The Use of Web Technologies by Librarians to Support Researchers and Students at an Open Distance e-Learning University

by

MPHELEKEDZENI AARON TSHIKOTSHI

submitted in accordance of the requirements

for the degree of

MASTER OF ARTS IN INFORMATION SCIENCE

at the

UNIVERSITY OF SOUTH AFRICA

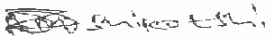
Supervisor: Dr. W E Nwagwu

November 2019

DECLARATION

Student number: 31616682

I, the undersigned, Mr. Mphelekedzeni Aaron Tshikotshi, hereby declare that; *The use of web technologies by librarians to support researchers and students at an Open Distance e-Learning university* is my own study. All sources of information used in the text are properly acknowledged in the reference list.

Signature: 

Date: 22 August 2019

ACKNOWLEDGEMENTS

I would like to acknowledge my supervisor, Prof. Williams Ezinwa Nwagwu, for his patience, guidance and support during my studies. I also wish to thank my colleagues at Unisa Library for sacrificing their precious time to participate in the study. I would further like to acknowledge my colleagues in the division of Library Research, Planning and Quality Assurance for their selfless contribution and support in the survey. To my wife, Mrs. Maitele Tshikotshi, your love and unconditional support did not go unnoticed.

Finally, I would like to thank the Almighty God for blessing me with good health, which made it possible for me to work on my studies.

DEDICATION

This study is dedicated to my parents, Mr. Samuel Tshikotshi and my late mother, Mrs. Joyce Masindi Tshikotshi. The support and love of my wife, Mrs. Maitele Tshikotshi, and my children also deserve a special mention.

ABSTRACT

The rapid development of web technologies poses many opportunities and challenges for librarians, particularly in an open and distance e- learning (ODeL) institution. Despite the challenges, librarians continue to use web technologies in order to improve the services that they offer to library clients. This research explored the usage of web technologies in the ODeL Unisa Library, where librarian-client interaction occurs remotely, with most services being offered online. Research in web technology applications abounds in the fields of general information technology and library information systems , but there are research gaps in terms of studies focusing on online and distance institutions, where librarians and clients do not have the privilege of face- to- face contact. The study integrates the Diffusion of Innovation (DOI) theory with the constructs in the Technology Acceptance Model (TAM), in order to test the hypotheses about the implementation and usage dynamics of web technologies by Unisa librarians. The study is a quantitative sample survey, with respondents drawn from the Unisa Library staff population of 246, who utilise web technologies in their daily duties when supporting researchers. An email was first sent to the respondents to solicit their participation in the study, and 135 participants consented. A questionnaire was then sent by e-mail to the participants through the SurveyMonkey platform, and 68 respondents completed the questionnaire, which is a return rate of 50.3%. Most of the respondents are innovators, who occupy the highest level of technology adopters in Rogers' hierarchy. The workforce has no demographic barriers in respect of the innovation category and can be considered potentially capable of being turned into a more efficient workforce in respect of web technology-based information service provision. The librarians who participated in the study have used a wide range of web tools in the last five years, although Facebook (FB), a social media tool, and reference/citation tools are the most used. Technical support and network issues top the challenges that are encountered by librarians. Relative advantage, compatibility, perceived usefulness, perceived ease of use, and communication have an influence on the adoption of web technologies by librarians. Network issues, ICT support problems and lack of coordinated teams focused on web technology are impediments towards the smooth implementation of web technology tools.

Keywords: Web technology tools, Technology Acceptance Model, Diffusion of Innovation, Open and Distance Learning, Open and Distance e-Learning, Social media, Web 2.0, Web 3.0, Information and Communication Technology, Library 2.0, Library 3.0.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS/ABBREVIATIONS

ANOVA	Analysis of Variance
ANCOVA	Analysis of Covariance
CAS	Current Awareness Services
DOI	Diffusion of Innovation
IDT	Innovation Diffusion Theory
ICT	Information and Communication Technology
IS	Information Systems
IT	Information Technology
HTML	Hypertext Mark-up Language
MANOVA	Multiple Analysis of Variance
MOOCS	Massive Open Online Courses
ODL	Open Distance Learning
ODeL	Open Distance e-Learning
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
RA	Relative Advantage
SDI	Selective Dissemination of Information
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action
TPB	Theory of Planned Behaviour
UGC	User-Generated Content
UNISA	University of South Africa
URLs	Uniform Resources Locators
UTAUT	Unified Theory of Acceptance and Use of Technology

VLE	Virtual Learning Environment
WWW	World Wide Web
XML	Extensible Mark-up Language

CHAPTER 1:
INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

The rapid development of web technologies in libraries presents both opportunities and challenges. Web technology develops from mechanisms that allow two or more computer devices to communicate over a network. It enables individuals to communicate and share information on the Internet (Van Jaarsveldt and Wessels, 2011:64).

Modern libraries must diversify their resources so that they can sustain the new information service trend arising from the utilisation of newer web technologies, and further maximise the opportunities offered by such web technologies. At the same time, library user-interaction strategies have dramatically changed, and librarians are facing a different kind of clientele, who expect services to be offered using recent web platforms, in addition to the traditional print-based service offerings. Web technology applications bring a new trend to the library and information sector (LIS), which encourages library clients to be part of the virtual community where they can contribute to the content offered to them (Kumar and Triphathi, 2010:195).

Based on the new challenges, libraries started developing and diversifying their services based on advanced information and communication technologies (Nguyen, 2008). The birth of a new library participatory model grounded on user engagement also compelled librarians to re-position the role of users in contemporary libraries (Nguyen, 2015).

In academic libraries, the process of selecting web technologies to be utilised in order to enhance library services depends on the service model of the parent institution. The chosen web technologies should comply with the requirements laid out in the policies and guidelines of that institution. In the case of University of South Africa (Unisa), the Digital Communication and Web Management Policy (2018), and the Unisa Social Media Guidelines (2011) direct the

implementation of web technologies to enhance services to students across all university departments.

Many studies highlight the positive contribution that web technologies that make to libraries as a solution to the ever-changing technology environment, such as Aharony (2009); Maness (2006); Seena and Sudier (2014); Lietzau and Helgren, (2011); Zinyeredzi and Zinn (2017); Nguyen (2015) and Rafique, Anwer, Shamim et al. (2018), amongst others. There is a general agreement among these authors that web technologies (blogs, wikis, podcasts, RSS feeds, social bookmarking tools, Researchgate, Libguides, etc.) assist in the provision of information services by librarians. There needs to be further exploration through research on how specific kinds of libraries implement web applications, what benefits are attained, and how clients and library staff experience such a change from their different perspectives.

According to Yong and Abbas (2010: 211), previous studies have explored how individual capabilities of Library 2.0, such as blogs or Really Simple Syndication (RSS) feeds, have been utilised. The questions that used to be asked by clients to the reference librarians persist, but the more flexibly and smoothly such interaction can be done, the better the library services that can be provided (Antiroikko and Savolainnen, 2011). Web technology applications provide the interaction required by libraries, and the process of clients' engagement when such applications are utilised becomes smoother and flexible. In libraries where clients are not easy to reach, there should be more effort taken by librarians in choosing suitable web applications. These web applications should be those which offer the best value proposition in an open distance e-learning (ODeL) institution like University of South Africa (UNISA). For instance, it is far easier to arrange and train clients on the usage of various library resources in a residential library than in an ODeL institution, because of infrastructural and cost challenges. Furthermore, there are varying network capabilities in different communities, depending on levels of technology uptake. This means that the utilisation of specific web

applications introduced by the library to satisfy a particular task may not be readily utilised by clients in some other countries. Clients located in countries where network and broadband are at a more advanced stage may have access to a wider range of more efficient web technology applications than their counterparts elsewhere. Implementation and usage of web technologies, in this instance, may offer unique challenges.

Several issues, such as infrastructure and technical, technological and cultural challenges have been addressed in a study done by Gichora and Kwanya (2015) in Kenya. They observed that these challenges have the potential to hamper the effectiveness of the integration of web technologies in Kenyan academic libraries. At the Unisa Library, the services offered to clients include providing information resources to them, and training clients so that they can independently access the resources, without a librarian's intervention. It is very similar to what other academic libraries offer online worldwide. The only difference is that the technology utilised is based on Unisa's tuition model for an open distance e-learning (ODeL) institution, where services that are normally offered on a face- to- face basis are offered online. Moore and Kearsley (1996:06) state that open distance e-learning encompasses the distribution of learning materials to students who are geographically distant from their lecturers, and from one another. In this format of education, the distance between the learner and educator is very significant, and technology is used intensively throughout the learning process (Akkoyonlu and Soylu, 2006). Unisa regards ODeL as a multi-dimensional concept aimed at bridging the time, geographical, economic, social, educational and communication barriers between students and the institution, students and academics, students and courseware, and students and peers.

Open distance e-learning focuses on removing barriers to learning access, providing flexibility of learning provision, promoting student-centeredness, supporting students, and constructing learning programmes to enable students to achieve learning (Unisa Open Distance Policy, 2008: 02). The Unisa Strategic Plan (2016-2030) emphasises that the university

commits to harnessing ICTs to support the transformation of the core business, to enable high performance, and to provide high levels of service and quality to all its communities. This transformation of the Unisa system has brought many opportunities and challenges to the teaching staff, support staff, and students in general.

The World Wide Web (WWW), and in particular the web technology tools, are potential solutions to bridging the distance between librarians and clients in an ODeL context. The flexibility offered by web applications in enhancing clients' interaction with librarians, collaboration with other library clients, and participation in improving library services and collections, are apparent in an ODeL institution. However, there are factors that affect the acceptance and adoption of these new web technologies by librarians and implementing them is not a straightforward process. There are many issues involved, such as network and hardware accessibility, technical complexity, competency to use, and compatibility, among others, that need to be examined so that better implementation decisions can be made. The regulatory policies in the university's Information and Communication Technology (ICT) department should also be examined, in order to determine how they promote the implementation of the use of web technologies. The readiness of librarians and their expertise in implementing web technology tools is an issue that may determine the success or failure of the implementation of web technology applications.

Staff competence in a library that is implementing web technology applications is important because it enables librarians to make informed choices on the relevant applications for specific library tasks. Abdekhoda and Dibaj (2011) analysed the familiarity of medical librarians with web technology applications and found that the analysis was important in determining librarians' adoption patterns. The familiarity with web technologies further helps librarians to develop better information delivery services. Nguyen (2015) identified enthusiasm, perception, education and training as drivers of the interaction between librarians

and clients. Such levels of competence and enthusiasm may be some of the drivers or motivators of librarians when choosing to use specific web applications. Informed knowledge about what kind of applications are suitable for the specific clients, and for which specific library tasks they are relevant is also crucial, because it may be the determining factor in the usage and/or non-usage of that tool by the clients.

The study uses the Technology Acceptance Model (TAM) pioneered by Davis (1985) to explain the acceptance and/or non-acceptance of web applications by librarians. The TAM has been used to study web technologies and how they are perceived, which then leads to their usage or acceptance. The variables are linked to the attitude and intention of the user.

Oded and Chen (2008:845) have shown that effective use of digital libraries depends on user acceptance, which is in turn affected by the user's perception. To expand on the issue of adoption, some of the determinants of adoption of innovations are used as constructs to formulate questions when collecting data from respondents. The rate of adoption, as indicated by Rogers (1995), includes the following: relative advantage, complexity, compatibility, observability and trialability.

The adoption and acceptance of new technologies is well researched in the broader fields of ICT and information systems, but the same phenomena have not been well explored in the library sector. Baggozzi, Davis and Warsaw (1992:659) stated that while contemporary representations focus on the act of using computers, the role of learning to use computers has to be better understood within the overall adoption process. It is therefore necessary for this study to explore the issues experienced in the implementation stage, and investigate the reasons for the adoption or rejection of web technologies by library clients. This exploration takes the form of integrating both the TAM model (Davis 1985) and Diffusion of Innovation (DOI) theory (Rogers, 1962), in order to understand the dynamics of human behaviour when confronted by newer technologies.

1.2 Unisa Library set-up

The Unisa Library is one of the largest academic libraries in Africa, with huge collections in both print and electronic formats. It is one of the departments of the University of South Africa, with its biggest branch being situated in the city of Pretoria in South Africa. According to the information published on the university's website (University of South Africa, 2018), the library has a huge collection of print material and electronic subscription databases, as well as a rapidly expanding collection of e-books. The expansion of electronic material is in line with the strategic objectives aimed at transforming the university into a completely online, distance and e-learning institution. The Unisa Strategic Plan (2015), as revised for 2016-2030, requires that each department changes the way it operates, in order to align itself with the changes happening institution-wide. In the Unisa policy document entitled *Selecting a Future Business Model for Unisa* (2012), an emphasis is placed on the ODeL model, with a suggestion that the model sees a complete shift to open, distance and e-learning at Unisa, with corresponding implications for all operations and systems, which have to go online. In this model, the entire institution's transactional environment with students is transformed, so that all aspects of that environment are fully digitised and thus underpinned by robust, effective, and integrated ICT applications (Unisa policy document, 2012:05).

The Unisa Library has three subject branches, namely the Muckleneuk Library in Pretoria, the School of Business Leadership (SBL) Library in Midrand, and the Science Campus library in Florida, Johannesburg. There are also smaller regional libraries located in various cities and small towns throughout South Africa, with one being located in Addis Ababa in Ethiopia. Figure 1.1 depicts the lay-out of the Unisa Library as follows:

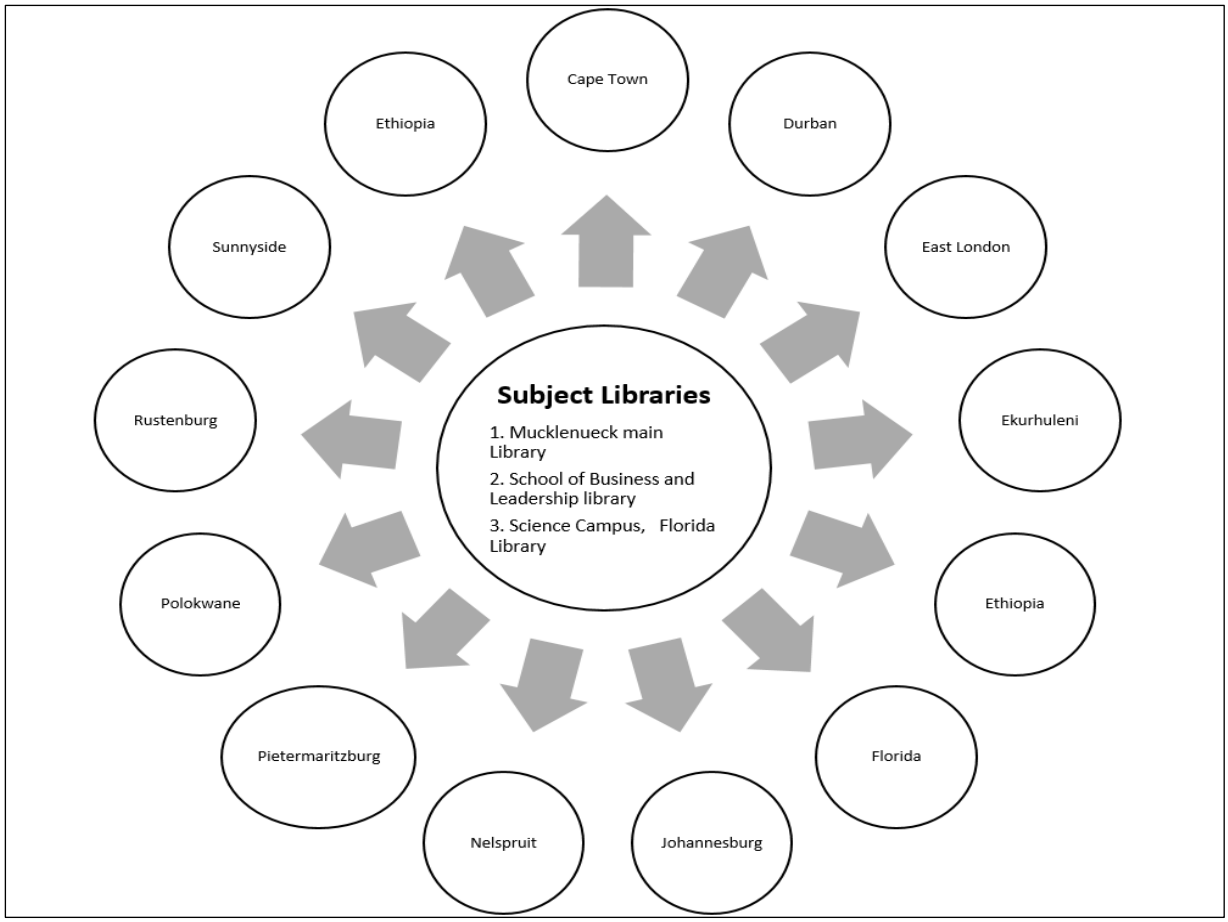


Figure 1.1: An illustration of the Unisa Library set-up

Source: Harries and Naude (2019)

Due to a significantly high number of students in remote locations and the geographical distance between librarians and students, the utilisation of web technology tools is inevitable. Kilemba (2016:89) also indicated that ICT holds the key to effective library and information services. With these tools, clients can utilise the services of the library without travelling to meet the librarian. Web tools/applications such as RSS feeds, blogs, wikis, podcasts, Diigo, ORCiD, Academia.edu, Scopia, social network tools and Libguides, amongst others, are used by librarians in the Unisa Library to enhance library services.

1.3 Theoretical Framework

The study used both the Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) theory to create the constructs that further aided in formulating the hypotheses for the research. The DOI theory was developed by Rogers (1962), whereas Davis (1985) pioneered the TAM model. Diffusion of innovation is associated with the adoption and implementation of new ideas, processes, products or services within an organisation (Lundlad, 2003:51). Several theories have emerged over the years, and are aimed at understanding the dynamics involved in the acceptance and adoption of new technologies. The theories that are prominent to date in this regard are the DOI, TAM, UTAUT, and Theory of Planned Behaviour. The researcher briefly presents the DOI and TAM below, as these two theories provide the framework for this study.

1.3.1 Diffusion of Innovation (DOI) Theory

According to Khan and Woosely (2011), diffusion is concerned with how innovation diffuses or gets accepted by society over time. Rogers (1995), who pioneered the theory, defines an innovation as a specific idea, practice or object that is perceived as new by an individual or other unit of adoption. Al-Jabri and Sohail (2012) indicated that the DOI theory seeks to explain how, why, and at what rate new ideas and technology spread through cultures. This theory originated from rural sociology, where there was an analysis of how agricultural technology diffused into the farming community in the United States (Ryan and Gross, 1943). It spread to other countries in Europe, Asia, Africa and Latin America in the 1960s. However, its application was most apparent in the diffusion of agricultural innovations of that era (Rogers and Valente, 2003). Rogers (1962) conducted an expansive study based on the diffusion studies done in earlier years. The publication gave rise to the elements of diffusion of innovation,

which are: innovations, adopters, communication channels, time and social systems. According to Rogers (1962), an innovation is characterised by attributes such as:

- Relative advantage - This refers to the advantage that the user gains by using the newer innovation.
- Compatibility- This looks at how the new innovation fits in with the task at hand.
- Complexity- How complicated is the innovation to potential adopters?
- Trialability- The ease with which the newer innovation can be tested in similar situations before the actual implementation.
- Observability- The clear and visible benefits attained by using a specific innovation amongst various innovations.

Regarding individual adopters, Rogers (1962) categorised them as innovators, early adopters, early majority, late majority, and laggards. The categorisation of individuals is necessary because they possess varying degrees of adoption motivation and potential (Khan and Wooseley, 2011). This research does not necessarily analyse the DOI model comprehensively, but some questions in the survey were drawn from the DOI model.

1.3.2 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was pioneered by Davis (1985), who derived it from the earlier social psychologists Fishbein and Ajzein (1942). The latter developed the Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB). These theories allude to the fact that the attitude and action of an individual who is faced with a new challenge will be dependent on the subjective norms and beliefs harboured by such an individual. Davis (1985) applied the TRA theory in the information systems field, giving rise to what is widely known as the Technology Acceptance Model (TAM).

In its original form, the TAM theorises that an individual's behavioural intention to use a system is determined by two beliefs, namely: perceived usefulness and perceived ease of use (Venkatesh and Davis, 2000:187). These two variables, together with the behavioural intention of an individual who has a positive attitude, determines the actual usage of the system. Perceived usefulness is defined as the degree to which an individual believes that using a particular system will enhance his or her job performance (Davis, 1985; Venkatesh and Davis, 2000). In the context of this research, for a Unisa librarian to utilise a specific technology system, there should be some form of perceived guarantee that such a system will enhance or fulfil the given task. Similarly, the perceived ease of use implies that by using the system, very little effort will be physically or mentally required from the user.

Venkatesh and Davis (2000:187) stated that, other things being equal, the easier the system is to use, the more useful it becomes. Figure 1.3 below illustrates one of the modified versions of the TAM model, which takes into consideration the external variables that play a role in influencing or determining acceptance, but which were not included in the original TAM model.

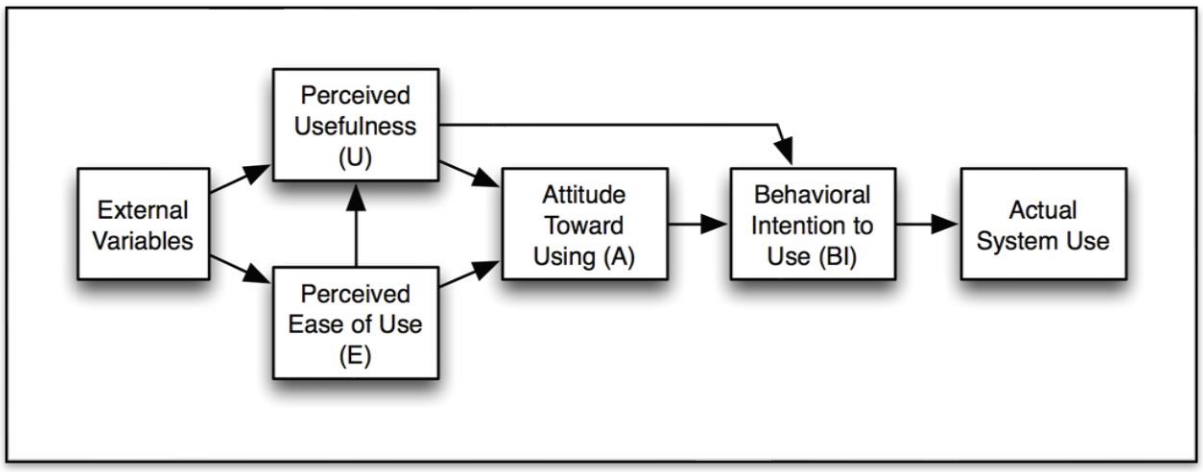


Figure 1.2: Technology Acceptance Model

Source: Davis, Bagozzi and Warshaw (1989)

Venkatesh (2000) further developed the TAM model and came up with a newer model called the Unified Theory of Acceptance and Use of Technology (UTAUT). This model incorporated several social variables and cognitive instrumental processes, in order to enhance the validity of the TAM model.

1.4 Integration of TAM and DOI variables

The relationship between the Technology Acceptance Model and Diffusion of Innovations theory has not been thoroughly studied in terms of how their constructs can work together in a particular e-learning situation. According to Lee, Hsieh and Hsu (2011), the integration of both models increases the possibility of understanding the issues being studied. Abdekhoda, Ahmadi, Dehnad, Noruzi and Gohari (2016) showed empirically that combining both theories enhance the validity of the conceptual path model.

There is a vast amount of literature that focuses on each of these theories and successfully applies them in various settings. However, on closer examination, the two models have elements of variables that overlap. Lee, Hsieh and Hsu (2011) conducted a pioneering study that integrated the variables in both the TAM and DOI theories in studying the adoption and usage patterns of e-learning systems. They found that the relative advantage variable in the DOI is similar to the Perceived Usefulness variable in the TAM, whilst the Complexity variable is similar to the Perceived Ease of Use variable in the TAM. Khan and Woosley (2011) analysed variables that are useful in studying the TAM, DOI and UTAUT. Lee et al. (2011:125) blended them and indicated that the TAM and IDT (acronymed as DOI in this study) are similar in some constructs and complement each other in examining the adoption of IS/IT. Al Rahmi et al. (2019) were also in favour of an integrated extended model that combines TAM and IDT with constructs that are complementary to each other, as indicated above.

The present study follows the same approach by blending variables in the TAM with those in the DOI model, focusing on their correlations. Unisa librarians are located within a

social system, and their innovation decisions depend on their knowledge, persuasion, implementation and confirmation, which are stages in decision making in the diffusion process (Rogers, 1962; Orr, 2003). Abdekhoda et al. (2016) studied the attitude of physicians in Tehran (Iran) using the integrated model of TAM and DOI constructs, in order to determine the acceptance and adoption of the Electronic Medical Records system. Figure 1.3 below illustrates the conceptual path model developed by these authors. The conceptual research path model is useful for the present study, because it reveals the relationship between the two models (TAM and DOI) when they are simultaneously applied to test the dynamics of web technology adoption. The research model further offers useful guidance to the researcher, by providing a clear and systematic way to answer research hypotheses and objectives.

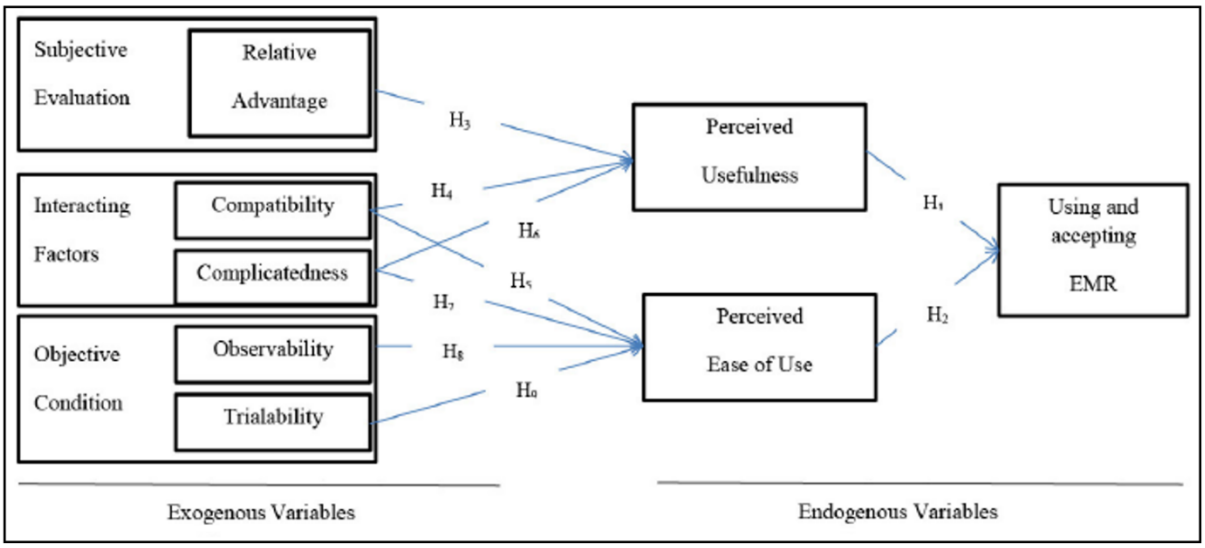


Figure 1.3: TAM and DOI integrated conceptual path model

Source: Abdekhoda et al. (2016)

1.5 Formulation of the research hypotheses

The study integrates variables in the DOI and TAM models to explore the adoption and acceptance of web technologies in the ODeL environment of Unisa Library. The research model illustrated in Figure 1.4 below is adapted from a path model (Abdekhoda et al., 2016), which links the constructs of DOI that focus on organisational adoption dynamics with the

TAM constructs that focus on individual acceptance dynamics. Figure 1.4 illustrates the path model for the adoption of web technologies by Unisa librarians, to improve services offered to researchers and students in an ODeL library. It further shows the hypotheses presented by the researcher in order to provide answers to the problems stated in this study.

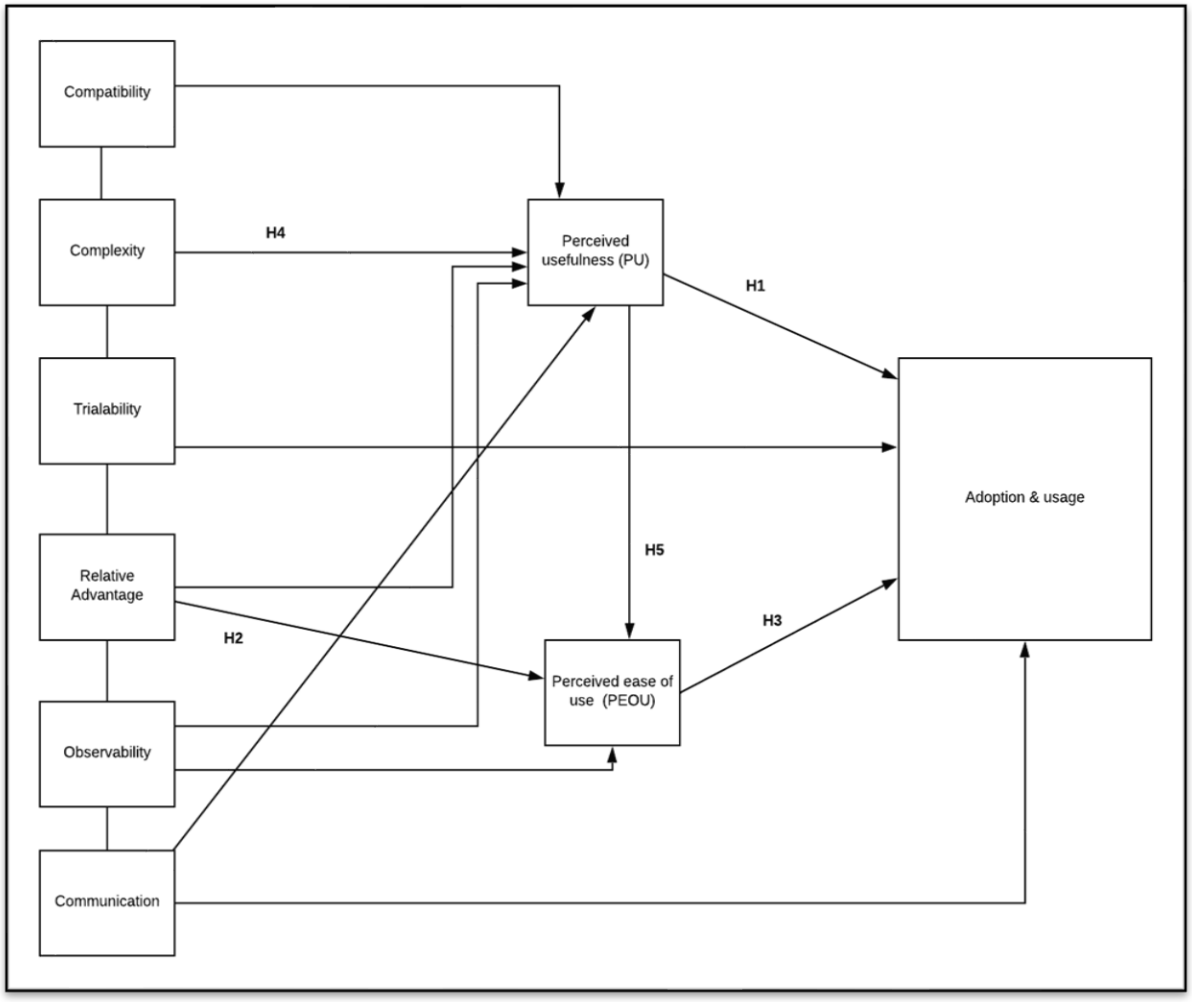


Figure 1.4: Conceptual research path model for web technology usage and adoption at the Unisa Library

Patten and Newhart (2018:84) indicated that a research hypothesis is concerned with testing the predictions of a study. The predictions may be based on an educated guess or a formal theory. Khothari and Garg (2019:179) further stated that a hypothesis is a proposition or set of propositions that provide an explanation for the occurrence of a specified group of phenomena, either asserted merely as a provisional conjecture to guide some investigation, or accepted as highly probable in light of established facts. The researcher did not adopt all the

hypotheses shown in Figure 1.3, but rather focused on the five dimensions that are central to the research objectives. However, the relationships between all the variables (see Figure 4.11 and Table 4.17) and the implications of such relationships are discussed in the findings.

Hypotheses

The hypotheses of this study are as follows:

H1. The perceived usefulness of web technology tools by librarians at the UNISA Library will positively lead to the adoption of these tools for library services.
H2. The perceived usefulness of web technology tools by librarians at the UNISA Library will significantly depend on the relative advantage that the librarians expect to gain when using such tools.
H3. The perceived ease of use of web technology tools by librarians at the UNISA Library will significantly influence their acceptance and adoption.
H4. The perceived complexity of library web technology tools by librarians at the UNISA Library will have a significant effect on the perceived usefulness of these tools.
H5. The perceived usefulness of library web technologies by Unisa librarians will significantly depend on the perceived ease of use of these tools.

1.6 Contextual setting

This research was conducted within the context of the University of South Africa (UNISA), and in particular the library department. Unisa is a large and complex university that has been undergoing rapid transformation recently in terms of its policies, structures, systems and use of technology, as well as its capabilities and core pedagogies, as we adapt to the changing technology landscape, and respond proactively to the requirements of a highly diverse student body (Makhanya, 2013: 01). The diversity and challenges of offering services to Unisa students is highlighted by referring to the enrolment figures of Masters and Doctoral students from 2013-2018, as illustrated in Figure 1.5 below.

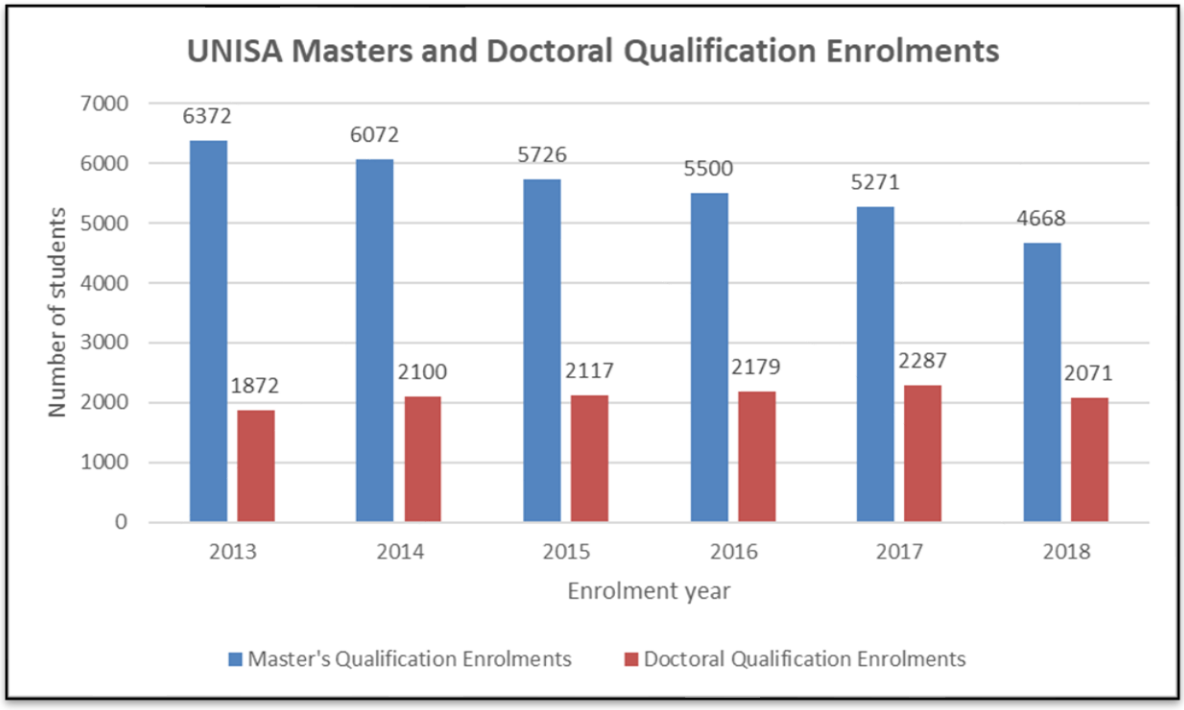


Figure 1.5: Masters and Doctoral student enrolment figures

Sourced from http://wpheda.unisa.ac.za/PowerHEDA/dashboard.aspx, (Accessed 15 February 2019).

The library, as one of the biggest support departments at Unisa, must adapt to newer ways of supporting the university model, and to cope with the high numbers of researchers and undergraduate students. Due to the rapid emergence of distance education, the changing nature of information access and the demand for equitable services for all students and faculty in higher education, serving the needs of distance students has become increasingly important (Yang, 2005:92). This study focuses on the use of web technologies to improve access for researchers and students to library and information resources.

Other researchers, such as Aharony (2009); Maness (2006); Seena and Sudier (2014); and Xu, Ouyang and Chu (2009), explored the impact of library web technologies in various settings, but no studies have fully investigated the opportunities and challenges which ODeL libraries such as Unisa encounter when implementing web technologies. This study offers a unique context because it focuses specifically on ODeL libraries, an area which lacks thorough research in terms of utilising web technologies relevant to such an e-model. The geographic

disparity between librarians and clients requires that the utilisation of web applications be done on a larger scale than it is in residential libraries. The lack of librarian-student physical contact justifies the larger scale of utilisation of web technologies in ODeL universities than their residential counterparts. This means that the adoption of web tools may be influenced by other factors which are not common in the previous findings, but which may be revealed within an ODeL context.

1.7 Statement of the problem

The study dealt with the extent to which the use of web technologies affects the library services in an ODeL library, and how librarians accept and adopt web technology tools in an ODeL library. The Unisa Library has been using various web technology services throughout the years as a way of improving its services and making them more accessible to clients. Librarians have investigated the feasibility of innovating web applications for use in the different tasks that they perform, but few studies have explored the impact that such web technologies have on the usage of the library resources in online distance institutions. At the same time, the implementation process of these technologies involves many issues that are highlighted in various meetings and forums in isolation, without the benefit of a study that investigates the process and makes scientific recommendations.

Furthermore, the problem centres on the adoption of and adaptation to web technologies by librarians, dynamics in the implementation and usage process, sustainability of adopted tools, and the potential benefits of web technologies in an ODeL library. The university will also benefit from this study, because participants in this study are questioned about the policies of the mother institution, as well as the extent to which these policies they support the implementation of web tools, or whether they are too rigid and therefore hinder the utilisation of innovations.

For the mother-institution to be rigid to new innovation is a challenge on its own, because the library may view a particular technology application to provide potential solutions for rendering a particular service, whereas university policies do not approve the usage of such an application due to various issues, such as bandwidth or security concerns. Venkatesh and Davis (2000), in their introductory remarks, indicated that the adoption and use of information technology in the workplace remains a central concern of information systems research and practice. Despite impressive advances in hardware and software capabilities, the troubling problem of under-utilised systems persists. Under-utilisation may be attributed to the reluctance of librarians to adopt and adapt to new technologies, which may then lead to poor utilisation of the available resources in an ODeL library, hence the need to investigate the problems stated above. Furthermore, under-utilisation may be attributed to the lack of support by the management of the ODeL library or the mother institution.

1.8 Purpose of the Study

The study aims to examine the acceptance and use of web technology tools by librarians in the Unisa Library.

1.9 Research objectives

The objectives of this research are:

i. To examine the web technology adopter categories among Unisa librarians,
ii. To examine the web technology tools commonly adopted by Unisa librarians,
iii. To examine the challenges encountered by Unisa librarians when using web technology tools,
iv. To understand the factors that influence the adoption of web technology tools by Unisa librarians,

v. To examine sources of influence in the adoption and use of web technologies by Unisa librarians, and,

vi. To analyse the TAM/DOI variables of perceived usefulness, perceived ease of use, relative advantage, compatibility, complexity, trialability, observability and communication.

1.10 Delimitations of the study

The study focuses on librarians' usage of web technology tools to enhance service delivery at the Unisa Library. However, the study does not focus on web technology tools or applications being utilised in other departments of the university. This study uses web technology as an all-encompassing concept, without specifying the era of the web. Thus, the study does not focus on whether the web technology tools implemented by Unisa librarians belong to the Web 1.0, Web 2.0 or Web 3.0 era. This is because the problem under investigation does not necessarily focus on applications introduced in a particular era, but rather focuses on the web applications introduced at Unisa Library.

The debate around whether the Web 1.0, Web 2.0, and Web 3.0 eras in general qualify as a technology or just as social web phenomena is also not part of this study. Instead, the focus is on librarians offering library services to clients using web technology applications in the ODeL environment of Unisa Library, and on issues related to the acceptance or rejection thereof. The research does not deal with issues of the diffusion of technological innovations comprehensively, but uses characteristics of innovation, adoption rate and adopter categories to study the patterns of and reasons for librarians' innovation of web technologies.

The implemented web technology tools are not new inventions, but rather those that have already been developed and used in some other sectors. The participants in this study are limited to Unisa librarians, who are also users of web technology tools. It is necessary to limit

this study to the Unisa Library in order to focus on library issues that are common in online distance learning environments. Leedy and Ormrod (2013:43) recommended limiting the study so that it describes precisely what the researcher intends to do.

1.11 Significance of and justification for the study

This study is important for the library and information science profession, because it provides librarians with knowledge on how they should respond to challenges brought about by the constant changes in web technologies. The study is further helpful in highlighting opportunities that web technologies may offer in terms of delivering services in smarter, more modern ways than traditional library services. The service dynamics within the library and information profession, and the diverse clients served by librarians justify the researcher's decision to investigate how librarians utilise web technology tools. Furthermore, the study builds a body of knowledge on how librarians should adapt to using newer web technology tools to satisfy clients' information needs in an ODeL environment. It interrogates the relevance of the technology acceptance model and theories on innovation adoption rates among a group of librarians in an ODeL institution. Lessons learnt do not only apply to the Unisa Library, but are relevant to the library and information profession as a whole (particularly those with an interest in library technologies used to serve remote clients).

Leedy and Ormrod (2010:122) stated the following:

> *"You must convince your readers that your planned research is not a trivial, meaningless undertaking – that, on the contrary, it can potentially make a substantial contribution to the body of human knowledge and may even in some small way help to make a world a better place."*

Research in the field of open and distance learning focuses mainly on how academic institutions respond to newer ways of delivering tuition using web technologies, in comparison to the traditional methods of print-based tuition. Very little research focuses on how support

departments such as libraries should respond to the change from print to web-based library services, particularly in ODeL institutions. Mabunda (2010) highlighted facts related to students' adoption of information and communication technologies (ICTs) in teaching and learning in the Unisa environment. Mabunda's study focuses on general ICT, but it does not reveal how ODeL changes have affected the way in which other support departments at Unisa should operate. Leong and Ibrahim (2015) conducted a study on technologies that improve the learning environment in Malaysian universities, particularly in digital libraries. Lietzau and Helgren (2011) and Aharony (2009) explored whether librarians are familiar with technological innovations and the use of web applications, and whether they even understand the power of using web technologies in library services.

This research goes beyond what has already been done in previous studies and provides suggestions that can be utilised by library practitioners. The actual process of implementing web technologies at Unisa Library, the type of applications implemented, and the gains achieved by the library, will ultimately be beneficial to the library community as they learn from the experiences of Unisa librarians, as depicted in this study. Booth (2008:148) emphasised that emerging communication and collaboration technologies should continue to be examined in terms of their ability to impact user behaviour, as well as their potential to provide effective platforms for reference and outreach services.

CHAPTER 2:
LITERATURE REVIEW

2.1 Introduction

It is important to conduct a literature review for this study because a literature review highlights the works and methodologies that previous scholars used when doing research on similar issues. The literature review gives credibility to a study and justifies the need for further exploration of the subject matter, since other scholars have already researched it. Kumar (1996:26) emphasised the importance of conducting a literature review when he stated that it helps the researcher to achieve clarity and focus, improve his or her methodology, and broaden the knowledge base in the research. Leedy and Ormrod (2013:51) and Newman (2003:03) also agreed that the literature review helps to ascertain whether other scholars already answered the problem in the present study.

In this study, the literature review was divided into five (5) categories. Some of these categories form the basis of the research objectives, as laid out in the previous section of this chapter. The literature review probes issues dealing with:

(i) Web technologies and their impact on the library sector.

(ii) Web technology tools common in libraries.

(iii) Web application usage in libraries.

(iv) Libraries in ODeL institutions, and the delivery of services to clients.

(v) Acceptance and adoption of web technologies by librarians.

2.2 Web technology tools common in libraries

The literature in this section deals specifically with web technology tools which are commonly applied in various entities, including libraries. The researcher starts by outlining the capabilities of web technologies and the building blocks that characterise web technologies, looking at

issues such as interactivity, collaboration, participation and communication as pillars of web technologies.

Various entities and corporations worldwide utilise web technology services for different functions. The library sector also implements web technologies based on activities that need to be accomplished in specific sections of a library. Sahai and Graupner (2005) defined web technology services within the context of an enterprise. The authors stated that web technologies distribute services via the web through Uniform Resource Locators (URLs).

Librarians worldwide have been using web technologies, specifically social media network services, from the advent of web 2.0 to the now emerging web 3.0. This led to the introduction of operational concepts such as Library 1.0, Library 2.0 and the anticipated Library 3.0. In the Library 1.0 era, users were only consumers of the information provided by librarians, but in the Library 2.0 era, users collaborate, participate and generate or produce (blogs, wikis and LibrayThing, among others) some of the information retrieved in an open, interactive web platform. In the library context, the participatory nature of the web (in a web 2.0 context) enables User 2.0 to collaborate with a fellow user and then with Librarian 2.0. The collaboration between User 2.0 and Librarian 2.0, using web technology tools, enables User 2.0 to access the information required in his areas of learning. In some instances, User 2.0 participates in the building of the online catalogue using web applications such as LibraryThing, which was previously unheard of. Eden, Westcott, Chappel and Lebel (2009) published a study based on the implementation of LibraryThing for libraries in Claremont, Cape Town. LibraryThing provides an opportunity for library clients to contribute to the cataloguing of their reading material, as well as to share their catalogues with fellow readers. LibraryThing allows users to tag items with meaningful keyword descriptors, review items, browse others' holdings based on similarly held items, browse books tagged with the same descriptor, and to create and contribute to the group (Eden et al., 2009). The cataloguing of

reading material was traditionally the preserve for professional cataloguers, but modern tools are capable of offering clients the opportunity to participate in such a unique task.

These clients collaborate with other scholars in disseminating the required information, using various applications on platforms such as Researchgate and Mendeley.

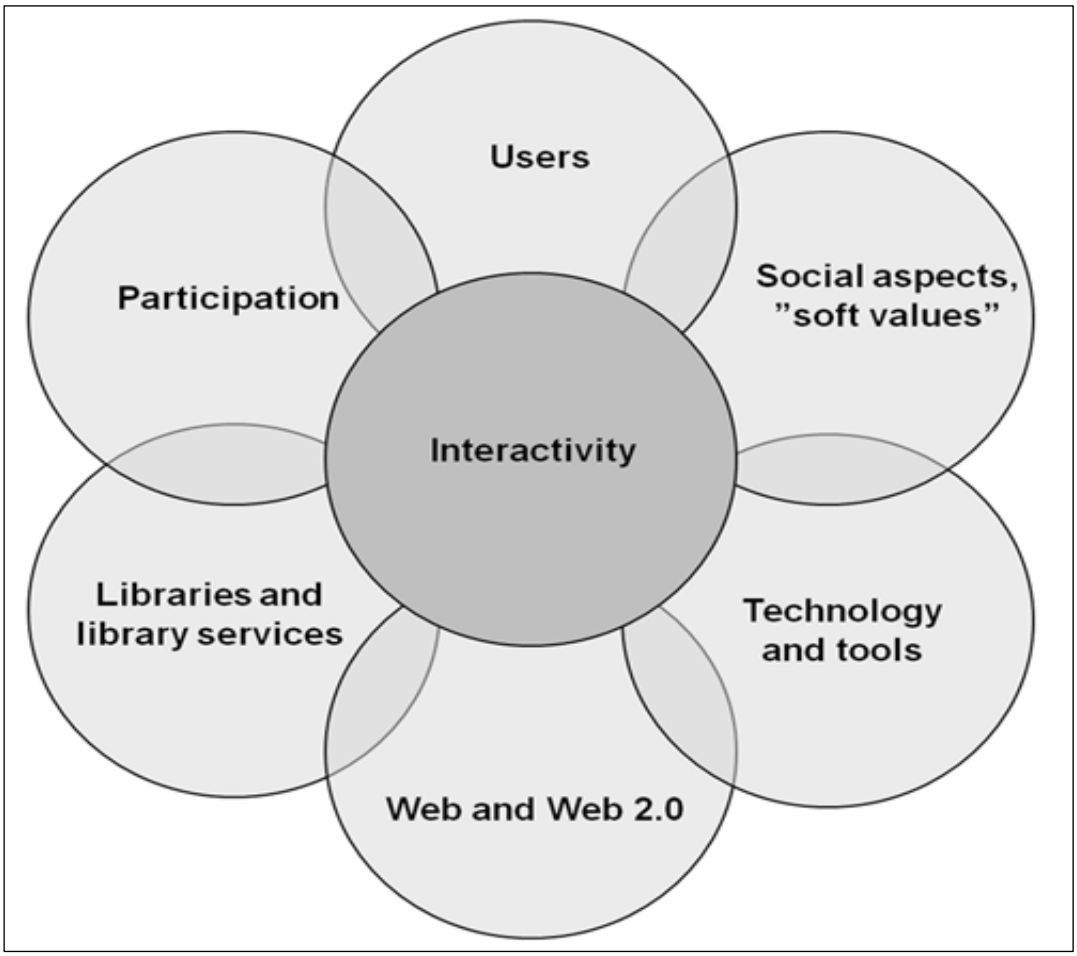


Figure 2.1: The building blocks of Library 2.0

Source: liseducation.wordpress.com (2009)

Figure 2.1 above shows an example of a modern library, where web technology tools play a crucial role. It emphasises concepts such as interactivity as central points, and illustrates the participatory nature of such a library. The central point is characterised by interactivity, where all elements around it work together. In the context of an ODeL library, users are situated in disparate locations. Web technology tools operating within web platforms enable the distance user to participate, collaborate and finally interact with librarians, irrespective of his or her

geographic location. The characteristics of such web technology services are discoverability, communicability, conversationality, security and manageability (Sahai and Graupner, 2007).

Within the participatory model proposed by Nguyen (2015), a library adopting web technologies is characterised by three attributes, namely community, empowerment and experience. As a community, clients should connect with each other, share resources and get support from their peers. Such interaction may happen in a localised context or in a virtual environment, such as the ODeL context. For the library to be capable of empowering such interaction, it must offer clients the ability to prosume (being both producers and consumers), give more authority for clients to be participative and independent, and ultimately enable them to collaborate with fellow clients (Nguyen, 2015). The service experience in such a library should make clients comfortable, even in their future encounters with librarians. Clients will then perceive the library not only from the traditional formal perspective, but also from the perspective of libraries as an area where web technologies make it easier for them to retrieve information. The ultimate implication is a favourable studying environment and a library that is perceived as a virtual, interactive study area, which gives clients an opportunity to contribute to library content. All stakeholders in this participatory model aim at achieving an enhanced library experience for clients, where equality and a learning community are realised by offering tailored services. In the next section, the researcher reviews literature that analyses common web technologies in their broad conceptual categories, and then based on their specific functions as follows:

2.2.1 Social media tools

McFedries (2009: XI) described social media as a phenomenon that is turning everyone into a publisher and distributor of media. In modern libraries, social media is useful for empowering library clients who were historically passive recipients of information into contributors of

information. Grotsseck and Holotescu (2011:03) commented that social media is about transforming internet users from traditional readers to creators of content, as well as interacting in the online world in order to form new personal or business relationships.

Similarly, Kaplan and Haenlein (2010:61) defined social media as Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content (UGC). George and Scerri (2007) conducted a pioneering study on UGC, and focused on the legal implications that should be considered when dealing with knowledge that is contributed by users. Barassi and Trere (2012) indicated that the web needs to be understood from the perspective of being an integrated socio-technical system, in which different web applications and stages co-exist. Various scholars have outlined the building blocks of web technologies and the capabilities of such technologies in the library context from a social media perspective. Boateng and Liu (2014), Bradley (2010), Kaplan and Haenlin (2010), and Kietzmann, Hermkens, McCarthy and Silvestre (2011) identified the following characteristics of web technology building blocks within the context of social media:

- User-Generated Content (UGC)
- Participative, interactive and user engaging
- Collaborative

Common examples of user-generated content in the modern era are web technologies such as blogs and wikis, as well as the social networking functionalities of collaborative academic sites such as Researchgate, Mendeley and RefWorks.

a) Twitter

This is an online micro-blogging service for distributing short messages amongst groups of recipients via personal computer or mobile telephone (Britannica Online, 2019). Many academic libraries worldwide (ODeL or residential institutions) use the Twitter service to

communicate with clients about upcoming events and library services. Murphy (2008: 375) suggested that these tools are great for library announcements, but that this is just the tip of the iceberg. Librarians can post news such as special events, holiday hours, exhibits, new book arrivals, updated resources, or reminders about important resources, instruction sessions, and new reference services.

b) Facebook

Kennedy and Shields (2012) stated that Facebook is a tool that helps a person to establish personal networks in the real world, and to be online and more visible and active than they really are. In the context of an ODeL library, Facebook will help clients to engage with librarians about library services. It is also an easy platform for librarians to invite clients for training and to market library events and services.

c*)* *Blogs*

A blog is a website that is usually maintained by an individual, with regular entries consisting of commentaries, descriptions of events, and/or other material such as graphics or video. Dhiman and Sharma (2008) described weblogs or blogs as sites that capture views, ideas or opinions over time. The most important positive attribute of blogs mentioned by these authors is their accessibility to the general public, with a variety of stories in different fields, thereby encouraging diverse readership and robust debate about the subject matter. In the context of the library, blogs may provide clients with opportunities to contribute content, instead of being recipients of content that has only been contributed by librarians. This is in line with the new participatory model and enabling platform offered by web technologies, which allow libraries to benefit from user-generated content.

d) Wikis

Wikis are collaborative efforts that can be edited by anyone who has access to then. In academic libraries, wikis are mostly used to create collaborative subject guides. Chu (2009:170) indicated that Wiki means 'quick' and is known for being simple and easy to use. In the context of the library, wikis are useful for the co-construction of web pages, information sharing, archiving, and for faster updating of web pages, (Chu, 2009).

e) *Really simple syndication feeds (RSS feeds)*

Britannica Online Encyclopaedia (2019) defines RSS feeds as a set of instructions residing on the computer server of a website, which is given upon request to a subscriber's RSS reader or aggregator. These are web feeds that allow users to access updates to online content in a standardised, computer readable format. The news aggregator automatically checks the RSS feed for new content, thereby enabling the content to automatically pass from website to website or from website to user. Boateng and Liu (2014:133) indicated that RSS feeds can be utilised in many ways, from sending out library news to publishing a list of new books, making announcements about workshops and exhibitions, etc. Furthermore, librarians can use RSS feeds to publish newly ordered and newly received books, as well as to provide links to relevant journal articles as part of current awareness services (CAS). The Unisa Library website and Libguides provide links to new books ordered and received, thereby offering remote clients an opportunity to view newly acquired material in their specific subject area.

2.2.2 Social bookmarking tools

Millen, Feinberg and Kerr (2005) indicated that social bookmarking systems share several common features, which allow individuals to create personal collections of bookmarks and easily share their bookmarks with others. The authors stated that these centrally stored collections could be accessed from any web-connected machine. Estelles, Del Moral and

Gonzalez (2010:176) further stated that social bookmarking systems (SBS) provide users with the reference (marked), description, classification, and the possibility of sharing resources with other users. The following are examples of social bookmarking tools analysed in various studies.

i) *Academia.edu*

This is a non-profit organisation offering a platform for researchers to share papers, monitor the impact, and follow researchers in particular open access movements, as well as facilitating the instant distribution of research and providing a peer review system alongside distribution, instead of prior to it. Niyazov et al. (2016) indicated that Academia.edu is a website where researchers can post their articles and discover and read articles posted by others. Ovadia (2014) stated that Academia.edu tracks various metrics, showing users how many times their profiles have been viewed, how many times documents have been viewed, and even the searches that led people to their profile. Furthermore, Thelwall and Kousha (2014:723) stated that Academia.edu plays a role in formal scholarly communication, as authors can upload preprints and other documents to their profile. The tool is useful for the interaction between librarians and researchers in different fields. It may also assist researchers to create their accounts for e-visibility purposes, as well as to monitor the impact of their publications. In an ODeL library context, the functionalities that Academia.edu offers should enhance the ability of librarians to follow and be followed by their clients, thereby offering and sharing crucial information about library services.

ii) *Diigo (Digest of Internet Information, Groups and Other Stuff)*

According to Estelles, del Moral and Gonzalez (2010:178), Diigo is an application that allows the use of social annotation through social bookmarking, text annotation in-situ, tags describing

the web site, clipping, pictures, etc. It is a social bookmarking tool that requires clients to register and bookmark and annotate relevant articles for their research work.

In the library context, Diigo may be useful for selective dissemination of information (SDI). The bookmarked articles may be linked within the student online system in various groups created by librarians, so that clients in such groups will have access to these linked articles. In the Unisa Library environment, accessing Diigo bookmarked articles via the myUnisa system (Unisa student system) may offer a user-friendly, smart platform that is already tailor-made to benefit researchers (Masters and Doctoral students) in an ODeL environment.

2.2.3 Online training and video conferencing tools

Sherer and Shea (2011:56) reported that online videos are used increasingly in higher education teaching as part of the explosion of Web 2.0 tools that are now available**.** Barnhart and Stanfield (2011:61) indicated that web conferencing allows people to meet online in real-time (often including audio, so that attendees can talk, in addition to text-based chat, to one another) and is used in some of the online course offerings, as well as for intra-system meetings to cut down on travel costs. The following are some examples of video conferencing tools that were analysed in various studies in terms of their ability to execute online library training:

a) Podcasts

According to Boulos, Maramba, and Wheeler (2006:03), "Podcasting's essence is about creating content (audio or video–vodcasts) for an audience that wants to listen when they want, where they want, and how they want. Users can listen to podcasts and watch vodcasts on their computer (e.g., using Windows Media Player), or download to portable MP3/MP4 players and listen/watch on the move/anywhere, which is perfect for the busy health professional."

Podcasts are audio content that is available on the internet and can be delivered automatically to a PC or MP3 player. Bradburry (2018:46) defined podcasts as a piece of audio or video

media that, when combined with an RSS feed, can be subscribed to by a worldwide audience. He further stated that teachers everywhere are creating podcasts as a way of telling their stories in their schools, flipping their classrooms, or archiving their classroom collection.

In ODeL environments, podcasts may be useful for recording training sessions on how to use library resources. These recordings help to educate clients who are geographically distant from their librarians on how to independently utilise library resources. They may be used for information literacy tutorials, and training on general search skills and usage of the library catalogue (Boateng and Liu, 2014:123).

b) Skype

According to Baset and Schulzrinne (2004:01), Skype is a peer-to-peer VoIP client developed by KaZaa in 2003. It is a telecommunications application software/programme that specialises in providing video chats and voice calls between computers, tablets and mobile devices, amongst others. It allows users to communicate over the Internet by voice using a microphone, by video using a webcam, and by instant messaging. Brittannica Online (2018) defined Skype as a software for communication over the Internet, which includes voice, video and instant message capabilities.

In the Unisa ODeL environment, librarians may use Skype to offer live online one-on-one or group training on the utilisation of library resources. Booth (2008) published a study about the usage of Skype in the higher education environment, and, how it was successfully implemented at the Ohio University libraries. Booth (2008:163) further indicated that 'Skype a Librarian' is intended to provide patrons who prefer interacting via Skype to other web-based methods with a convenient means of contacting library staff for research and information assistance.

2.2.4 Research management/Citation management tools

Citation software facilitates both the management and the citing of references (Hristova, 2012:46), but the balance between these two aspects may be very different across tools. These are web tools used by researchers and students to manage, store and organise citations and bibliographies for their research. Several citation management tools existed for years in desktop format until they recently became available on a web platform. Zhang and Hristova (2012) conducted a study on usage patterns and the role played by libraries in managing these tools. Furthermore, these authors focused on the adoption patterns of citation management tools. In the context of this study, it is important to analyse the acceptance and usage patterns of these tools, so that the dynamics of their adoption by library clients can be determined and further improved in terms of their shortcomings.

i) RefWorks

According to Marsalis and Kelly (2004:01), RefWorks is a web–based citation manager.

It is a citation management tool developed by the ProQuest publishing company and used by scholars to collect and import articles from various databases, as well as to manage and store citations, and share their research works with other scholars worldwide. Unisa Library has a subscription for RefWorks, and the Unisa librarians market RefWorks and offer training, both online and face-to-face, in order to help researchers to utilise the tool independently.

ii) Mendeley

According to Zaugg, West, Tateishi and Randall (2011:33), Mendeley is a free, web-based tool for organising research citations and annotating their accompanying PDF articles. Mendeley is a free set of tools that assists users with resource discovery, collaboration, information management and citation (Macmillan, 2012). It is available both as an open-source tool with

limited provisions, and as an institutional edition that is available via subscription, with lots of added features and capabilities for researchers and librarians. Librarians play a crucial role in answering queries, troubleshooting and offering training to researchers on how to use Mendeley (Zhang, 2012). In addition, Unisa librarians in the Client Services division create public groups for various themes (e.g. predatory publishing and plagiarism), whereby remote clients can join groups and participate in discussions within specific groups.

iii) Researchgate

ResearchGate is the professional network for scientists and researchers. It is a platform used by researchers to share papers, obtain usage statistics about their publications and collaborate with peers working on similar projects (Researchgate, 2019). For Unisa librarians, who work within an ODeL environment, it offers a platform to interact with clients by marketing services/ events, providing relevant articles for research, etc. Although the platform is not necessarily designed for library purposes, librarians' creativity makes the platform suitable for networking and sharing research information with fellow researchers. O'Brien (2019) also emphasised that librarians play a role in familiarising researchers with Researchgate, in order to assist them in establishing scholarly collaboration networks.

iv) Altmetrics

According to Rodgers and Barbrow (2013:04), Altmetrics provide an opportunity for institutions and researchers to join informal academic discourse with the formal output of research. Altmetrics is a data science that tracks online publications, and provides tools and services to institutions, publishers, researchers, funders, and other organisations, for them to monitor this activity. Librarians play a significant role in marketing and popularising the Altmetrics resource among researchers, so that the latter can monitor the usage dynamics of their publications in various scenarios, rather than only relying on citation databases. Thelwall

et al. (2013) and Brown (2014) discussed the functionalities of Altmetrics and highlighted its ability to act as an indicator of article impact and usefulness. Thelwall et al. (2013:06) also identified the shortcomings of Altmetrics in the research environment, such as the varying results between the different social media platforms.

2.2.5 Content management systems

*i***)** *Libguides*

Gonzalez and Westbrock (2010) indicated that Libguides are software applications that make it possible to collect knowledge and present information in an organised manner. Libguides have tab-based structures with a variety of boxes and columns available to create content in many different formats. Furthermore, libraries can use the Libguides program to create subject or course guides. Bernier (2010) stated that a Libguide is a robust content management system containing a variety of integrated Web 2.0 tools. Library sites can be customised to show only resources in specific subjects, thereby improving the user-friendliness and accessibility of library resources for clients. Libguides can also link podcasts (as done by some librarians at Unisa), which makes them a useful resource for training remote library clients to become information literate. The accessibility of library resources is significantly improved throughout the introduction of Libguides, and in online distance universities such as Unisa, Libguides may provide a platform for marketing events to specific and remote clients, as well as being used for current awareness services. Links to online reference services such as "Ask a Librarian" can be easily embedded into a specific Libguide, thereby offering a platform for remote clients to interact with a subject librarian in their specific field, without having to use the library website.

2.3 Other web technology tools used in the library

The number of web technology tools is growing rapidly. For example, the services of Web of Science (now Clarivate Analytics, which includes Incites), Google Scholar (GS), Scival, Scopus and others are tools that can be used to meet library needs. Librarians at Unisa are also required to analyse the bibliometrics of researchers and submit reports to Colleges/ Faculties for individual researchers and groups in specific fields. The institution further requires librarians to analyse collaborations, benchmarks and trends in specific subjects, and to formally create reports that can be used in the analysis of institutional research impact. Furthermore, plagiarism checking tools such as Turnitin have become very common in libraries, as the ever-increasing capacity of information technology has highlighted the need to address issues of intellectual integrity, now more than ever before. Newer web tools such as Cabell's are also common in libraries for the verification of a journal's authenticity, in view of the common trend of researchers being solicited by fake publishing companies to publish in predatory journals. Citation data in Google Scholar was originally aimed at identifying the most relevant documents for a given information query, but it has also been useful for formal or informal research evaluations. The free citation data in Google Scholar, accompanied by the free software known as Publish or Perish (Harzing, 2007), which gather citations from the Internet, has made citation analysis possible without a citation database subscription (Harzing & van der Wal, 2008). However, GS does not enable bulk access to its data, reportedly because their agreements with publishers preclude this (Van Noorden, 2014). Thus, third-party web-scraping software is currently the only practical way to extract more data from GS than is permitted by Publish or Perish. Web of Science and Scopus have been shown to be weak in the arts and humanities fields regarding citations, in comparison to the natural sciences and engineering fields.

2.4 Web application usage in libraries

There are many studies that have addressed the implementation and usage of suitable web technology tools in libraries worldwide. These studies have provided in-depth discussions on the useful and suitability of web tools for enhancing modern library services. Kim and Abbas (2010); Kumar and Triphathi; (2011) Antirroikko and Savolainnen (2011); Nguyen (2008); Nguyen (2015); Gichora and Kwanya (2015); Bradley (2007); Stuart (2010); and Seena and Sudhier (2014), amongst others, made significant contributions towards research on web technologies by identifying web tools/applications within the library context. Nguyen (2015), Paroutis and Al Saleh (2009), and Blank and Reisdorf (2012) conducted studies on web technologies within a participatory model of the library, where clients are no longer just passive recipients of information, but are also capable of contributing to a body of knowledge generated by working together as a community. The participatory nature of the web is highlighted by Paroutis and Al Saleh (2009:54), who stated that Wikipedia best exemplifies an environment where people work collaboratively to input, produce and update knowledge, as opposed to the traditional encyclopaedia, where information is static and predetermined.

Booth (2008), Booth (2010), Zhang (2012) and Hristova (2012) further portrayed web technology tools as making a significant contribution to library services, and looked at how they should be integrated into traditional library functions. These publications provide this study with a point of departure for analysing the dynamics of the implementation of web tools within the Unisa Library context. Kim and Abbas (2010:212) explored different functionalities of web applications by indicating which applications are user-initiated (folksonomy, tagging, bookmarking) and which ones are librarian-initiated (Podcasts, RSS feeds, and the recently introduced Libguides). The authors also focused on social media applications used for social interaction, such as Twitter, Facebook, wikis and blogs, amongst others. These web technology tools are common in ODeL institutions because of their geographic distance from their clients.

Furthermore, the above authors also highlighted modern web technology tools that are very common in academic institutions, such as Researchgate, Diigo, Academia.edu, ORCiD and Libguides, amongst others. These applications enhance collaboration and the sharing of scientific research amongst researchers, students and librarians, despite the distance between them and their institutions.

Boateng and Liu (2014) analysed more than one hundred (100) top university libraries in the United States (US), focusing on the usage trends and adoption of web technology tools. There is no distinction in their study in terms of which universities use the online distance tuition model, and which ones are residential. Boateng and Liu (2014) found that academic libraries are increasingly using Web 2.0 applications to promote themselves, enhance library services, and market resources to patrons. This research further benefited from the checkpoints used in Boateng and Liu's (2014) study to create a list of web technology tools common in libraries, which was also used in this study for the data collection instrument. Baro, Idiodi and Godfrey (2012) discussed the level of awareness regarding web tools in Nigerian libraries and the purpose of implementing specific tools. The study examined the ways in which librarians acquire skills for introducing web technology tools in their libraries, as well as the barriers they encountered when implementing such applications. A comparative study by Baro, Ebiagbe and Godfrey (2013) analysed the implementation dynamics of web technology tools in South African and Nigerian academic libraries. This research goes further by highlighting the dynamics of implementing web tools/applications within the context of an ODeL library, using some of the already utilised methods identified in the literature review. Unique challenges such as network accessibility and computer availability, which the previous studies identified as impediments or barriers to the implementation of web tools in Nigerian libraries, are used in this research, together with the technology acceptance model constructs and adoption

determinants. Unisa is in South Africa, where Internet access is not a problem in most urbanised parts of the country.

However, as already indicated in the previous chapter, some library clients are situated in rural environments with less developed Internet access, which may affect their usage of web applications. Silva and Rahman (2008) highlighted issues such as privacy, security and legislation as potential challenges to the implementation of web technologies, particularly during the Web 3.0 era.

Chetty (2011) investigated Web 3.0 and its impact from a global point of view to a South African point of view. Her thesis looked at how Web 3.0 may resolve some of the challenges common to Web 2.0, such as privacy and intellectual property for user-generated content, by using the semantic web. The study was outside the library context, but the challenges and issues which the author discussed are useful for this study, since it analyses how South African web technology users interact online. The analysis of user interaction helps in identifying the usage patterns that determine why some applications are more useful than others, and which traditional library services they should replace or be integrated with.

Anttiroiko and Savolainen (2011:87) focused on how libraries should adopt web applications to enhance their services. The questions addressed by the authors are similar to what this study is interrogating with respect to, what kind of web technologies are adopted, for what purpose, and how such web technologies contribute to the development of online libraries. A critical difference, however, is how these questions relate to an ODeL library, where the client is physically absent from the library that is supposed to serve him/her. While the services of librarians in place-based libraries might embrace web technologies, librarians in ODeL libraries are compelled by the nature of the institution and the clients that they serve to focus more on web tools in their services. Zhao, Deng and Zhou (2015) analysed the usage continuance of mobile applications adopted by libraries, questioning some anomalies in terms

of what makes clients adopt specific applications and then suddenly stop using them within a short space of time in most Chinese libraries. While this kind of experience might occur in non-ODeL libraries, librarians in ODeL institutions are obliged to adopt web technologies. This inference, a lesson learnt from Zhao, Deng and Zhou (2015), contributes towards directing the attention of this researcher to peculiar difficulties confronted by ODeL librarians in using web tools to meet their service demands.

Al-Daihani (2009), Bauman (2009), Chisega-Negrila (2012), and Chu and Yang (2012) conducted studies on web technology usage in various sectors, including the library. Al-Daihani (2009) focused on librarians working in academic fields (those who are teaching or training librarians). According to the information obtained from the University of South Africa library website (2019), a section of librarians in the Client Services directorate (Personal librarians and Branch librarians) have an educational role to play in training researchers on how to retrieve articles from various subject databases. They design training material and are required to have strong working relationships with academic staff. The study highlights common issues experienced when using web tools in the teaching or training context, such as usage continuance, accessibility, adoption, among others. The sustainability of web tools is very important when training library clients. Library clients who do not sustain the usage of specific web tools that they were trained to use may have trouble in accessing relevant material, which ultimately impacts on the adoption or rejection of such web tools.

Al Daihani (2009:42) stated the following: "The increasing use of Web 2.0 applications in the field of LIS makes it incumbent upon the educational programmes to respond to the challenges and demands of this technology." His study is useful for this research, since it depicted situations where web applications were implemented and how clients responded to them. Chisega-Negrila (2012) outlined how web technologies, in the context of Web 3.0, reveal the possibility of the web serving as an educational tool. The author referred to Web 3.0 as a

3D web, and visualised what searching for information in the future Web 3.0 environment will entail for librarians and clients, by stating that:

> *"The search results will consist of a multimedia report which contains the information collected from different sources, such as websites, but also from books, blog entries, and videos on YouTube by using a number of devices, computers, mobile phones, tablets…etc."*

The author looked at how people may be reluctant to use web technologies, i.e. how such "people will be trapped in the web revolution". Although the abovementioned study did not focus on the library setting, it is relevant to this research because it outlines the potential impact of the anticipated Web 3.0 on web technology users. It indicates what the Web 3.0 era will entail, what it can offer educationally, and the technical features of devices that will be required for browsing such applications. These speculative insights are important for this research, because an understanding of web technology 's future helps librarians in an ODeL environment to anticipate their clients' expectations.

Baumann (2009) further anticipated what Web 3.0 would bring by drawing a distinction between Web 2.0 and Web 3.0. The author indicated how Web 2.0 changed the average internet user into a contributor (i.e. the participatory nature of the web), whereas Web 3.0 improves on the preceding era by further developing the interface and the software. Evidently, a major concern of the ever-increasing development in web applications in ODeL libraries is the pressure that these tools put on library professionals. Bauman (2009) suggested that the academia, library and information science, as well as computer science, would benefit from the emerging Web 3.0. However, more research is required to establish the nature and implications of the transition to new technologies, most of which occur while librarians are already employed. In other words, librarians might not have been exposed to these technologies while they were in library schools. Without addressing these challenges, Chu and Yang (2012) have predicted how a library client in the Web 3.0 era would experience the literature searching

process. The authors explained how a client in modern libraries would conduct a search, and how databases would be able to offer intelligent predictions based on the user's input, thereby providing multimodal responses. However, this optimism may also serve as a hint of possible technology hiccups that may occur in the adoption stages. All the same, the study of Chu and Yang (2012) gives a useful background to Web 3.0 and the benefits of the semantic web, as well as depicting the future library outlook in the Web 3.0 era.

In their study, Kenefick and Werner (2008) showed how web technology tools would pose challenges for libraries. Kenefick and Werner (2008) emphasised that librarians should not only introduce new technologies to clients, but should also do a thorough analysis of the value that such technology brings to their service delivery process. These expectations cannot be met unless there is a clear understanding of adoption issues. Brindley (2009) elaborated more on the challenges facing libraries in the digital era, by stating the following (Brindley, 2009:07):

> *"This is as much a challenge to the role of the academic community as it is to the library, and we each have to find new roles and opportunities in this messier, more dynamic and democratic world."*

In this regard, the importance of re-examining information literacy programmes becomes very clear, in order to reduce the burden on librarians. There are significant changes in both residential and ODeL libraries in terms of how training is done due to the availability of web tools. Mabweazara and Zinn (2016) highlighted the importance of the appropriation of social media tools (part of web technology applications) in countries in Africa with growing economies. Their study comes closest to this research in its analysis of the implementation and usage of social media tools in the library context, although the present research focuses on a specific ODeL library. Factors that shape or constrain the usage and adoption of web technologies were investigated by Mabweazara and Zinn (2016), together with workplace usage (librarian's perspective) of the web tools based on specific tasks. The authors found that

the growing popularity and usage of new technology applications among tertiary institutions points to the effective adoption and deployment of social media platforms among university libraries, as a way of ensuring excellent service provision (Mabweazara and Zinn, 2016).

2.5 Challenges for the library and information science sector

The concept of web technologies is an overall concept embracing the social networking tools, collaboration tools and social bookmarking tools used via the Internet. Recently, these web technology tools have begun to play a vital role, by offering libraries and librarians worldwide a platform on the web for clients to interact with each other, as well as to contribute to the content that libraries offer. The background to web technology utilisation and the challenges that it poses are discussed in studies such as Hayman and Smith (2015); Sun and Chen (2011); Kenefick and Werner (2008); and Booth (2008), which show how libraries, and librarians in particular, are affected by the changes brought by newer or emerging technologies. Veletsianos (2010) described emerging technologies as tools, concepts, innovations, and advancements utilised in diverse educational settings (including distance, face-to-face, and hybrid forms of education) to serve a variety of education–related purposes.

The author clarified the fact that newer and emerging technologies do not necessarily have the same meaning. In this study, the researcher focuses on web technologies that were utilised recently and in previous years to offer better services to library clients in a distance education context. They may be newer or emerging technologies, but the main issue should be the fact that they supplement traditional print-based library services. The study depicts the social, organisational and contextual factors in emerging technology implementation, which have a bearing on the adoption decision.

Hayman and Smith (2015:08) suggested using the Evidence-Based-Practice (EBP) method to make an informed decision on whether a particular technology is useful or may be useful upon implementation. Such decisions depend on both hard, factual evidence and soft

evidence (opinions), and are pillared on individual expertise, external evidence and individual values. This study does not use the EBP, but rather uses the widely utilised technology acceptance theories (TAM) and diffusion of innovation (DOI) model as determinants of the adoption of an innovation.

Modern library clients have their 'footprints' in many web technologies, in order to satisfy their information needs. Sun and Chen 201:323 confirmed the reality of the changing information world by stating that the information world is in a state of rapid change. Zadeh, Veisi and Zadeh (2013:32) outlined how Web 2.0 in the library led to the introduction of the Library 2.0 concept. Library 2.0 emanated from synchronising web technologies for the library context, and by applying available web tools in order to deliver library services in a more modern, smarter way. The present study further portrays the educational role which librarians play in order to enhance the utilisation of services by library clients. It gives ideas on how web technology applications may assist in offering client training services, so that clients are able to utilise library resources independently.

According to Sun and Chen (2011:330), technology continues to evolve. Librarians will have to continue to evolve with it, not as people in the know, but as people who can share that knowledge as educators. In further affirming the resilience of librarians in an ever-changing technology world, Kenefick and Werner (2008:47) studied the prospects of libraries. Gregory (2009:76) indicated that despite facing all the changes and challenges caused by technological changes in their jobs, librarians still show commitment and perseverance in serving their clients. The authors reminded librarians of what people say when sympathising (in anticipation of job losses) with librarians, in view of new and emerging technology. Gregory (2009:79) stated:

> *"The library profession will go to the next level because of its commitment to service, not simply because of a desire of the latest and coolest technology."*

These abovementioned studies emphasise the drive to serve clients as a motivating factor for librarians who are using technology to enhance their services. Librarians who are not motivated to adopt new technologies will face the consequences of failing to adapt and to deal with the future library outlook (Gregory, 2009:78). Herring (2014:78) further interrogated the relevance of the library in the modern digital era, which is dominated by tools used on web platforms.

Miller and Clarke (2004:98) affirmed the paradigm shift in the library sector by highlighting the importance of librarians adapting to newer web technologies such as Extensible Mark-up Language (XML). XML is a system for electronically tagging or marking up documents in order to label, organise and categorise their content. The authors further highlighted the threat that these web technologies pose to librarians' careers, by stating that:

> *"Librarians, faced with changing user expectations, are feeling a little uncomfortable. Some are shaken by these seemingly ominous developments and wonder about the role of the library and their careers in the emerging digital environment."*

Freire (2008:9) explored the issues that institutions encounter when adopting web technologies. The study's focus was not only library-specific, but also institution-wide. It is relevant to this research, because it deals with the challenges of web technology adoption from a broader (institutional) perspective. These are issues such as bottlenecks in web technologies adoption and learning paradigms. In this study, the researcher investigates how some of these bottlenecks (in the context of Unisa Library) affect the implementation of web tools as support tools for library services. Regarding the issues of security and privacy as part of the challenges, Freire (2008) referred to privacy and security as the main building blocks for instilling trust among clients when using web technology applications. In the case of ODeL library clients, their constant presence on web platforms and the mandatory requirement to register their

personal details may evoke negative feelings of insecurity and invasion of privacy, which ultimately affect the adoption of web technologies.

Kumar and Tripathi (2010) specifically focused on the prospects of web technologies (RSS feeds, blogs, wikis, podcasts…etc.) in the context of Web 2.0, and how they contribute positively towards attracting library clients to use the library. Their study highlighted the web technology tools used for enhancing the organisation of materials by librarians, as well as for improving internal functions and overall services. They encouraged librarians to be vigilant and always ready to learn about the challenges posed by these technological innovations. Nguyen (2008) surveyed several Australasian academic libraries in terms of their application of web technologies (Web 2.0), looking at, amongst other things, the adoption strategies and features of web applications. Fields (2010) analysed how libraries in Canadian universities such as the University of British Columbia applied Twitter in traditional reference services, by giving accounts under #refdesk, where library clients could ask reference desk questions, which librarians then responded to. The abovementioned studies examined web tools from a general library perspective. However, they do not analyse web tools within the context of any specific kind of institution (ODeL or residential university). Instead, the debate is generally centred on how web applications contribute towards enhancing the services of an academic library.

Zhang (2013) speculated about how the modern web era (Web 3.0) would affect library services. The study further encouraged librarians to take advantage of the opportunities that Web 3.0 would bring in terms of serving clients in the future. In order to develop web technologies in libraries, libraries need to re-position their strategies and introduce new ideas actively, and librarians should improve (*sic*) their information technology literacy (Zhang, 2013:116). The above study is useful for this research because it predicts opportunities that may be realised by both librarians and clients if they adopt web technologies when utilising library services. Opportunities that are gained by adopting web technologies include the ability

to effectively reach the client, flexibility, accessibility (no physical boundaries), and ultimately the ability to offer similar services to those received by clients in residential university libraries. These are services such as bibliographic instruction, document delivery, and collaboration platforms (e.g. Mendeley) for clients, as well as seamless interaction with clients about the progress of their inter-library loan requests. Kilemba (2016) also mentioned the above opportunities as benefits of online distance learning within the library context.

George and Screrri (2007) outlined the challenges posed by web technologies for user-generated content (which drives web technologies, especially Web 2.0 and the anticipated Web 3.0). These challenges are mostly from a legal perspective, and are resolved differently in various countries, focusing on issues such as privacy, intellectual property, and hate speech (which may have racial, ethnic and religious connotations), amongst others. Internet service providers are regulated differently in different countries, and the ODeL library client may be discouraged from participating in or generating User Generated Content (UGC) such as blogs, wikis, Twitter etc., based on the heavy-handed regulation of his/her country of residence. The above-mentioned study provides an expansive approach by emphasising the inclusion of countrywide/universal issues (social, political and religious) when dealing with web technology challenges.

With regard to introducing new ideas, the emphasis is on having an open mind when adopting innovations and trying to assimilate them with traditional methods. Historically, the Unisa Library was a print-based entity, serving clients using a remote document delivery model. The traditional way of serving clients by librarians should move along with the changes in the mother institution in terms of the mode of operation, where blended learning is adopted for the short to medium term, with a view to adopting fully-fledged online tuition in the long term. Concannon, Flynn, and Campbell (2005:501) referred to blended learning as the combination of traditional face-to-face lectures or tutorials, and the best aspects of real and

virtual environments. Web technologies bring challenges, but at the same time offer opportunities for librarians to be in line with Unisa's strategy of Open and Distance Learning (ODL) and ODeL (Open Distance and e-Learning).

As already indicated, some students are residing in third world countries, with no access to most modern technologies, whilst others are in the modern technological world. Therefore, the effort of trying to accommodate both groups has been found to be a difficult challenge for librarians who are attempting to integrate web technologies into library services, The university (UNISA) recommends a slow transition towards ODL and ultimately ODeL, offering students residing in different countries services of an equal quality, despite their differing levels of competency in the use of web technology. Zhong and Alexander (2007:141) looked at off-campus access and in-library wireless access and emphasised the need for library instruction as one of the areas where academic achievement may be thoroughly improved. This research goes further by exploring how some web technology tools are utilised for library instruction purposes.

2.6 Acceptance and adoption of web technologies in modern ODeL libraries

The acceptance and adoption of library web technology tools is not as common and well researched as the acceptance of technology in the information systems (IS) or information technology (IT) sector. Most studies done on library web technologies have focused on how such technologies should be developed, instead of whether the already existing technologies are used or not. Hong, Thong and Wong (2002:98) stated that the traditional focus of digital library research has been on technological development, and there is now a call for user-focused research. The user focus idea is necessary, because the development of technology does not guarantee usage, availability and sustainability. The information and communication technologies (ICTs) and information systems field conducted studies on the application of

theories related to the acceptance of technology, using theories such as the Technology Acceptance Model (Davis, 1985) and Diffusion of Innovation theory (Rogers,1965). On a positive note, these theories may also be applied in many other fields, including the library and information sector. The theory of technology acceptance pioneered by Davis (1985) and further developed by Venkatesh (2003) and Davis; Baggozzi and Warsaw (1989) offered this study some usable constructs for designing a data collection instrument, so that the factors driving librarians to use or reject a particular technology could be explored. Afari (2010:02) stated that the lack of technology acceptance may lead to the loss of money and resources. This research may assist institutions to enhance their policies for web technology use, thereby ultimately helping to save on resources.

Davis (1985), Davis, Bagozzi and Warsaw (1989), and Venkatesh and Davis (2000) conducted studies analysing and proposing improvements to technology acceptance theories. The Technology Acceptance Model (TAM) is based on social psychology theories such as the Theory of Reasoned Action (TRA), which originated from studies done by psychologists Fishbein and Ajzen (1975). These theories were used to analyse people's behaviour when they are faced with the problem of using or implementing new innovations. Miller and Khera (2010); Hong, Thong and Wong (2002); Lin and Sher (2007); and Ukwoma and Dike (2017) are some of the authors who applied theories of technology acceptance in the library context, and in particular, digitised libraries.

These above-mentioned studies gave the present study a new perspective on the different dynamics that librarians experience in various settings when implementing web technologies in ODeL or residential libraries. Lee; Hsieh and Hsu (2011); Khan and Woosley (2011); and Al- Rahmi et al. (2019) used both the TAM and DOI theories in their studies to outline the usage of technology in an e-learning and health environment. Rogers and Valente (1995) analysed the paradigm shift during the era of diffusion of innovation in the farming

community, and looked at how it affected the research community. Their study provides a good perspective on the origin of the paradigm shift that led to the review of publications that contributed to the development of the Diffusion of Innovation (DOI) theory.

Rogers (1962) and Wilson (2013) explored theories guiding the adoption of an innovation. Chor, Wisdom, Olin and Horwirtz (2014) developed measures that may be utilised to predict the extent of innovation adoption. By using such measures when constructing a data collection instrument, the researcher may collect information about the sustainability of adopted innovations and social variables that are influential in the adoption, such as culture, politics, and religion, amongst others. McCoy, Everard and Jones (2005) related culture, attitude and intentions to the adoption of technological innovations. They further warned that culture is not a determining factor, but acts as a moderator when a client adopts the new technology. The cultural background of both librarian and client plays a big role in the adoption rate and actual usage of web technologies. In this study, previous experience will be used as an all-encompassing concept that includes culture, amongst other social issues, as factors influencing adoption. Acceptance, according to Afari (2010:03), is the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support, based on its usefulness. Usefulness is defined in the context of productivity, performance, effectiveness and ultimately usability in a practical situation (Legris, Ingham and Collerette, 2001:196).

2.7 Library support in modern ODeL institutions

The study by Dugan and Heron (1997) indicated how frequent changes in technology affect modern distance universities and the way in which ODeL universities attempt to adapt to such challenges. Even though their study was published when the Internet was still in its infancy, it is still relevant to this research because it reveals the challenges faced by distance education

librarians when supporting students. Dugan and Heron (1997:316) stated that several problems might arise for the provider library when supporting a distance education programme. Such problems may entail expenditures in acquiring the best technologies to be utilised, in order to enable students to receive the same level of support as in residential, walk-in libraries. Web technologies used in an ODeL library should be well researched before they are implemented, to ensure their suitability for the tasks that librarians want to accomplish.

Librarians in ODeL environments should also have the necessary skills to research and select the best web applications. Partridge and Munro (2010) described skills in this context as the knowledge and attributes required for library professionals in the era of web technologies. The analysis was done within the Web 2.0 context, giving rise to such concepts as Librarian 2.0 (referring to a library professional of the Web 2.0 era) and Library 2.0. Partridge and Munro (2010:318) commented that technology or the ability to use web technologies to meet client and community needs is frequently included within various lists of competencies or abilities. Brumvand et al. (2001) focused on the off-campus library services and emphasised how difficult it can be for students to access library services in a distance education library. The study highlighted consortia cooperation with other libraries in Utah as alternatives for librarians, so that they can adapt to the challenges of offering their services in a distance education environment. The study was conducted before the onset of modern web technologies, but it does outline solutions for overcoming bureaucratic and technological barriers, which hinder access to library resources by remote clients. Library clients in the modern era of web technologies still experience these barriers, particularly in terms of the limited or unequal bandwidth allocations in various countries, as well as restrictions in various countries based on culture, religion and politics. The authors further proposed using Internet services as one of the platforms to connect, share skills and leverage on capacities, and to market the services of the library. The skills factor is especially important in ODeL scenarios, where librarians do not

have the privilege of physically meeting their clients. Tait (2000:288) suggested different strategies to support students in an ODeL institution. The study did not examine ODeL in the context of the library, but rather focused on institution-wide support for online distance students. It helps the present study by portraying the characteristics or outlook of an ODeL institution, which gives an indication of how librarians should position themselves in order to offer relevant services to ODeL clients.

Kimbrel (2013) focused on how web applications should be used in a way that has a positive impact on distance education support. The author questioned the anomaly in ODeL institutions, whereby, despite all kinds of web applications supporting students, institutions still face "undesirable outcomes". The present research helps to determine whether present ways of accessing information resources contribute to such anomalies (which may be poor academic performance), and whether delivering library services by using or adopting web applications plays a significant role in increasing accessibility and usage, thereby remedying the anomaly. Kimbrel (2013) analysed the overall effectiveness of web applications (though not in a library context) in a distance learning environment. The study investigated how all support and academic sections of the institution should adapt to new web technology trends. It suggested that technical problems and training issues are more inclined to lead to a negative learning experience, thereby yielding undesirable outcomes. The above study is valuable to this research because it provides a broader perspective on how web technology applications can support students effectively. The author does not focus on the library as a single entity in ODeL institutions, but rather includes several departments in the institution. Issues such as slow websites, instructional time spent familiarising students with the software, instructors who have difficulty keeping up with the technology, and connection speeds for some software are cited as factors contributing to undesirable outcomes. Undesirable outcomes, in this instance, relates

to the negative outcomes realised after implementing a web application within a particular context.

This research further examines how Unisa librarians adopted and implemented web applications, the kind of applications chosen, what informed their choices, as well the competencies they possess for the implementation process.

Morris (2011) commented about how web platforms benefit online learning. The author provided useful insight into web technologies from their period of origin to the impact on those in the teaching or student training environment, as well as implications for web-based leaners. Loureiro, Barbas and Messias, (2012) analysed web technology tools by focusing on their use in lifelong learning contexts. Their study highlights how today's education is affected by recent digital phenomena, focusing on critical e-skills that are required for learning, such as ICT practitioner skills, ICT user skills and ICT business skills. The above study is relevant to this research, because it not only outlines the required skills for present-day education, but also focuses on the challenges and opportunities that web technology tools may bring to an ODeL library. Furthermore, it gives valuable suggestions on how to alleviate those challenges. The paradigm shift is from a learner point of view, but the author indicates how those paradigm shifts have affected learner support services, such as library services. The above study enables the researcher to obtain the perspective and profile of a modern-day library user and librarian, who are more techno–savvy and already have devices that are compatible with modern web technology tools. The study also suggests how to best satisfy the modern user's requirements regarding information retrieval in an ODeL learning environment.

Kurilovas, Kubilinskiene and Dagiene (2012) discussed the web within the context of a virtual learning environment (VLE). The study highlighted the change in the learning environment, which entails a shift from the traditional classroom environment to a virtual classroom environment within the web technology era. Lessons learnt from this study, such as

post-adoption behaviour, will assist Unisa librarians to implement suitable web technology tools that may enhance access to digital information in ODeL settings, which also operate within virtual environments. Raaj and Schepers (2008) investigated the acceptance of technology in virtual learning environment in China. Although their study was not conducted in the library context, the scenario mirrors the Unisa model, because learners are off campus, studying online with limited privileges of facing support staff. Raaj and Schepers (2008:02) stated that: "A factor critical to successful implementation of VLEs is student acceptance of the system."

A long tradition of research on technology acceptance established that the user's perceived ease of use and perceived usefulness are central factors in explaining the acceptance and use of new technology. The above study helps this research in terms of data collection strategies (especially designing the questionnaires). It also offers extensive applications of technology acceptance models, which act as determinants of the acceptance or rejection by clients of technologies introduced in the library. Chuttur (2009) alluded to the evolution of the TAM model, focusing on literature published from 1985 to 2007. The study gives ideas on how these technological adoption models can be applied in real-life situations, and shows the response of the community when facing new technologies in their daily lives, work environments, or even learning environments.

2.8 Synthesis of the literature

Literature on the use of web technology tools in libraries is varied and extensive. One of the explanations for this development is the fast rate at which technology tools that support library services have emerged. While the opportunities that these tools present for efficient library services are enormous, they pose challenges to librarians and other library staff, whose main training and orientation focus on traditional ways of offering library services. However, there

is a lack of analysis in the literature of the dynamics involved in the adoption and usage of web applications in online distance university libraries. It is therefore imperative to examine how Unisa Library uses these web applications, by addressing issues ranging from identifying appropriate applications to analysing the patterns of adoption and acceptance of these tools.

CHAPTER 3:
METHODOLOGY

3.1 Introduction

This chapter focuses on the research methodology used to investigate the questions posed in this study, and to test the hypotheses outlined in the previous chapter. Research methodology gives a clear indication of how the study should unfold. It clarifies the strategies used in selecting the target population, sampling procedure, and relevant data collection instruments, as well as the ethical issues that the researcher should carefully consider when collecting data. Leedy and Ormrod (2005:12) described research methodology as the general approach taken by the researcher in carrying out the research project. Schensul (2012:01) indicated that research methodology consists of the assumptions, rules, and methods that researchers employ to render their work open to analysis, critique, replication, repetition or adaptation, and to choose research methods. In this study, the researcher developed tables, charts and figures with several attributes, where respondents gave their opinions regarding their use of web applications, in order to make data interpretation easier and more elegant.

The variables in this study were tested using constructs selected from the Technology Acceptance Model and the Diffusion of Innovation theory. The variables in the study are as follows: perceived usefulness; perceived ease of use; observability; relative advantage; complexity; compatibility, communication and trialability. Recommendations will be made at the end of this study based on these variables. The aspects outlined in the research design below provide a guideline in terms of how the investigation of web technology implementation at the Unisa Library was conducted.

3.2 Research Design

The study uses a descriptive quantitative design to study a sample of Unisa librarians. The study is therefore a sample survey dealing with librarians' efforts to utilise web applications to

satisfy clients' academic information needs in a remote setting. Librarians must adopt modern web-based tools to make information retrieval easier. In this instance, the descriptive research design is relevant, because it allows researchers to examine conditions in various locations (including the library), where human activities are systematically explored, documented and analysed (Salkind, 2007:251).

This study used a survey in order to obtain information from the subjects about their perceptions, challenges and adoption patterns of web technologies. Babbie (2010:254) supported the use of surveys, stating that surveys may be used for descriptive, explanatory and exploratory purposes. Leedy and Ormrod (2013:189) advocated the use of surveys in research and further stated that it involves acquiring information about one or more groups of people, including their characteristics, opinions, attitudes, and previous experiences. This is further substantiated by May (1997), who indicated that surveys help to measure facts, attitudes and behaviour. Andres (2012) provided several definitions in his study, but the one that clearly depicts a social survey states that surveying is a means to establish the value or extent of the phenomena under investigation, by either counting or measuring some or all of the information gathered.

3.3 Target Population

Callegaro, Manfreda and Vehovar (2015) indicated that for sampling purposes, the researcher needs to precisely describe the target population. The population for this study has different characteristics in terms of their social standing, age, previous experience and knowledge of technological developments throughout their careers. Such diversity is crucial in order to portray different experiences in the usage of web applications in various scenarios in the library. Librarians are the custodians of web application implementation at Unisa Library and therefore qualify as units of analysis in this study. Neuman (2003:216) referred to the target population as elements or cases in a larger pool that a researcher intends to study. Cox

(2011:816) stated that the target population for a survey is the entire set of units to which the findings of the survey are meant to be generalised.

The population in this study was composed of Unisa Library staff members. The researcher sent a request to the Unisa Human Resources department for details about the library staff. Table 3.1 below shows the number of Unisa Library staff members per directorate, as obtained from the Human Resources department in response to the researcher's request. These directorates are Client Services (100), Information Resource Distribution (87), Information Resource Content Management (43), as well as Library Corporate Services (28). The Client Services directorate consists of staff working in the main branches of the library, such as; Muckleneuk in Pretoria, Science Campus in Johannesburg (Florida), School of Business Leadership in Midrand and various regions across South Africa, including Addis Ababa in Ethiopia. The researcher isolated a total number of 260 library staff from the Human Resources records (see Table 3.1). Overall, 243 librarians constituted the population.

Table 3.1: Breakdown of Unisa Library staff per directorate

Unisa Library staff per Directorate	Fixed Term	Permanent	Total
Unisa Library: Client Services (including regional library staff)	0	100	100
Unisa Library: Information Resource Content Management	1	42	43
Unisa Library: Information Resource Distribution	4	83	87
Unisa Library: Library Corporate Services	0	28	28
VP Research, Postgraduate Studies, Innovation and Commercialisation: Unisa Library	0	2	2
Grand Total	**5**	**227**	**260**

Source: Unisa Human Resources Department (2019)

The researcher excluded approximately 17 library staff members who were not necessarily engaged in professional library duties, such as secretaries, library finance officers, library

human resources officers, and drivers of the mobile libraries (bus libraries). The inclusion criteria were determined by selecting all Unisa Library staff whose duties involve executing professional library functions to be part of the sample. The sample included librarians who are more exposed to using web technology tools. These are librarians such as those in the Library Technology Services section, Personal librarians (commonly known as subject librarians), Branch librarians and Search librarians, based on their duties, which involve them interacting with clients. The researcher observed that amongst these librarians, some investigate and utilise web technologies in order to market or offer library services. They also identify web technology tools that can be selected for trial, or the possibility of these web tools being utilised in an ODeL library environment. The other group of librarians in various directorates still make a valuable contribution to the study, because they are the ones using the selected web tools in a practical work environment for various duties.

According to the figures presented in Table 3.1, the Client Services directorate constitutes the biggest segment of the population (100). The researcher observed that Client Services staff conduct duties which compel them to have direct contact with clients. The other directorates have Collection Developers who are responsible for the development of the library collection, Cataloguers responsible for processing and cataloguing new material, and lastly, the Search librarians/Document delivery staff specialising in the processing of information requests and searches from clients, amongst others. Library Technology Services are "responsible for enabling the provision of high-standard information technology in support of Library services and processes for Unisa Library staff and clients" (University of South Africa Library Technology Support Libguide, 2019). They are the first line of contact before referring ICT-related matters to the university-wide ICT department. The library has a dedicated marketing team responsible for managing all the public relations matters between the library and the clients. Twitter and Facebook accounts are used by the marketing team (within the

Library Corporate Services directorate) as web technologies for announcing library events, interacting with the library about document delivery matters (including inter-library loans enquiries), as well as providing a general enquiry platform for access to Unisa Library online resources. Client Services staff use several web technologies, such as Microsoft Teams, Skype for Business, podcasts, videocasts, Scopia, and WebEx, amongst others, to conduct online information literacy training for library clients. The marketing of such events is also done using the above-mentioned social media platforms. Islam and Habiba (2012:300) also found that social media tools such as Facebook and Twitter are used for marketing library products, with most libraries using them for sharing news and advertisements, among others.

Unisa has subscriptions for citation databases such as Scopus and Clarivate Analytics, which are used to support researchers in monitoring their citations and conducting bibliometric searches. Librarians also assist researchers by verifying the authenticity of journals, using recent web technology tools such as Cabell's database, thereby improving the quality of their research output. Collection developers (Information Resource and Content Management Directorate) and Personal/Subject librarians (Client Services Directorate) use the same resources to decide on subscriptions to top journals. In order to monitor collaboration networks, trends and benchmarks in various fields, Unisa librarians use web tools such as Incites and Scival, and submit monthly reports. Such reports assist the university to monitor the research outputs of scholars in the university, as well as its global impact.

Furthermore, librarians encourage and assist researchers to create e-visibility profiles using web technologies such as ORCiD, ResearchGate and ResearcherID, among others. These profiles help researchers to improve their individual research footprint and boost their h-index (a metric for measuring individual research productivity and citation impact) and visibility on many online research platforms.

Content management tools such as Libguides are essential to an ODeL institution such as Unisa, because they offer a platform where library clients can access specific resources customised for a specific audience. The researcher observed that there are 128 subject guides published on the Unisa Library site (https://libguides.unisa.ac.za), offering clients a wide range of resources from how to request library material to reference management tools, referencing styles, research data management, e-visibility for researchers, and Massive Open Online Courses (MOOCS), among others. With these comprehensive subject guides designed by Unisa librarians from all library directorates, the geographic distance between clients and librarians is diminished, since clients can get guidance on the usage of various online resources.

3.4 Sample size and techniques

White (2006:185) indicated that sampling allows quantitative researchers to make claims based on statistical inference about the whole population. In this study, the sampling technique used was non-probability convenience sampling, which was conducted based on participants' availability. Khotari and Garg (2019:52) defined a sample design as a definite plan for obtaining a sample from a given population. An e-mail was first distributed to 243 units of the population, explaining the essence of the study and soliciting their participation. Altogether, 135 Unisa Library staff members agreed to take part in the study.

3.5 Description of the questionnaire

Data collection was guided by a questionnaire that contained the following sections:

- Information about the demographic characteristics of respondents, such as age, gender, previous experience, etc., focusing on the influence of these characteristics on how web applications are perceived or adopted. This included perceptions regarding the effectiveness of web technologies as communication tools for training, short messaging, alerting services, and invitations to specific events within the library context.

- Familiarity with the strategic policies of the institution and their support for web technology adoption in support departments such as the library.
- Categories of librarians, in line with Rogers' (1962) diffusion of innovation theory, which indicates that not everyone is equally motivated to adopt an innovation. The survey includes questions that indicate whether a respondent is an innovator, early adopter, early majority, late majority, or laggard. Jahamir and Cavadas (2018) promote a thorough understanding of adoption rate, because their study will help in reducing scepticism amongst adopters.
- Acceptance and adoption of web technology as probable determinants of the actual usage or rejection of library web technologies, using universally tested TAM and DOI variables. The researcher created a table with structured questions using a 5-point Likert scale ranging from strongly agree to strongly disagree.

3.6 Data collection methods

The study used an online survey with structured questions to collect data. The distribution of the online survey was done with the help of the SurveyMonkey tool. As Andres (2012:50) stated, an online survey reduces the chance of non-sampling coverage error. Andres (2012) further indicated that as long as internet use is part of these employees' daily work, the coverage error in sampling will be minimal.

Patten and Newhart (2018) suggested that Internet surveys are not all created equal; hence their value must be assessed based on the purpose for which they are intended, and the claims or generalisations that researchers apply in their analyses. Pattern and Newhart (2018) further stated that lists of e-mail addresses can work for sampling organisations, but more information than an e-mail address may be needed if a stratified sampling technique is to be used, because of its non-probability nature. Stratification was not done in this study because of its non-probability nature, as well as the fact that sampling was done on a convenience basis.

An online survey is appropriate as a data collection instrument for Unisa librarians, because participants are in various regions throughout South Africa, and in one regional library located in Addis Ababa, Ethiopia. The structuring of objective questions enabled the researcher to obtain objective responses from the participants. The study used simplified standard TAM and DOI questions to enable participants to express their opinions, with a thorough understanding of the meaning of each question.

3.7 Validity and reliability

The validation of the data collection instrument was necessary before the researcher distributed the instrument to potential respondents. The questionnaire used in this research was based on the validated constructs universally utilised in most studies about the acceptance and adoption of newer technologies in various settings in the ICT and information systems sector. Leedy and Ormrod (2013:89) stated that the validity of a measurement instrument is based on the extent to which the instrument measures what it is intended to measure. Beins (2019:145) further indicated that validity relates to the question of whether measurements provide information on what the researcher wants to measure. The instrument used in this study was checked and approved by the research supervisor and found to satisfy all the criteria for content and construct validity (Pattern and Newhart, 2018).

The researcher adapted questions used in various studies. These questions were useful for studying adoption behaviours in e-learning environments, such as the studies conducted by Abdekhoda et al (2013), Khan and Woosley (2011) and Chuttur (2009), amongst others. The use of the tried and tested or standardised TAM and DOI constructs to formulate questions ensured the validity and reliability of the questionnaire.

The validity and reliability of the constructs were tested in many studies, and were found to be applicable (external validity) in many e-learning scenarios. The tested and widely validated questions further assisted the researcher to avoid designing questions based on pre-

conceived knowledge of the environment, thereby avoiding bias and maximising precision in responses. Limitations of the study were reported (see chapter 05), and the criteria used for the reliability test and thresholds were acknowledged and reported (see Table 3.2).

3.7.1 Testing the reliability of the instrument

The reliability of this study was tested using the Cronbach-alpha coefficient. This instrument is useful to measure or estimate the internal consistency of the instrument. The test values are classified in most literature (standardised) as follows:

- Good and reliable is greater than 0.8
- Acceptable and reliable is between 0.6 and 0.8
- Unacceptable reliability is below 0.5

Leedy and Ormrod (2013:90) indicated that reliability is the consistency with which a measuring instrument yields a certain, consistent result when the entity being measured has not changed. Patten and Newhart (2018:142) stated that reliability measures the consistency of different aspects of measurement, and Beins (2019:144) indicated that reliability relates to the consistency and repeatability of the results. Table 3.2 below shows a highly reliable and consistent score of 0.858 for the TAM and DOI constructs used in the study.

Table 3.2: Instrument for reliability scores using Cronbach's Alpha based on standardised items

Cumulative Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
.858	.866	09

All nine (9) variables were above the recommended threshold of 0.6. They also showed a consistent and highly dependable score of above 0.8 per item, as per Table 3.3 below.

Table 3.3: Total individual items' reliability using Cronbach alpha

Item-Total Statistics				
Computed TAM and DOI Variables	**Scale Mean if Item Deleted**	**Scale Variance if Item Deleted**	**Corrected Item-Total Correlation**	**Cronbach's Alpha if Item Deleted**
Computed usefulness	43.39	92.602	0.748	0.828
Computed Relative advantage	42.82	94.607	0.705	0.833
Computed Complexity	38.69	97.987	0.333	0.877
Computed ease of use	40.50	81.238	0.735	0.827
Computed compatibility	42.32	94.288	0.731	0.831
Computed trialability	42.18	100.738	0.522	0.849
Computed observability	39.82	89.361	0.721	0.829
Computed communication	41.95	96.014	0.555	0.846
Computed adoption	44.19	110.355	0.363	0.861

3.8 Ethical clearance

The fact that this study was probing the internal working environment of Unisa staff members (librarians) compelled the researcher to apply for an ethical clearance certificate pertaining to the ethical issues that may arise when conducting the research. Accessing records of Unisa librarians using the university systems was done in accordance with the strict protocols required

by the university (see Appendix B and C). Flew, as cited by May (1997:54), regards ethics in research as a set of standards by which a particular group or community decides to regulate behaviour, in order to distinguish between what is legitimate or acceptable in the pursuit of their aims and what is not. The South African PoPI Act (2013) offers legislative guidelines on how to deal with people ‘s personal information. This may apply in situations where personal information is needed (amongst other things) for business transactions or parts of respondents’ questions/answers in research scenarios. Unisa has a policy on Research and Ethics (2007:09-16) which guides researchers in dealing with human beings as participants in research scenarios.

The guidelines assisted the researcher to follow all the protocols, because participants are also stakeholders within the UNISA Library environment. An online survey was designed and a SurveyMonkey link to the questionnaire was sent to UNISA Library participants via e-mail, in line with the ethical requirements of UNISA.

3.9 Conclusion

This chapter looked at the methodologies selected for studying Unisa librarians’ challenges when implementing web technologies for clients in an ODeL institution. It also discussed the research design/approach utilised for studying the acceptance and adoption of these web technologies by researchers. The sampling techniques for selecting the participants and the research questions laid the foundation for the constructs that led to the composition of the questionnaire. The testing of the reliability and validity of the questionnaire, together with the computed test results derived from the statistical software (SPSS v.25), were also presented in this chapter. Lastly, the chapter described the protocols which were followed in order to ensure that all ethical requirements were fulfilled.

CHAPTER 4:
DATA ANALYSIS AND PRESENTATION

4.1 Introduction

According to Marshall and Rossman (2010), it is important when analysing data to ensure that it is in an interpretable and intelligible format. For this study, data was analysed using the objective methods used in a quantitative study. Barbie (2010:422) indicated that the quantitative analysis of data involves the numerical manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect. Leedy and Omrod (2011:146) stated that: "The central task during data analysis is to identify common themes in people's descriptions of their experiences." Creswell (2007) offered guidelines regarding the main aspects that researchers conducting a phenomenological study should focus on when analysing data. Such guidelines include identifying statements that relate to the topic, grouping statements into meaningful units, seeking divergent perspectives, and constructing a composite.

In this chapter, demographic characteristics of the respondents, work experience at Unisa Library, challenges in terms of usage, adopter categories, policy familiarity, as well as types of web technologies familiar to the respondents constituted the first part of the questionnaire. The standardised TAM and DOI variables, contextualised within Unisa Library, constituted the second part of the questionnaire. Variables were measured on a 5-point Likert scale (Strongly Agree=5; Agree=4; Neutral=3; Disagree=2; Strongly Disagree=1), and were further analysed using the SPSS version 25 statistical programme.

4.2 The findings

The instruments were sent to 135 librarians who were willing to participate in the study, and five reminders were sent to the participants over a period of three months. However, despite

participation in the study being solicited, only 68 of the participants completed the instrument, which is a low response rate of 50.3%. Although Andres (2012) has described online surveys as being capable of reducing the chances of non-sampling coverage error, online surveys also have a high chance of achieving a low response rate. The first presentation relates to the demographic characteristics of the respondents.

4.2.1 Demographic characteristics of respondents

Table 4.1 shows the distribution of the respondents, with 68.18% being females and 31.82% males. The age distribution shows a higher constitution of respondents aged 50 years and above (50%). It shows that 19.12% of the respondents were in the age group 30-39, and 29.41% were in the age group 40-49. The age group of 20-29 years was the lowest at 1.47%. No respondent in the study was below the age of 20 years.

Table 4.1: Demographic characteristics of the respondents

Sex		**Frequency**	**Percentages**
	Male	21	31.82
	Female	45	68.18
	Missing record	2	
	Total	**68**	**100**
Age	<20	0	0
	20-29	1	1.47
	30-39	13	19.12
	40-49	20	29.41
	50+	32	50.00
	Total	**68**	**100**
Number of years employed	0-5	6	8.82
	6-10	29	42.65
	11-15	2	2.94
	16-19	4	5.88
	20+	27	39.71
	Total	**68**	**100**

Table 4.1 further shows the distribution of the respondents in terms of their years of experience at Unisa Library. The table indicates that 8.82% of the respondents have spent 0-5 years working at Unisa. Less than half of the respondents (42.65%) have worked at the Unisa Library for 6-10 years, while 39.71% have been employed for more than 20 years. The categories of 11-15 and 16-19 years of working experience have the lowest percentages at 2.94% and 5.88% respectively.

4.2.2 Web technology adopter categories

Table 4.2 shows the distribution of the categories of adopters at Unisa Library. This table shows that 37.31% of staff at Unisa Library are innovators of web technologies. The early adopter category constitutes 7.40%, while the early majority category applied to 35.82% of the respondents. The results further indicate that 5.97% and 11.94% of respondents are in the late majority category. Only 1.49% of the respondents are laggards.

Table 4.2: Web technology adopter categories at Unisa Library

Questionnaire items	Adopter Categories	Frequency	Percentages
I usually want to be the first to try new web technology tools	Innovators	25	37.31
I always encourage my colleagues to use web technology tools	Early adopters	5	7.40
I usually require some training by someone before using new web technology tools	Early majority	24	35.82
I usually need to see some evidence that web technology tools work before I use them	Late majority	8	11.94
I only use web technology tools when I see most of my colleagues using them	Late majority	4	5.97
I think the traditional way of working (without web technology tools) is still the best	Laggards	1	1.49
Missing records		1	
TOTAL		**68**	**100**

4.2.3 Web technology tools commonly used in the last five years

Regarding web technology tools used by the respondents, Table 4.4 shows that Facebook and Twitter are the mostly used social media tools at 66.18% and 41.18 %. In line with modern trends (in terms of how librarians support research), reference management tools (collaboration tools) such as Mendeley and RefWorks (58.82%), as well as ResearchGate (42, 7%), were the most used web tools. Web tools used for online training purposes, such as podcasts (29.41%), Skype (30.88 %) and Scopia (39.71%) were also familiar to Unisa librarians. RSS feeds (which are normally utilised in libraries for selective dissemination of information) are also highly utilised (54.14%) by respondents. Respondents also use social bookmarking tools, and Table 4.3 shows that Diigo was used by 8.82% of the respondents and Academia.edu by 25%. A relatively small proportion (11.76%) of respondents have adopted LibraryThing, while ORCiD has been adopted by 35.29%. Respondents were also given an opportunity to mention other web tools that they commonly adopted.

Table 4.3: Types of web technology tools commonly adopted at Unisa Library

Web technology	Frequency	Percentage
Podcasts	20	29.41
Join.me	2	2.94
Researchgate	29	42.65
Facebook	45	66.18
Reference management tools, e.g. Mendeley; RefWorks	40	58.82
WebEx	2	2.94
Scopia	27	39.71
Skype	21	30.88
LibraryThing	8	11.76
Twitter	41	41.18%
ORCiD	24	35.29
Diigo	6	8.82
Academia.edu	17	25.00
RSS feeds	37	54.41
Other (please specify)	11	16.18
Total Respondents: 68	**Multi-response**	

The results of the open-ended responses show that 16.8 % of respondents mentioned other web technologies, such as Massive Open Online Courses (MOOCs) and Pinterest.

4.2.4 Challenges experienced by librarians when using web technologies

Figure 4.1 shows that 76% of the respondents experienced various challenges when using web tools, while 24% of respondents reported that they did not experience any challenges.

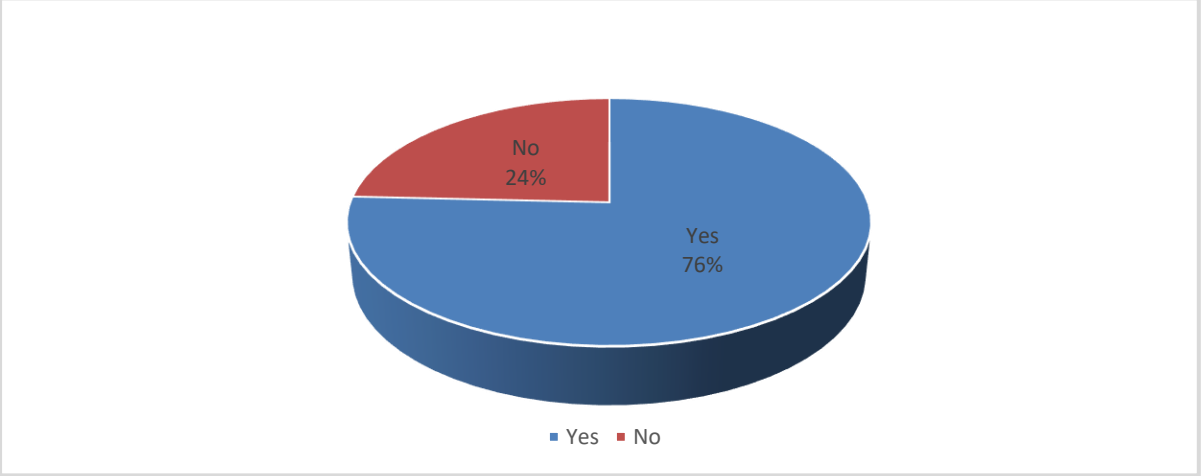


Figure 4.1: Challenges when using web technologies

The results of the survey also show that a high number of respondents (63.5%) reported network issues and technical support as challenges. Respondents also reported security issues (34.55%), privacy issues (14.55%) and technical training requirements (54.55%) as challenges experienced when using web technologies, while keeping up with new versions of web technologies was considered a challenge by 38.18% of respondents. Only 10.91% of respondents viewed the use of web technologies as an added stress.

Table 4.4: Frequency of multi-response distribution for web technology usage challenges

Web technology usage challenges	Frequency	Percentages
Cost to implement	13	23.64
Need for technical support	35	63.64
Training requirements	30	54.55
Keeping up with new versions	21	38.18
Privacy issues	8	14.55
Security issues	19	34.55
Clients' technology limitations	20	36.36
Added stress for me	6	10.91
Network issues	35	63.64
Complex to use	11	20.00
None of the above	2	3.64
Others (please specify)	8	14.55
Missing Records	**13**	
Total	**68**	**100**

The opinion of Respondent 01 in the open-ended section of the questionnaire shed more light on these challenges:

Obtaining official approval to purchase licences or to develop products in support of our information service. Red tape. Slow and cumbersome tender process. Confusion of correct forms and procedure to follow, e.g. when submitting business specifications and requirements. Lack of clear written and accessible guidance from Library/institution on procedural matters around technology. Lack of reliable and up to date information on clients' ownership of devices/level of access to the Internet (e.g. continuous or reliant upon Library/ Telecentres, etc.) to inform decision-making.

4.2.5 Factors that influence the adoption of web technologies in libraries

Table 4.5 outlines respondents' answers to multi-response questions about factors that contribute to librarians using web technologies. Respondents reported issues such as clients' expectations (47.06%), the university's strategic ODeL objectives (50%) and enhancement of communication (52.94%) with clients on online platforms (not physical day-to-day contact) as contributing to librarians' adoption of web technologies.

Table 4.5: Factors that influence librarians' adoption of web technologies

Factors that influence the adoption of web technologies	Frequencies	Percentages
Clients' expectations	32	47.06
Ease of training of remote library clients by using web technology tools	27	39.71
It enhances the credibility of the library profession	21	30.88
Enhancement of communication with library clients	36	52.94
It enhances my librarianship career	21	30.88
ODeL strategic objectives	34	50.00
Other (please specify)	6	8.82
Total	**68**	**100**

The ease of training of remote library clients (39.71%) is also cited as one of the factors contributing to the usage of web tools, whilst 30.88% of respondents indicated that the usage of these tools enhances their librarianship career. The survey also gave an opportunity for respondents to expand on these factors, and 8.82% added more factors that were not specified in the survey. The following is an extract from Respondent 02's comments in this regard:

Influencers within the Unisa Library (there are always colleagues with a passion for all things new and useful and they often raise the interest of others in trying something new), benchmarking what we do against other local and international institutions offering similar services. Necessity-anything widely used by clients or fellow professionals inevitably makes its way into the operations of the Library, even if we adopt more slowly owing to budget constraints, staff shortages, discontinuity on ICT projects as the contracts of business analysts and other ICT staff expire and a new person has to take over and orientate to the project. Fear of being left behind. The next technology on the horizon is no longer in the singular - we face many new information technologies sitting just over the horizon, and not for long.

4.2.6 People or individuals who influence the use of web technologies in libraries

The questionnaire examined the influence of other individuals on librarians' decision to adopt web technologies. Table 4.5 shows that personal interest (55.22%), library clients (47.76%) and library colleagues (53.73%) were the most influential individuals or factors in terms of their adoption decisions.

Table 4.6: Multi-responses of people who influence Unisa librarians' decision to adopt web technologies

People or Individuals who influence respondents' decision to use web technologies	Frequencies	Percentages
My boss	10	14.93
Library clients	32	47.76
Library colleagues	36	53.73
ICT colleagues	11	16.42
Personal interest	37	55.22
Library Management	15	22.39
Other (please specify)	3	4.48
Missing record	1	
Total	**68**	**100**

Library management and participants' line managers were reported as influencers by 22.39% and 16.42% respectively. Colleagues in ICT were reported as influencers by 16.42% of the respondents, whereas 4.48% mentioned other influencers in an open–ended scale.

4.3 Analysis of TAM and DOI constructs

The following variables were analysed on an item-by-item basis, as well as for testing the correlations and hypotheses.

4.3.1 Perceived Usefulness (PU)

a) Applying web technologies in my job would enable me to accomplish tasks more quickly

Table 4.7 (on the next page) shows that 36.8% of respondents strongly agreed and 51.5% agreed that web technologies enabled them to accomplish their tasks more quickly, while 8.8% respondents were neutral. A smaller margin of 1.5 % of the respondents strongly disagreed and disagreed.

Table 4.7: Frequency distributions for web tools enabling the accomplishment of tasks more quickly

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	25	36.8	36.8	88.2
Agree	35	51.5	51.5	97.1
Neutral	6	8.8	8.8	98.5
Disagree	1	1.5	1.5	100.0
Strongly Disagree	1	1.5	1.5	
Total	**68**	**100.0**	**100.0**	

b) Applying web technology tools would improve my job performance

Table 4.8 shows that 39.7 % of the respondents strongly agreed, while 45.6 % agreed. Only 4.4% disagreed that web tools would improve their job performance, 1.5% strongly disagreed, while 7.4% were neutral.

Table 4.8: Frequency distributions for web tools improving job performance

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	27	39.7	40.3	40.3
Agree	31	45.6	46.3	86.6
Neutral	5	7.4	7.5	94.0
Disagree	3	4.4	4.5	98.5
Strongly Disagree	1	1.5	1.5	100.0
Total	67	98.5	100.0	
Missing	1	1.5		
Total	**68**	**100.0**		

4.3.2 Perceived Ease of use (PEOU)

Interacting with library clients using web technology tools is always easy

Figure 4.2 shows that 19.1% of the respondents strongly agreed, while 33.8% agreed that interacting with library clients using web technologies is easy. Only 17.6% of respondents disagreed, while 2.9% strongly disagreed and 26.5% were neutral.

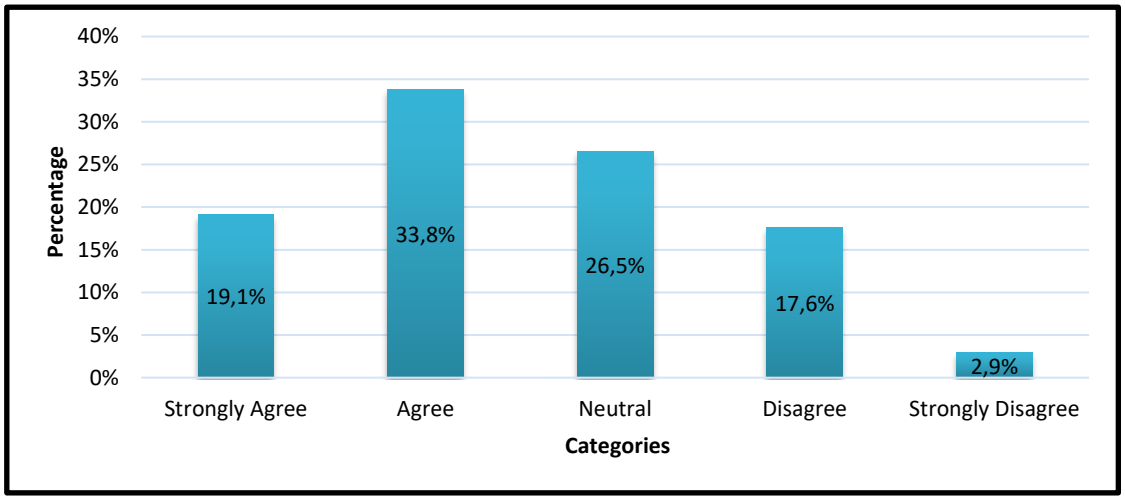


Figure 4.2: Web tool usage and their ease of use

a) Learning to use web technology tools to assist clients in my library will be easy for me

Table 4.9 shows that 23.5% and 50.0% of respondents strongly agreed and agreed respectively that it is easy to learn to use web tools. 20.6 % were neutral about the issue. Only 1.5 % of respondents strongly disagreed that it is easy to learn web tools, whereas 4.4% disagreed**.**

Table 4.9: Frequency distributions for the ease of learning to use web technology tools

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	16	23.5	23.5	23.5
Agree	34	50.0	50.0	73.5
Neutral	14	20.6	20.6	94.1
Disagree	3	4.4	4.4	98.5
Strongly Disagree	1	1.5	1.5	100.0
Total	**68**	**100.0**	**100.0**	

b) Using web technology tools to offer remote library training makes a librarian's job easier

As shown in Figure 4.3, 32.4% of respondents strongly agreed with the statement, while 45.6% agreed. Only 2.9% disagreed with the idea that using web technologies makes it easy for librarians to offer remote training. A smaller percentage of 1.5% of respondents strongly disagreed, while 16.2% of respondents were neutral

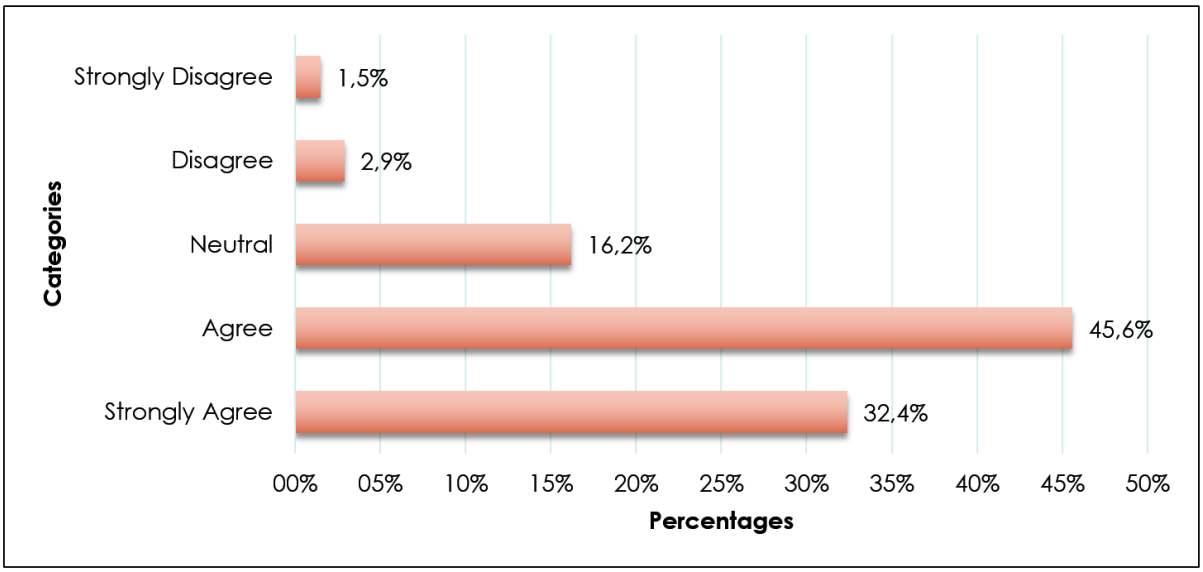


Figure 4.3: Level of web technologies' ease of use in offering remote library training

4.3.3 Relative advantage (RA)

a) The web technology tools I use to assist Unisa clients give me a relative advantage over my peers who do not want to use them

Table 4.10 shows that 17.6% strongly agreed with this statement and 52.9% agreed, while 13.2% of respondents were neutral about the idea that they gain an advantage in using web technologies over their peers who do not utilise them. Furthermore, Table 4.10 shows that 13.2% disagreed and 1.5% strongly disagreed with this statement.

Table 4.10: Relative advantage for librarians using web technologies

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	12	17.6	17.9	17.9
Agree	36	52.9	53.7	71.6
Neutral	9	13.2	13.4	85.1
Disagree	9	13.2	13.4	98.5
Strongly Disagree	1	1.5	1.5	100.0
Total	67	98.5	100.0	
Missing	1	1.5		
Total	**68**	**100.0**		

b) Adopting web technology tools in Unisa Library may improve the quality of my work

Figure 4.4 shows that 29.4% strongly agreed and 55.9% agreed with the statement, whereas 10.3% were neutral. Figure 4.7 further shows that 2.9% and 1.5% respondents disagreed and strongly disagreed respectively.

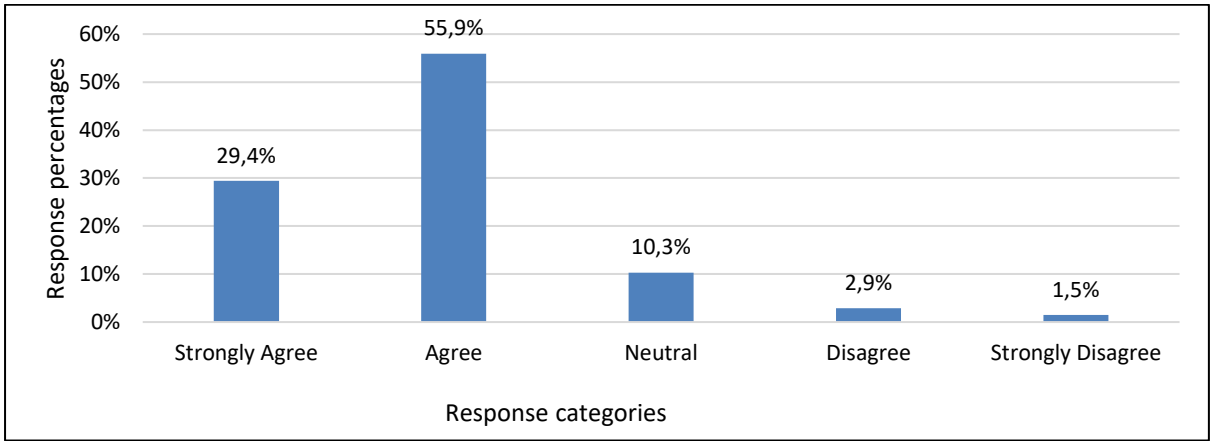


Figure 4.4: Web technologies improve the quality of librarians' work

4.3.4 Compatibility

a) Using web technology tools is compatible with all aspects of my work

Table 4.11 shows that 19.1% strongly agreed, 36.8% agreed and 27.9% of respondents were neutral about the compatibility of web technologies with their work tasks.

Table 4.11: Responses regarding the compatibility of web technologies with librarians' work

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	25	19.1	19.1	19.1
Agree	35	36.8	36.8	55.9
Neutral	6	27.9	27.9	83.8
Disagree	1	13.2	13.2	97.1
Strongly Disagree	1	2.9	2.9	100.0
Total	**68**	**100.0**	**100.0**	

The results also show that 13.2% disagreed, whereas 2.9% strongly disagreed with the assertion that web technologies are compatible with all aspects of their duties.

b) Web technologies I use are consistent with my existing values and needs

Table 4.12 shows that 10.3% of the respondents strongly agreed with the statement. The majority (58.8%) of the respondents agreed that web technologies are consistent with their values and needs. Furthermore, 23.5% of the respondents were neutral, while 4.4% disagreed. Only 2.9% of respondents strongly disagreed that web technologies are consistent with their personal values and needs.

Table 4.12: Responses regarding web technologies being consistent with librarians' values and needs

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	7	10.3	10.3	10.3
Agree	40	58.8	58.8	69.1
Neutral	16	23.5	23.5	92.6
Disagree	3	4.4	4.4	97.1
Strongly Disagree	2	2.9	2.9	100.0
Total	**68**	**100.0**	**100.0**	

4.3.5 Complexity

a) Web technology innovations are complex to use

Figure 4.5 illustrates the responses regarding the complexity of web technologies.

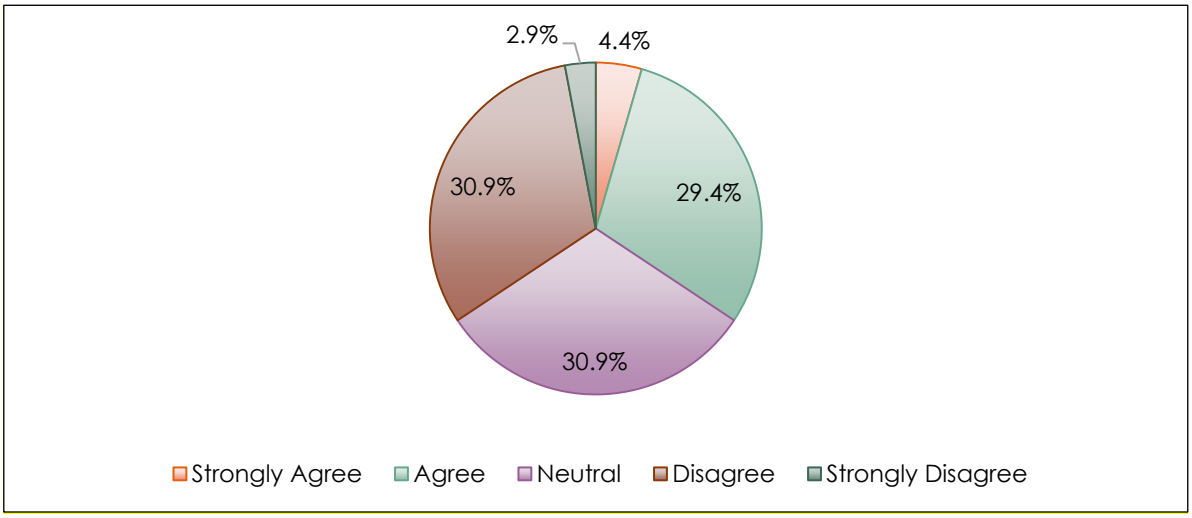


Figure 4.5: Responses regarding the complexity of web technologies

Figure 4.5 shows that 4.4% strongly agreed and 29.4% agreed, while 30.9% were neutral about the complexity of using web technologies. Furthermore, 30.9% disagreed, while 2.9% strongly disagreed with the assertion that web technologies are complex to use

b) Using web technology tools for library clients is often frustrating

Figure 4.6 shows that 4.4% strongly agreed, 41.2% agreed and 29.4% were neutral about the statement that web technologies are frustrating to use when assisting clients. The results further show that 17.6% disagreed and 6% strongly disagreed with the statement.

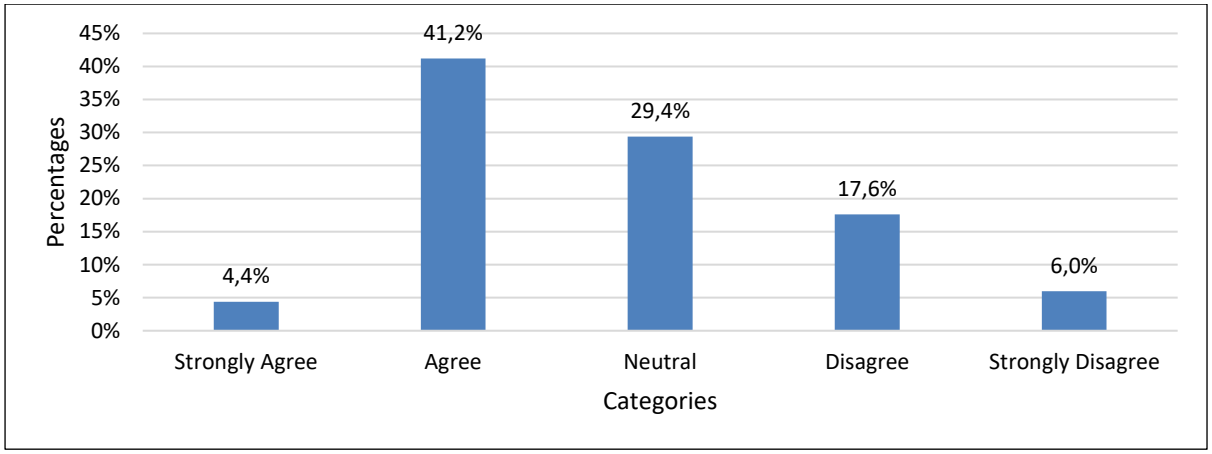


Figure 4.6: Responses regarding web technologies being frustrating to use for librarians

c) Using web technology tools to support library clients' needs a lot of mental effort

The results in Table 4.13 indicate that 10.3% strongly agreed and 41.2% agreed, whereas 29.4% were neutral about the statement that web technologies require a lot of mental effort to use. It further shows that 14.7% disagreed, while 2.9% of respondents strongly disagreed with the statement that using web technologies requires a lot of effort, while 1,5% of the responses are missing from these results.

Table 4.13: Responses regarding web technologies requiring a lot of mental effort from librarians

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	7	10.3	10.4	10.4
Agree	28	41.2	41.8	52.2
Neutral	20	29.4	29.9	82.1
Disagree	10	14.7	14.9	97.0
Strongly Disagree	2	2.9	3.0	100.0
Total	67	98.5	100.0	
Missing	1	1.5		
Total	**68**	**100.0**		

4.3.6 Trialability

a) I need more time to experiment with web tools before their implementation in Unisa Library

Table 4.14 shows that 20.6% of respondents strongly agreed, 52.9% agreed, and 16.2% were neutral about the idea of being given more time to experiment with specific web technology innovations before their implementation in the library. It further shows that 2.9% of respondents strongly disagreed, while 7.4% disagreed with the need to experiment with the innovation before its implementation.

Table 4.14: The importance of experimenting with web technologies before implementation

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	14	20.6	20.6	20.6
Agree	36	52.9	52.9	73.5
Neutral	11	16.2	16.2	89.7
Disagree	5	7.4	7.4	97.1
Strongly Disagree	2	2.9	2.9	100.0
Total	**68**	**100.0**	**100.0**	

b) There are enough people in my organisation to help me to test the various uses of web tools

Table 4.15 shows that 17.6% strongly agreed and 30.9% agreed with the statement, while 29.4% were neutral. Furthermore, the results show that 14.7% of the respondents disagreed, whereas only 7.4% strongly disagreed with the fact that their organisation has enough people to assist them when experimenting with new web technology tools.

Table 4.15: Availability of people to assist in experimenting with web technology tools

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	12	17.6	17.6	17.6
Agree	21	30.9	30.9	48.5
Neutral	20	29.4	29.4	77.9
Disagree	10	14.7	14.7	92.6
Strongly Disagree	5	7.4	7.4	100.0
Total	**68**	**100.0**	**100.0**	

4.3.7 Observability

a) I have seen what other librarians can achieve by using web technology tools in their libraries

Figure 4.7 shows that 19.1% strongly agreed, 60.3% agreed and 16.2% were neutral about the issue. Only 2.9 % disagreed and 1.5% of respondents strongly disagreed that they observed any achievements by other librarians who utilised web technologies.

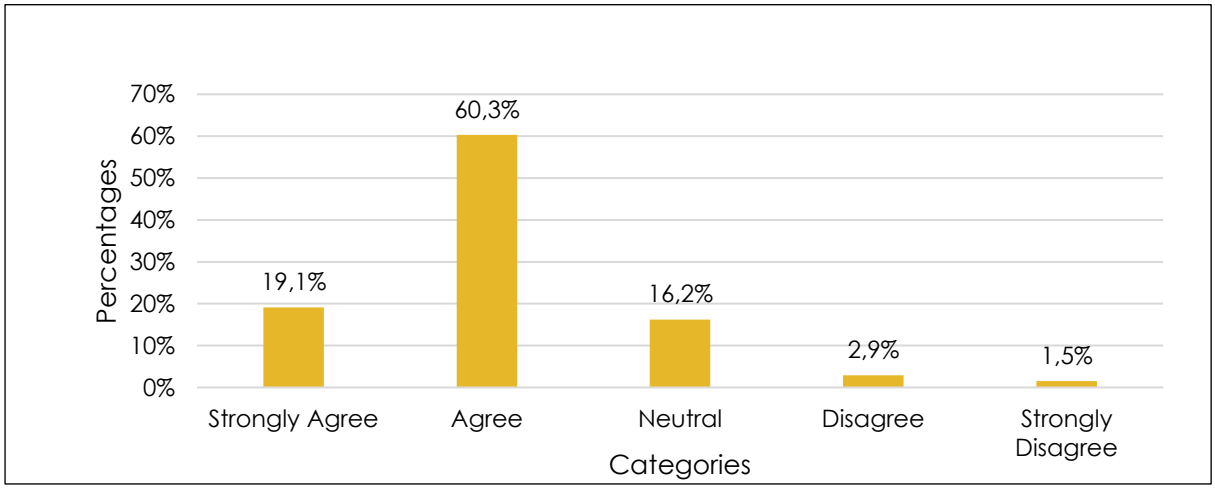


Figure 4.7: Visible results for tasks done using web technologies

b) The benefits of using web technology tools are visible to remote library clients

Figure 4.8 indicates that 7.4%, of respondents strongly agreed, 45.6% agreed and 30.9% were neutral about the statement that there are visible benefits which can be seen by observing the

library usage patterns of clients using web technologies. Figure 4.8 further shows that 10.3% of respondents disagreed, whereas only 1.5% strongly disagreed with this statement.

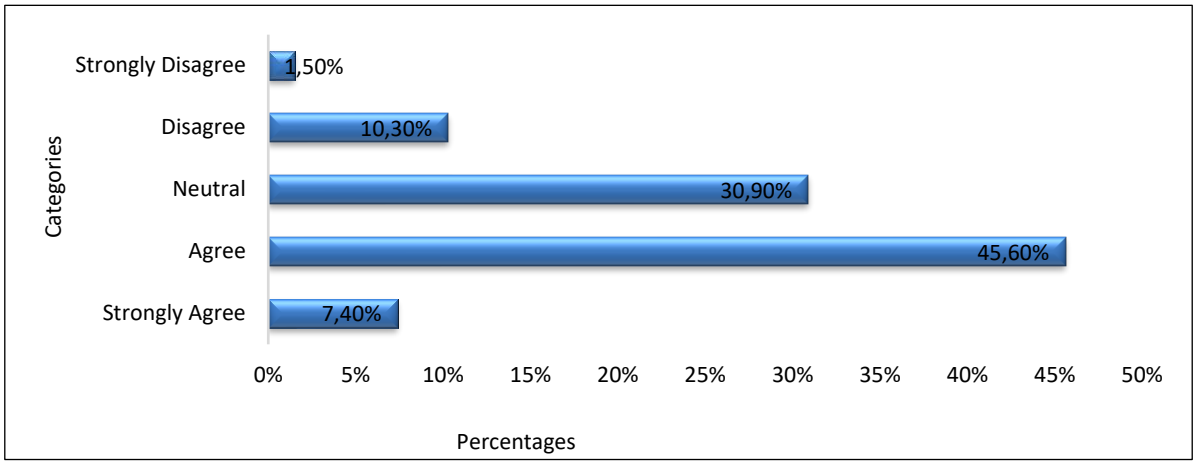


Figure 4.8: Visible benefits of using web technologies for remote library clients

4.3.8 Communication

a) I use communication tools (Skype, Scopia, live broadcasts, etc.) to train remote library clients

Table 4.16 shows that 10.3% of respondents strongly agreed, 27.9% agreed and 20.6% were neutral about the use of communication web technology tools for training purposes. Furthermore, 29.4% disagreed and 8.8% strongly disagreed with the statement.

Table 4.16: Communication tools used for remote training of clients

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	7	10.3	10.6	10.6
Agree	19	27.9	28.8	39.4
Neutral	14	20.6	21.2	60.6
Disagree	20	29.4	30.3	90.9
Strongly Disagree	6	8.8	9.1	100.0
Missing	**2**	**2.9**		
Total	**68**	**100.0**		

b) I use interpersonal communication tools (such as Skype, Scopia, live broadcasts, etc.) to communicate with remote library clients

Figure 4.9 shows that most respondents (47.1%) agreed, while 27.9% strongly agreed and 14.7% were neutral about the use of interpersonal web communication tools to communicate with clients in remote locations. Only a few (7.4%) respondents disagreed with the statement, while 1.5% strongly disagreed with the statement regarding the use of web technologies for communication with remotely located library clients.

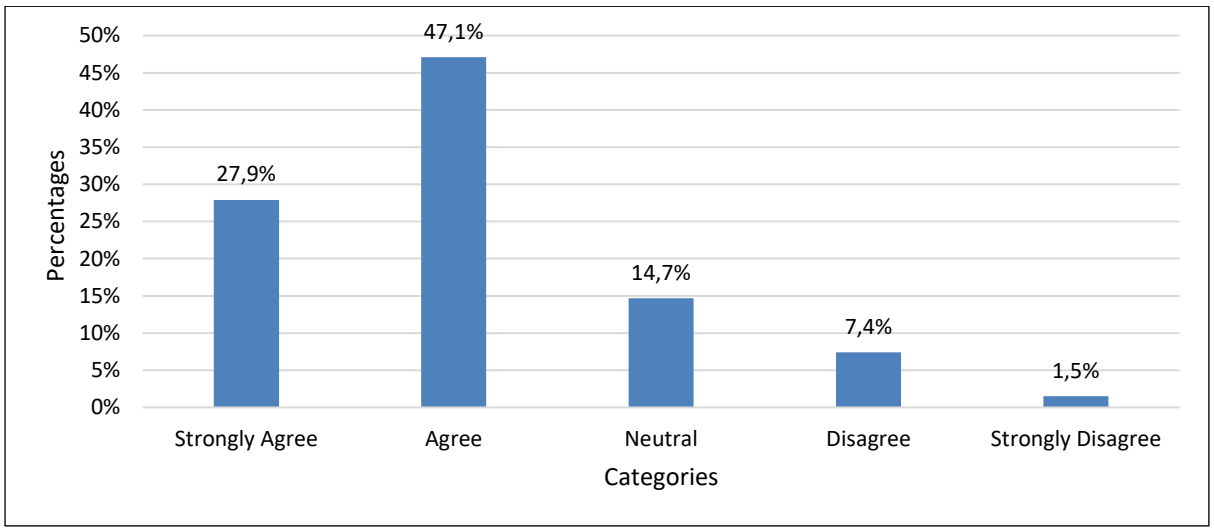


Figure 4.9: Interpersonal communication tools used by librarians to communicate with remote library clients

4.4 Familiarity with institutional policies on web technology use

The majority (51%) of respondents (Fig. 4.10) indicated that they are somewhat familiar with the policies of the university guiding the use of web technologies. Only 22% were familiar, while 18% were not sure. Only 9% of respondents indicated that they are not at all familiar with the policies for web technology usage at Unisa.

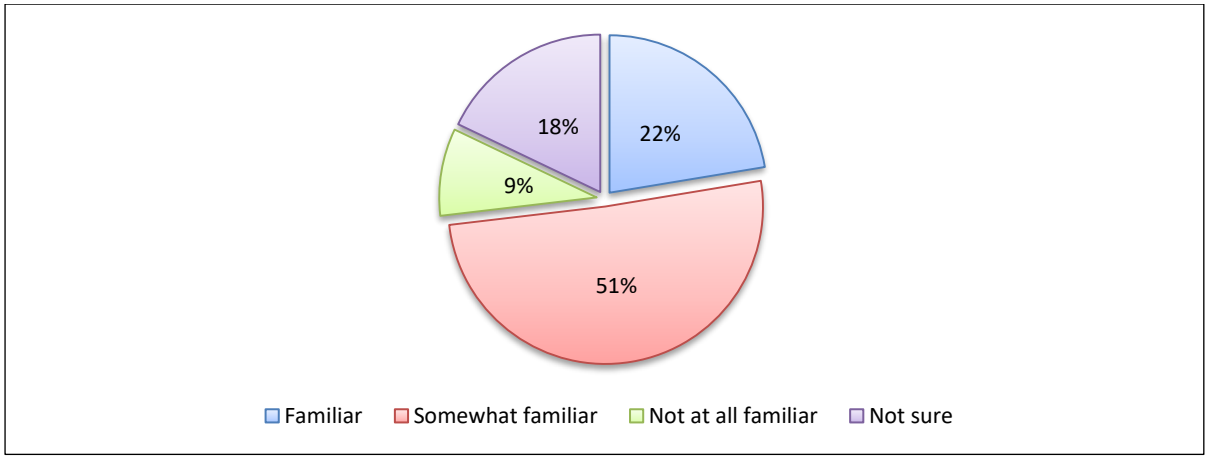


Figure 4.10: Familiarity of librarians with Unisa policies on web technology use

4.5 General comments from respondents about web technology usage experience

The researcher provided an opportunity for participants (Appendix E) to express their opinions about web technologies in an open-ended question. In this context, 42 (61.8 %) of the respondents offered their opinions and cited issues such as: network problems, ICT support, and cost of data on the side of clients as some of the issues related to the use of web technologies. Positive experiences were also shared by 61.8 % of respondents, which will be further interrogated in other sections of this study.

4.6 Pearson Correlation Coefficient

Table 4.17 shows the correlation coefficient of the TAM and DOI variables that were tested using the Pearson product-moment correlation coefficient, which indicates the extent of the linear relationships amongst the specified variables. A Pearson product-moment correlation coefficient was computed to assess the relationship between perceived ease of use and perceived usefulness.

The results in Table 4.17 indicate a strong relationship between the two variables *(r*=0.675, n=66, $p<0.001$. The interpretation of this result may be that if librarians use a web technology

tool and find it easy to use, there is a stronger likelihood that such a tool will be considered useful for a given task.

Therefore, perceived ease of use has been found to be a good predictor of the usefulness of web technologies. The results further show a strong relationship between relative advantage (RA) and perceived usefulness (PU), with values of r=0.775, n=67 p= <0.001. This means that the fact that a web technology tool offers clear advantages in terms of librarians' accomplishment of given tasks leads to it being perceived as useful, especially if such gains are evident in early adopters, compared to laggards or late adopters.

Table 4.17: Pearson correlation coefficient

Pearson's correlation coefficient for TAM and DOI constructs										
		PU	RA	COMPLE	PEOU	COMPA	TRIA	OBS	COMM	ADOP
Perceived Usefulness (PU)	Pearson Correlation	1								
	Sig. (2-tailed)									
	N	67								
Relative (RA) advantage	Pearson Correlation	.775**	1							
	Sig. (2-tailed)	.000								
	N	66	67							
Complexity (COMPLEX)	Pearson Correlation	.229	.196	1						
	Sig. (2-tailed)	.066	.120							
	N	65	64	65						
Perceived Ease of use (PEOU)	Pearson Correlation	.675**	.671**	.215	1					
	Sig. (2-tailed)	.000	.000	.088						
	N	66	67	64	67					
Compatibility (COMPA)	Pearson Correlation	.589**	.655**	.209	.703**	1				
	Sig. (2-tailed)	.000	.000	.094	.000					
	N	67	67	65	67	68				
Trialability (TRIA)	Pearson Correlation	.359**	.391**	.406**	.451**	.451**	1			
	Sig. (2-tailed)	.003	.001	.001	.000	.000				
	N	67	67	65	67	68	68			
Observability (OBS)	Pearson Correlation	.668**	.616**	.214	.612**	.637**	.426**	1		
	Sig. (2-tailed)	.000	.000	.090	.000	.000	.000			

Pearson's correlation coefficient for TAM and DOI constructs										
		PU	RA	COMPLE	PEOU	COMPA	TRIA	OBS	COMM	ADOP
	N	66	67	64	67	67	67	67		
Communication (COMM)	Pearson Correlation	.480**	.355**	.355**	.460**	.312*	.268*	.559**	1	
	Sig. (2-tailed)	.000	.003	.004	.000	.011	.029	.000		
	N	65	66	63	66	66	66	66	66	
Adoption (ADOP)	Pearson Correlation	.314*	.232	.338**	.246*	.245*	.199	.264*	.304*	1
	Sig. (2-tailed)	.010	.061	.006	.046	.046	.106	.032	.014	
	N	66	66	64	66	67	67	66	65	67

Furthermore, the results show that there is a reasonably strong relationship between communication and the adoption of web technologies (r=0.304, n=66, p=0.014). There is a high statistical significance for the belief that web technologies enable communication, which has an impact on their adoption.

Previously, in the analysis of items, respondents agreed strongly with the idea of web communication tools playing a significant role in enabling communication with clients in an ODeL library. Communication is further revealed in the study to have a very strong relationship with the usefulness of web technologies (r=0.480, n=65, p< 0.001).

Surprisingly, in the survey results shown in Table 4.17, trialability has a somewhat weaker relationship with the adoption of web technologies, with values of r=0.199, n=67 p=0.199. There is no statistical significance between the trialability of web technologies and the actual adoption, as per the data presented. This may be attributed to the items in the survey questionnaire, which focused more on the availability of people to assist in the trial period, and the time needed for experimenting with web technologies, instead of asking questions about the actual testing of the tools.

The study further revealed that compatibility has a strong relationship with the perceived usefulness of web technologies (r= 0.589, n=67, p<0.001), which means that if a specific tool is compatible with librarians' tasks; it is likely to be perceived as being useful by librarians.

The observability of the tasks accomplished using web technology tools is strongly associated with all other variables, except Complexity. Complexity and Observability have weaker relationship scores of r=0.214, n=64 p=0.090. This means that the observable duties that Unisa librarians accomplish using web technologies have very little to do with their complexity to use.

4.7 Testing the hypotheses

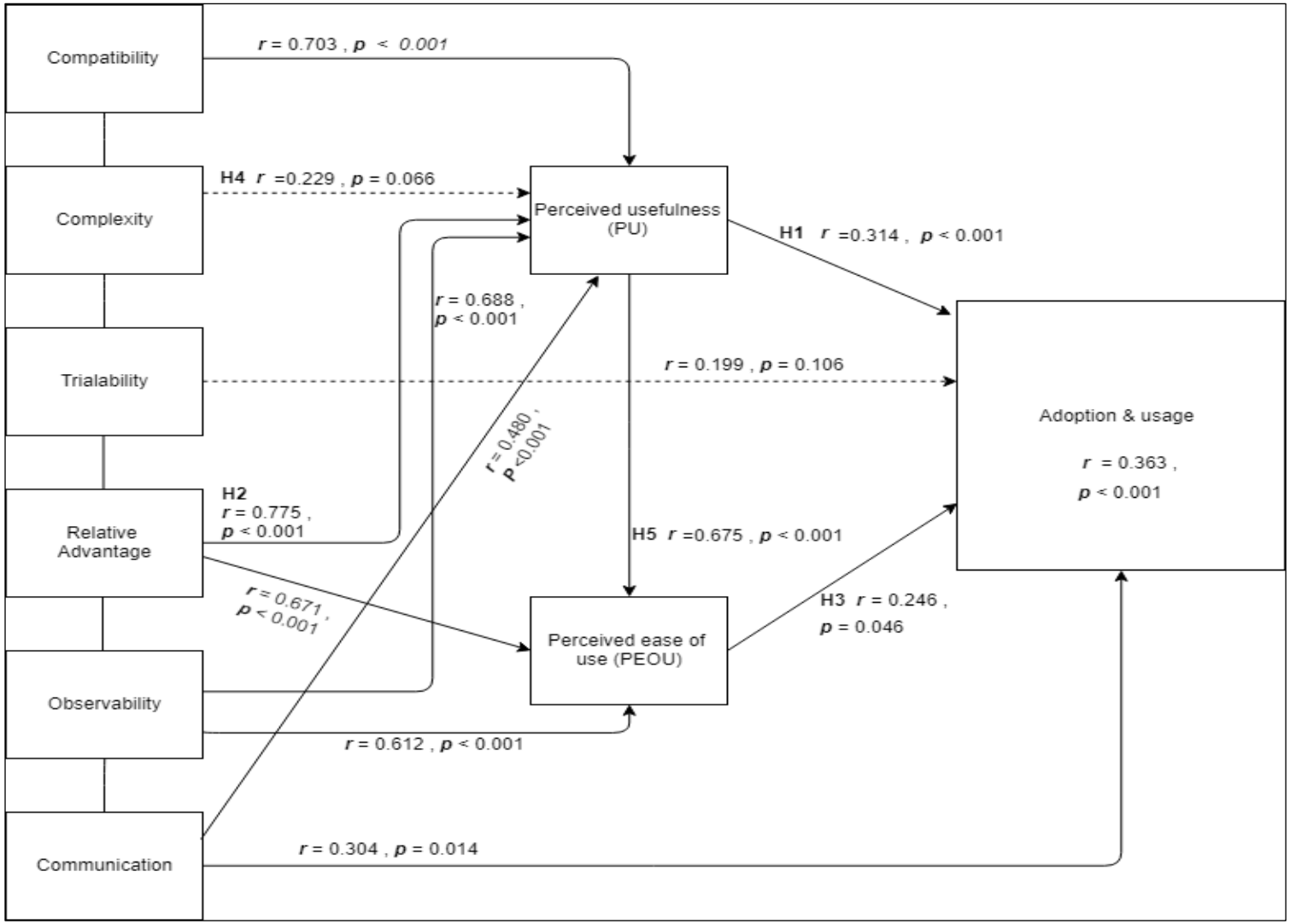
The study stated five hypotheses. Figure 4.11 shows the relationship between acceptance and adoption variables, from which information can be deduced to analyse the hypotheses.

H1. The perceived usefulness of web technology tools by librarians at the UNISA Library will positively lead to adoption of the tools for library services.

Figure 4.11 shows the results regarding the perception that web technology tools are useful and positively influence their adoption. The results (r=0.314, p< 0.001) show a weak relationship in this regard. Previous studies, such as Abdekhoda, Denhad, Ahmadi and Noruzi (2016); Al-Suqri (2013); Buabeng-Andoh (2017); and Afari (2010), among others, also reported similar findings.

H2. The perceived usefulness of web tools by librarians at the UNISA Library will significantly depend on the relative advantage that the librarians expect to gain when using such tools.

Figure 4.11 shows a high and significant correlation between usefulness and relative advantage (r = 0.775, p<0.001). The hypothesis is therefore supported. Yang, Meister and Yang (2011); Wu, Li and Lin (2010); and Lin, Chao and Tang (2017) reported similar findings in terms of relative advantage having a positive influence on the perception of usefulness.



Note: ——► Significant =p<0.001, p<0.05 - - - - - - - - ► Not supported

Figure 4.11: Conceptual research path model with results

H3. The perceived ease of use of web tools by librarians at the UNISA Library will significantly influence their acceptance and adoption.

Figure 4.11 shows a somewhat strong but low relationship between the perceived ease of use and the adoption of web technologies (r= 0.246, p=0.046). This hypothesis is therefore supported. Thong, Wong and Tam (2002), as well as Abdekhoda, Ahmadi, Gohari and Noruzi (2015), also found that perceived ease of use has an impact on the decision to adopt.

H4. The perceived complexity of web technology tools by librarians at the UNISA Library will have a significant influence on the perceived usefulness of the tools.

Figure 4.11 shows a weak and insignificant correlation between complexity and perceived usefulness (r=0229, p=0.066). Respondents in this study did not associate the complexity of web technology tools with their usefulness or lack thereof. Ramavhona and Mokwena (2016); Lee (2007); Hardgrave (2003); and Al-Rahmi et al (2019) found no relationship between complexity and usefulness. The hypothesis is therefore not supported. Future research needs to isolate a particular web tool to further interrogate the relationship between usefulness and complexity. The researcher realised that there is a split in the literature in terms of those in support of the hypotheses and those not in support of them.

H5. The perceived usefulness of web technologies by Unisa librarians will significantly depend on the ease of use of the tools.

Figure 4.11 shows a strong and significant relationship between the ease of use and the usefulness of web technologies (r=0.675, p<0.001). Unisa librarians find web technologies useful if such tools are easy to use. Stoel and Lee (2013), Lee, Kozar and Larse (2003), Mensah

(2016), and Rafique, Anwer, Shamin et al. (2018) affirmed this finding. Lee et al. (2011), however, found that, counterintuitively, complexity had a significant positive effect on PU.

Table 4.18: Summarised hypotheses testing results

Hypotheses	Path	Direction	Results	*r* value	*p* value
H1	PU vs Adoption	Positive	Supported	0.314	**p<0.001**
H2	PU vs RA	Positive	Supported	0.775	**p<0.001**
H3	PEOU vs Adoption	Positive	Supported	0.246	**p=0.046**
H4	COMPLEX vs PU	Negative	Not Supported	0.229	**p<0.066**
H5	PU vs PEOU	Positive	Supported	0.675	**p<0.001**

Note: *P*-value is highly significant at <0.001, p≤ 0.05 levels, *P*-value is not significant at 0.066 levels

PU: Perceived Usefulness; PEOU: Perceived ease of use; RA: Relative advantage; CO: Complexity

CHAPTER 5:
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This research aimed to investigate the use of web technologies by librarians to support students and researchers in an ODeL institution. The study focused on Unisa Library and sought to determine if web technology applications play any significant role in supporting library services. The research objectives laid out in the first chapter included determining if the ease of use has any impact on the adoption decision. The study also focused on Unisa librarians' work experience, Unisa policies related to the use of web technologies, familiarity of librarians with web technologies, as well as the advantages (if any) that librarians gain by using web technologies.

The previous chapter provided a comprehensive outline of the results obtained in this study and analysed data as per the responses by participants regarding the way in which researchers are supported using web technologies, in order to enhance library services at Unisa Library. Variables from the Technology Acceptance Model and Diffusion of Innovation theories were used to test the acceptance and adoption of these web technologies by participants in this study.

5.2 Summary of the findings

The study showed a higher number of female respondents at Unisa Library than males. The age groups for most the respondents were 40-49 and 50 and above. The interpretation of this pattern may be related to the employment trends in the library and information sector, which historically shows an observable trend of a higher concentration of female staff members than males. With regard to the higher concentration of staff in the age group of 50 and above, this may also reflect the experience levels. Most respondents indicated that their years of

employment were 6-10 years and 20 years and above. The study further highlighted a strong motivation amongst Unisa librarians to accept and adopt web technologies, by showing most of them to be innovators and early adopters. This clearly indicates their eagerness to use web applications to support ODeL library clients. The familiarity of librarians with web technology tools was revealed to be at a high level in this research. Unisa librarians are familiar with most web technologies that are popular worldwide for supporting ODeL or digital libraries.

Podcasts, Twitter, Facebook and reference management tools (Mendeley and RefWorks) were cited as applications that are most useful in supporting researchers. This is in line with other literature reviewed in the study, which cited similar web tools as being useful in enhancing online library services. The study revealed a high number of respondents who cited ICT support and network issues as factors affecting the usage of web technologies at Unisa Library. Issues such as implementation costs and the need for training were also mentioned as crucial for the success of web technology usage. Factors that influence librarians' adoption of web technologies were identified in this study, and included clients' needs, online training and communication, changes in the library and information science profession, and the university 's strategic objectives. Training library clients in an ODeL environment may be a complex activity, hence it is understandable that this research cited online training and communication as some of the key factors influencing web technology utilisation. The study also revealed individual influencers of adopters as being mostly peers and library colleagues. There seems to be a need for library management to improve the library's motivation strategies or encourage their staff members to adopt web technologies. In this regard, the study showed that the impact of library management on staff members' motivation to adopt web technologies was low. The researcher observed that web technology tools on their own have a very short lifespan. The time and effort invested by librarians in investigating the relevance of web tools to the library online environment is enormous. The suitability and sustainability of web tools

for accomplishing specific library tasks must be carefully scrutinised, because web technologies can become obsolete within a short period.

5.3 TAM and DOI variables as measures of technology acceptance/adoption

The research explored web technology usage in ODeL libraries using the TAM and DOI variables. The study affirmed that there would (for the most part) be an uptake of web technologies at Unisa Library for as long as they are perceived to be useful. The usefulness of web technologies to support researchers at an ODeL institution was affirmed by this study, despite various challenges that are experienced by librarians.

A significantly high number of respondents indicated that web tools help them to accomplish their tasks more easily, which in turn improves their job performance. The findings are similar to other studies in terms of web applications implemented in libraries and their usefulness – these studies include Kim and Abbas (2010); Kumar and Triphathi (2011); Antirroikko and Savolainen (2011); Nguyen (2008); Nguyen (2015); Gichora and Kwanya (2015); Bradley (2007); Stuart (2010); Seena and Sudhier (2014); and Rafique, Anwer and Shamim (2018), amongst others.

The importance of the ease of use in the adoption and usage of web technologies was strongly affirmed in the results of this study, which highlighted the ease with which web technologies help librarians interact with their clients. The results further affirmed that respondents find most web technologies easy to learn. Web tools were earlier shown to make online training of remote clients easier. Considering the common trend of dwindling financial resources to reach out to remotely located clients, it is good to hear librarians endorsing web technology tools as alternative means to conduct remote training. Data collected from the respondents indicated that if a specific application is perceived to be easy to use, and offers some relative advantage for the given tasks, such an application will be adopted. This was

revealed in the study when most respondents reported seeing the potential of these tools to improve the quality of their work. Respondents indicated that they have realised significant advantages in the way they perform their jobs, in comparison to their peers who do not use web tools.

With regard to the compatibility of web technology tools with librarians' duties, the study showed that participants were slightly divided in terms of the compatibility of web tools with all aspects of their work, but they indicated that web tools are in line with their values and needs. The first finding may be attributed to the way in which the researcher structured the question, because it is possible that respondents may not necessarily view web tools as being compatible with all aspects of their job, but rather specific parts of their job. Although a high number of respondents agreed with the complexity of using web tools and saw them as being frustrating to use when assisting clients (refer to data analysis), future research needs to probe this construct in more depth. There should be more interrogation in future research, perhaps using interviews as data collection instruments, in order to make follow-ups on respondents' answers, because there is no conclusive evidence regarding how complexity affects adoption decisions.

The issue of experimenting with web tools before actual usage was regarded by respondents as being very important. This is understandable because testing web tools helps to ensure that all aspects of a particular tool in terms of feasibility, user-friendliness, and bandwidth requirements, amongst others, should be addressed before the actual implementation. Furthermore, a conducive environment and expertise amongst librarians should be created for the trial of web tools before implementation.

The belief by librarians that the observability of the results attained using web technology tools influences adoption is shown in the survey results, wherein a high number of respondents acknowledged that they saw the achievements and benefits of web technologies

used by other librarians to serve remote clients. This is a positive sign for an ODeL institution, because if the fruits and benefits of utilising web tools are observable to potential adopters, they will also be encouraged to adopt them.

Items in the adopter categories questioning respondents about their willingness to adopt web technologies were used to test the adoption variable in combination with the statements in the open-ended questions showing willingness of adoption by respondents.

Table 4.2 shows a high number of respondents (80.53 %) willing to adopt web technologies (37.31% of innovators, 35, 82% of early majority adopters as well as 7.40% early adopters). The remainder of the respondents are not necessarily reluctant to adopt web technologies, but only adopt web technologies when they see their colleagues already utilising web technologies. Furthermore, the general comments in open questions (see Appendix D) show a high willingness of respondents in adopting web technology tools. The issues that the respondents are citing as barriers are outliers affecting the adoption process.

The researcher also explored the usage of web technology tools for interpersonal communication. He realised (through the results) that many respondents indicated that they use these web tools for communication purposes. Only a small number of respondents did not find these tools useful in their training responsibilities, as per the results. This is understandable, because the researcher did not select the sample by isolating only participants who train clients at Unisa Library. The question might only have been relevant for a few of the sampled participants who conduct online training.

5.4 Librarians' familiarity with policies for web technology usage at Unisa

The study considered external variables such as familiarity with university policies, previous experience of librarians, and technical issues as determinants of adoption decisions by librarians. Most respondents are not confident about their level of familiarity with Unisa

policies guiding the adoption of web technologies, as per the findings in the previous chapter. However, on the issue of university policies supporting the implementation of web tools, a high number of respondents agreed that the policies of the university support web tool implementation.

5.5 Summary of conclusions

The study focused on the challenges and opportunities that librarians experience when they offer library service to their researchers and students using web technology tools. The study used Unisa as a focal area, because of the strategic shift of the university's service offering from traditional distance education to an online distance and e-learning environment. The quantitative approach was found to be a suitable method for the study due to its objective method of investigation. A cross-sectional approach was chosen over a longitudinal approach in view of the limited time and resources for this type of the study. The researcher distributed questionnaires to participants consisting of items investigating their gender, employment experience, familiarity with various university policies guiding web technology implementation, familiarity with web technology tools commonly implemented in digital libraries, level of innovation capabilities or reluctance to innovate, influencing factors (human and material), as well as several questions that used the Likert-scale to determine the acceptance and adoption patterns of librarians (see Appendix D).

The study revealed a high level of motivation and eagerness to innovate web technology tools among respondents, because most of them are in the category of innovators, early adopters and early majority. Regarding the innovated technologies, respondents agree with modern trends in terms of implementing common web tools. These are tools such as those mentioned in this research, namely: Facebook, Twitter, Skype, and ResearchGate, among others. These tools are often utilised in situations where there is a geographic distance between

the researcher and librarian, which is similar to the Unisa Library environment. Research management tools are also common amongst librarians, as Mendeley, RefWorks, ORCiD were found to be familiar amongst the librarians participating in the study.

Furthermore, the study focused on the challenges of using web tools, and show that majority of respondents (75%) agreed that they experienced some challenges in using web technologies. Issues such as technical support, network issues and security should be addressed by the mother-institution in order to improve the adoption and usage.

5.6 Limitations of the Study

The study experienced the universal challenge of a low response rate, which is often associated with online surveys. Online surveys are still very recent and the factors that affect response rates are yet to be fully understood. Moreover, a better understanding of the situation regarding the acceptance of web technology tools by Unisa librarians will benefit from an expanded range of issues covering matters that the respondents raised in their comments. These include legal issues, copyright, and technical assistance, among others.

Ideally, web technology usage and adoption need to be explored using the mixed-methods approach, in order to give the researcher an opportunity to make follow-ups and interrogate respondents on a face-to-face basis. Such an approach will help to clarify misunderstandings in terms of questions and answers, so that accurate findings can be captured.

Although there are many cross-sectional studies on the acceptance and adoption of newer technologies, there is a need in future research to focus on a specific kind of web technology tool (as mentioned above) and conduct a longitudinal study on such a tool. In this way, a thorough analysis can be done, and a specific web application/tool can be monitored scientifically, by looking at the dynamics of its implementation and adoption over a specific period.

Sampling the population in the modern internet era, where there are various online web survey tools, can lead to errors among inexperienced researchers. In this regard, the study may have encountered a situation where respondents honestly answered the questions that focused mainly on the web tools that they are more familiar with, and just randomly commented, without paying much attention, in response to questions regarding tools that they are not familiar with. As recommended by Lee, Hsieh and Hsu (2011), this study could benefit more by pursuing other data collection methods, such as focus groups and interviews. By using interviews and focus groups as additional data collection instruments, the researcher may then, as already indicated, make follow-ups and explore the participants' responses in more detail. For example, in situations where respondents stated that web technologies are complex and difficult to use, there could be a follow-up by the researcher to get more clarification. As per the data collected in this study, complexity does not disqualify web technologies from being useful, so when respondents indicate that these technologies are complex, it does not imply that these web technologies are not useful.

5.7 Study recommendations

The study dealt with several issues regarding Unisa librarians' usage experiences when supporting researchers in a modern ODeL environment. Generally, librarians are eager to adopt and utilise web technologies to enhance library services, as shown by the high statistical significance of the Adoption variable in the results ($r=0.063$, $n=66$, $p<0.001$). However, several issues need to be addressed to make the utilisation of web technologies easier at the Unisa Library. The researcher realised that there is no conclusive evidence that ICT is totally lacking in terms of supporting web technology implementation in the library. Nevertheless, the perception about ICT support and the constant unreliability of the network, as mentioned by respondents, is high and seems to be influencing the perception that there is no ICT support.

Unisa Library would further benefit by establishing properly coordinated teams which would investigate the services of the library in various sections, and then identifying specific web tools that may be utilised in those sections. In that instance, support would be based on tools that are properly researched for specific functions. The team would then focus on the technical and network requirements, in order to enhance the compatibility of these tools with the university systems. ICT personnel should be involved in the identification and selection of these web applications, so that they can determine how these tools will be supported, instead of the ICT department learning of such implementation after the library has already done the investigation and launched the product. Furthermore, there should be co-operation and co-ordination between the library ICT team and the university ICT team in terms of web tools that need to be implemented, and those that would not be compatible with the university's ICT network infrastructure. In-house web technology investigation teams with clear mandates to investigate and draft implementation plans, and consolidated support structures are required in the library. These teams should get all the necessary support from library management, including time and relevant resources for investigating and launching appropriate tools library-wide.

Library management should motivate staff to adopt web technologies in order to improve library services, in compliance with the university's ODeL strategic objectives. Staff in remote library branches should also be involved in the teams investigating web technologies. They have first-hand experience in dealing with remote clients, and are suitably informed about network and bandwidth issues in the areas where clients are located. The library should develop an e-learning laboratory room which may be used as a virtual training room, video-conferencing facility, and for Skype sessions, amongst others. These facilities should be established in the main branches or strategic regions of the university, wherein staff would have all the facilities to engage with clients in a virtual environment. The policies and procedures

guiding the use of web technologies should be simplified and further promote the innovation of new web technologies by library staff.

Respondent 03 shed more light on this when recommending that:

"It would be wonderful if Unisa had a web technology laboratory where products could be designed to meet its own ODeL needs. All web technology tools would benefit from the input of librarians at the design phase. The teams formulated by management to investigate and recommend web technology tools should seek input from all stakeholders in the library. Feedback from clients should always be taken into consideration and their comments should be interrogated and be used as a basis to improve the usefulness and compatibility of web technologies to both clients' and librarians' tasks. Just because of the short life span of web technology tools, a properly coordinated development team would then assist to investigate an alternative tool before the one in use becomes irrelevant for the assigned task. That would then make web tools useful for supporting research in an ODeL environment on a long-term measure, rather than the present scenario where there are no dedicated teams involved.

5.8 Implications for the library and information science profession

The library and information science sector and ODeL libraries in general will benefit from this study by learning about the various dynamics and complications that may arise from attempts to implement web technology tools in their libraries to support researchers and students. Distance education (which has taken the form of online distance learning in the modern era) should also take note of the factors that impact the adoption of web technologies in ODeL libraries, as well as ways to overcome the barriers that are usually encountered when utilising such tools. Future research in the field should explore and investigate how to mitigate the impact of these barriers on distance education library services. The following barriers were noted in this research:

- Distance between the client and the librarian,
- Bandwidth issues for students in different countries with different levels of ICT development,
- Web technology tools becoming obsolete within a short period, despite a lot of effort by librarians in the investigation and implementation stages,
- Institutional ICT red tape,
- Tall bureaucracy in procurement policies and procedures,

- Social issues such as politics, religion and culture, which have an impact on how ODeL libraries deliver services to remote clients.

University policies and procedures must be simplified (alongside ICT red tape), and partnerships must be established with other ODeL institutions worldwide, in order to share the experiences and knowledge resources required to implement web technologies in ODeL environments.

References

Abdekhoda, M; Dibaj K. Medical librarians and new web technologies: how familiar are we with web facilities and use of library services applications? *Journal of health informatics in developing countries* Vol 5 (01) Pp. 38-46.

Abdekhoda, M; Ahmadi, M; Dehnad, A; Noruzi, A; Gohari, M. 2016. Applying electronic medical records in healthcare. *Applied Clinical Informatics* Vol. 7(2) Pp. 341-354.

Adams, D. A; Nelson, R; Todd P A.1992. Perceived usefulness, Ease of use and usage of information technology: a replication. *MIS Quarterly* Vol 16 (2) Pp. 227-247.

Aharony N, 2009. Web 2.0 use by librarians. *Library & Information Science Research* Vol. 31 (1) Pp.29-37.

Aidrina, M. S. 2014. Sustainable development, e-learning and Web 3.0. *Journal of Information, Communication and Ethics in Society* Vol.12 (3) Pp. 157-176.

AL-Daihani S. 2009. The knowledge of Web 2.0 by library and information science academics. *Education for Information* Vol. 27(01) Pp. 39-55.

Al-Ghatani S. 2003. Computer technology adoption in Saudi Arabia: Correlates of perceived innovation attributes. *Information technology for development* Vol. 10 (01) Pp. 57-69.

Al- Jabri I. M; Sohail M S. 2012. Mobile banking adoption: application of diffusion of innovation theory. *Journal of Electronic Commerce Research* Vol. 13(4) Pp. 379-391.

Al-Rahmi, W M; Yahaya, M; Aldrahiweesh A. Alamri M; Aljarboa, N A; Al Turki U; Aljeraiwi A. 2019. Integrating Technology Acceptance Model with Innovation Diffusion Theory: An Empirical Investigation on Students' Intention to Use E-Learning Systems. *IEEE Access* Vol. 7 (February) Pp. 26797-26809.

Al-Suqri, M. N. 2014. Perceived usefulness, perceived ease-of-use and faculty acceptance of electronic books: An empirical investigation of Sultan Qaboos University, Oman. *Library Review*, Vol. 63 (4/5) Pp.276-294.

Akkoyunlu, B.; Soylu M. 2006. A Study on Students' views on Blended Learning Environment. *Turkish Online Journal of Distance Education* Vol. 7(3) Pp. 43-56.

Andres L. 2012. Designing and doing survey research. SAGE Publishers: London.

Anttiroiko, A. Savollainen 2011. Towards Library 2.0: the adoption of Web 2.0 technologies in Public Libraries. *Libri*. Vol. 61(2) Pp. 87-99.

Bagozzi, R.P.; Davis F.D; Warsaw P.R. 1992. Development and test of a theory of technological learning and usage. *Human Relations* Vol. 45(7) Pp. 659-686.

Bagozzi, R.P.; Davis F.D; Warsaw P.R. 1989. User acceptance of computer technology: a comparison of two theoretical models. *Management Science* Vol. 35(8) Pp. 982-1003.

Barbie, E. 2010. *The practice of social research*.12th ed. Wadsworth Cengage: Belmont.

Barnhart, A C; Standfield A G. 2011. When coming to campus is not an option: using web conferencing to deliver library instruction", *Reference Services Review,* Vol. 39 (1) Pp. 58 – 65.

Baro, E; Idiodi, E.O; Godfrey, V. Z. 2012. Awareness and use of Web 2.0 tools by librarians in university libraries in Nigeria. *OCLC systems & Services* Vol. 23 (3) Pp. 170-188.

Baro, E; Ebiagbi J; Godfrey V. Z. 2013. Web 2.0 usage: a comparative study in university libraries in Nigeria and South Africa. *Library Hi Tech News* Vol. 30 (5) Pp. 10-23.

Baset A. S; Schulzrinne H. 2004. An Analysis of the Skype Peer-to-Peer Internet Telephony Protocol. *Networking and Internet Architecture* Vol 01 (01) Pp. 01-12.

Baumann, M. 2009. Web 3.0: The next step for the Internet. *Information Today.* Vol. 26(5) Pp.18-20.

Beins B. C. 2019. *Research Methods: A Tool for Life*. 4th ed. Cambridge University Press. United Kingdom.

Bernier R. 2010. Using LibGuides as a Web 2.0 Content Management System and a Collaboration Tool for Engineering Librarians. Paper presented at the 2010 *ASEE Annual Conference & Exposition*. American Society for Engineering Education: Louisville. Pp. 1-14.

Blank, G.; Reisdorf B C. 2012. The Participatory web. *Information, Communication & Society* Vol. 15(4) Pp. 534-554.

Bradbury, J. 2016. Podcasts expand classroom wall. *Education Digest; Ann Arbor* Vol. 81(8) Pp. 46-48.

Bradley, A. 2007. Key issues in the enterprise application of Web 2.0 practices. *Technologies, products and services*. Research report. Gartner, https://gtnr.it/36rlMmR. Accessed August 2019.

Brantley, J. S; 2010. Exploring library 2.0 on the social web. *Journal of Web of Librarianship* Vol. 4 (4) Pp. 351-374.

Brindley, D. L. J. 2009. Challenges for great libraries in the age of the digital native. *Information services and use*. Vol. 29 (01) Pp. 3-12.

Brown, M. 2014. Is Almetrics an acceptable replacement for citation counts and Impact factor? *The Serials Librarian* Vol 67 (01) Pp. 1-19.

Boateng, F. Liu, Y. Q. 2014. Web 2.0 applications' usage and trends in top US academic libraries. *Library Hi Tech* Vol.32 (01) Pp. 120-138.

Booth, C. 2008. Developing Skype-based reference services. *Internet Reference Services Quarterly.* Vol. 13 (2-3) Pp. 147-165.

Booth, C. 2010. VoiP in Reference, User Services and Instruction. *Library Technology Reports* Vol 5 July.

Boulos, M. N. K.; Maramba I; Wheeler S. 2006. Wikis, Blogs and Podcasts: a new generation of web based tools for virtual collaborative clinical practice and education. *BMC Medical Education*. Vol. 6 (41) Pp. 01-08.

Buabeng-Andoh, C. 2018. Predicting students' intention to adopt mobile learning: A combination of theory of reasoned action and technology acceptance model. *Journal of Research in Innovative Teaching & Learning* Vol. 11(2), Pp.178-191.

Brumvand, A; Lee, D R; Mcloskey, K M; Hansen, C; Kochan C A; Morrison R. 2001. Consortium Solutions for Distance Education Libraries. *Journal of Library Administration* Vol. 31(3-4) Pp.75-92.

Cassey M.E; Savastinuk L. C. 2006. Library 2.0: for the next generation library. *Library Journal*, September 01.

Chandra P; Raymond, I. 2003. Web technology in public libraries: findings from research. *Library Hi Tech,* Vol. 21(1) Pp.62-69.

Chau P. K; Hu P H. 2002. Examining a model of Information Technology Acceptance by Individual Professionals: An Exploratory Study. *Journal of management Information Systems* Vol. 18 (04) Pp.191-229.

Chen X; Fenfei, O and Heting, C. 2009. The Academic Library meets Web 2.0: Applications and Implications. *The Journal of Academic Librarianship* Vol. 35 (4) Pp. 324-331.

Chetty, Lee-Roy. 2011. Understanding Web 3.0 - the semantic Web: how the evolution to a third generation of the web will impact upon the Internet and media environment within a global and South African Context. Master's Thesis. *University of Cape Town*: South Africa.

Chisega-Negrila. 2012. Web 3.0 in Education. *8th International Conference e-Learning and Software for Education in Bucharest.* April 26-27. Issue 01. Pp. 455-460.

Cho, A and Giustini D. 2008. Web 3.0 and health librarians: an introduction. *Journal of the Canadian Health Libraries Association* Vol. 29(1) Pp. 13-18.

Chu, H; Yang, S. 2012. Innovative semantic web services for next generation academic electronic library via web 3.0 via distributed artificial intelligence. *ACIIDS Part I*. Pp. 119-124.

Chu, S. K. 2009. Using Wikis in Academic Libraries. *The Journal of academic Librarianship* Vol 35 (02) Pp. 170-176.

Chuttur. M. 2009. Overview of the technology acceptance model: Origins, developments and future directions. *Sprouts: working papers on information systems*. Vol. 9 (37) Pp. 1-21.

Creighton P. M. 2010. *Perceptions of Web 2.0 tools as catalysts to Teacher and Librarian Collaboration*: a case study. PhD Dissertation. Walden University: USA.

Creswell, J. W. 2007. *Qualitative inquiry and research design: Choosing among five approaches.* SAGE Publishers: Lincoln.

Creswell, J. W. and Clark, V. L. P. 2007*a*. *Designing and conducting mixed methods research*. Thousand Oaks, SAGE Publishers: CA.

Concannon, F.; Flynn, A; Campbell, M. 2005. What campus-based students think about the quality and benefits of e-learning? *British Journal of Educational Technology* Vol. 36 (3) Pp. 501-512.

Davis, F. D. 1985. A technology acceptance model for empirically testing new end-user Information systems: theory and results. *PHD Thesis*. Massachusetts Institute of Technology: USA

Davis, F. D; Venkatesh, V. 2000. A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science* Vol. 46 (2) Pp. 186- 204.

De Beer, K. J. 2010. Enhancing the contribution of Open and Distance e- learning in higher education: Implications for the Central University of Technology, Free State. *Interim: International Journal* Vol. 9 (2) pp. 41-58.

Dhiman, A. K. and Sharma, H. 2008. Blogging and uses of blogs in Libraries. 6th *International CALIBER*. Feb 28-29. University of Allahabad: India. Pp.437-445. https://pdfs.semanticscholar.org/a35c/d9ecc7a8c69490735589af6f9cca282d7b06.pdf. Accessed July 2018.

Dialsingh, I. 2013. Face-to-face Interviewing. *SAGE Journals Online*. SAGE Publications: London.

Dugan, R. E.; Heron, P. 1997. Distance Education: Provider and Victim Libraries. *Journal of Academic Librarianship* Vol 23 (4*)*. Pp. 315-318.

Eden, B; Westcott, J; Chappell, A; Lebel, C. 2009. LibraryThing for libraries at Claremont", Library Hi Tech, Vol. 27 (1) Pp. 78-81.

Encyclopædia Britannica. 2019. RSS feeds. *Encyclopædia Britannica, Inc*. https://www.britannica.com/technology/RSS. Accessed October 2019.

Encyclopædia Britannica. 2019. Twitter. *Encyclopædia Britannica, Inc*. https://www.britannica.com/technology/Twitter. Accessed October 2019.

Estelles, E.; del Moral, E; Gonzalez, F. 2010. Social bookmarking tools as facilitators of learning and collaborative processes. The Diigo case. *Interdisciplinary Journal of E-Learning and Learning Objects* Vol. 6 (1) Pp. 175-186.

Fanning, E. 2005. Formatting a paper based survey questionnaire: best practices. *Practical assessment, research and evaluation* Vol.10 (12) Pp. 1-14.

Ferreira, J. G.; Venter E. 2011. Barriers to learning at an ODL institution. *Progressio* Vol.33 (1) Pp. 80-93.

Fields, E. 2010. A Unique Twitter use for reference services. *Library Hi Tech news*. Vol. 6 (7) Pp. 15-16.

Freire, J. 2008. Universities and web 2.0: Institutional challenges. *E-Learning papers no.8*. https://bit.ly/2WZbRET. Accessed 20th June 2019.

Gainess, K. 2011. A brief introduction to Web 3.0. *Social Media, Tips, Web Designer*. https://1stwebdesigner.com/what-is-web-3-0/. Accessed 22nd June 2019.

George, C; Scerri, J. 2007. Web 2.0 and user-generated content: legal challenges in the new frontier. *Journal of Information law and technology*. Pp. 1- 21. https://bit.ly/38t2dwh. Accessed on 31st May 2019.

Gichora, F. G.; Kwanya T. 2015. The Impact of Web 2.0 in academic Libraries in Kenya. *International Journal of Library and Information Science* Vol.07 (2) Pp. 21-26.

Gonzalez, A. C.; Westbrock, T. 2010. Reaching Out with LibGuides: Establishing a Working Set of Best Practices. *Journal of Library Administration* Vol. 50 (5-6) Pp. 638-656.

Gregory G. M. 2009. Are we over library 2.0 yet*? Information today*. www.infotoday.com. Accessed 25 July 2016.

Halliday, A. 2007. *Doing and Writing Qualitative Research*. 2nd ed. SAGE Publishers: London.

Hardgrave, B. ; Davis, F; Riemenschneider; C. 2003. Investigating Determinants of Software Developers' Intentions to follow methodologies. *Journal of Management Information Systems* Vol. 20(1) Pp.123-151.

Harries T L; Naude, F. 2019. Library Evaluation Report. *Unisa School of Engineering for ECSA Programme Review*. Unpublished report. Unisa: Pretoria

Hayman, R; Smith E. E. 2015. Sustainable decision making for emerging educational technologies in libraries. *Reference services review*, Vol. 43 (1) Pp. 7-18.

Herring M. Y. 2014. *Are libraries obsolete? An argument for relevance in the digital age.* McFarland Publishers: North Carolina.

Hong W; Thong J. Y. L.; Wong W. M.; Tam K Y. 2002. Determinants of user acceptance of digital libraries: an empirical examination of individual differences and system characteristics. *Journal of Management information systems* Vol. 18(3) Pp.97-124.

Hristova, M. 2012. RefWorks usage patterns: Exploring the first four semester of use by faculty, graduate students and undergraduates. *Internet Services Quarterly* Vol. 17(2) Pp. 45-64.

Hughes, G. 2007. Using blended learning to increase learner support and improve retention. *Teaching in higher education*. Vol.12 (3) Pp. 349-363.

Islam, M.; Habiba U. 2012. Use of social media in marketing of library and information services in Bangladesh. *Journal of Library and Information Technology* Vol. 35(04) Pp. 299-303.

Jahamir S. F. and Cavadas J. 2018. Factors affecting late adoption of digital innovations. *Journal of Business Research* Vol. 88. 25 January. Pp. 337-343.

Kaplan, A. M.; Haenlein, M, 2010.Users of the world, Unite! The challenges and opportunities of social media. *Business Horizons.* Vol. 59 Pp. 544-559.

Kenefick, C; Werner, S. 2008. Moving towards Library 3.0: taking management basics into the future. *Journal of hospital librarianship.* Vol. 8(4) Pp. 464-468.

Kennedy, D; Shields A C. 2012. *Facebook in one hour for lawyers*. American Bar Association: Chicago.

Khan, A; Woosley, J M. 2011. Comparison of Contemporary Technology Acceptance Models and evaluation of the best fit for health industry organisations. *IJCSET* Vol 1(11) Pp.703-717.

Kietzmann, J H.; Hermkens, K; McCarthy, I P; Silvestre B S. 2011. Social media? Get serious! Understanding the functional building blocks of social media. *Facebook Developers*. Vol. 54 (03) Pp. 241-251.

Kilemba, L M. 2016. The role of academic libraries in supporting distance education in Kenya. PhD Theses. *University of KwaZulu Natal*: South Africa.

Kimbrell, J. 2013. *The Impacts of Web 2.0, Web 3.0 and Web 4.0 technologies used in Distance Education*. Master's Thesis. East Carolina University: USA.

Klobas, J. E. 1995. Beyond information quality: fitness for purpose and electronic resource use. *Journal of Information Science* Vol. 21 (2) Pp. 95-114.

Kothari, C. R; Garg, G. 2019. *Research Methodology; methods and techniques.* 4th ed. New Age International Publishers: London.

Kumar, R. 1996. *Research Methodology: a step-by-step guide for the beginners*. 2nd ed. SAGE Publishers: London.

Kumar, S; Tripathi, M. 2010. Use of Web 2.0 tools in academic libraries: a reconnaissance of the international landscape. *The International Information & Library review* Vol. 42(3) Pp. 195-207.

Kurilovas, E; Kubilinskiene S; Dagiene, V. 2014. Web 3.0- based personalisation of learning objects in virtual learning environments. *Computers in human behaviour*. Vol. 30. 19 August. https://doi.org/10.1016/j.chb.2013.07.039. Accessed October 2019. Pp.654-662.

Lee, Y. H.; Hsieh, Y C; Hsu; C. N. 2011. Adding Diffusion of Innovation Theory to the Theory of Acceptance Model: Supporting Employees intentions to use E-learning systems. *Journal of Educational Technology & Society* Vol 14 (4) Pp. 124- 137.

Lee, Y. H. 2007. Exploring key factors that affect consumers to adopt e-reading services. Unpublished Master Thesis, *Huafan University:* Taiwan.

Lee, Y; Kozar K A; Larsen K. R. T. 2003. The Technology Acceptance Model: Past, Present, and Future. *Communications of the Association for Information Systems* Vol. 12 (50) Pp. 752-780.

Leedy, D. P. and Ormrod, E. J. 2010. *Practical Research: planning and design*. 9th ed. PEARSON Publishers: New Jersey: USA.

Legris P; Ingham J; Collerette P. 2003. Why do people use information technology? A critical review of the technology acceptance model. *Information and Management* Vol. 40 (3) Pp. 191-200.

Leong, L W; Ibrahim O. 2015. Role of Information system (IS), social networking technology (SNT) and Web 2.0 for Improving Learning Outcomes: A Case of Malaysian Universities. *Procedia- Social and Behavioral Sciences*. Vol. 211 (November) https://doi.org/10.1016/j.sbspro.2015.11.017. Accessed November 2019. Pp.111-118.

Lewis-Beck, M S; Skalaban, A. 1990. The *R*-Squared: Some Straight Talk. *Political Analysis*. Vol. 2 (February) Pp. 153-171. https://doi.org/10.1093/pan/2.1.153. Accessed June 2019.

Lewis–Beck, M. S.; Bryman A. E; Liao, T.F. 2007. Systematic Review. *Encyclopaedia of Social Research Methods*. Sage: London.

Lietzau Z; Helgren J. 2011. *U.S. Public Libraries and the use of web technologies*, 2010: A closer look report. Denver, Colorado State Library: USA.

Lin, C. Y.; Chao, Y C; Tang T W. 2017. Why not be "smarter"? Examining the factors that influence the behavioural intentions of non-smartphone users. *Industrial Management & Data Systems* Vol. 117 (01) Pp. 32-49.

Loureiro, A; Messias, I; Barbas, M. 2012. Embracing web 2.0 and web 3.0 tools to support lifelong–Let learners connect. *Procedia-Social and behavioural sciences.* Vol. 46. https://doi.org/10.1016/j.sbspro.2012.05.155. Accessed September 2018. Pp. 532- 537.

Mabunda, P. L. 2010. Information and communication technologies for teaching and learning: Challenges and implications for ODL universities. *Progressio* Vol. 32(2) Pp. 222-244.

Mabweazara, R. M. Zinn, S. 2016. Assessing the appropriation of social media by academic librarians in South Africa and Zimbabwe. *South African Journal of Library and Information Science* Vol. 82(1) Pp. 1-12.

Macmillan, D. 2012. Mendeley: teaching scholarly communication and collaboration through social networking. *Library Management* Vol. 33 (8-9) Pp. 561-509.

Mannes, J M. 2006. Library 2.0 Theory: Web 2.0 and its implications for libraries. *Webology* Vol. 3(2). Pp. 1-13.

Marshall, C. Rossman, G. B. 2010. *Designing qualitative research*. SAGE Publishers: London.

May, N. 1997. *Social Research: issues, methods and process*. 2nd ed. Open University Press: Buckingham.

Marsalis, S. E., Kelly J A. 2004. Building a RefWorks Database of Faculty Publications as a Liaison and Collection Development Tool. *Issues in Science and Technology Librarianship*, Summer. http://www.istl.org/04-summer/article3.html: Accessed August 2019.

Mensah I. K. 2016. Perceived ease of use (PEOU) and perceived usefulness (PU) of e-government services in Ghana: the moderation role of computer self-efficacy. *European Journal of Research and Reflection in Management Sciences* Vol. 4 (05) Pp. 39-50.

Metz, C. 2007. Web 3.0: The Internet is changing again. *PC Magazine.* April 10. Pp. 74-79.

Millen, D; Feinberg J; Kerr, B. 2005. Social Bookmarking in the Enterprise: Can your organization benefit from social bookmarking tools? *ACM QUEUE* Vol 3(9) Pp. 29-35.

Miller, P. 2005. Web 2.0: Building the new library. *Ariadne: Web Magazine for Information Professionals*. Issue No. 45. 30th October. http://www.ariadne.ac.uk/issue45/miller. Accessed May 2019.

Miller, D. R. and Clarke K. S. 2004. *Putting XML to work in the library: tools for improving access and management.* American Library Association: Chicago.

Montello D. R. and Sutton C S. 2006. Sampling. *An introduction to scientific research methods in geography*. SAGE Publications, Inc.: Thousand oaks.

Morris, R. D. 2011. Web 3.0: Implications for Online learning. *TechTrends* Vol. 55 (1) Pp. 42-46.

Moore, M. G.; Kearsley, G. *1996*. *Distance Education: A systems view*. Wadsworth Publishing: Boston, MA.

Neumann. W. L. 2003. *Social Research Methods: Qualitative and Quantitative approaches.* Pearson: Boston.

Nguyen, C. L. 2008. A survey of the application of Web 2.0 in Australasian libraries. *Library Hi Tech* Vol.26 (04) Pp.630-653.

Nguyen, C. L. 2015. Establishing a Participatory Library model: a grounded theory study. *The Journal of Academic Librarianship* Vol.41 (4) Pp. 475-487.

Niyazoz Y; Vogel C; Price, R. Lund, B; Judd D; Akil, A; Mortinson M; Scwartzman, M, Shron, M. 2016. Open access meets discoverability: Citations posted to Academia.edu. *PLoS ONE* Vol 11 (2) Pp. 1-23.

Nwagwu, E. W.; Adekannbi J; Bello O. 2009. Factors influencing use of internet: A questionnaire survey of the students of University of Ibadan, Nigeria. *The Electronic Library* Vol. 28 (5) Pp. 718-734.

O'Brien, K. 2019. Researchgate. *Journal of Medical Library Association* Vol. 107 (2) Pp. 284-285.

Oded, N.; Chen, Y. 2008. Users' personality and perceived ease of use of digital libraries: the case for resistance to change. *Journal of American Society for Information Science and Technology* Vol. 59 (5) Pp.845-851.

Orr. G, 2003. Diffusion of Innovation theory by Everett Rogers. *A review*. https://teamlead.duke-nus.edu.sg/worktable. Accessed August 2018.

Oosthuzen, A.G; Loedolff, P.v.Z; Hamman. F. 2010. Students 'perception of the quality learner support in ODL. *Progressio* Vol. 32 (4) Pp. 185-205.

Ovadia, S. 2014. ResearchGate and Academia.edu: *Academic Social Networks. Behavioral & Social Sciences Librarian*. Vol. 33(3) Pp. 165-169.

Paroutis, S; Al Saleh A. 2009. Determinants of knowledge sharing using Web 2.0 technologies. *Journal of Knowledge Management* Vol.13 (4) Pp.52-63.

Partridge, H; Lee, J; Munro, C. 2010. Becoming Librarian 2.0: The Skills, Knowledge and Attributes required by Library and Information Science Professionals in a Web 2.0 world (and beyond). *Library Trends* Vol. 59 (1-2) Pp. 315-335.

Pattern M. L.; Newhart M. 2017.*Understanding research methods: an overview of the essentials.*10th ed. Routledge: New York.

Raaj E. M.; Schepers J.L. 2008. The acceptance and use of a virtual learning environment in China. *Computers & Education* Vol. 50 (03) Pp. 1-29.

Rafique, H; Anwer; F; Shamin; A; Minaei-Bidgoli; Qureshi, Muhammad Ahsan Qureshi; Shahaboddin; Shamshirband. 2018. Factors Affecting Acceptance of Mobile library applications: Structural Equation Model. *Libri* Vol. 68 (2) Pp. 99-112.

Ramavhona T.C; Mokwena S. 2016. Factors influencing internet banking adoption in South African rural areas. *South African journal of information management* Vol 18 (2) Pp. 01-8.

Republic of South Africa. *Protection of Personal Information Act No. 104*. 2013. Pp. 1-156.

Researchgate. 2019. About Researchgate. https://www.researchgate.net/about. Accessed July 2019.

Rogers, C. 2009. Social Media, Libraries, and Web 2.0: How American libraries are using new tools for public relations and to attract new users. *German Library Association Annual Conference, Erfurt. 2nd–5th June.* Pp. *1-7.*

Rogers, C; Valente T W. 1995. The origins and development of innovations paradigm as an example of scientific growth. *Science communication* Vol 16 (03) Pp. 252- 273.

Rogers, E. M. 2001. Evolution: *Diffusion of innovations. International Encyclopaedia of the Social & Behavioural Sciences*, edited by Neil, J S and Paul, B. Pergarmon press: Oxford Pp. 4982-4986.

Rodgers, E. P.; Barbrow, S. 2013. A look at Altmetrics and its growing significance to research libraries. *The University of Michigan Library*. https://bit.ly/32sYzPW. Accessed July 2019.

Sahai, A; Graupner, S. 2005. *Web Services in the enterprise: concepts, standards, solutions and Management*. Edited by Malek M. Springer: California.

Schensul, J. 2012. Methodology. *The Sage encyclopaedia of qualitative research methods*. Edited by Given L M. SAGE: Thousand Oaks.

Seena, S. T.; Sudhier Pillai K G. 2014. Impact of web 2.0 technology applications in Kerala University Library: Library professionals' perspective. *Journal of Library and information technology*, Vol.34 (5) Pp. 419-425.

Sherer, P; Shea, T. 2011. Using Online Video to Support Student Learning and Engagement. *College Teaching* Vol. 59 (2) Pp. 56-59.

Silva J. M.; Rahman, A M and El Saddik, A. 2008. Web 3.0: A Vision for bridging the gap between Real and Virtual. *Communicability MS '08: Proceedings of the 1st ACM international workshop on Communicability design and evaluation in cultural and ecological multimedia system.* https://doi.org/10.1145/1462039.1462042. Accessed July 2019. Pp. 9-15. Vancouver: Canada.

Spivack, N. 2007. Web 3.0: The third generation Web is coming. *Lifeboat Foundation Advisory Board*. http://www.radarmatworks.com: Accessed August 2018.

Social media Oracle .2007. *Blogging*. http://www.socialmediaoracle.com/blogging/what-is-a-blog/: Accessed December 2017.

Stoel, L. Lee, K H. 2013. Modelling the effect of experience on student acceptance of Web-based courseware. *Internet Research*. Vol 13 (05) Pp. 364-374.

Sun H; Chen K. 2010. Role Changing of Librarians in the new information technology era. *New Library World* Vol. 112 (7/8). Pp. 321-333.

Thelwall, M; Hausten, S; Laviere, V; Sugimoto, C R. 2013. Do Altmetrics work? Twitter and Ten other Social web Service. *PLoS One* Vol. 8 (5) Pp. 1-7.

Thelwall, M; Kousha, K. 2014. Academia.edu: Social network or Academic Network? *Journal of the Association for Information Science and Technology*, Vol. 65 (04) Pp. 721-731.

Tait, A. 2000. Planning student support for open distance learning. *Open Learning*. Vol.15 (3). Pp. 287- 299.

University of South Africa (Unpublished). 2008. *Open Distance Learning Policy*. Unisa: Pretoria.

University of South Africa (Unpublished). 2012. *Selecting a future business model for Unisa*. Unisa: Pretoria.

University of South Africa. (Unpublished) 2016. *The Unisa strategies plan 2016- 2030*. Unisa: Pretoria.

University of South Africa. 2018. *About the library*. Available at: https://www.unisa.ac.za/sites/corporate/default/Library/About-the-Library. Accessed April 2018. Unisa: Pretoria.

University of South Africa, 2019a. *Library personal librarians' services*. Available at: https://www.unisa.ac.za/sites/corporate/default/Library/Library-services/Research-support/Personal-librarians. Accessed April 2019. Unisa: Pretoria.

University of South Africa. 2019b. *Library Technology Support Libguide*. Available at: https://libguides.unisa.ac.za/techsupport. Accessed June 2019. Unisa: Pretoria.

Van Noorden, R. 2014. Google Scholar, pioneer on search engine. *Nature*. https://www.nature.com/articles/nature.2014.16269. Accessed November 2014.

Veletsianos, 2010. *Emerging technologies in Distance Education*. AU Press: Edmonton.

Venkatesh, V; Davis, F D. 2000. A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*. Vol.46 (2) Pp. 186-204.

Vogt, W. P. 2007. *Quantitative research methods for professionals*. Pearson: Boston.

Walliman, N. 2011. *Research Methods: The basics*. Routledge: London.

Wang, Y; Meister, D; Wang, Y. 2008. Relative Advantage and Perceived Usefulness: The Adoption of Competing ICTs. *Diffusion Interest Group in Information Technology 2008 Proceedings. 6.* Pp. 02-21.

Wei, W. 2012. The impact of product complexity on adoption of web based interactive innovation practices. *Innovation: Management, Policy and Practice.* Vol 14 (03) Pp. 431-445.

White K. 2006. Sampling. *The dictionary of health and society*. Sage Publications LTD City: London.

Woody, E. 2009. Building Library 3.0: *Issues in creating a culture of participation*. Woodhead publishing: Cambridge.

Wu, H. Y; Lin, C; Li C. L.; Lin H. 2010. A study of bank customers' Perceived Usefulness of adopting online banking. *Global journal of business research* Vol 4 (03) Pp. 101-109.

Xu, C. Ouyang, Chu, H. 2009. The Academic Library meets Web 2.0: applications and implications. *The Journal of Academic Librarianship* Vol. 35 (04) Pp. 324-331.

Yorke, M. 2010. Retention, persistence and success in on-campus higher education, and their enhancement in open distance learning. *Open Learning: The Journal of Open, Distance and e-Learning*. Vol. 19 (1) Pp. 19-32.

Zadeh, K. S.; Veisi A G; Zadeh E K. 2013. Web 2.0 and libraries. *International journal of advanced research* Vol.1 (3) Pp. 367-371.

Zaugg, H. Z.; West R E, Tateishi I, Randall D L. 2011. Mendeley: Creating communities of scholarly inquiry through research collaboration. *TechTrends* Vol. 55 (01) Pp.32-36.

Zhang, J. 2013. The analysis of library information services based on web 3.0. *Fifth International Conference on Intelligent Human-machine Systems and Cybernetics*. Vol. 2. Pp. 114-117.

Zhang, Y.; Deng, S.; Zhou, R. 2015. Understanding Mobile Library Apps Continuance Usage in China: A Theoretical Framework and Empirical study. *Libri* Vol. 65 (03) Pp. 161-173.

Zhang, Y. 2012. Comparison of select reference management tools. *Medical Reference Services Quarterly*. Vol. 31 (01) Pp. 45-60.

Zheng Ye (Lan) Yang. 2005. Distance Education Libraries in the U.S. ARL Libraries and Library Services provided to their Distance. *The Journal of Academic Librarianship.* Vol. 31(2) Pp. 92- 97.

Zinyeredzi, C; Zinn, S. 2016. Use of Web 2.0 technologies by library and information science students. *Mousaion* Vol. 34 (4) Pp. 19-42.

Appendices

Appendix A: Informed consent letter

Date: 15th February 2019

Title: The use of web technologies by librarians to support researchers and students at an Open Distance e-learning university.

Dear prospective participant

My name is Mphelekedzeni Aaron Tshikotshi
Student number: 31616682
You are invited to participate in a survey conducted under the supervision of **Prof. Williams E. Nwagwu**, in the Department of Information science at the University of South Africa (UNISA). The study is registered towards a Master of Information Science degree.
The survey you received is designed (with mostly structured questions) to determine whether web technology tools such as; *social media, social bookmarking tools, online communication or video conference tools, reference management/ bibliographic management tools*…etc., improve the services of the ODeL library like Unisa when supporting students and researchers. The study uses variables from Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) theories as constructs of the survey.
You were selected to participate in this survey because you are a librarian at UNISA library, where the study is conducted. By completing this survey, you agree that the information you provide may be used for research purposes, including dissemination through peer-reviewed publications and conference proceedings.
It is anticipated that the information we gain from this survey will help us determine the opportunities gained by utilising web technology tools at Unisa library, highlighting also the challenges that librarians experience when implementing these technology tools. You are, however, under no obligation to complete the survey and you can withdraw from the study prior to submitting the survey.
The survey is developed to be **anonymous**, meaning that we will have no way of connecting the information that you provide to you personally. Consequently, you will not be able to withdraw from the study once you have clicked the send button based on the anonymous nature

of the survey. If you choose to participate in this survey it will take up no more than 15 minutes of your time.

We do not foresee that you will experience any negative consequences by completing the survey. The researcher undertakes to keep any information provided herein confidential, not to let it out of our possession and to report on the findings from the perspective of the participating group and not from the perspective of an individual. We do not foresee that you will experience any negative consequences or personal harm by completing the survey. The researcher undertakes to keep any information provided herein confidential, not to let it out of our possession and to report on the findings from the perspective of the participating group and not from the perspective of an individual.

You will not be reimbursed or receive any incentives for your participation in the survey.

The researcher, **Mr. Mphelekedzeni Aaron Tshikotshi** obtained ethical clearance from the Unisa College of Human Sciences Research Ethics committee as well as Unisa library services department. A copy of the approval letter can be obtained from the researcher if you so wish.

The researcher may be contacted during office hours on (011) 471 3159 or at e-mail address tshikam@unisa.ac.za. If you come across serious transgressions of ethical conduct, report such to the University by dialling a Toll free Hotline 0800 86 96 93. Alternatively, you may contact the research ethics chairperson of the College of Human Sciences Prof L. Roets at 012 429 2226.

Thank you for taking time to read this information sheet and for participating in this study.

…….

Signature

Appendix B: Ethical Clearance Certificate

UNISA university of south africa

COLLEGE OF HUMAN SCIENCES RESEARCH ETHICS REVIEW COMMITTEE

12 February 2019

Dear M. A. Tshikotshi

NHREC Registration # : Rec-240816-052

CREC Reference # : 2019-CHS-0244

Student No : 31616682

Decision:
Ethics Approval from 12 February 2019 to 01 March 2022

Researcher(s): M. A. Tshikotshi

Supervisor(s): Dr. W.E Nwagu
Department of Information Science
012- 429- 607

The use of web technologies by librarians to support researchers and students at an Open Distance e-Learning university.

Qualifications Applied: Masters (Information Science)

College of Human Science ethics committee hereby acknowledge your application for Research Ethics Certificate; approval is granted for three years on condition that the researcher should submit annual progress report.

The **Chair of College of Human Sciences Research Ethics Committee reviewed the Medium risk application** on the 29 January 2019 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment. The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the Department of Psychology Ethics Review Committee.
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.
5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data require additional ethics clearance.
7. No field work activities may continue after the expiry date **(01 March 2022).** Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number **2019-CHS-0244** *should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Yours sincerely,

Signature :

Dr Suryakanthie Chetty
Deputy Chair : CREC
E-mail: chetts@unisa.ac.za
Tel: (012) 429-6267

Signature :

Professor A Phillips
Executive Dean : CHS
E-mail: Phillap@unisa.ac.za
Tel: (012) 429-6825

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

Appendix C: Permission to research using Unisa employees and students

UNISA university of south africa

RESEARCH PERMISSION SUB-COMMITTEE (RPSC) OF THE SENATE RESEARCH, INNOVATION, POSTGRADUATE DEGREES AND COMMERCIALISATION COMMITTEE (SRIPCC)

14 February 2019

Decision: Research Permission Approval from 14 February 2019 until 13 August 2019.

Ref #: 2019_RPSC_001
Mr. Aaron Tshikotshi
Student #: 31616682
Staff #: N/A

Principal Investigator:
Mr. Aaron Tshikotshi
Department of Information Science
School of Arts
College of Human Sciences
tshikam@unisa.ac.za; 079 1920 220

Supervisor: Dr. Williams Ezinwa Nwagu, willieezi@yahoo.com; +221765459602

The use of web technologies by librarians to support researchers and students at an Open Distance e-Learning university.

Your application regarding permission to conduct research involving UNISA employees, students and data in respect of the above study has been received and was considered by the Research Permission Subcommittee (RPSC) of the UNISA Senate, Research, Innovation, Postgraduate Degrees and Commercialisation Committee (SRIPCC) on 24 January 2019.

It is my pleasure to inform you that permission has been granted for the study. You may:

1. Send an online survey to Unisa librarians at Libraries in Muckleneuk, Science Campus, School of Business Leadership and 13 regional library centres, through the assistance of the Library Planning Research and Quality Assurance office.
2. Gain access to the following Unisa documents:

   - Communication Policy for the University of South Africa
   - Annexure A: Digital communication and web management policy (2018)

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

- Unisa Strategic Plan 2016-2030
- Unisa Social media guidelines
- ICT policy on broadband agreements
- Registration enrolment figures for Masters and Doctoral students for the past 5 years and the geographic locations of the students. (2014-2018).

You are requested to submit a report of the study to the Research Permission Subcommittee (RPSC@unisa.ac.za) within 3 months of completion of the study.

The personal information made available to the researcher(s)/gatekeeper(s) will only be used for the advancement of this research project as indicated and for the purpose as described in this permission letter. The researcher(s)/gatekeeper(s) must take all appropriate precautionary measures to protect the personal information given to him/her/them in good faith and it must not be passed on to third parties. The dissemination of research instruments through the use of electronic mail should strictly be through blind copying, so as to protect the participants' right of privacy. The researcher hereby indemnifies UNISA from any claim or action arising from or due to the researcher's breach of his/her information protection obligations.

Note:
*The reference number **2018_RPSC_001** should be clearly indicated on all forms of communication with the intended research participants and the Research Permission Subcommittee.*

We would like to wish you well in your research undertaking.

Kind regards,

pp. Dr Retha Visagie – Deputy Chairperson: RPSC
Email: visagrg@unisa.ac.za, Tel: (012) 429-2478

Prof Lessing Labuschagne – Chairperson: RPSC
Email: llabus@unisa.ac.za, Tel: (012) 429-6368

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

Appendix D: Data collection instrument (Questionnaire)

1. Indicate your gender below (*tick the appropriate box*):
- Male
- Female
2. Indicate your age from the range below:
- Less than 20 years old
- 20-29
- 30-39
- 40-49
- 50+
3. Number of years employed at Unisa library:
- 0-5 years
- 5-10 years
- 10- 15 years
- 15-20 years
- 20+
4. Select ONE statement that best describes you:

- I usually want to be the first to try new web technology tools
- I always influence my colleagues to use web technology tools
- I usually require some training by someone before using new web technology tools
- I usually need to see some evidence that web technology tools work before I use them
- I only use web technology tools when I see majority of my colleagues use them
- I think the traditional way of working (without web technology tools) is still the best

5. Indicate the web technology tools you have adopted into your work as librarian for the past five (5) years (*Please select all that apply*).

- Podcasts
- Join.me
- Researchgate.
- Facebook
- Reference management tools, e.g. Mendeley; RefWorks
- WebEx
- Scopia
- Skype
- LibraryThing
- Twitter
- ORCID
- Diigo
- Academia.edu
- RSS feeds
- Others, please specify……

6. Have you ever experienced any challenges when implementing or using web technology tools in the workplace?

- Yes
- No

If yes, please select all that may have applied in your workplace.

- Cost to implement
- Need for technical support
- Training requirements
- Keeping up with new versions
- Privacy issues
- Security issues
- Clients' technology limitations
- Added stress for me
- Network issues
- Complex to use
- Others; please specify….....

7. Generally, what influences you to adopt new web technology tools? (*Please select all that apply*).

    - Clients' expectations
    - Ease of training of remote library clients when one adopts web technology tools
- It enhances the credibility of the library profession
- Enhancement of communication with library clients
- It enhances my librarianship career
- ODeL strategic objectives
- Other: Please specify…….

8. Who usually influences your adoption of web technology tools? (*Please select all that apply*).

- My boss
- Library clients
- Library colleagues
- ICT colleagues
- Personal interest
- Library management team
- Other: Please specify……

9. To what extent do you agree or disagree with the following statements?

Variables	**Question**	**Strongly Agree** 5	**Agree** 4	**Neutral** 3	**Disagree** 2	**Strongly Disagree** 1
Perceptions about policy support	The policies of the university strongly support the implementation of new web tools in the library					
Perceived Usefulness (PU)	Applying web technology tools in my job would enable me to accomplish tasks more quickly					
Perceived Usefulness (PU)	Applying web technology tools would improve my job performance					
Perceived Ease of Use (PEOU)	Interacting with library clients using web technology tools is always easy					
Perceived Ease of Use (PEOU)	Learning to use web technology tools to assist clients in my library will be easy for me					
Perceived Ease of Use (PEOU)	Using web technology tools to offer library remote trainings make a librarian's job easier					
Relative Advantage	The web technology tools I use to assist Unisa clients, give me a relative					

	advantage over my peers who do not want to use them.					
Relative Advantage (RA)	Adopting web technology tools in Unisa library may improve the quality of my work					
Compatibility	Using web technology tools is compatible with all aspects of my work					
Compatibility	Web technology tools I use are consistent with my existing values and needs					
Complexity	Web technology innovations are complex to use					
Complexity	Using web technology tools for library clients is often frustrating					
Complexity	Using web technology tools to support library clients need a lot of mental effort					
Trialabilty	I need more time to experiment with web tools before their implementation in Unisa library					
Trialability	There are enough people in my organisation to help me try the various uses of web tools					

Observability	There are visible results of web technology adoption at Unisa campuses.					
Observability	I have seen what other librarians can achieve by using web technology tools in their libraries					
Observability	The benefits of using web technology tools are visible to remote library clients					
Observability	Using web technology tools has enhanced my status at Unisa library.					
Communication	I use communication tools (*such as Skype, Scopia, Live broadcasts…etc.*) to train remote library clients					
Communication	I use interpersonal communication tools (*E-mail, Skype, Twitter, Facebook…etc.*) to communicate with remote Unisa library clients					

10. Are you familiar with the policies guiding the web tools usage at Unisa?

- Extremely Familiar
- Familiar
- Somewhat familiar
- Not at all familiar
- Not sure

11. Any other comment about your experience of web technology tools.

……
……
……
……
……
……
……

Appendix E: General comments from respondents about their web tools experience

Any other comment about your experience of web technology tools				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
	42	61.8	61.8	61.8
1. Ethical, legal and online security issues are very important and should be investigated and handled up front before new web technology tools are adopted and factored into any training offered to staff and students, and into interaction with staff and students. Even knowledgeable users are vulnerable when online. 2. Accessibility issues for users living with disabilities should also be taken into account when selecting web technologies. 3. A full, permanent Team of ICT staff would help, including more people who specialise in educational technologies and the needs of clients living with disabilities. 4. It would be wonderful if Unisa had a web technology laboratory where products could be designed to meet our own ODeL needs. 5. Compatibility of new technologies with existing systems and infrastructure. 6. Liaison with the database vendors to consider the librarian as intermediary in the design of their databases - they should be friendly to both the self-help end user and the intermediary. All web technology tools would benefit from the input of librarians at the design phase. EBSCOhost has one of the most friendly and effective retrieval interfaces and it is because they have professional librarians working on the development team. 7. Disaster plan/ business continuity plan. 8. Real time communication with clients when we experience and then resolve IT problems so that they are kept in the picture. 9. To keep in mind that perpetual change is fatiguing (even boring) and to investigate ways to support staff to enjoy the ride, and to truly take their advice and input on board. Front line staff are a fount of knowledge when it comes to evaluating the problems of a technology in practice.	1	1.5	1.5	63.2
41R is approaching Unisa supposed to be OdEl Remote learners and even in towns- poor internet connection; poor access to internet, cost of software and hardware (can make use of telecenters); librarians and clients not all techno- savvy; Cost of data; Librarians need training and state of the art PC's and time and a place (studio) to experiment and create e.g. podcasts or screen casts ; Library must budget for training and tools; Technology (ICT)	1	1.5	1.5	64.7

support ; Not all students are using myUNISA and mylife e-mail- must be motivated to use it , they not aware of its importance for communication				
Even though web technology tools are assistive for the work it is difficult to use more often to our end users in our branch as most of them said have a problem of connectivity.	1	1.5	1.5	66.2
I battle to get quick support from both library ict and Unisa ict	1	1.5	1.5	67.6
I prefer Web Technology tools to assist me to achieve my work objectives however, it becomes so frustrating due to the network problems.	1	1.5	1.5	69.1
ict to be more robust with support and implementation of technology in regions	1	1.5	1.5	70.6
It takes too long to implement web technologies at Unisa and we constantly try and play catch-up. The approval and procurement processes hinder the adoption of web technology and by the time we implement, there is already something new and more exciting than the technology we just acquired.	1	1.5	1.5	72.1
It's the frustration with the ICT	1	1.5	1.5	73.5
More training needed. Library ICT must make us aware of newer technologies. It always feels like we must know everything without receiving any assistance.	1	1.5	1.5	75.0
Need user friendly sophisticated ICT.	1	1.5	1.5	76.5
No comment	1	1.5	1.5	77.9
none	1	1.5	1.5	79.4
NONE	1	1.5	1.5	80.9
ODeL. the e always fall off with restrictions, network challenges, unable to load apps	1	1.5	1.5	82.4
Our ICT department must be able to support us. Our ICT department is not on par. Certain web technologies have been investigated but there was no support from ICT in using them. I believe library management also need to come up with suggestions since they usually visit other libraries including libraries overseas. Professional staff should also investigate latest technologies.	1	1.5	1.5	83.8
Sometimes users or client battle with access as a result it defeats the purpose of implementing such tools	1	1.5	1.5	85.3

The main challenge we face is the lack of ICT support and infrastructure, as well as the time factor.	1	1.5	1.5	86.8
The uptake has been slow due to ICT policies. However, there are benefits to using web technologies.	1	1.5	1.5	88.2
The usage of web technology definitely enhances my knowledge and helps me be a more focussed and relevant academic librarian. I can conduct my work as a professional and embrace the new emerging technologies to enhance the research workflow of the researchers.	1	1.5	1.5	89.7
There is a need to have a dedicated place within the library for library staff to learn/experiment with new tools. Library staff training is need on other systems/tools used in other sections of the library	1	1.5	1.5	91.2
They also helped me with my schoolwork. Whenever I do research, I do communicate with other professionals to help me.	1	1.5	1.5	92.6
This is quite interesting to learn about Web Tools especially for the ODeL institution Like Unisa Library.	1	1.5	1.5	94.1
Very good tools to use and need to explore more of them for the benefit of our clients, especially the remote clients	1	1.5	1.5	95.6
Web technology tools are always advancing and requires one to always be up to date and be willing to learn and unlearn	1	1.5	1.5	97.1
Web tools are useful but need a lot of practice to test them.	1	1.5	1.5	98.5
wonderful experience to support student wherever they are, that support ODeL	1	1.5	1.5	100.0
Total	**68**	**100.0**	**100.0**	

Appendix F: Editing certificate

UNISA university of south africa

Research and Subject Libraries Division
Unisa Library
Po Box 392
0003 Pretoria
15 January 2020

CERTIFICATE OF LANGUAGE EDITING

To whom it may concern,

This letter serves to confirm that I have done the language editing of the dissertation submitted by Mr. Mphelekedzeni Aaron Tshikotshi for his Master of Arts in Information Science at the University of South Africa. The title of his dissertation is "The Use of Web Technologies by Librarians to Support Researchers and Students at an Open Distance e-Learning University".

Please feel free to contact me if you have any queries in this regard.

Yours sincerely

Leanne Brown (Miss)

Contact details:
Tel: (012) 4293216
Cell: 072 994 1244
E-mail: brownlt@unisa.ac.za

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392, UNISA 0003, South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za