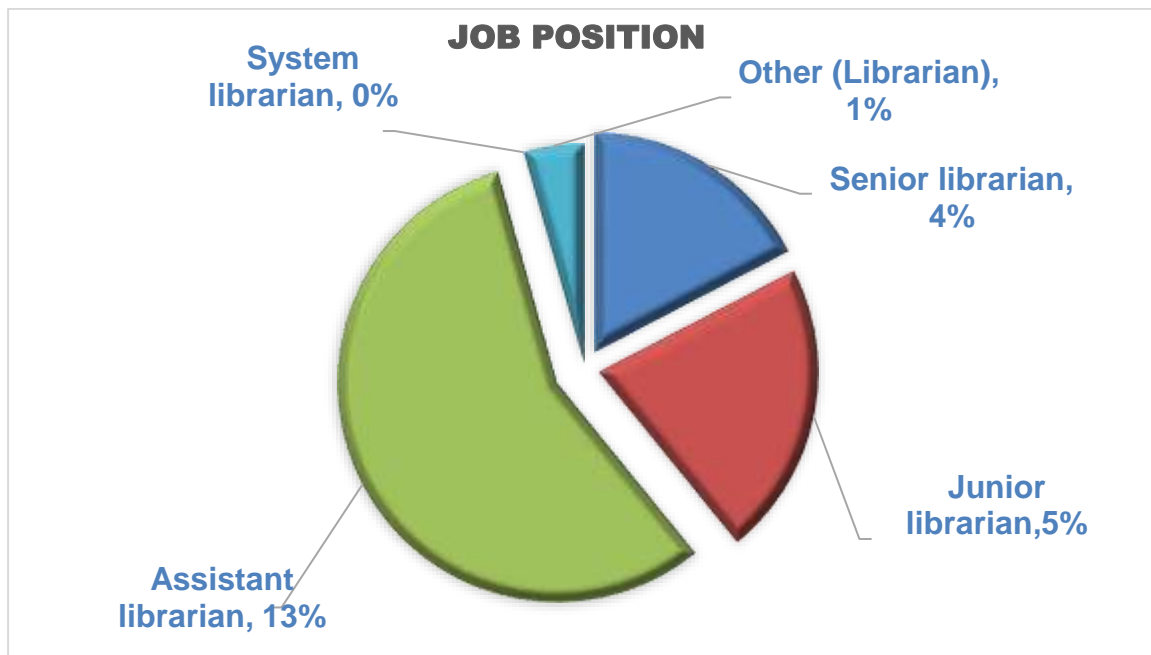


**Figure 4.3: Highest educational qualification N 28**

Findings in Figure 4.3 shows that the majority of librarians 12 (43%) are employed at Polokwane Municipal Libraries with more having a diploma in LIS as the highest qualification. Fewer librarians 11 (39%) have a first degree, followed by one respondent with a master’s degree. These librarians with a diploma in LIS are likely to be having less required knowledge on CC. Dhanushraja and Dhanushraja (2014) support that libraries are busy shifting into cloud-based services but run short of library professionals with skills and knowledge.

#### *4.3.1.5 Job Position*

The researcher asked the respondents to specify their job position. Out of 28 respondents who completed questionnaire, 4 (17%) senior librarians, 5 (22%) junior librarians, 13 (57%) assistant librarians, 0 (0%) and 1 (4%) librarian. figure 4.5 below illustrates the findings.



**Figure 4.5: CC applications known by librarians N 28**

Polokwane Municipal libraries have employed more assistant librarians 13 (57%) to provide library services. This tells that these libraries are populated by assistant librarians than senior and system librarian and putting Polokwane Municipal libraries at risks of not operating in the cloud due to short of system librarians. Obuh (2019) alerts that ICT has changed the roles of librarians and resulting in a need for system librarians to manage the computer-based library systems.

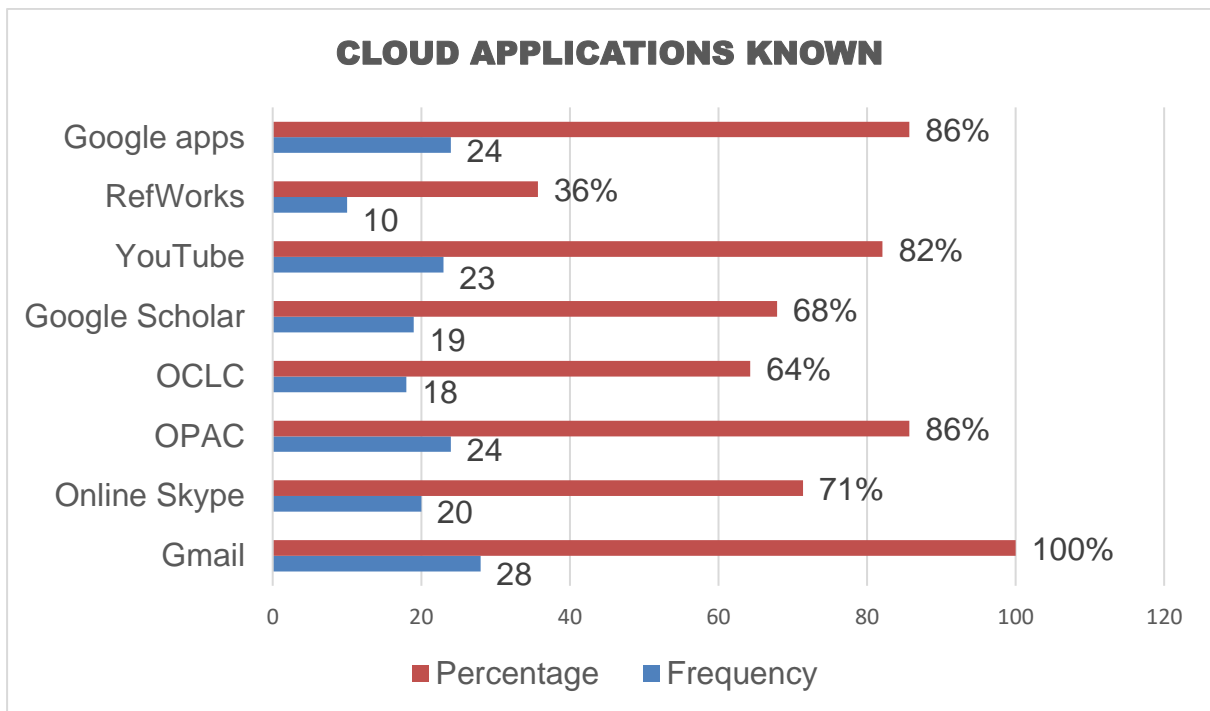
#### 4.3.2 Cloud computing tools used in libraries

The study perused to identify CC tools used by libraries. The findings are presented below.

##### \* Cloud applications known by librarians

The study sought to find out if librarians know some of CC application. The figure 4.6 below shows the findings that 28 (100%) of respondents know Gmail, 20 (71%) know Online Skype, 24 (86%) OPAC, 18 (64%) OCLC, 19 (68%) know Google Scholar, 23 (82%) YouTube, 10 (36%) RefWorks, and 24 (86%) Google apps.



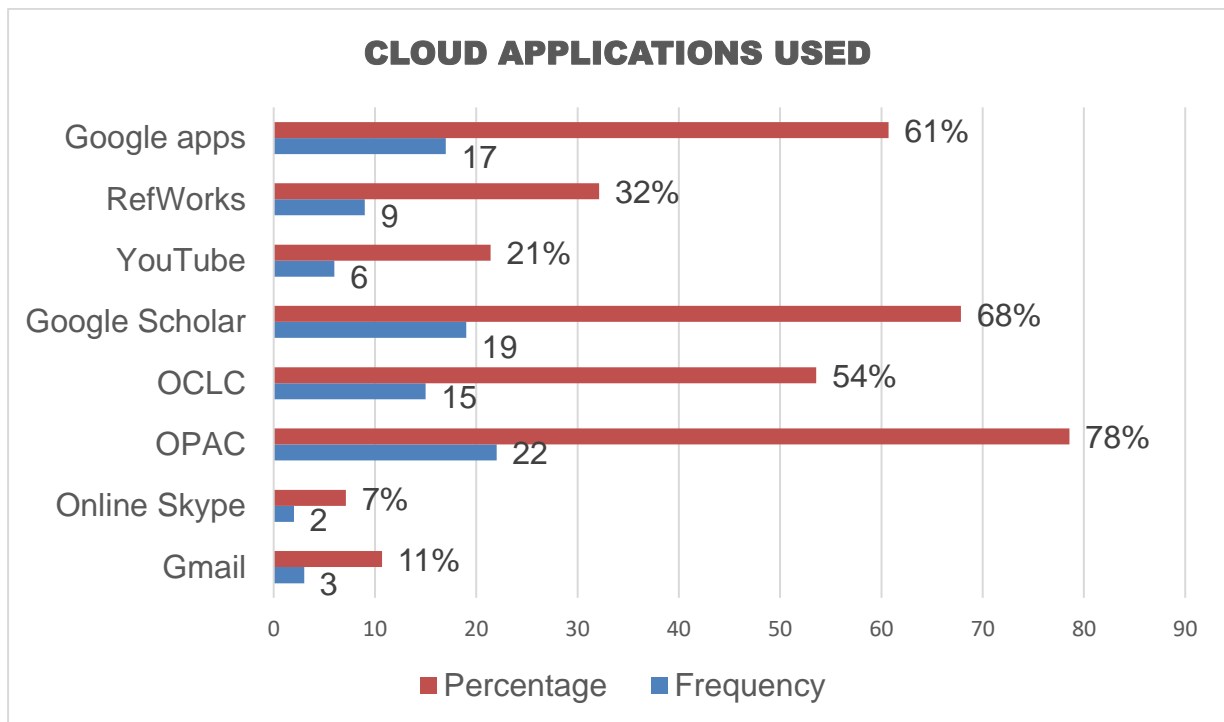


**Figure 4.6: CC applications known by librarians N 28**

Findings of the study reveal that librarians at Polokwane Municipal libraries were familiar to CC applications which include Gmail, Online Skype, OPAC, OCLC, Google Scholar, RefWorks, Google apps. This draw conclusion that librarians apply CC application either for personal and organisational reasons. Sudhier and Seena (2018) acknowledge that Google Apps like Gmail and Google forms are the CC tools used by librarians.

*\* Cloud applications used by librarians*

The researcher pursued to establish some of the CC applications used by the respondent for library service. The figure 4.7 below shows that 3 (11%) of respondents use Gmail, 2 (7%) Online Skype, 22 (78%) OPAC, 15 (54%) OCLC, 19 (68%) Google Scholar, 6 (21%) YouTube, 9 (32%) use RefWorks, and 17 (61%) use Google apps.

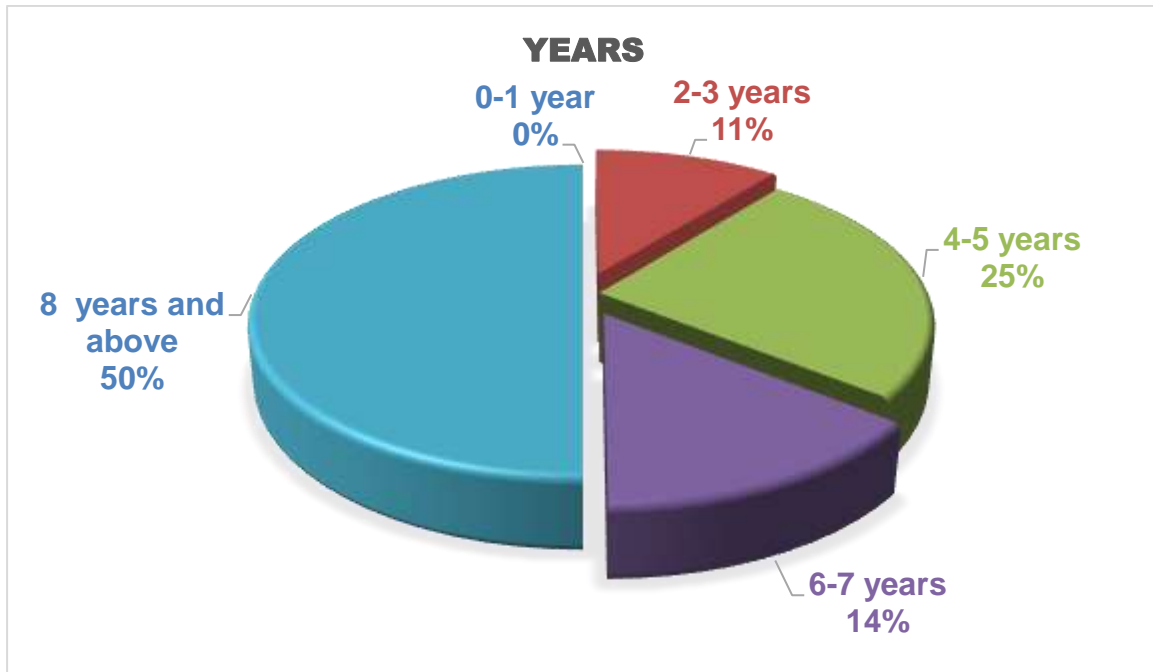


**Figure 4.7: CC applications used by librarians for library service N 28**

The study discloses that CC applications used by librarians in Polokwane Municipal libraries for library service include OPAC, OCLC and Google Scholar. In support of this, the study by Yuvaraj (2013) explored the librarians' curiosity in CC adoption in libraries of Indian Central Universities, with the intention to identify applications and services of CC used for services in libraries. Findings discovered that librarians heavily rely on CC tools and the majority of librarians are using various CC PaaS tools such as google applications to improve the quality of library services.

*\* Librarians' years of using CC applications*

The researcher wanted to know how long librarians have been using CC applications in providing library services. Findings in figure 4.8 below show that most 14 (50%) of the respondents indicated that they have 8 years and above, 7 (25%) have 4 to 5 years, 4 (14%) have 6 to 7 years, 3 (11%) have 2 to 3 years, and 0 (0%) have 0 to 1 years.



**Figure 4.8: Librarians' years of using CC applications N 28**

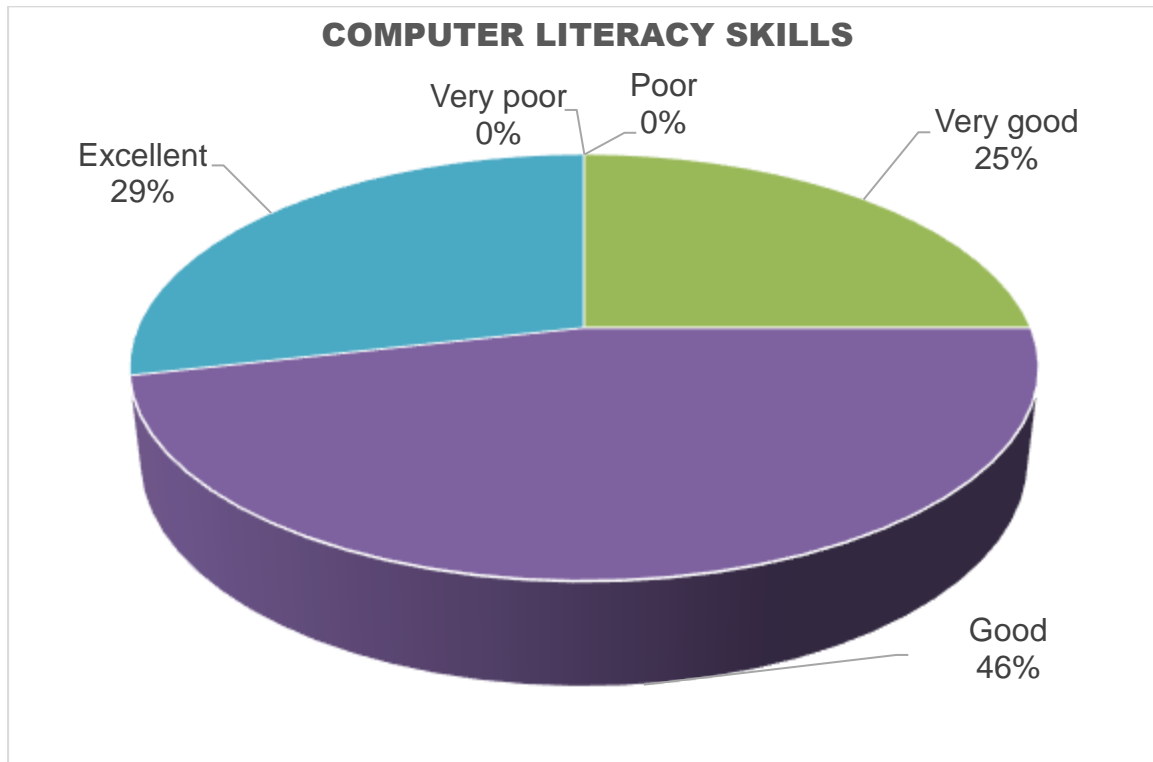
The findings of the study convey that librarians at Polokwane Municipal libraries have 8 years and above using CC applications that were listed in a questionnaire. Despite female domination at Polokwane municipal libraries, the findings reveals that these librarians have been using CC applications without noticing that they are on CC. The finding is in line with finding of Omotunde and Omotunde (2017), who found that there is no significant influence of gender on effort expectancy, performance expectancy and social influence of administrative staffs towards the adoption of CC. Additionally, this finding is supported by Wada (2018:20) who states that “many people hardly notice that CC is part of their daily activities until people are engaged in carrying out their transactions in the cloud such as emailing”.

#### *4.3.3 The level of librarians' knowledge and understanding of cloud computing*

The researcher presents the findings below intended to measure the level of librarians' knowledge & understanding of cloud computing.

\* *Computer literacy skills*

Respondents were requested to rate their computer literacy skills. 13 (46%) of respondents rated good, 8 (29%) rated excellent, 7 (25%) rated very good, 0 (0%) rated poor, and 0 (0%) rated very poorly. The figure 4.9 below illustrates the findings.

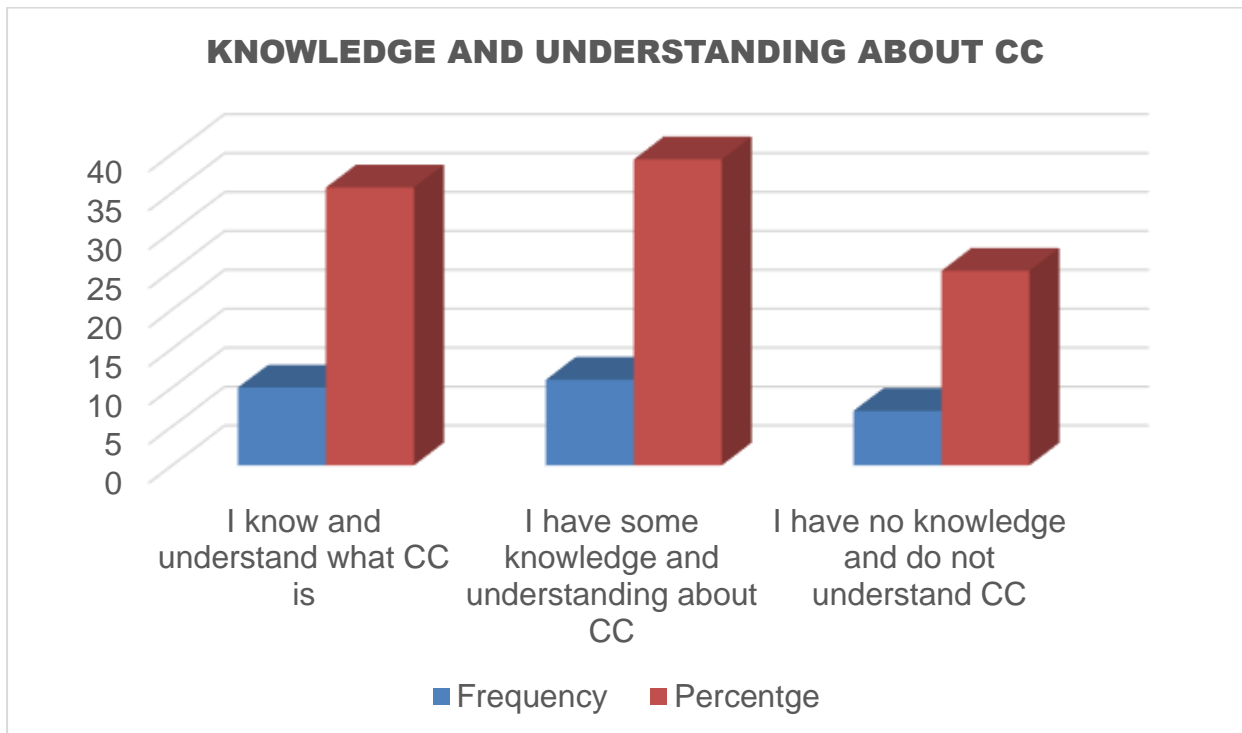


**Figure 4.9: Librarians' computer literacy skills N 28**

Wada (2015) measured library professionals responsibilities in managing a digitised library in a CC environment and identifies that knowledge for computer software and hardware as the one required to facilitate the application of CC in Libraries. Findings of the study show that the majority 13 (46%) of the librarians have good computer literacy skills followed by 8 (29%) librarians who have excellent skills. In line with Wada (2015) statement mentioned above, it can be deduced that computer literacy skills of librarians who majority are in the age of 41 years and above at Polokwane Municipal libraries can allow them to handle computer hardware and software.

*\* Librarians' knowledge and understanding of CC*

The study sought to determine librarians' level of knowledge and understanding about CC. The figure 4.10 presents that 11 (39%) indicated to be having some knowledge and understanding about CC, 10 (36%) indicated to be knowing and understanding what CC is, and 7 (25%) indicated to be not know and do not understand CC.



**Figure 4.10: Librarians' level of knowledge and understanding about CC N 28**

The study presents findings that librarians at Polokwane municipal libraries have some knowledge and understanding about CC. This shows that these librarians lack detailed knowledge and holistic understanding of CC. This can be due to the majority of these librarians having a diploma in LIS, old age employees and occupied assistant positions. Dhaka (2017) published a paper on the use of CC in libraries concerning its concepts, types and general applications. The paper concludes that library staff needs to be fully aware and understand that CC does have the potential of improving library services and workflows. However, librarians at Polokwane municipal libraries have less knowledge about CC. This finding suggests that performance expectance mediated by age, negatively influence adoption of CC.

#### 4.3.4 Factors influencing use of cloud computing

The study wanted to determine the factors influencing the use of CC in libraries. Findings on factors influencing the use of CC are therefore presented below.

##### *\* Librarians' satisfaction with the use of CC*

The researcher wanted to establish the extent to which librarians are satisfied with the use of CC. Out of 28 respondents, 17 (61%) indicated to be satisfied to a great extent, 8 (29%) somewhat, and 3 (11%) very little. The figure 4.11 below shows the findings.

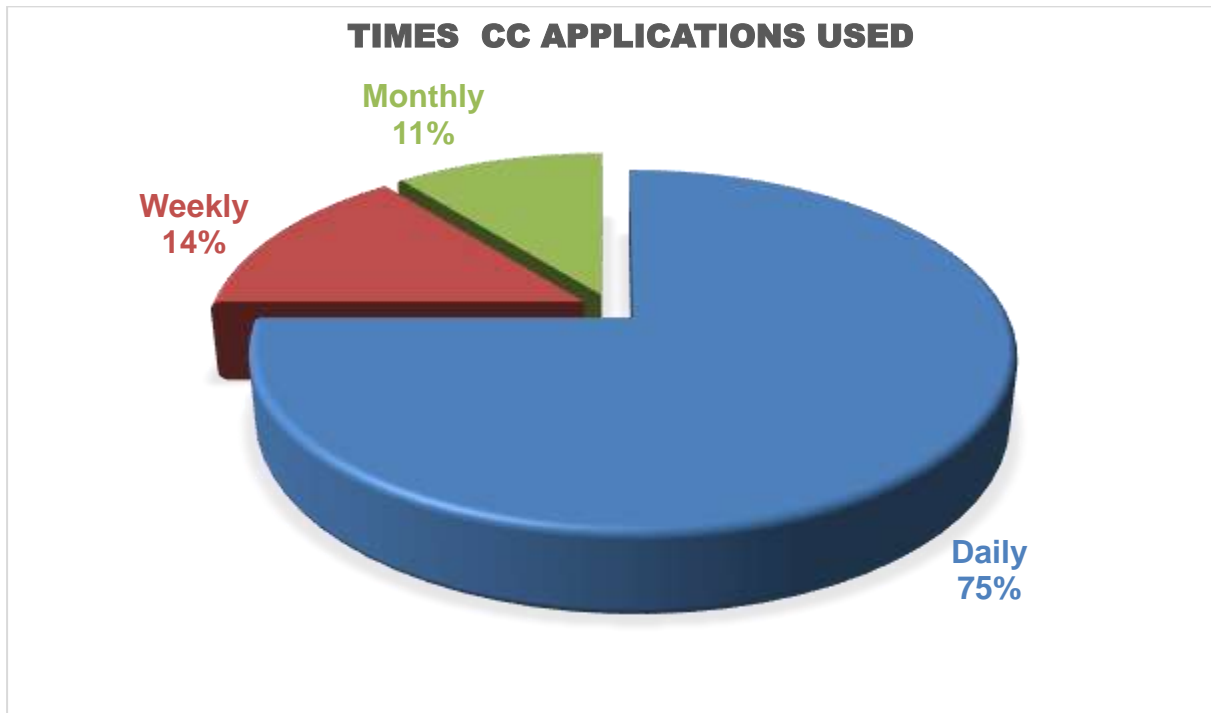


**Figure 4.11: Librarians' satisfaction with the use of CC N 28**

Adegbilero-Iwari and Hamzat (2017) reviewed channels of the library to CC acceptance in Nigerian libraries studying the use of CC and how libraries adopt CC. The reviewers conclude that the latest library services platform that is too satisfactory and convenient for use, is a certain route to wider adoption of CC. In the study, it was discovered that the majority of librarians at Polokwane Municipal libraries are satisfied with the CC applications and services, and this led to the use of CC within the library.

*\* Librarians use CC applications and services*

Respondents were asked to specify how often they use CC applications. 21 (75%) of respondents indicated that they use CC applications daily, 4 (14%) weekly, 3 (10%) monthly. The figure 4.12 below shows the findings.



**Figure 4.12: Times librarian use CC applications N 28**

These findings present that librarians at Polokwane Municipal libraries use CC applications daily when providing library services. These findings are supported by Konganurmah and Shekar (2014:298), who note that libraries commonly apply SaaS services for daily routine work. SaaS services include google calendar for scheduling meetings. These findings draw light that either the library has fully adopted or not yet on CC, librarians are carrying out some of the library transactions of CC. Even though librarians at Polokwane Municipal libraries have less knowledge about CC they still use CC, showing behavioural intentions for effort expectance. Mitzner et al (2016:2) intentions can still positively impact actual use in absence of experience with new technology. The finding conveys that effort expectation positively influence application of CC.

*\* CC purposes in the library*

The researcher requested respondents to indicate the state of agreements on the purposes they have used CC applications for. Table 4.2 below presents that out of 28 respondents, 1(4%) strongly agreed, 5 (18%) agreed, 4 (14%) were undecided, 10 (36%) disagreed, 8(29%) strongly disagreed that they use CC applications to host and share videos for library orientations or another video content. 3 (11%) strongly agreed, 2 (7%) agreed, 6 (21%) were undecided, 11 (39%) disagreed, 6 (21%) strongly disagreed that CC applications faster community participation in library awareness services campaign. 3 (11%) strongly agreed, 3 (11%) agreed, 3 (11%) were undecided, 9(32%) disagreed, and 10 (36%) strongly disagreed that library use CC applications to survey library users' satisfaction. 3 (11%) strongly agreed, 7 (25%) agreed, 3 (11%) were undecided, 10(36%) disagreed, and 5 (11%) strongly disagreed that library use CC applications to providing reference service. 4 (14%) strongly agreed, 7 (25%) agreed, 6 (21%) were undecided, 6(21%) disagreed, and 5(18%) strongly disagreed that library use CC applications to collaborating with other librarians. 3 (11%) strongly agreed, 7 (25%) agreed, 6 (21%) were undecided, 6(21%) disagreed, and 6 (21%) strongly disagreed that library use CC applications entertainments. 6 (21%) strongly agreed, 4 (14%) agreed, 5 (18%) were undecided, 11 (39%) disagreed, and 2 (7%) strongly disagreed that library use CC applications to storing and sharing files. 10 (36%) strongly agreed, 11 (39%) agreed, 4 (14%) were undecided, 1 (4%) disagreed, and 2 (7%) strongly disagreed that library use CC applications to downloading bibliographic description records. 6 (21%) strongly agreed, 13 (46%) agreed, 4 (14%) were undecided, 3(11%) disagreed, and 2 (7%) strongly disagreed that library use CC applications to scheduling library meetings and activities. 12 (43%) strongly agreed, 10 (36%) agreed, 2 (7%) were undecided, 2 (7%) disagreed, and 2 (7%) strongly disagreed that library use CC applications to searching recent publications.

**Table 4.2: Purposes of Cloud Computing in the library**

**Keys SA : STRONGLY AGREE**  
**A : AGREE**  
**UD : UNDECIDED**



DA : DISAGREE  
SD : STRONGLY DISAGREE

Purposes	SA		A		UD		DA		SD	
	F	%	F	%	F	%	F	%	F	%
Host and share videos for library orientations	1	4%	5	18%	4	14%	10	36%	8	29%
To faster community participation in library awareness services campaign	3	11%	2	7%	6	21%	11	39%	6	21%
To conduct survey on library users' satisfaction	3	11%	3	11%	3	11%	9	32%	10	36%
Providing Reference Service	3	11%	7	25%	3	11%	10	36%	5	18%
Collaborating with other librarians	4	14%	7	25%	6	21%	6	21%	5	18%
Entertainments	3	11%	7	25%	6	21%	6	21%	6	21%
Storing and sharing files	6	21%	4	14%	5	18%	11	39%	2	7%
Downloading bibliographic description records	10	36%	11	39%	4	14%	1	4%	2	7%
Scheduling library meetings and activities	6	21%	13	46%	4	14%	3	11%	2	7%
Searching recent publications	12	43%	10	36%	2	7%	2	7%	2	7%

Sallehudin, Razak, Ismail, Fadzil, and Baker (2019) conducted a study on CC implementation in the public sector, findings present that the influence of operational effectiveness of cloud implementation is at the lower level. Findings of the study reveal that librarians at Polokwane Municipal libraries do not use CC applications to host and share videos for library orientations or another video content, faster community participation in library awareness services campaign, conduct survey on library users' satisfaction, provide reference service, collaborate with other librarians, entertainment library users, store and share files, schedule library meetings and activities. However, librarians use CC applications to downloading bibliographic description records and search for recent publications. This is supported by Mate (2016), who notes that many libraries already host online catalogues and share bibliographic data with OCLC.

*\* Benefits of using CC applications*

Respondents were asked to indicate the benefits of using CC applications. Table 4.3 below shows that out of 28 respondents 23 (82%) strongly agreed, 4 (14%) agreed, 1 (4%) were undecided, 0 (0%) disagreed and 0 (0%) strongly disagreed that CC saves time. 20 (71%) strongly agreed, 6 (21%) agreed, 2 (7%) were undecided, 0 (0%) disagreed and 0 (0%) strongly disagreed that CC save cost. 21 (75%) strongly agreed, 5 (18%) agreed, 2 (7%) were undecided, 0 (0%) disagreed and 0 (0%) strongly disagreed that CC simplify workflows. 20 (71%) strongly agreed, 7 (25%) agreed, 1 (4%) were undecided, 0 (0%) disagreed and 0 (0%) strongly disagreed that CC makes work faster and much easier. 16 (57%) strongly agreed, 11 (39%) agreed, 1 (4%) were undecided, 0 (0%) disagreed and 0 (0%) strongly disagreed that CC is the latest trend that can allow the library to keep pace with technological advancement. 7 (25%) strongly agreed, 14 (50%) agreed, 4 (14%) were undecided, 1 (4%) disagreed and 2 (7%) strongly disagreed that CC can provide the opportunity for collaboration among libraries. 5 (18%) strongly agreed, 19 (68%) agreed, 3 (11%) were undecided, 1 (4%) disagreed and 0 (0%) strongly disagreed that CC can make work more effective and efficient.

12 (43%) strongly agreed, 12 (43%) agreed, 3 (11%) were undecided, 1 (4%) disagreed and 0 (0%) strongly disagreed that CC faster the process of downloading bibliographic description records from Online WorldCat. 9 (32%) strongly agreed, 6 (21%) agreed, 10(36%) were undecided, 1 (4%) disagreed and 2(7%) strongly disagreed that CC can provide an opportunity to manage complex data storage, information access, sharing and consumption at anytime and anywhere. 0 (0%) strongly agreed, 0 (0%) agreed, 2(7%) were undecided, 8 (29%) disagreed and 18(64%) strongly disagreed that CC provides users with remote access to library Catalogue. 0 (0%) strongly agreed, 0 (0%) agreed, 1(4%) were undecided, 7 (25%) disagreed and 20(71%) strongly disagreed that CC allows library users to remotely access library system to renew, and place on hold library material.

**Table 4.3: Benefits to the use of CC**

Benefits to the use of CC	SA		A		UD		DA		SD	
	F	%	F	%	F	%	F	%	F	%
CC saves time	23	82%	4	14%	1	4%	0	0%	0	0%
CC saves cost	20	71%	6	21%	2	7%	0	0%	0	0%
CC simplify workflows	21	75%	5	18%	2	7%	0	0%	0	0%
Make work faster and much easier	20	71%	7	25%	1	4%	0	0%	0	0%
CC is the latest trend that can allow library to keep pace with technological advancement	16	57%	11	39%	1	4%	0	0%	0	0%
CC can provide the opportunity for collaboration among libraries	7	25%	14	50%	4	14%	1	4%	2	7%
CC can make work more effective and efficient	5	18%	19	68%	3	11%	1	4%	0	0%
CC faster the process of downloading bibliographic description records from Online WorldCat	12	43%	12	43%	3	11%	1	4%	0	0%
CC can provide opportunity to manage data storage, information access, & sharing at anytime and anywhere	9	32%	6	21%	10	36%	1	4%	2	7%
CC provide users with remote access to library Catalogue	0	0%	0	0%	2	7%	8	29%	18	64%
CC allow library users to remotely access library system to renew, and place on hold library material	0	0%	0	0%	1	4%	7	25%	20	71%

Findings show that librarians at Polokwane Municipal libraries are of the view that CC applications and services save time, save and costs, simplify workflow, make work faster and much easier, allow the library to keep pace with technological advancement, can provide the opportunity for collaboration among libraries, make work more effective and efficient, faster the process of downloading bibliographic description records from Online World Cat, can provide an opportunity to manage complex data storage, information access, sharing and consumption at anytime and anywhere. These findings are in line with the findings of the study by Jones, Irani and Sivarajah (2017), which presents motivations for moving to cloud-based services as

perceived cost savings, effective workflow etc. However, the study also found that librarians disagree that CC applications provide library users with remote access to library Catalogue and allow library users to remotely access library system to renew, and place on hold library material. These findings throw light that library system used in Polokwane Municipal libraries does not provide library users with remote access which happens on CC applications. Suman and Singh (2016:121) explain that CC host digital libraries and integrate library systems to create incorporated presence on the web to provide users with local, national and global remote access.

*\* Challenges inhibiting librarians from using CC*

The study sought to find out the challenges of stopping librarians from using CC. Table 4 below shows that 7 (25%) of the respondents strongly agreed, 15 (54%) agreed, 4(14%) were undecided, 1 (4%) disagreed and 1(4%) strongly disagreed that Limited budget inhibits the use of CC. 10 (36%) strongly agreed, 9 (32%) agreed, 7(25%) were undecided, 1 (4%) disagreed and 1(4%) strongly disagreed that lack of CC knowledge and awareness slow use of CC. 5 (18%) strongly agreed, 15 (54%) agreed, 4(14%) were undecided, 2 (14%) disagreed and 2(7%) strongly disagreed that lack of skills to use advanced technology can be constrains to the use of CC. 7 (25%) strongly agreed, 6 (21%) agreed, 10(36%) were undecided, 3 (11%) disagreed and 2(7%) strongly disagreed that CC has no security and privacy of the data which inhabits its use. 4 (14%) strongly agreed, 10 (36%) agreed, 9(32%) were undecided, 5 (18%) disagreed and 0(0%) strongly disagreed that libraries have a slow internet connection to use on CC. 4 (14%) strongly agreed, 10 (36%) agreed, 9 (32%) were undecided, 5 (18%) disagreed and 0(0%) strongly disagreed that Irregular staff training and development inhabit use of CC.

**Table 4.4: Constraints associated with the adoption of CC**

Constraints to adopt CC	SA		A		UD		DA		SD	
	F	%	F	%	F	%	F	%	F	%
Limited budget	7	25%	15	54%	4	14%	1	4%	1	4%
Lack of CC knowledge and awareness	10	36%	9	32%	7	25%	1	4%	1	4%
Lack of skills to use advanced technology	5	18%	15	54%	4	14%	2	7%	2	7%
CC has no security and privacy of the data.	7	25%	6	21%	10	36%	3	11%	2	7%
Slow internet connection	4	14%	10	36%	9	32%	5	18%	0	0%
Irregular staff training and development	3	11%	17	61%	3	11%	2	7%	3	11%

Wada (2018) explains that libraries find challenged by the constant reduction of budgetary allocation, technical know-how and cost of Internet access, poor network tools, no subscription to the database and lack of infrastructural facilities to strengthen presence on the web. In the study, findings depict that Limited budget, lack of CC knowledge and awareness, lack of skills to use advanced technology, lack of security and privacy of the data on CC, slow internet connection, and irregular staff training and development inhabit adoption of CC within Polokwane Municipal libraries. These challenges can be classified as facilitating conditions, negatively influencing the adoption of CC at Polokwane Municipal libraries. These findings are in contract with findings of Mabawonku (2018:14), which reported that facilitating conditions in terms of technical and human resources had positive impact on the use digital library.

#### *4.3.5 Perceptions of librarians towards cloud computing*

The findings presented below, give the perception of the librarians towards CC to address the aim of the study.

#### *\* Benefits of CC to the library services*

Respondents were requested to indicate their views on the library service enhancements that the library stands to benefit from using CC. 16 (57%) of the respondents strongly agreed, 10 (36%) agreed, 2(7%) were undecided, 0 (0%)

disagreed and 0(0%) strongly disagreed that application of CC can facilitate quick access to data. 17 (61%) strongly agreed, 11 (39%) agreed, 0(0%) were undecided, 0 (0%) disagreed and 0(0%) strongly disagreed that CC applications can improve quality of library services. 15 (54%) strongly agreed, 8 (29%) agreed, 5(18%) were undecided, 0 (0%) disagreed and 0(0%) strongly disagreed that CC can help in high storage capacity. 14 (50%) strongly agreed, 12 (43%) agreed, 2(7%) were undecided, 0 (0%) disagreed and 0(0%) strongly disagreed CC technologies can help in easy information dissemination. 9 (32%) strongly agreed, 15 (54%) agreed, 4(14%) were undecided, 0 (0%) disagreed and 0(0%) strongly disagreed that CC can reduce space management problems. Table 4.5 presents the findings.

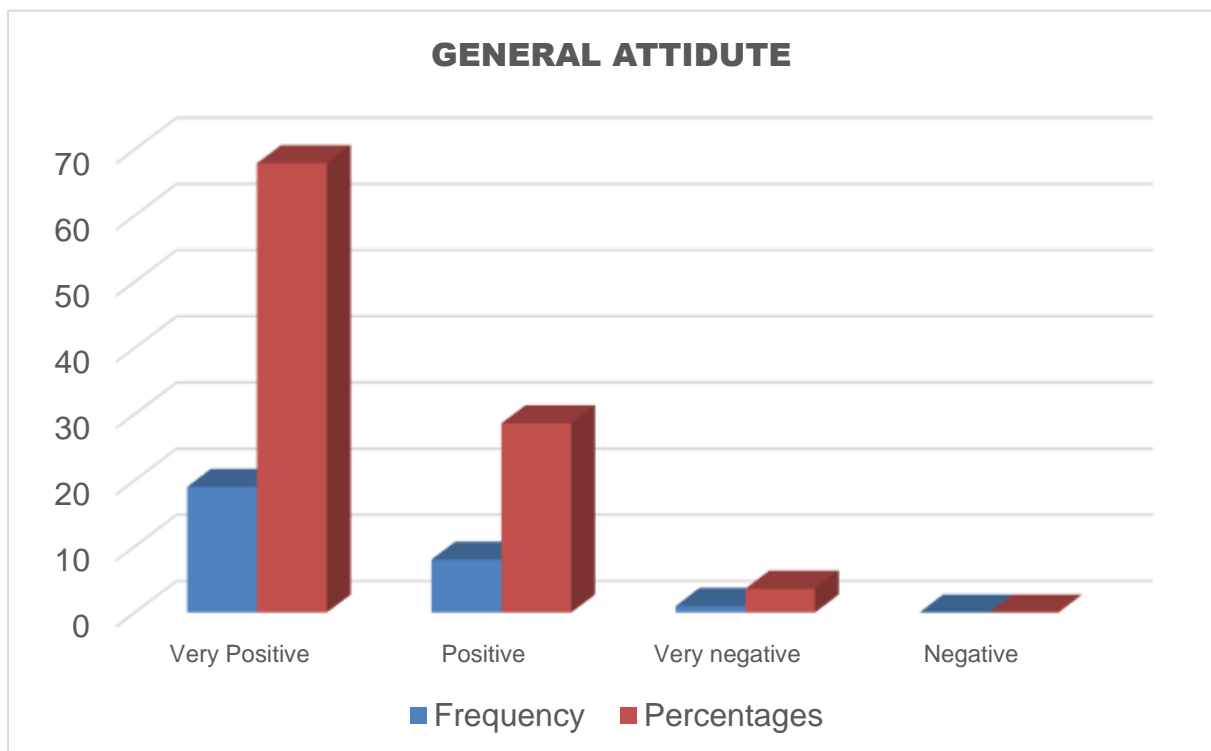
**Table 4.5: Benefits of CC to the library services**

Benefits of CC to the Library Services	SA		A		UD		DA		SD	
	F	%	F	%	F	%	F	%	F	%
Application of CC can facilitate quick access to data	16	57%	10	36%	2	7%	0	0%	0	0%
CC applications can improve quality of library services	17	61%	11	39%	0	0%	0	0%	0	0%
CC can help in high storage capacity.	15	54%	8	29%	5	18%	0	0%	0	0%
CC technologies can help with easy information dissemination.	14	50%	12	43%	2	7%	0	0%	0	0%
CC can reduce space management problems.	9	32%	15	54%	4	14%	0	0%	0	0%

Findings of the study show that librarians are of the views that the library stands to benefits from CC applications which can improve quality of library services, help in high storage capacity, help in easy information dissemination, and reduce space management problems. The study by Gbaje and Aliyu (2014) also found out that librarians believe that libraries stand the chance to benefit from a variety of services such as information storage, sharing, retrieval and other different approaches of use. These findings give a sense of hope that Polokwane Municipal libraries stand a great chance to benefit from the adoption of CC.

*\* General attitude of librarians towards CC*

The researcher sought the find out what could be the general attitude of library staff towards CC. Figure 4.13 shows that 19 (67%) of respondents are very positive, 8 (28.6%) are positive, 1 (4%) are very negative and 0 (0%) are negative.



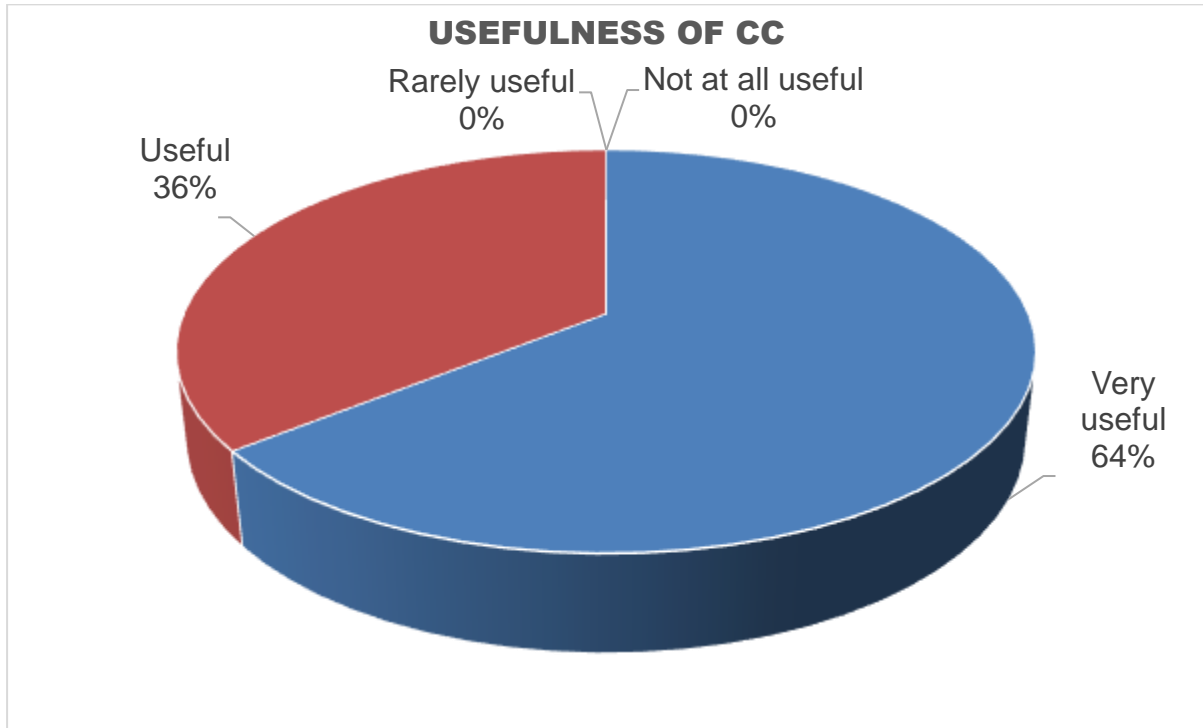
**Figure 4.13: General attitude towards CC N 28**

The study presents the findings which show that the attitude of the librarians towards CC is very positive. These findings are confirmed by the findings of the study by Koury and Jardine (2013) which found out that library professionals have a positive attitude towards the use of CC in libraries hence its tools such as Google applications establish effective collaboration and communication within libraries.

*\* Usefulness of CC applications*

Respondents were asked to indicate how useful do they think CC application such as Gmail and Online Skype can allow effective communication and

workflow in your library. 18 (64%) indicated very useful, 10 (36%) useful, 0(0%) rarely useful, 0(0%) not at all useful, and 0(0%) not sure. Figure 17 below presents the findings.



**Figure 4.14: Usefulness of CC N 28**

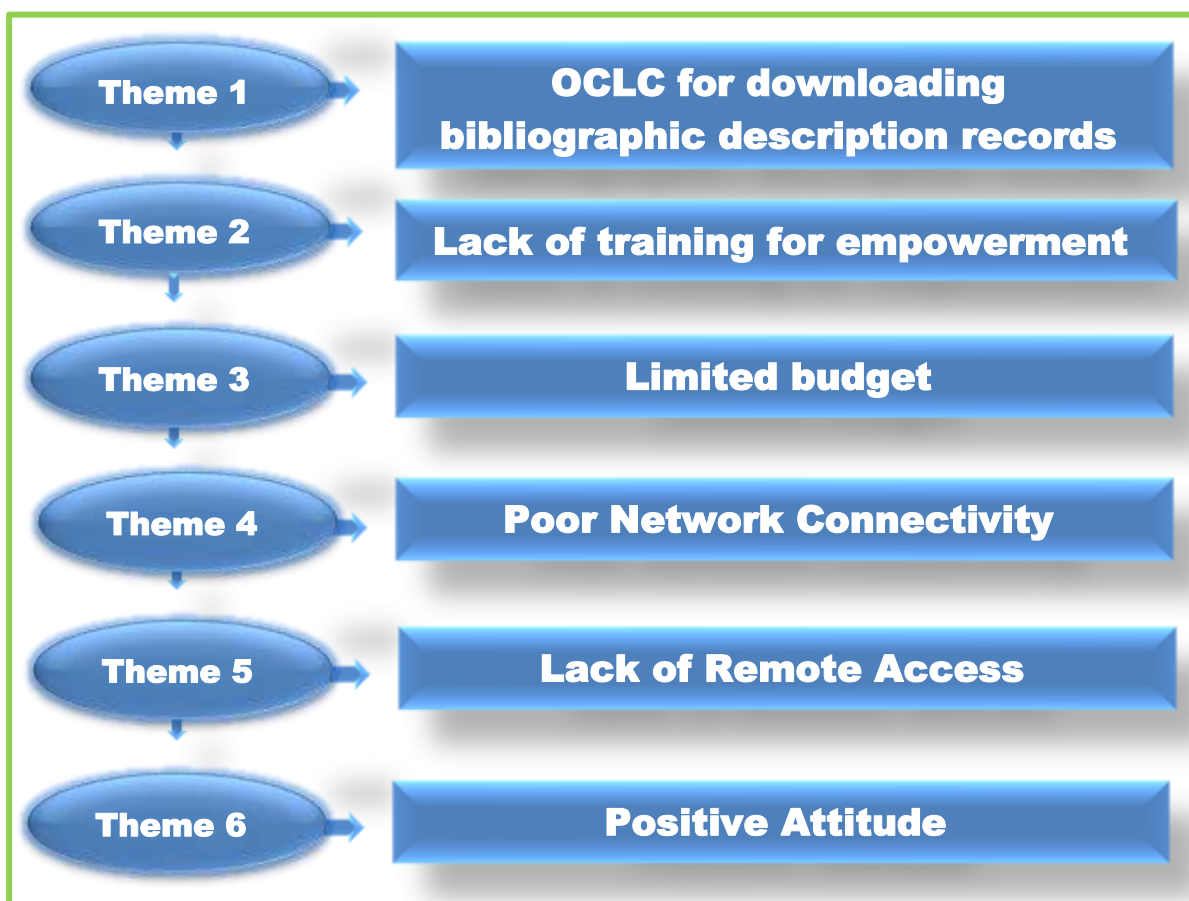
Alsanea (2015) reveals that organisational and technological factors, quality of service, cost effectiveness and usefulness are features that could support government organisations in deciding to adopt CC. These findings are in position with findings of the study which shows that Librarians at Polokwane Municipal libraries find CC applications which were listed on a questionnaire very useful, which support the finding that despite either Polokwane Municipal libraries having fully adopted or not yet on CC, librarians are carrying out some of the library transactions of CC. This suggests that effort expectance as proposed in UTAUT theory, has positive influence in the adoption of CC.



#### 4.4 Results from unstructured interviews

This section presents data analysis and discussion of the finding obtained from the unstructured interview conducted by the researcher with interviewees telephonically. Interviewees were two (2) library managers of Polokwane Municipal libraries. Results were analysed using thematic analysis through NVivo qualitative software. The transcripts were captured into the software, read through, coded the data and organised it into themes. Finally, the findings were grouped into six themes to address the research objectives. Each theme is being supported by verbatim quotes from the participants' responses and presented following the objectives of the study. The table 6 below presents a summary of themes.

Table 4.6: Summary of themes



#### *4.4.1 Cloud computing tools used in libraries*

##### *Theme 1 OCLC for downloading bibliographic records*

Participants were asked to give and explain the purpose of the new technological tools recommended to librarians for use.

**Participant A:** librarians are encouraged to use google scholar to check recent publications, cataloguers are advised to use OCLC to download bibliographic description records.

**Participant B:** noted normally, in cataloguing libraries are recommended to use OCLC to make cataloguing simple.

Findings show that librarians working in the cataloguing were recommended to use OCLC for downloading bibliographic records. This confirms and gives light that librarians are using OCLC which is one of the CC applications because there was a recommendation from the library managers to use OCLC when cataloguing. Mate (2016) confirms that many libraries already have an online catalogue and share bibliographic data with OCLC. The finding of librarians having been recommended to use OCLC proves that social influences positively influence adoption of CC. It is affirmed that social influences have been shown to profoundly affect human behaviour in technology adoption (Graf- Vlachy, Buhtz & König, 2018:37).

#### *4.4.2 The level of librarians' knowledge and understanding of cloud computing*

##### *Theme 2 Lack of training for empowerment*

The researcher sought to discover empowerment of librarians to have great knowledge and understanding of technological advancement.

**Participants A:** responded that there is not any empower undertaken; it has been too long librarians went for training.

**Participant B:** noted that their libraries do not have library training nor lecture on technologies.

It is found that Library managers are not giving any form of training to empower librarians to have great knowledge and understanding of technological advancement. This endorses the findings that librarians have some knowledge and understanding but lack a detailed knowledge and holistic understanding of CC. Similarly, the study by Musungwini et al. (2016), presents finding that there were a knowledge gap and a need for workshops to enlighten the lecturers on the value of CC technology.

#### *4.4.3 Factors influencing the use of cloud computing*

##### *Theme 3 Library budget*

The study sought to determine the state of the library budget to cover the advancement of technology. Participant A answered that budget allocated for libraries is very limited, and it cannot cater to technological development at once. Participant B noted that budget to develop libraries is very small.

These findings obtained in quantitative data disclose that limited budget inhabits full adoption of CC. These findings are qualified by findings obtained from library managers, which shows that the library has a limited budget to cover the advancement of technology. In support of the findings, Wada (2018) states that libraries are confronted by the constant reduction of budgetary allocation.

##### *Theme 4 Network connectivity*

The participants were asked to tell how network connectivity is and how often is maintained within libraries. Participant A stated that the network is very poor in our libraries and is maintained by ICT staff from municipal offices, so it is only maintained when it is down. Participant B noted that librarians struggle with connectivity which internet is always down.

These findings are in line with the finding from library managers which confirms that there is poor network connectivity that is only maintained when is down.

Comparatively, Muhammed et al. (2015) highlight major challenges in adoption of CC as the problems that include poor internet service.

#### *Theme 5 Remote access*

Participants were requested to explain how libraries ensure quality service technologically wise. Participant A responded that technologically wise libraries have no means to render library services other than telephonically. Participant B noted that unlike other libraries, their libraries do not have remote access to catalogue, nor other means to deliver library services online to library users.

Findings in the study show that librarians are not in agreement that CC application provides library users with remote access to the library system and that drawn conclusion that Polokwane Municipal libraries are not fully in CC. These findings are supported by library managers who confirmed that Polokwane Municipal libraries have no remote access to ensure quality service of the library technologically wise. This finding opposes findings of the study by Alsanea (2015), who reveals that organisational and technological factors, quality of Service, cost effectiveness and usefulness are features that support government organisations in deciding to adopt CC.

#### *4.4.4 Perception of librarians towards cloud computing*

##### *Theme 6 Librarians' attitude*

The study wanted to determine the general perception of staff towards new technologies such as CC applications and services. Participant A responded that if CC was available for librarians and proper training is given, librarians were going to appreciate the effort as it will save time and be quicker for them to perform their daily duties. Participant B noted that the staff is very curious to adopt new advanced technology because it seems to be making library work to be easy and provide library users with effective services.

The study pursued to measure librarians' perception of CC applications and services. Findings show that librarians have a positive attitude towards CC application and

services. Librarians are of the view that libraries stand a chance to benefits through CC application and services that appear to be useful within libraries. These findings are in support of the findings by Usman (2018), who reveals that a good number of the librarians are of the view that CC can address some of the many challenges facing the library services in the era of technological advancement.

#### **4.5 Summary**

In this chapter, both quantitative and qualitative data were analysed, and the results of the findings were presented and discussed in two sections. The first section covered the results obtained from the questionnaire that was converted into Google form and sent the link to respondents for completion. The second section covered the results obtained from the unstructured interviews which were conducted telephonically with library managers. The next chapter is about a summary of the findings, conclusion and recommendations of the study.

## CHAPTER 5:

### SUMMARY OF THE FINDINGS, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents the summary of findings, conclusion, and recommendations of the study based on the interpretation and discussion of the findings presented in chapter five. In this chapter, the summary of the findings, and recommendation are presented separately in line with research objects. The conclusion presents an overall summary looking at research aim, research objectives, literature review and findings of the study, this is to minimize repetition in the summary of the findings.

#### 5.2 Summary of the findings

The findings of the study are summarised and presented in accordance with research objectives below.

##### *5.2.1 Cloud computing tools used by libraries*

The study wanted to identify CC tools used by the librarians at Polokwane Municipal libraries. The findings revealed that librarians have eight (8) years and above using PaaS and SaaS CC tools that include Gmail, Online Skype, OPAC, OCLC, Google Scholar, RefWorks, and Google apps. OCLC and Google scholar were found to be CC tools mostly used by librarians for library services. The adoption of these CC tools was found to be positively influenced by social influences as proposed by UTAUT theory.

##### *5.2.2 The level of librarians' knowledge and understanding of cloud computing*

The study sought to find out the knowledge and understanding that librarians possessed about CC. Findings revealed that librarians had very good computer literacy in computer hardware and software. However, the findings also indicate that librarians lacked detailed knowledge and a holistic understanding of CC. Findings from library managers show that these librarians were never taken to training for ICT

related matters. Lastly, performance expectance mediated by age, was found to be negatively influencing adoption of CC.

### *5.2.3 Factors influencing the use of cloud computing*

In the study, it was discovered that factors influencing the use of CC application and services within libraries involve a high level of satisfaction obtained when carrying out CC transactions and benefits that cover saving time and, simplifying workflow, festering the process of downloading bibliographic description records from Online World Cat. The study also found out that Polokwane Municipal libraries do not use CC applications and services for purposes that include fostering community participation in library awareness services campaign. However, findings show that the use of CC applications and services is inhibited by lack of CC knowledge and awareness, lack of skills to use advanced technology, lack of security and privacy of the data on CC, slow internet connection, and irregular staff training which can be classified as facilitating conditions.

### *5.2.4 Perception of librarians towards cloud computing*

The study measured librarians' perception of CC applications and services. Findings show that librarians have a positive attitude towards CC application and services and are of the view that libraries stand a chance to benefit if they use CC applications for different services that appear to be useful within libraries. These findings are in support of the findings by Usman (2018), who reveals that a good number of the librarians are of the view that CC can address some of the many challenges facing the library services in the era of technological advancement. The general positive attitude towards in CC reports that effort expectance positively influences adoption of CC.

## **5.3 Recommendations**

Recommendations below, are presented based on the major findings of the study.

### *5.3.1 Cloud computing tools used in libraries*

CC tools for PaaS and SaaS were found to be used in libraries. The researcher therefore, recommends the use of infrastructure as a service that includes for instance, remote servers to allow libraries provide users with remote access to the library catalogue.

### *5.3.2 The level of librarians' knowledge & understanding of cloud computing*

The study found out that librarians lacked detailed knowledge and understanding of CC. Therefore, the researcher recommends that librarians must be taken to workshops, training and lectures that are related to technological innovation and new concepts.

### *5.3.3 Factors influencing the use of cloud computing*

The researcher recommends library manager to request an increase in allocation of budget, embark on fundraising from different stakeholders, engage Polokwane Municipal officials to address internet connection, and invite experts in ICT to impart librarians with awareness and knowledge of CC application and services such as Google Apps for enhancing library services.

### *5.3.4 Perception of librarians towards cloud computing*

The study disclosed that librarians have positive attitude towards CC application and services. The researcher recommends that CC tools used at low cost should be identified for convenient library services, train and encourage librarians to apply such tools for library services of high quality.

## **5.4 Recommendations for the future study**

Since the found out that Polokwane municipal libraries use CC tools which are PaaS and SaaS. The researcher recommends intensive study on the use of software as a service, and study on why infrastructure as a service is not used in these libraries.



## 5.5 Limitations of the study

Before the lockdown resulting COVID 19 pandemic, the researcher proposed to self-administrate the questionnaires among librarians and conduct interviews with librarian managers who work at Polokwane Municipal libraries. However, methods used to collect data were an online questionnaire using Google form, and telephonic interviews. To avoid librarians guess working some responses and compromising the study when completing Google form, the researcher omitted **Since when** and **how often questions**, as responding to them would have required librarians to have sought permission of physically visiting libraries where they work to access online records, These would have probably been a long process delaying the researcher to get the data. However, limiting the two questions did not affect the quality of the study as essential and relevant information has been provided.

## 5.6 Conclusion

CC presents information system users with a perception of a limited set of possible technological alternatives for future development. Yatin et al. (2018) predict that CC can be the future and it may become the next platform for building an innovation ecosystem for the development of economic and social infrastructure. Though the study found out that Polokwane Municipal Librarians tend to use CC applications and services for some of the library services, the study concludes that these libraries had not yet adopted CC and librarians had no detailed knowledge and understanding of CC. As guided by variables of UTAUT, effort expectance and social influences were found to be positively influencing application of CC, whereas performance expectance mediated by age, and facilitating conditions were found to be negatively influencing application of CC. Based on these findings of the study, the researcher deduces that Polokwane Municipal libraries have to consider the benefits of CC and fully adopt CC to prepare for the future Polokwane Municipal libraries with quality and convenient library services, such as remote access to the library catalogue.

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## APPENDIX A: ETHICAL CLEARANCE CERTIFICATE



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

**TURFLOOP RESEARCH ETHICS COMMITTEE**  
**ETHICS CLEARANCE CERTIFICATE**

**MEETING:** 05 March 2020

**PROJECT NUMBER:** TREC/47/2020: PG

**PROJECT:**

**Title:** Application of Cloud Computing in South African libraries: A case study of Polokwane Municipal libraries  
**Researcher:** AI Molaudzi  
**Supervisor:** Dr JK Tsebe  
**Co-Supervisor/s:** Ms MR Mahlatji  
**School:** Languages and Communication Studies  
**Degree:** Master of Information Studies

**PROF P MASOKO**  
**CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE**

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

**Note:**

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

**APPENDIX B: REQUEST LETTER FOR PERMISSION TO CONDUCT A STUDY AT  
POLOKWANE MUNICIPAL LIBRARIES**



**UNIVERSITY OF LIMPOPO**

**Faculty of Humanities**

**School of Languages and Communication Studies**

**Private Bag 1106, Sovenga, 0727, South Africa**

**Tel: (015) 268 4635, [Email: john.tsebe@ul.ac.za](mailto:john.tsebe@ul.ac.za)**

---

Municipal Manager  
*Polokwane Local Municipal*  
P.O.BOX 111  
*Polokwane*  
0700

Dear Sir/Madam

**REQUESTING PERMISSION FOR MR AI MOLAUDZI, STUDENT NUMBER:  
201529128 TO CONDUCT RESEARCH AT POLOKWANE MUNICIPAL LIBRARIES**

This serves to formally introduce the above named as a full-time Masters of Information Studies (MIS) student in the Department of Media, Communication and Information Studies at University of Limpopo. Mr. Ai Molaudzi has proposed to conduct research on a research dissertation titled "**Application of Cloud Computing in South African libraries: A case study of Polokwane Municipal libraries.**"

Mr. Ai Molaudzi's research proposal has been approved by the Higher Degrees Research Committee of the School of Languages and Communications Studies and received University ethical clearance (Appendix A). Mr Ai Molaudzi would like to collect data for the research dissertation by way of distributing questionnaire (Appendix B)

and conduct interviews (Appendix C) to library manager and library staff who can give relevant information and knowledge at Polokwane Municipal libraries. You are therefore requested to permit him to distribute questionnaires and conduct interviews.

The researcher will share the findings of the study with the libraries and assist in the implementation of the recommendations. For any further information about Mr. Al Molaudzi please do not hesitate to contact us on (015) 268 4635 or 073 015 1157

Thank you for your kind assistance.

Yours sincerely

  
Dr John K. Tsebe (Supervisor)

17th March 2020  
DATE

  
Prof ST Bopape-HOD

17/03/2020  
DATE

## APPENDIX C: COVER LETTER FOR PARTICIPANTS



**Faculty of Humanities**  
**School of Languages and Communication Studies**  
**Private Bag 1106, Sovenga, 0727, South Africa**  
**Call: (071) 237 9611, Email: [201529128@ykeyaka.ul.ac.za](mailto:201529128@ykeyaka.ul.ac.za)**

---

Dear Participants

I am Amogelang Isaac Molaudzi, doing master's Research in Information Studies at the University of Limpopo. The title of the study: "Application of Cloud Computing in South African libraries: A case study of Polokwane Municipal libraries." under the supervision of Dr John K Tsebe.

I aim to gather information about librarians' 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 without penalty.
- ❖ You may also refuse to answer any questions you don't want to answer and remain in the study.
- ❖ I may also withdraw you from this research if circumstances arise that warrant doing so.

- ❖ If you volunteer to participate in this study, I expect you to do the following things:
- ❖ Sign the consent form that is attached
- ❖ Participate in filling in the questionnaire
- ❖ Please do not write your name of any of the pages or documents you submit.

Thank you for your co-operation.

Yours Sincerely



.....  
Mr Al Molaudzi

## APPENDIX D: EDITOR'S LETTER

Fax: 0152682868  
Tel. 0152862684  
Cell: 0822198060  
[Rammalaj@ul.ac.za](mailto:Rammalaj@ul.ac.za)

Dr J R Rammala  
440B Mankweng  
Box 4019  
Sovenga  
0727  
29 August 2020

### EDITORIAL CERTIFICATE

Author: Amogelang Isaac Molaudzi

DOCUMENT TITLE: **Application of Cloud Computing in South African libraries: A case study of Polokwane Municipal libraries**

Dear Sir/Madam

This document certifies that the above M.A dissertation was proofread and edited by Dr J R Rammala (PhD, Linguistics). The document was edited for proper English language, grammar, punctuation, spelling and overall style. The editor endeavored to ensure that the author's intended meaning was not altered during the review. All amendments were tracked with the Microsoft Word "Track Changes" feature. Therefore, the authors had the option to reject or accept each change individually.

Kind regards



Dr J R Rammala

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## APPENDIX E: INFORMED CONSENT

### INFORMED CONSENT FORM

I hereby agree to participate in research regarding application of cloud computing in South African libraries: A case study of Polokwane Municipal libraries. 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 consent form will not be linked to the questionnaire and that my answers will remain confidential.

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

.....

Signature of the participant

.....

Date

## APPENDIX F: QUESTIONNAIRE

QUESTIONNAIRE LINK: [https://docs.google.com/forms/d/e/1FAIpQLSe2fBzdueUDS3-vBE6g4O1SIE97BI0wJgJjOu19bXm-z-Bc4w/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSe2fBzdueUDS3-vBE6g4O1SIE97BI0wJgJjOu19bXm-z-Bc4w/viewform?usp=sf_link)

### QUESTIONNAIRE COMPLETION GUIDELINES

1. Kindly respond to all questions
  2. The questionnaire will take approximately 10 minutes to complete.
  3. Please indicate your choice with a cross **X** next to relevant answer(s).
- 

### SECTION A: PERSONAL INFORMATION

1.1 Please indicate your gender.

1.	Male	<input type="checkbox"/>	2.	Female	<input type="checkbox"/>
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1.2 Please indicate your age category.

1.	25 years and below	<input type="checkbox"/>
2.	26-30 years	<input type="checkbox"/>
3.	31-35 years	<input type="checkbox"/>
4.	36-40 years	<input type="checkbox"/>
5.	41 years and above	<input type="checkbox"/>
6.	Other (specify)	<input type="text"/>

1.3 Please specify your highest educational qualification.

1.	Standard 10 (Gr.12)	<input type="checkbox"/>
2.	Certificate in LIS	<input type="checkbox"/>
3.	Diploma in LIS	<input type="checkbox"/>

4.	Degree in LIS	
5.	Honours in LIS	
6.	Masters in LIS	
7.	Other (specify)	

1.4 Please specify your job position

1.	Senior librarian	
2.	Junior librarian	
3.	Assistant librarian	
4.	System librarian	
5.	Other (Specify)	

## SECTION B: CLOUD COMPUTING TOOLS USED BY LIBRARIANS

2.1 Please indicate CC application you know. (Multiple answers allowed)

1.	Gmail	
2.	Online Skype	
3.	OPAC	
4.	OCLC	
5.	Google Scholar	
6.	YouTube	
7.	RefWorks	
8.	Google apps	
10.	None	
11.	Other (specify)	

2.2 Which of the following CC applications do you use at your library? (Multiple answers allowed)

1.	Gmail	
2.	Online Skype	

3.	OPAC	
4.	OCLC	
5.	Google Scholar	
6.	YouTube	
7.	RefWorks	
8.	Google apps	
9.	None	
10.	Other (specify)	

2.3 How long have you been using CC applications in providing library services?

1.	0-1 year	
2.	2-3 years	
3.	4-5 years	
4.	6-7 years	
5.	8 years and above	

### **SECTION C: THE LEVEL OF LIBRARIANS' KNOWLEDGE & UNDERSTANDING OF CLOUD COMPUTING**

3.1 How would you rate your computer literacy skills?

1.	Very poor	
2.	Poor	
3.	Very good	
4.	Good	
5.	Excellent	

3.2 What is your level of knowledge and understanding about CC?

1.	I know and understand what CC is	
2.	I have some knowledge and understanding of CC	

3.	I not know and do not understand CC	
----	-------------------------------------	--

**SECTION D: FACTORS INFLUENCING THE USE OF CLOUD COMPUTING**

4.1 To what extent are you satisfied withwith the use of CC?

1.	To a great extent	
2.	Somewhat	
3.	Very little	

4.2 How often do you use CC applications

1.	Daily	
2.	Weekly	
3.	Monthly	

KEY: SA= STRONGLY AGREE, A = AGREE, UD=UNDECIDED, DA= DISAGREE  
SD=STRONLY DISAGREE

4.3 For what purposes have you used CC applications? (Multiple answers allowed)

	Purposes	SA	A	UD	DA	SD
1.	Host and share videos for library orientations or another video content					
2.	To foster community participation in library awareness services campaign					
3.	To survey library users' satisfaction					
4.	Providing Reference Service					
5.	Collaborating with other librarians					
6.	Entertainments					

7.	Storing and sharing files					
8.	Downloading bibliographic description records					
9.	Scheduling library meetings and activities					
10.	Searching recent publications					
11.	Other (specify)					

4.4 Please indicate what are the benefits do you have from using CC applications

	Benefits to using CC	SA	A	UD	DA	SD
1.	CC saves time					
2.	CC saves cost					
3.	CC simplify workflows					
4.	Make work faster and much easier					
5.	CC is the latest trend that can allow the library to keep the pace with technological advancement					
6.	CC can provide the opportunity for collaboration among libraries					
7.	CC can make work more effective and efficient					
8.	CC faster the process of downloading bibliographic description records from Online <b>WorldCat</b>					
9.	CC can provide an opportunity to manage complex data storage, information access, sharing and consumption at anytime and anywhere					
10.	CC provides users with remote access to library Catalogue					
11.	CC allows library users to remotely access library system to renew, and place on hold library material					
12.	Other (specify)					

4.5 Please indicate what challenges do you find from using CC applications.

	Constrains to use of CC	SA	A	UD	DA	SD
1.	Limited budget					
2.	Lack of CC knowledge and awareness					
3.	Lack of skills to use advanced technology					
4.	CC has no security and privacy of the data,					
5.	Slow internet connection					
6.	Irregular staff training and development					

## SECTION E: PERCEPTION OF LIBRARIANS TOWARDS CLOUD COMPUTING

KEY: SA= STRONGLY AGREE, A = AGREE, UD=UNDECIDED, DA= DISAGREE

SD=STRONGLY DISAGREE

5.1 In your view, please indicate the library service enhancements that the library stands to benefits from using CC. (Multiple answers allowed)

		SA	A	UD	DA	SD
1.	Application of CC can facilitate quick access to data.					
2.	CC applications can improve the quality of library services.					
3.	CC can help in high storage capacity.					
4.	CC technologies can help in easy information dissemination.					
5.	CC can reduce space management problems.					
6.	Other (specify)					

5.2 In your view, please indicate if what could be the general attitude of library staff towards CC.

1.	Very Positive	
2.	Positive	
3.	Very negative	
4.	Negative	

5.3 In your view, please indicate how useful you think CC application such as Gmail and Online Skype allow effective communication and workflow in your library.

1.	Very useful	
2.	Useful	
3.	Rarely useful	
4.	Not at all useful	
5.	Not sure	

*Thank you for your cooperation and participation in this study*



**APPENDIX G: INTERVIEW QUESTIONS**

1 How is the general perception of staff towards new technologies such as CC applications and services?

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2 What are the new technological tools have you recommended librarians to use, and for what purpose?

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3 How is the state of the library budget to adopt the advancing of technology?

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4 How reliable is internet connectivity and how often maintained within libraries?

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5 Briefly explain how you ensure quality service through employment of technology?

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6 How do you empower librarians to have great knowledge and understanding of technological advancement?

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*Thank you for your cooperation and  
participation in this study*

## APPENDIX H: TURNITIN REPORT

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